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Highlights

Repayment of Agricultural Credit

Rural Root & Tuber Crops Farmers

Discovering Thoughts, Inventing Future

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Contents of the Issue

i. Copyright Notice
ii. Editorial Board Members
iii. Chief Author and Dean
iv. Contents of the Issue

1. The Determinants of Money Demand Function in ASEAN-5 Countries. *1-8*
2. The Relationship between the Stock Market and Foreign Direct Investment (FDI) in Sri Lanka-Evidence from VAR and Co-Integration Analysis. *9-15*
3. Econometric Analysis of Accessibility and Repayment Ability of Agricultural Credit among Rural Root and Tuber Crops Farmers in Oyo State Nigeria *17-29*
4. Camel Milk Marketing Channel Choices for Enhancing Competitiveness in Easter Ethiopia: Multinomial Logit Approach. *31-39*
5. Aggregate Consumption Expenditure and Economic Growth: Evidence from Bangladesh. *41-50*

v. Fellows
vi. Auxiliary Memberships
vii. Preferred Author Guidelines
viii. Index

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The Determinants of Money Demand Function in ASEAN-5 Countries

By Hussaini Umaru & Muhammad-Bashir Owolabi Yusuf
Waziri Umaru Federal Polytechnic

Abstract- This paper aims to investigate the determinant of money demand function for ASEAN-5 countries over the period from 1987-2014. Macroeconomic data of these countries from World Bank Data Stream were obtained for the period between 1987 until 2014 was collected and analyzed using panel data regression analysis. Money demand function model is designed and tested using Stata 13. The results obtained showed that all the independent variables except stock price are determinants of money demand function in ASEAN-5 excluding time-invariant variables. This current study provides empirical results regarding the relationships between money demand function and its determinants in ASEAN 5 countries from 1987-2014. The finding of this study provides useful insights for policymakers; it could be used by the central bank of ASEAN 5 Countries as a guide for effective monetary policy. Even though the findings are fairly significant with a stable money demand in the five ASEAN 5 countries, they have some limitations. Other scholars should look at the other methods of analysis in determining the money demand functions in the region.

Keywords: *money demand, GDP per capita, exchange rate, interest rate, inflation.*

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The Determinants of Money Demand Function in ASEAN-5 Countries

Hussaini Umaru [α] & Muhammad-Bashir Owolabi Yusuf [σ]

Abstract- This paper aims to investigate the determinant of money demand function for ASEAN-5 countries over the period from 1987-2014. Macroeconomic data of these countries from World Bank Data Stream were obtained for the period between 1987 until 2014 was collected and analyzed using panel data regression analysis. Money demand function model is designed and tested using Stata 13. The results obtained showed that all the independent variables except stock price are determinants of money demand function in ASEAN-5 excluding time-invariant variables. This current study provides empirical results regarding the relationships between money demand function and its determinants in ASEAN 5 countries from 1987-2014. The finding of this study provides useful insights for policymakers; it could be used by the central bank of ASEAN 5 Countries as a guide for effective monetary policy. Even though the findings are fairly significant with a stable money demand in the five ASEAN 5 countries, they have some limitations. Other scholars should look at the other methods of analysis in determining the money demand functions in the region.

Keywords: money demand, GDP per capita, exchange rate, interest rate, inflation.

I. Introduction

After the 2009 Global Financial Crisis, the five ASEAN countries, including Malaysia, Indonesia, the Philippines, Thailand, and Singapore experienced unstable economic growth, which includes reducing in export demand, where the export is a major growth of the countries (Musibah, 2014). These bring about unemployment crisis and economic recession in the countries. These tight economic situations directly affect the quantity of Money holding in the economic system, which brings unstable money demand in the countries. The policy makers are faced with a challenge from global financial turmoil, which brings about the need to understand the role of macroeconomic policy response and behavior of money demand to conduct effective monetary policy (Musibah, 2014).

The essential component in formulating monetary policy is demand for money. It makes possible for monetary authorities to influence the expected changes in macroeconomic variables such as income and interest rate by correct changes in monetary policies (Iftekhar, Mamoon, & Hassan, 2016). According to Jhingan (2004), demand for money arises from two functions of money. That is it is a store of value and the second is that money act as a medium of exchange. Thus businesses and individuals wish to hold money partly both in cash and in the form of assets.

There are so many literatures on money demand, for instance, Abdullah, Ali, & Matahir, (2010) Re-examining the demand for money in ASEAN-5 countries; Arize and Nam (2012) The Demand for Money in Asia: Some Further Evidence; Asif and Rashid (2014) Estimation of money demand function through partial adjustment model; Azim, Ahmed, Ullah, and Zakaria (2010) Demand for money in Pakistan: an Ardle approach; Dogru and Recepoglu (2013); Gu (2007) Empirical analysis of money demand in China: A cointegration approach; Hussain and Wijeweera (2013) Estimation of the money demand function in a heterogeneous panel for selected Asian countries; Jiranyakul and Opiela, (2014a) Instability of money demand: recent evidence for Thailand, 2014b An empirical test of money demand in Thailand from 1993-2012; Sarwar, Sarwar, and Waqas (2013) Stability of money demand function in Pakistan; Sarwar, Hussain, and Sarwar (2010) Money Demand Function for Pakistan (Divisia Approach); Tang (2002) "Demand for money under low interest rates in Japan"; and Valadkhani (2008) "Long-and short-run determinants of the money demand in the Asian-pacific countries: An empirical panel investigation".

The above literature, show there are quite a few empirical studies on money demand function in ASEAN countries. Most papers seem to ignore the factors of money demand function, especially the money demand behavior in the ASEAN countries. Therefore, this paper aims to provide information on the relationship between money demand and its determinant in major five developing countries in ASEAN (ASEAN-5). This paper is one of the few empirical studies that concerned both long-run and the short-run equilibrium of demand for money in developing countries. The ASEAN 5 is chosen as the area of study due to its relatively similar economic, cultural, and geographical background. The region has experienced rapid growth of the economy last decade. The region has been the attractive center of investors with its abundant resources and large market. These will lead to cross-border transactions which will give an indirect effect towards the money demand of ASEAN 5 countries. Hence, there is a need for stable money demand function in the region. The findings of this study could be used by the monetary authorities of

Author α: Department of Banking and Finance, Waziri Umaru Federal Polytechnic, Birnin Kebbi, Nigeria. e-mail: umaruk002@gmail.com
Author σ: Department of Economics, Al Hikmah University, Ilorin, Nigeria.

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the central bank of ASEAN 5 Countries as a guide for effective monetary policy.

II. Literature Review

According to Hassan, Ali, and Dawood (2016), Money demand function is being affected by various macroeconomic factors. These factors are inflation, fiscal deficit, interest rate, exchange rate, real income, energy crises, external and internal debt, oil shocks, tax revenue, etc. The relationship between variables mentioned above and money demand has ever been of vital importance to the researchers. The stability of money demand is what will make the monetary authorities to adequately estimate the effect of monetary policy on economic activities, to enable them to carry out policy actions with greater confidence and efficiency.

It is essential to track the interest rates and the money stock to assess exactly how monetary policy influences the economy (Valadkhani & Alauddin, 2003). Tang (2007) reveal that real M2 aggregate, exchange rate, real expenditure components, and inflation rate are cointegrated for Singapore, Malaysia, and the Philippines. The statistical significance of real income mechanisms suggests the biases of using an (M2 aggregate) single real income variable in money demand specification of both long and short-run.

A stable money demand allows for better expectations of the effect of monetary policy on inflation, output, and interest rates and therefore reduces the possibility of an inflation bias (Cziráky & Gillman, 2006). Also, the determinant of money demand function has significant implications for the selection of appropriate monetary policy instruments (Musibah, 2014). The money demand function is an essential way of meeting the liquidity needs of economic agent. Therefore, understanding the determinants of money demand function is a key for successful conducting monetary policy in any nation (Rutayisire, 2010). Because of the significance of money demand, it has attracted attention from researchers.

The issue of money demand function, particularly the relationship between money demand function and its determinants, has drawn concerns in monetary economics research. Over the past decade, many researchers attempt to examine the relationship between the money demand function and its determinants in developing, emerging, and developed Countries. Inan Asean country, most papers focus on the effect of financial liberation on the stability of money demand function. For example, James (2005) in Abdullah et al. (2012) attempt to offer the new approach to analyze the effect of financial liberalization on the money demand in Indonesian. His findings revealed that there is the existence of along-run relationship between broad money and its determinant when the proxy of liberalization is included.

In developing and emerging economies the function of money demand function in four countries of Africa was investigated, including Cameroon, Kenya, Ivory Coast and Nigeria. The findings supported the co-integrational relationship existed in the case of Nigeria (Fielding, 1994). The results further reported the evidence of the existence of long-term relation among M2, real income, and inflation (Abdullah et al., 2012). Jiranyakul and Opiela (2014) their study examines the short and long-run stability of demand for money in Thailand using monetary aggregates M1, M2, and M3, using Johansen cointegration test and revealed that only a change in real GDP affects money holdings (M1) in the short run. The short-run uncertainty of M1 money demand makes it hard for the monetary authorities to use M1 as an intermediate target to control short-run and long-run inflation. A relationship exists between M1 money demand and real GDP (a proxy for real income) and interest rate in the long-run. Also, it was revealed in the long-run both real GDP, and an interest rate determines money demand.

There are mixed results on the relationship between the determinants and money demand. These are due to the difference in estimation techniques; researchers could not come to the same conclusion. The other reason for different results is different data time spans. Therefore, this research aims to find the determinants of money demand function in ASEAN-5. These research applied the econometric model in investigating the determinate of money demand function in the ASEAN-5 including Indonesia, Malaysia, Philippine, Thailand, and Singapore, by using broad money (M2) as a proxy for money aggregate between 1987-2014.

Theoretically, there are three motives for holding money or money demand. Firstly, transaction demand for money, which had a positive relationship with income and inverse relationship to interest rates. Secondly, precautionary demand for money, which is also positively related to income. Lastly, speculation demand for money, which had a negative relationship with interest rates. However, many previous studies and real-world experience usually include the cost of credit in money demand estimation.

The conventional theories of demand for money assume that the determinant of money demand on the closed economy is by opportunity cost, income and country's overall interest rate (M. Abdullah et al., 2012).Currently, the efforts have been carried out by the researchers to find other determinants of money demand (Foresti & Napolitano, 2013). Wealth may have a different impact on money demand. According to Foresti and Napolitano (2013),a positive wealth effect can occur in three situations. Firstly, a rise in the assets prices could imply an increase in the volume of their transactions, which will lead to a rise in money demand to facilitate the transactions. Secondly, an increase in

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asset prices leads to rising or additional wealth, which may be stored in money. And thirdly, the rise in assets prices reflects an increase in the anticipated return from risky assets on risk-free ones.

Several studies indicated the positive impact of income on money, for instance: Arize and Nam (2012); Bhatta (2012); Sarwar, Sarwar, and Waqas (2013). Some other studies like Arize and Nam (2012); Tang (2007) reported a negative relationship between interest rate and money demand function whereas; interest rate has a positive relationship on money demand as suggested by Abdulkheir (2013); Abdullah, Ali, and Matahir (2010). Also, Azim, Ahmed, Ullah, and Zakaria, (2010) Reported that there is a unique cointegrated long-run relationship among exchange rate, inflation, income, and M2 monetary. The inflation coefficients and income elasticity are positive while it is negative in exchange rate elasticity.

Furthermore, Azim et al. (2010) reported inflation and income are positively related to money demand while exchange rate affects money demand negatively. The negative relationship of money demand ad exchange rate supports the theoretical expectation that depreciating of domestic currency will lead to a decline in demand for domestic currency. Kumar, Chowdhury, and Rao (2013) reported that the decrease in income elasticity of demand for money, increase interest rate changes.

Subsequently, exchange rate is also considered to be among the important factors of money demand function and according to Arize and Nam (2012) exchange rate has a positive relationship with money demand function while Dharmadasa and Nakanishi (2013); and Okonkwo, Ajudua, and Alozie, (2014) recorded negative effect on money demand function. Moreover, there is a positive relationship between fiscal deficit and money demand. Khrawish, Khasawneh, and Khrisat (2012); and Vamvoukas, (1998) reported a negative effect of fiscal deficit on money demand function. Similary, Samimi, Kenari, Ghajari, and Rate (2013) reported the exchange rate elasticity and money demand coefficient are negatively related. These indicate that depreciation of local currency reduces the demand for money.

Furthermore, Bathalomew and Kargbo (2009) reported the existence of a cointegrating relationship between real M2 and its determinants. In the long run, there is a negative and statistically significant effect on the demand for real M2 on the coefficient of the exchange rate, providing evidence of the currency substitution phenomenon. While in the short run dynamics also reported the presence of substitution of currency but there is no significant on the coefficient of the exchange rate, which is attributed to the mix of both wealth effects and currency substitution. The results also find the statistically significant negative coefficient of the foreign interest rate, which support the argument of the capital mobility effect. The Valadkhani and Alauddin (2003) explored some determining factors of money demand for eight developing countries like Malaysia, Thailand, Papua New Guinea, Bangladesh, Chile, Sri Lanka, Sierra Leone, and the Philippines. The annual time series data were employed for the period ranges from 1979- to 1999. The findings showed the positive link between income and money demand, while a negative relationship was observed between inflation, interest rate, US long-term interest rate and money demand

III. Methodology

Data are taken from World Bank Data Stream for five ASEAN countries for Indonesia, Malaysia, Philippines, Singapore, and Thailand. The data collected; GDP per capita, interest rate, exchange rate, inflation rate and stock price index as independent variables. While money demand stands as the dependent variable, the time frame of the data starts from 2000 to 2015. This study is interested in finding the relationship that exists between money demand and its determinant.

This study applied a different type of panel data models such as Pooled OLS model, Fixed Effect Model (FEM), and Random Effect Model (REM are used to analyze the data. All intercept and coefficient are assumed to be fixed in the constant coefficient model, so time element and space are overlooked.

a) Pooled Ordinary Least Square

The basic model to be used in this research is as follow:

$$M = \beta_0 + \beta_1 GDP + \beta_2 IR + \beta_3 ER + \beta_4 INF + \beta_5 SPI \ldots + u_t$$

Where,

M2	=	Money Demand (Million),
GDP	=	GDP per Capita,
IR	=	Interest Rate,
ER	=	Exchange Rate
INF	=	Inflation Rate,
SPI	=	Stock Price, and
U	=	Error Term

Pooled OLS model does not consider the panel structure of the data and estimate the model. It is used to test whether panel data or Pooled OLS can estimate the data set. (Larisa, 2012).

$$Y = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + \varepsilon_{it}$$

While

$$\varepsilon_{it} = \lambda_i + u_{it}$$

$$u_{it} \sim N(0, \sigma_u^2)$$

The u_{it} is called the time-varying error or idiosyncratic error. Its use is to explain changes over time and among the units in panel data. On the other hand, is unobserved heterogeneity.

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b) Random Effects Model

In the random-effects analysis, the assumption is that the true effect size is different from one study to the others and that the studies in our analysis represent a random sample of effect sizes that could have been observed. The summary effect will be our estimate of the mean of these effects. Random effect assumes λ_i drawn from some probability distribution. The random effect has the following form:

$$Y = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + \lambda_i + u_{it}$$

In random effect model, λ will be treated as a part of the error term. Error term would not be well-behaved error term. Hence, this study will overcome this problem with General Least Square (GLS):

$$\widehat{\beta_{re}} = (X'\widehat{\Omega}^{-1}X)^{-1}X'\widehat{\Omega}^{-1}y$$

GLS is a weighted average of between and within effect.

c) Fixed Effects Model

The fixed effect also is known as the unobserved effect. In the fixed-effect analysis, all studies are assumed to have the same true size effect. The summary effect will be our estimate of this common effect size. As it relies on the variation that occurs within individuals rather than between individuals, it is called the "within" estimator. The assumption in fixed effect model assumes λ_i constant. Hence the equation as follow:

$$Y = (\beta_0 + \lambda_i) + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + u_{it}$$

d) Hausman Test

Hausman test has been used in these projects. To decide between the fixed effect or random effect model, this study ran the Hausman test. It is a general test that assesses the uniformity of an estimator when compared to an alternative. It helps one identify if a statistical model correlates to the data. The Hausman specification test model would be as follow:

$$H = (\hat{\beta}_{re} - \hat{\beta}_{fe})'(Var(\hat{\beta}_{fe}) - Var(\hat{\beta}_{re}))^{-1}(\hat{\beta}_{re} - \hat{\beta}_{fe})$$

If the null hypothesis shows that $\hat{\beta}_{re}$ is inconsistent and we should apply FEM in the study.

IV. Analysis Data

This part will include results and explanation of fixed effect and random effect. Some specification test conducted by using some test like Hausman test, Breusch and Pagan Lagrangian multiplier test and F-test. The test aims to find the best model for this study.

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
M2	140	11.2091	1.1722	7.8098	13.0439
Gdppc	140	8.1201	1.2546	6.0916	10.9382
Sp	140	7.0180	0.8073	4.4031	8.8763
Inf	140	4.9966	5.7753	-0.8457	58.3871
Ir	140	9.9577	6.5728	0.0380	32.1542
Er	140	1327.4020	3106.4120	1.2497	11865.2100

Note: M2=money demand for country, Gdppc= GDP per capita, SP= Stock Price, Inf= Inflation, IR= Interest rate, and Er= Exchange rate.

Table 1 above presents a summary of the descriptive statistics which shows the total observation (Obs), mean, standard deviation, minimum, and maximum values for each variable used in this study. The results show that Money demand (M2) has an average of 11.21 with a standard deviation of 11.72%. The mean value for Gross domestic product per capita (Gdppc) is 8.1201, which means Gdppc is highly related to money demand, with a standard deviation of 12.55%, with minimum and the maximum value of 6.0916 and 10.9382 respectively. And the mean value indicates that on average,

Table 2: Correlation

Variables	M2	Gdppc	Sp	Inf	Ir	Er
M2	1.0000					
Gdppc	0.6387*	1.0000				
Sp	0.4653*	0.4521*	1.0000			
Inf	-0.3405*	-0.4750*	-0.1762*	1.0000		
Ir	-0.6664*	-0.8607*	-0.4504*	0.6887*	1.0000	
Er	0.0332	-0.2846*	0.0396	0.4354*	0.4537*	1.0000

** Significant at 0.01 level, ** Significant at 0.05 level*

Note: M2=money demand for country, Gdppc= GDP per capita, SP= stock price, Inf= Inflation, IR= Interest rate, and Er= Exchange rate.

From the table above it shows all the variables are correlated with money demand at 1% levels except exchange rate that does not provide any correlation with the money demand.

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Table 3: OLS, FE, RE, and VIF

Variables	Pooled OLS		FE		RE		VIF
M2	Coef.	P>|t|	Coef.	P>|t|	Coef.	P>|t|	
Cons	11.51031	0.0000	1.743426	0.0340	11.51031	0.0000	
Gdppc	0.026069	0.7740	1.416636	0.0000*	0.026069	0.8840	7.47
Sp	0.101362	0.2430	-0.23238	0.1060	0.101362	0.6020	4.45
Inf	0.022836	0.0800***	0.025315	0.0220**	0.022836	0.1810	2.20
Ir	-0.153507	0.0000*	-0.07744	0.0520***	-0.15351	0.0000*	1.46
Er	0.000143	0.0000*	0.000179	0.0030*	0.000143	0.0000*	1.42
R-sqr	0.5982		0.8941		0.7366		
White test		Chi^2=38.77		P= 0.0071			
Hausman	Chi^2= 142.22			P= 0.0000			

**Significant at 0.01 level **Significant at 0.05 level ***Significant at 0.10 level*

Note: M2=money demand for country, Gdppc= GDP per capita, SP= stock price, Inf= Inflation, IR= Interest rate, and Er= Exchange rate. All models are based on robust standard.

The normality test shows VIF of less than 10 proving that multicollinearity is not an issue for the study. Also, the white test has shown that Heteroskedasticity exists for the study. However, all the result is based on a robust standard to eliminate Heteroskedasticity. Although, the result supported the fixed effect (FE) by having a p-value of less than 0.05 on Hausman test. The study also reports both Pooled OLS and RE to look at the relationship in the model.

a) Regression Results

Table 3 above shows the OLS result coefficient for Gdpppc is 0.026069 with an insignificant relationship with the M2. The coefficient of FE effect for Gdppc is -0.23238 with a significant negative relationship at 1% level with M2. The RE model for the Gdppc provides 0.026069 but do not provide any significant relationship with M2. Among the models, only FE presented a significant relationship between Gdppc with the M2.

The variable SP presents a coefficient of 0.101362 that has an insignificant relationship with M2 under OLS. However, the FE model provides a negative coefficient of -0.2561159 at a significant level 10% relationship with M2. The RE model presents a coefficient of 0.101362 that has an insignificant relationship with M2. Among the models, only FE has provided a significant relationship between SP and M2.

OLS coefficient figure for Inflation is 0.022836 with a significant relationship with the M2. The coefficient of FE effect for Inflation is 0.025315 with a significant positive relationship at 5% level with M2. The RE model for the Inflation provides 0.022836 with insignificant relationship to M2. Among the three models, only FE presented a significant relationship between Inflation with the M2.

The Interest rate variable presents all the models reported significant negative relationship, a coefficient of -0.153507 at a significant level of 1% with M2 under OLS. The FE model provides coefficient -0.07744 at a significant relationship at 10% level with M2. The RE model presents a negative coefficient of -0.15351at a significant level of 5% relationship with M2.

The variable Exchange rate presents a minimal significant relationship in all the models with a coefficient of 0.000143 that has a positive relationship with M2 under OLS. Also, the FE model provides a coefficient 0.000179 showing a minor relationship with M2. The RE model presents a coefficient of 0.000143 that has a minimal significant relationship with M2.

According to Hausman test fixed effect model is the most suitable model for this study. The Fixed Effect (FE) R2 within is 0.8941. These show that the model explains 89.41% of changes in money demand. The model has all the variables significant, except stock price (SP). GDP per capita is statistically significant at 1% level and positive relationship with money demand. The Inflation has a positive relationship and statistically significant at 5% level with money demand. While interest rate results show significant at 10% level and negative correlation with money demand, and exchange rate revealed significant results with the minor positive relationship at 1% level with money demand.

V. Conclusion

This study has three alternative models (i.e., OLS, FE, and RE) to estimate money demand, M2 in 5 ASEAN countries. The Hausman test results support FE against Pooled OLS and RE. And therefore report FE to be more suitable for this study. See table 3 for details.

a) The implication of the study to ASEA 5

The findings show all the variables are significant, GDP per capita is statistically significant and has a positive relationship with money demand, this relationship indicates that the demand for money rise as a result of perceived increase in GDP per capita which is consistent with (Azim et al., 2010; Samimi et al., 2013).The stock price is reported to have a negative relationship and statistically significant at 10% level with M2, indicating a decrease in stock price will lead to increase in demand for money. Inflation is statistically significant and has a positive relationship with money demand is also supported the findings of (Azim et al., 2010), the implication of this findings is demand for

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money positively response to inflation that increases in prices of good will bring about the increase in money demand of ASEAN 5 countries.

Also, the interest rate is statistically significant and has a negative relationship with money demand, showing an increase in interest rate will reduce money demand in ASEAN 5 countries this supports the finding of Kumar et al. (2013). Lastly, exchange rate is also statistically significant but with a very small effect on money demand, this because In a flexible exchange rate regime, the demand for money would not depend on the exchange rate otherwise the monetary policy effects on employment and income may be compromised, this also supports the findings of Tang (2007).

The above finding shows that that real M2 is a predictable monetary aggregate. The results of the findings also indicate that a relationship exists for all the ASEAN 5 countries between the dependent variable independents variables at 1%, 5%, and 10%

Table 4: Regression analysis for cross-sectional data

	Cons	Gdppc	Sp	Inf	Ir	Er	R2	Country
Coef.	1.2952	-0.0890	-0.0030	0.0369	0.0003	-0.2910		
t	4.7200	-0.5500	-0.3000	1.3200	10.5400	-0.1900	0.9709	Indonesia
P>|t|	0.0000	0.5850	0.7670	0.2020	0.0000*	0.8550		
Coef.	-3.4623	1.5709	-0.0281	-0.0668	0.0403	0.5385		
t	-3.1500	10.4300	-0.2100	-2.4300	1.3800	8.2900	0.9765	Malaysia
P>|t|	0.0050	0.0000*	0.8330	0.0240**	0.1810	0.0000*		
Coef.	-3.6429	1.4859	0.2046	-0.0271	0.0339	0.0474		
t	-4.3100	9.4700	2.2400	-2.2900	2.4200	14.1400	0.9883	Philippine
P>|t|	0.0000	0.0000*	0.0350**	0.0320**	0.0240**	0.0000*		
Coef.	-11.6189	2.0583	-0.0689	0.0080	-0.0269	1.8720		
t	-7.1400	11.6800	-0.4700	0.4600	-1.2500	7.0200	0.9798	Singapore
P>|t|	0.0000	0.0000*	0.6400	0.6510	0.2260	0.0000*		
Coef.	-1.0910	1.4265	-0.0209	-0.0215	0.0171	0.0540		
t	-3.3600	41.1000	-0.6400	-2.8700	2.4000	19.9400	0.9966	Thailand
P>|t|	0.0030	0.0000*	0.5280	0.0090**	0.0250**	0.0000*		

**Significant at 0.01 level **Significant at 0.05 level ***Significant at 0.10 level*

Note: M2=money demand for country, Gdppc= GDP per capita, SP= stock price, Inf= Inflation, IR= Interest rate, and Er= Exchange rate. All models are based on the robust standard.

b) Country Cross-Sectional Data

Table 4 above shows a regression analysis of cross-sectional data for Asean 5 countries.

The regression results for the country Indonesia, the variables Ir presents a positive coefficient of 0.0003 at a significant level of 1% relationship with money demand. The explanatory power between Ir and M2 provides 97.09%. In the regression, all other variables provide an in significant relationship with the m2.

In Malaysia, the variables Pgdpc, Inf, and Er provide coefficients (Pgdpc= 1.5709, at a significant level of 1%, Inf=-0.0668, at a significant level of 5%, and Er=0.5385, at a significant level of 1%) relationship with money demand. While Sp and Er provide an insignificant relationship with M2, with the explanatory power of 97.65%.

In Philippine variables Pgdpc, Sp, Inf, Ir and Er provide positive coefficients (Pgdpc=1.4859, at a significant level of 1%, Sp=0.2046, at a significant level of 5%, Ir=0.0339, at a significant level of 5%, and Er= 0.0474, at a significant level of 1%) relationships with M2. While a negative coefficient for Inf= -0.0271 at a significant level of 5% relationship with M2. Explanatory power for the variables under Philippine reported 98.83%.

The regression results for the country Singapore, the variables Gdppc and Er presents a positive coefficient of 2.0583 and 1.8720 respectively at a significant level of 1%) relationship with money demand. The explanatory power between Gdppc, Er, and M2 provides 97.98%. While variables Sp, Inf, and Ir provide insignificant relationships with the m2.

In Thailand variables, Gdppc, Inf, Ir, and Er provide a positive coefficients (Gdppc=1.4265 at a significant level of 1%, Ir=0.0171 at a significant level of 5%, and Er=0.0540, at a significant level of 1%) relationship with M2. A negative coefficient for Inf=-0.0215 at a significant level of 5%, relationship with M2, and Sp provide an insignificant relationship with M2. The explanatory power of 99.66%

c) The implication for individual countries

Table 4 above shows a regression analysis of cross-sectional data for Asean 5 countries.

Gdp per capita reported a positive statistical significant relation at 1% level from Malaysia, Philippines, Singapore, and Thailand, and insignificant relationship at Indonesia with money demand. These shows that Gdp per capita is an important determinant of money demand for all the countries except Indonesia. All the Asean 5 countries reported an insignificant

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relationship except Philippine which has a positive and statistically significant at 5% between stock price and money demand, explaining stock market is not a good determinant of money demand among the Asean 5 countries. A negative and significant relationship is found in Malaysia, Philippine, and Thailand between inflation and money demand while Indonesia and Singapore present insignificant results. Indonesia, Philippine, and Thailand present positive and statistically significant results at 10% level between interest rate and money demand, while Malaysia and Singapore have an insignificant relationship between interest rate and money demand. Lastly, the exchange rate is positively, and significant relationship was observed between exchange rate and money demand while Indonesian has a negative and insignificant relationship.

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The Relationship between the Stock Market and Foreign Direct Investment (FDI) in Sri Lanka-Evidence from VAR and Co-Integration Analysis

By R P C R Rajapakse
University of Sri Jayewardenepura

Abstract- The low level of savings in developing countries like Sri Lanka is a major reason for the slower economic growth, In order to enhance domestic investment and accelerate growth a country needs to find the capital required. Consequently most of the countries turned to foreign sources of financing during the transition from a centrally planned to a market economy the dominant form of foreign capital inflows was foreign direct investments (FDI), which, due to their characteristics, may have many positive effects on the host economy.

The objective of this study is to explore the existence and characteristics of both the long- and short-term relationships between FDI and the stock market in Sri Lanka. This study used quarterly data for FDI and Stock Market Trading Volume From 1994, Q1 to 2017 Q2. Unit root tests indicated a Vector Auto Regression Model and it was run with two lags. Wald Tests and Granger Causality tests were carried out. Findings indicated uni-directional causality from Stock Market to FDI. This implies that policy makers must aim at developing the stock market for a resulting increment in FDI flows to the country.

Keywords: *var, granger causality, foreign direct investment, stock market.*

GJMBR-B Classification: *JEL Code: F21, F31,F60,G28*



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R P C R Rajapakse

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Keywords: var, granger causality, foreign direct investment, stock market.

I. Introduction

The low level of savings in developing countries like Sri Lanka is a major reason for the slower economic growth, in order to enhance domestic investment and accelerate growth a country needs to find the capital required. Consequently most of the countries turned to foreign sources of financing during the transition from a centrally planned to a market economy The dominant form of foreign capital inflows was foreign direct investments (FDI), which, due to their characteristics, may have many positive effects on the host economy (Blomström, Lipsay and Zejan, 1992; Borensztein, De Gregorio and Lee, 1998; Bosworth and Collins, 1999; Loungani and Razin, 2001; etc.). Theory regarding the characteristics of FDI emphasizes the stability, long-term motivation and flexibility of this type of capital investment, even during financial crises (Lipsey, 2001). On the other hand, stock market and portfolio investments are characterized as short-term, speculative and, thus, prone to quick disinvestment and capital flight. Despite these significant differences between the two types of capital flow, no study has been done so far to prove the existence of a connection between FDI and portfolio investments.

Hence, the underlying interlinkages and the direction of the causality still remain un-clarified.

The main purpose of this study is to explore the existence and explain the characteristics of the relationship between long-term (FDI) and short-term (stock market) investments in Sri Lanka. The study emphasizes on the strength and the direction of the relationship between the two variables in the long run by using the Engle-Granger and Johansen cointegration methodology. In the long run, FDI should, influence economic growth through the transfer of know-how and technology and, indirectly, capital markets. Alternative explanations of this long term relationship include the assumption that the presence of FDI inflows causes spillover effects on the domestic stock market and encourages policy makers to adopt market-friendly regulations, which encourage stock trading. In addition, the existence of the short-term relationship between FDI stock and trading volume is also tested using the vector autoregressive (VAR) model approach. In the short run, assumed direction of the connection stems from events on capital markets which send signals regarding the domestic investment climate to foreign investors, and thus affect FDI. Hence, the direction of causality in the short run should be reversed. Therefore, the main hypothesis of this study is that, in the long run, trends in FDI flows influence trading on the Sri Lankan stock market, while in the short run events on the domestic stock market affect the volume of foreign direct investment in Sri Lanka.

II. Literature

FDI is considered more stable and secure because it is, (in theory), less prone to capital withdrawals and financial contagion. This is because the presence of large, fixed and illiquid assets, which comes with a direct investment. Portfolio investors in contrast are usually not primarily interested in controlling and managing the enterprise, but interested in short-term capital gains. Accordingly, portfolio investments are characterized by frequent changes of ownership and places of investment, as well as by an anonymous relationship between the issuer and the holder of securities. Those investments are driven by investors'

Author: PhD, Department of Finance, University of Sri Jayewardenepura Nugegoda, Sri Lanka. e-mail: champa@sjp.ac.lk

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speculative expectations and due to their short-term character and the moral hazard that stems from it, portfolio investments are sometimes considered as unfavorable. That is, in the event of a financial crisis or negative expectations of investors, this type of capital is the first to flee the country and may cause serious disturbances at the micro and macro levels of the economy.

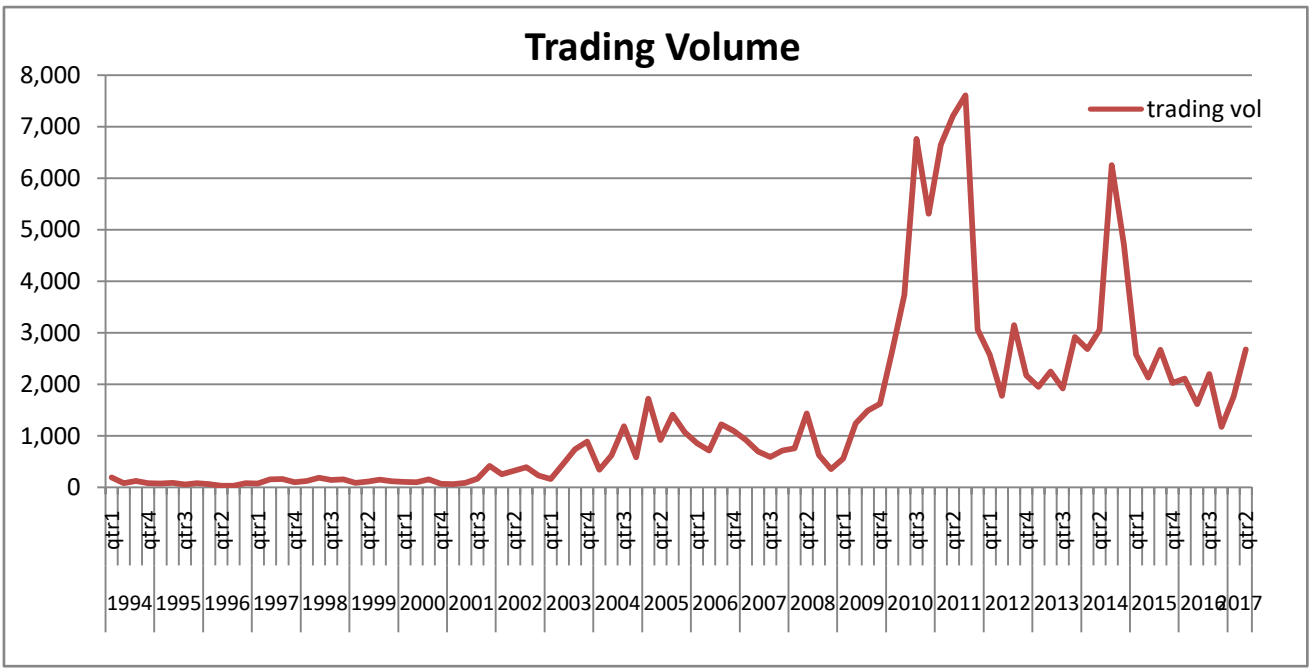
Although the volume of global capital flows has reached unprecedented levels over the past 20 years, the interrelationship and connection between FDI and portfolio investments has remained largely unclear. Despite the differences in character and motivation of the two types of investments, a relatively large number of empirical studies deals with the finding of causality and inter linkages between these two variables.

Based on an empirical analysis, De Santis and Ehling (2007) concluded that the movements on the stock market are the most important determinant of FDI and portfolio transactions. The stock market affects the movement of FDI flows by producing signals that are important for corporate investment decisions. On the other hand, foreign and domestic stock markets determine portfolio investments because "they measure the investment opportunity set and wealth effects."Adam and Tweneboah (2008) highlight an indirect, but strong relationship between stock markets and FDI inflows for Ghana. FDI inflows are a source of technological progress and increasing employment in most developing countries, which increases the production of goods and services and, ultimately, increases GDP. Economic growth then has a positive effect on the development of stock markets and the rise of share prices.

The financial markets of developing countries shows a developing trend especially in the Stock markets during the last two decades. A well-managed stock market attracts foreign investments in to the country. Studies on this subject show a positive relation between FDI and Stock market development. Tsaurai (2014) discovered that there exists a long run relationship between stock market and FDI net inflows in Zimbabwe. Further, Kalim & Shahbaz (2009), Baker, Foley & Wurgler (2004), Halalmeh & Sayah (2010) found a positive impact of FDI on stock market development. Arbacic, Globan and Raguz (2012) found that there is short run relationship evident for the case of Croatia. Claessens, Klingebiel, & Schmukler (2001) cited in Raza, et. al (2012) and Malik and Amjad (2013), found a strong positive relationship between foreign direct investment and stock market development for Pakistan. Njane (2017) found that FDI is statistically insignificant in stock market performance in Kenya.

III. The Colombo Stock Exchange

The Colombo Stock Exchange (CSE) is the main stock exchange in Sri Lanka. It is one of the exchanges in South Asia, providing a fully automated trading platform. The headquarters of the CSE is located in Colombo since 1995 and it also has branches across the country in Kandy, Jaffna, Negombo, Matara, Kurunegala, Anuradhapura and Ratnapura. The CSE has 296 companies representing 20 business sectors as at 3 August 2015, with a Market Capitalization of Rs. 3115.52 Bn. The graph indicates an Increase in Trading Volume after 2009. This year marked the ending of the 30 year old civil conflicts in the country.



Source: Compiled by Author

Figure 1: Trading Volume

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IV. Foreign Direct Investment

The Cambridge Dictionary defines FDI as "money that is invested in companies, property, or other assets by people or organizations from other countries"

Foreign investment inflows to Sri Lanka increased over the last decade as a result of favorable investment policies adopted by the successive governments. Since the beginning of the 90's, the annual value of FDI inflows to Sri Lanka has started to continue with an increasing rate when compared to 80's. This upward movement of FDI can be interpreted as an outcome of the liberalization reforms initiated in 1977. The incentives under structural adjustment and stabilization programme implemented in 1990s were of great importance in generating a surge in FDI. Economic theory assumes a positive relation between FDI and economic growth (and thus indirectly between FDI and the capital market).This connection has not been empirically confirmed in the case of Sri Lanka.

a) *Objectives of the Study*

This study aims at explaining the relationship between FDI and Stock Market in Sri Lanka.

V. Methodology

a) *Data*

In order to determine the relationship between stock market movements and FDI in Sri Lanka, quarterly data on FDI and trade volume on the Colombo Stock Exchange (FTRV) for the period 1994:Q1–2017:Q2 are used in the analysis.

FDI data are taken from the Central Bank of Sri Lanka (CBSL) while the trade volume data were taken from the Colombo Stock Exchange database. The series "volume" is constructed as a quarterly average of daily trade volumes. For the purpose of the analysis, both time series have been deflated by the CCPI and expressed in natural logarithms. The data length was limited by the availability of data. Both FDI and FTRV are measured by million US$.

All variables will be operated on econometric software EVIEWS.

b) *Analysis Techniques*

Economic theory suggests a possible bi-directional relationship between FDI and the stock market. In the short run, developments in stock markets may affect the decision of investors whether to invest abroad, i.e. may affect the amount of FDI inflows. A growth in stock markets and positive expectations are usually an indication of market vitality, a favorable investment climate and the openness of the country to FDI (Desai, Foley and Hines, 2006; Soumaré and Tchana Tchana, 2011). However, if the long-term impact of FDI on economic growth is channeled through the process of rapid technological progress, then the causality direction is reversed, because FDI then indirectly affects stock market movements (Adam and Tweneboah, 2008).

Different techniques will be used in analyzing the data. The Unit root test, Co-integration test, optimal lag length, Vector Auto-Regression (VAR) and Granger causality will be employed in this research in order to investigate the relationship between, FDI and FTRV.

Unit Root Test: To investigate whether the time series data contain unit root or not. Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979) and Phillips-Perron (PP) (Phillips & Perron, 1988) unit root tests which are generally used in most researches will be used.

Optimal Lag Length Test: The number of lagged terms is chosen to ensure that the errors are uncorrelated. To determine the suitable optimal lag length, two most popular methods are the Akaike's information criterion (AIC), and Schwarz information criterion (SC) for Vector Auto regression (VAR). By choosing optimal lag length of explanatory variables based on data, the explanatory variables with appropriate lag length in the model will cover all the related information and better explain the endogenous variable.

Co-integration Test: Co-integration implies that causality exists between the two variables, but it does not indicate the direction of the causal relationship. This paper applies the co-integration approach to examine whether, FDI and FTRV have long run equilibrium interaction. If the series do not have co-integration and no long run equilibrium relation among time series, VAR model will be applied to measure Granger causality effect. In contrast, if there is equilibrium interrelation among the time series, restricted VAR (or VECM ie. Vector Error Correction Model) is used to examine Granger causality.

Granger Causality: Can be used to verify whether one time series is capable of forecasting another (Granger, 1969) [26]. As mentioned earlier, if the variables have one unit root and are co integrated, then the bivariate VECM is specified and estimated. The Granger causality test is then conducted in the context of the VECM. If the two series have one unit root and are not co integrated, then the bivariate VAR is specified and estimated.

VI. Data Analysis

a) *Data*

Quarterly data from 1994:1 to 2017:2 compiled by the Central Bank of Sri Lanka and Colombo stock Exchange are used in this study. FDI and FTRV are measured by US$ millions.

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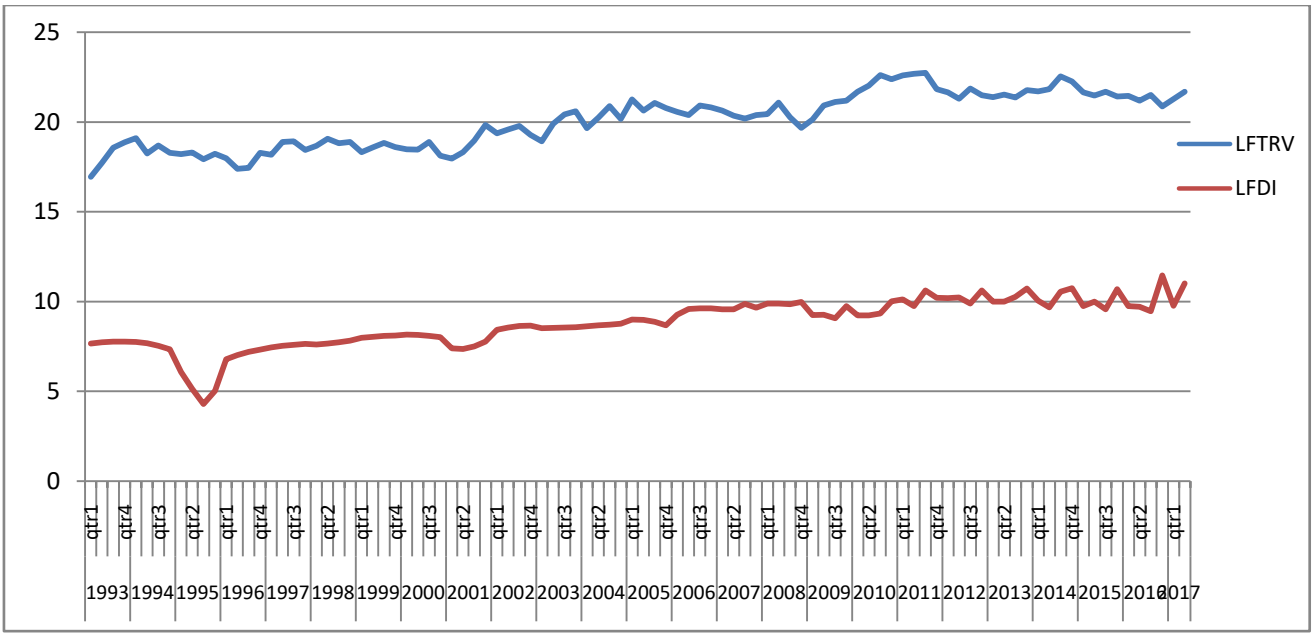


Figure 2: LFDI and LFTRV for the period 1995:1-2017:2

Figure 2, the raw data for the two variables in our study. The nature of the graphs indicates that there is trend effect in the variables.

b) Unit Root Test

This study starts with investigating whether the time series data contain unit root or not. If they do, they are non-stationary. It is important because if time series data are not stationary, the results may contain what is called a "spurious regression problem" (Granger & Newbold, 1974). The spurious regression has a high R squared and t-statistics that appear to be significant, but the results do not have any economic significance (Enders 2008). If the data have unit roots, then all the usual regression results might be misleading and incorrect (Koop, 2008). A regression of variables should never be carried out if they contain unit root (Koop, 2008). It is required to verify whether the data series is stationary or not before examining the correlations among series to avoid the problem of the spurious regression. Number of tests has been suggested to perform in order to assess whether the data series contains a unit root or not. The Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979) and Phillips-Perron (PP) (Phillips & Perron, 1988) unit root tests are generally used by many researchers. According to Greene (2003), the hypothesis to be examined with unit root test is as follows:

H0: There is a unit root (data series are non-stationary)

H1: There is no unit root (data series are stationary)

The unit root hypothesis for non-stationarity was checked using ADF test which both depend on the structure of model (with or without trend and drift). If the H0 is accepted, the series contain unit root and are non-stationary. Converting non-stationary data to a stationary one could be done by taking difference of the data from the first lag. If a series in level form is non-stationary and its first difference is stationary, this series has integration order of 1, I (1); the difference would be I (0). The integration order informs how many times the data need to be differenced to become stationary. Once the data are differenced, and become stationary, the data are ready to proceed with regression analysis.

Table 1: Unit root using ADF Level/Tend and Drift for Trading Volume and FDI

(ADF Test Statistic)	LTRV	LFDI
Constant	-1.43128 (0.5637 Prob.)	-1.14697(0.6941 Prob.)
Trend and Drift	-3.80649(0.0204 Prob.)	-4.02098 (0.0112 Prob.)

Source: Author's Calculations

We observe that, both the trading volume and FDI are stationary at levels but with a trend and drift.

c) Co Integration

Table 2 depicts the co-integration test carried out in order to assess whether there is long run association among the variables FDI, and TRV.

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Table 2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.17084	17.85265	15.49471	0.0217
At most 1	0.008801	0.804479	3.841466	0.3698
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				

** Denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values*

The test results indicate that there is co-integration among the two variables which means that there is long run association between the variables and that in turn enabled the estimation of VECM model instead of a VAR model.

d) Optimal Lag Length

In order to determine the suitable optimal lag length: the Akaike's information criterion (AIC), Schwarz information criterion (SC), log-likelihood ratio test (LR) Criterion, and the Hannan-Quinn information criterion (HQ) are being used. However, most popular methods are AIC and SC. VAR or VECM with the optimal lag length will make the estimated model have higher explanatory power than using the other lag lengths. The smallest AIC / SC can be applied for choosing the most efficient and accurate optimal lag length. As indicated by the Table 3, the optimal lag length is 2.

Table 3: Lag Order Selection Criteria

VAR Lag Order Selection Criteria
Endogenous Variables: LFDI LTRV
Exogenous Variables: C
Sample: 1994Q1 2017Q2
Included Observations: 86

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-220.118	NA	0.600367	5.165539	5.222616	5.18851
1	-94.1482	243.1512	0.035201	2.329029	2.500262*	2.397942
2	-86.5735	14.26874*	0.032400*	2.245895*	2.531284	2.360751*
3	-84.3892	4.012933	0.033813	2.288121	2.687666	2.44892
4	-79.1047	9.462945	0.032845	2.258249	2.77195	2.46499
5	-77.1656	3.382123	0.034501	2.306177	2.934034	2.558861
6	-75.7002	2.487839	0.036664	2.365121	3.107133	2.663746
7	-74.3275	2.266596	0.039073	2.42622	3.282388	2.770788
8	-69.9978	6.947589	0.038904	2.418554	3.388877	2.809064

** Indicates lag order selected by the criterion*

Source: Authors Calculations

Thus this study determines and uses a lag length of 2 in estimating the restricted VAR (we call this VECM).

Vector Error Correction Model (VECM)

$$D(LFDI) = C(1)*(LFDI(-1) - 0.872605758537*LTRV(-1) - 3.24740068348) + C(2)*D(LFDI(-1)) + C(3)*D(LFDI(-2)) + C(4)*D(LTRV(-1)) + C(5)*D(LTRV(-2)) + C(6)$$

R squared = 0.240817 Adjusted R squared= 0.19616 DW statistic= 1.919948

The Error correction coefficient c(1)=0.30722, t statistic (3.58144) with a Probability of 0.0006 we can conclude that there is long run causality from TRV to FDI

C(4)	0.117214	0.12669	0.925206	0.3575

Short run causality is represented by c(4)=0.117214 , t statistic (0.925206) with a probability of 0.3575, we can conclude that there is no short run causality TRV to FDI

$$D(LTRV) = C(1)*(LTRV(-1) - 1.14599289567*LFDI(-1) + 3.72149811265) + C(2)*D(LTRV(-1)) + C(3)*D(LTRV(-2)) + C(4)*D(LFDI(-1)) + C(5)*D(LFDI(-2)) + C(6)$$

R Squared= 0.097448, Adjusted R Squared= 0.044356 DW Statistic= 1.962064

The Error correction coefficient c(1)=0.13319, t statistic (1.94501) with a Probability of 0.0551 we can conclude that there is no long run causality from FDI to TRV.

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Short run causality is represented by c(4)=0.15371, t statistic (1.48836) with a probability of 0.1404, we can conclude that there is no short run causality FDI to TRV.

Table 4: Wald Test: C(4)=C(5)=0 rejected

Test Statistic	Value	df	Probability
F-statistic	0.966037	(2, 85)	0.3847
Chi-square	1.932074	2	0.3806

Source: Authors Calculations

Table 5: Wald Test C(4)=C(5)=0 rejected

Test Statistic	Value	df	Probability
F-statistic	1.429552	(2, 85)	0.2451
Chi-square	2.859103	2	0.2394

Source: Authors Calculations

e) Granger Causality

There is Uni-directional causality from Stock Market to FDI

Table 6: Pairwise Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Prob.
LFDI does not Granger Cause LTRV	92	1.85676	0.1623
LTRV does not Granger Cause LFDI		7.22803	0.0012

TRV granger causes FDI in the long run
Source: Authors Calculations

VII. Conclusion

This study is a step towards the clarification of the unclear relationship between FDI and the stock market in Sri Lanka.

Literature suggests that the long run, trends in FDI flows influence trading on the Sri Lankan stock market, while in the short run events on the domestic stock market affect the volume of foreign direct investment in Sri Lanka, our findings do not go in line with this literature. In contrast our findings suggest that in the long run stock market influences the inflow of FDI while there is no short term relationship between the two variables. Authorities may use this relationship in promoting FDI to the country. If the stock market is developed and foreigner participation can be increased then that will motivate FDI inflows to the country. The main contribution of this paper is an additional step towards the clarification of the so far rather unclear relationship between FDI and the stock market in Sri Lank a, as well as of their characteristics and determinants both in long and short run. The research proceeds from accepted theoretical assumptions, and thus represents mainly a contribution in terms of empirical research. However, the confirmation of the existence of a long term connection and the inability to prove short-term causality between the stock market and FDI in Sri Lanka can also be useful to policymakers and financial investors in the decision making process.

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Econometric Analysis of Accessibility and Repayment Ability of Agricultural Credit among Rural Root and Tuber Crops Farmers in Oyo State Nigeria

By Ololade, R. A., Olagunju, F. I., Adejumo, T. J. & Okegbade, A. I.
Ladoke Akintola, University of Technology

Abstract- This study examined the factors that contributed to the agricultural credit accessibility and repayment ability among rural tuber crops farmers in Oyo State Nigeria. The study specifically described the socio-economic characteristics of the respondents, sources of credit, conditions for obtaining credit and effects of socio-economic characteristics on repayment of credit. Random sampling technique was used to select 144 respondents in the study area, and the structured questionnaire was administered to collect data. Descriptive statistics and logit model was used in analyzing the data. The results showed that a higher percentage (56.9%) of both categories of tuber crops farmers were within the age bracket of 30-50 years. About 74.3% of those that obtained credit were male farmers. Majority of the respondents (91.7%) were married. 38.9% of the farmers have formal education. Only 48.7% of the farmers have secondary occupation. Most of the farmers have the family sizes between 6-10 people and most of the farmers had been practicing and cultivating tuber crops for at least 10-50 years. Most of these farmers are cultivating yam and cassava only a few are planting cocoyam as major or mixed crop. Majority of the farmers source for credit from cooperative societies, commercial bank, SPFS and friends.

Keywords: *root-tuber crops, rural farmers, credit repayment, logit regression.*

GJMBR-B Classification: *JEL Code: M20*



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Econometric Analysis of Accessibility and Repayment Ability of Agricultural Credit among Rural Root and Tuber Crops Farmers in Oyo State Nigeria

Ololade, R. A. [α], Olagunju, F. I. [σ], Adejumo, T. J. [ρ] & Okegbade, A. I. [ω]

Abstract- This study examined the factors that contributed to the agricultural credit accessibility and repayment ability among rural tuber crops farmers in Oyo State Nigeria. The study specifically described the socio-economic characteristics of the respondents, sources of credit, conditions for obtaining credit and effects of socio-economic characteristics on repayment of credit. Random sampling technique was used to select 144 respondents in the study area, and the structured questionnaire was administered to collect data. Descriptive statistics and logit model was used in analyzing the data. The results showed that a higher percentage (56.9%) of both categories of tuber crops farmers were within the age bracket of 30-50 years. About 74.3% of those that obtained credit were male farmers. Majority of the respondents (91.7%) were married. 38.9% of the farmers have formal education. Only 48.7% of the farmers have secondary occupation. Most of the farmers have the family sizes between 6-10 people and most of the farmers had been practicing and cultivating tuber crops for at least 10-50 years. Most of these farmers are cultivating yam and cassava only a few are planting cocoyam as major or mixed crop. Majority of the farmers source for credit from cooperative societies, commercial bank, SPFS and friends. The Coefficient of determination (r^2 = 0.26) indicates that 26% of the variation in the value of all the explanatory variables (independent variables), leaving only 74% of variation in the dependent variable (credit repayment). Logit regression estimated for the credit repayment showed that secondary occupation, family size, and farming experience are significant variables at 5% level of significance while other factors did not contribute significantly to the credit repayment.

Keywords: root-tuber crops, rural farmers, credit repayment, logit regression.

I. Introduction

Agricultural credit has been described as loans and advances that are given to farmers to finance, service production, distribution and marketing of farm products resulting from these activities (Mgbakor et al, 2014; Ojiegbe and Duruechi, 2015). The role of agricultural credit in the development of agricultural sector cannot be over emphasized. Availability of agricultural credit is an important tool that determines the efficiency, progress, output, productivity, and access to all of the resources on which farmers depend (Adejobi and Atobatele, 2008; Kohansal et al., 2008; Oboh and Ekpebu, 2011; Ibrahim and Bauer, 2013; Filli et al., 2015; Alabi et al., 2016). Financing agricultural business in Africa is a serious task due to change and fluctuations in government policies (Lunt et al., 2016). Therefore, farming as a business must be managed very well like any other one, to do this; it requires a lot of capital which the farmers may not be able to get easily due to some shortcomings such as lack of collateral. Credit given to farmers would assist in the following ways: Procurement of new improved technology in agriculture, purchase of high yielding and disease resistant crops, put more land into cultivation and organizing the farm better and more purposeful (Kohansal et al., 2008; Chisasa, 2014; Ali et al., 2017). Agricultural credits are mostly obtained by rural farmers from personal saving, family, and friends, but this is not enough as sometimes you may not even get any from these sources (Hananu et al., 2015). However, financial institutions in Nigeria now provide funds for agribusiness but not all of them. The following are the source of getting credit by rural farmers: cooperative societies, microfinance banks, commercial banks, the bank of agriculture, the bank of industry (Nwanyanwu, 2011). Agricultural loan repayment is the act of paying back money previously borrowed from financial institutes. It usually takes the form of periodic payments that normally include part principal plus interest in each payment (Wijewardana and Dedunu, 2017). Repayment of Agricultural loans depends primarily on the successful planting and harvesting of crops. Loan repayment performance by rural farmers has been poor in Africa (Okarie, 2004; Olagunju and Ajiboye, 2010; Ibrahim and Aliero, 2012; Sileshi et al, 2012; Wongnaa and Awunyo-Vitor, 2013; Addae-Korankye, 2014; Agbo et al, 2015; Mgbenka et al, 2015; Ojiegbe and Duruechi, 2015). Credit default problem among rural farmers has been a tragedy as it leads to a system failure to implement appropriate lending strategies and credible credit policies. Also, it discourages the financial institutions

Author α σ: Department of Agricultural Economics, Ladoke Akintola, University of Technology, Ogbomoso, Nigeria.
e-mail: raololade@gmail.com
Author ρ ω: Department of Statistics, Ladoke Akintola, University of Technology, Ogbomoso, Nigeria.

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from refinancing the defaulting members, which put the defaulters once again into a vicious circle of low productivity (Gebeyehu et al., 2013; Asfaw et al., 2016; Atinkut et al., 2016; Fentahun et al., 2018).

Yam, cassava and cocoyam are the most important annual root and tuber crops cultivated in tropical climates, especially in areas with moderate rainfall mainly for direct human consumption. They contain vitamins and minerals with a high concentration of dietary fibers which make them good diets, though they are very high in carbohydrate. They are cultivation of these crops complements food security because of their affordability (Apata and Babalola, 2012). They are cultivated in varied agro-ecologies and production systems ranging from highland densely populated regions to lowland drier areas prone to droughts or floods. These crops account for about 95% of the total root and tuber crops production in Africa and produce more than 240 million tons annually on 23 million hectares. One of the key economic values of these crops when they are processed as flour in most Africa countries. They also bring in much money to the farmers when sold in the market, hence their huge popularity (Eke-Okoro et al., 2014; Chandrasekara and Kumar, 2016).Yam is considered to have some cultural values; hence it is widely grown in Africa. Yam is easily grown here by planting the tubers or using tubers from previous planting season. Yam is used medicinally as a heart stimulant due to the presence of alkaloids. It is also used, as an industrial starch (Apata and Babalola, 2012). Cassava and cocoyam grow well under poor soil, and it can be cultivated with other crops such as vegetable, oil palm, coconut, groundnut, melon, etc. Cassava are processed into starch which serves as a very important raw material in the industry. Cassava are used as thickeners in food, stabilizer in foods such as ice-cream, glucose sugar are produced from the starch in cassava and cassava chips are also used in animal feed. It is used to produce high-value products like confectioneries, sweeteners, glue, textile, papers, and drugs (Apata and Babalola, 2012). Cocoyam contains mainly protein, starch and water and the leaves are a source of vitamin A and C. Cocoyam corm is used to manufacture drugs and paper due to its high concentration of mucilage (Apata and Babalola, 2012).

To the best of our knowledge, there is a paucity of information on the analysis of accessibility and repayment ability of agricultural loans among rural root and tuber crops farmers in Oyo State Nigeria. Therefore, the present research was undertaken with the aim of looking at sources of credit available to root and tuber crops farmers, conditions for obtaining credit among tuber crop farmers and factors affecting credit repayment among tuber crop farmers in the study area.

II. Materials and Methods

a) Study Area

This study was carried out in Ogbomoso, Oyo State, Nigeria, mainly because of some international and federal agricultural establishments are located in the state and because of its prominent agricultural activities being the primary occupation of the inhabitants of the state.

b) Sampling Technique

A multistage sampling technique was used to select 144 respondents from the state. Firstly, Ogbomoso agricultural zone was purposively chosen from the state, because a majority of the populace makes farming their primary occupation and the main source of income. The zone contains five blocks. Secondly, simple random sampling was used to select two cells from each block. Random sampling was used to select 15 farmers each from two cells, ten farmers each from six cells, seven farming household each from two cells. This selection was based on the number of registered farmers available in each cell.

c) Objectives

i. To determine the socio-economic characteristics of root and tuber crop farmers.
ii. To identify the sources of credit available to root and tuber crop farmers.
iii. To examine the conditions for obtaining credit among root and tuber crop farmers.
iv. To determine factors affecting credit repayment among root and tuber crop farmers.

d) Analytical Techniques

Various analytical techniques were used for this study. Descriptive statistics such as frequency distribution and percentages were used to analyse the socio-economic characteristics of the sampled farmers. Logit regression was used to quantitatively determine the factors that influence loan repayment among the respondents in the study area.

e) The Logistic Regression Model

A logistic model is a univariate binary model. We use a binomial logistic regression model given that the dependent variable is dichotomous: 0 when a farmer is having no access to credit and 1 when having access to credit. Due to the dichotomous nature of the independent variable, the logistic regression model was employed to assess how a set of independent variables such as sex, age, marital status, household size, level of education, farm size, farming experience etc. determine credit repayment among root and tuber crop farmers. Moreover, logit regression provides an indication of the adequacy of a set of predictors by assessing suitability and indicates the relative importance of each predictor variable or interaction among predictor variables (Hazra and Gogtay, 2017). Predictor variables are a set

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of socioeconomic and demographic status indicators and dwelling endowment of the farmers. They contain both dichotomous and continuous variables. In the analysis of dichotomous outcome variable, the logit model is preferable to others, since it is extremely flexible and capable of generating meaningful interpretation (Owusu, 2017). The logit model is mathematically expressed by Olaguju *et al*., 2012 and Ololade *et al* (2013) as:

Let Pj denote the probability that the j-th farmer is having access to credit. We assume that Pj is a Bernouli variable and its distribution depends on the vector of predictors X, so that:

$$Pi\ (X) = \frac{e^{\alpha + \beta x}}{1+e^{\alpha + \beta x}} \quad \text{(i)}$$

The logit function to be estimated is then written as:

$$In\frac{Pi}{1-Pj} = \alpha + \sum_i \beta i Xij \quad \text{(ii)}$$

The logit variable ln{Pj/(1-Pj)}is the natural log of the odds in favour of the farmer having access to credit. Equation iii is estimated by maximum likelihood method and the procedure does not require assumptions of normality or homoskedasticity of errors in predictor variables.

III. Results and Discussion

a) Socio-Economic Characteristics of Respondents

This section discussed socio-economic characteristics of respondents to capture objective one: to determine the socio-economic characteristics of root and crops farmers and objective four: to determine factors affecting credit repayment among root and tuber crops farmers. The following socio-economic characteristics of both credit beneficiaries and non-beneficiaries were considered the age of farmers, gender, marital status, family size, educational qualification, religion, farm size, farming experiences, types of crop cultivated, source of credit and conditions of obtaining credit. The group's membership formation occurred without any bias toward the individual members' socio-economic characteristics.

The frequency distribution and percentages of respondents according to their ages are shown in figure 1 and table 1 respectively. Out of the total respondents, 22.2% were of age between 31-40; 34.7% were between 41-50 years of age, while 26.4% were between 50-60 years of age, and others were older than 60 years of age, revealing the respondents as financially and economically efficient middle-aged men and women. Only 4.2% were between 21-30 years of age. According to table 1 majority (34.7%) of credit beneficiaries belong to the age group of 41-50 years, while for non-beneficiaries, majority representing 43.1% also belong to the age bracket of 41-50 years. However, the results showed that a higher percentage (56.9%) of both categories of tuber crops farmers were within the age bracket of 30-50 years. This age bracket is productive age where farmers are physically and mentally fit for any agricultural activities. This age bracket agrees with the result of this study which recommended an age bracket of between 30-50 years for productive agriculture. This in line with the previous study by Badmus et al., 2015, and Ajayi et al., 2016 that stated that a large proportion of the farmers practicing organic farming were between 41-50 years showing that the farmers were mainly middle aged who are in their economically active stage and as such, can undergo the stress and this has implication for productivity of the farmers.

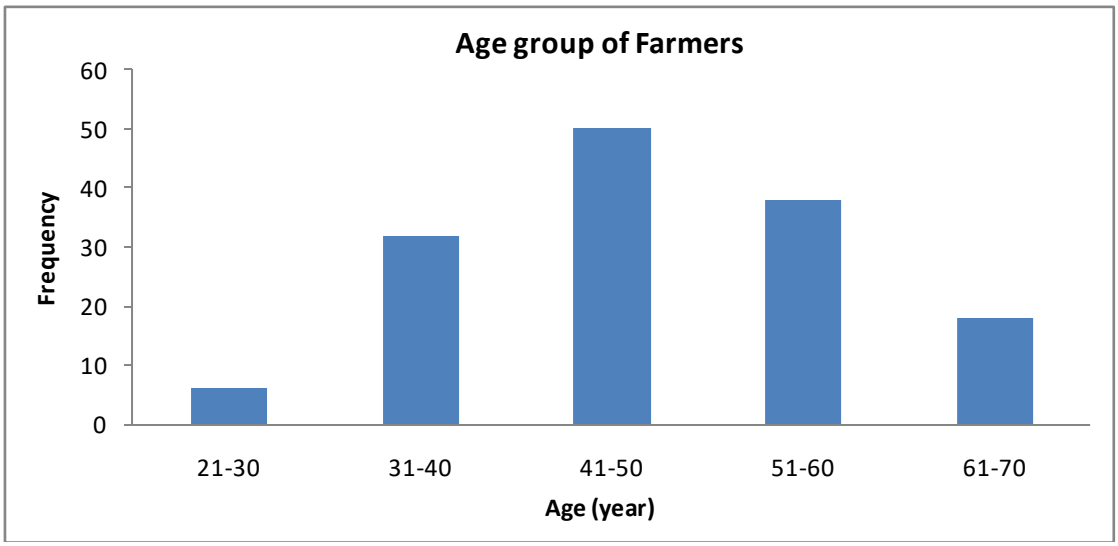


Figure 1: Frequency distribution of respondents according to age

Table 1 and figure 2 indicate that 74.3% of the respondents were male and 25.7% were female, showing that men are more actively involved in credit groups and tuber crops production. There was slight gender bias in the agricultural loan repayment in the study area because about 74.3% of those that obtained

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credit were males. This shows that tuber crops production was dominated by male farmers in the study area. This has implication on gender equality and calls for main streaming of the female gender in root tuber crops production since they constitute the bulk of work force in agricultural production. This may also not be unconnected with access to credit which usually favours male respondents (Agbugba et al., 2014). This suggests that males had higher participation than females in the programme which may be due to access to resources, credit, labour task, land ownership, Leadership and membership in organizations and access to and control over income (Akter et al., 2017).

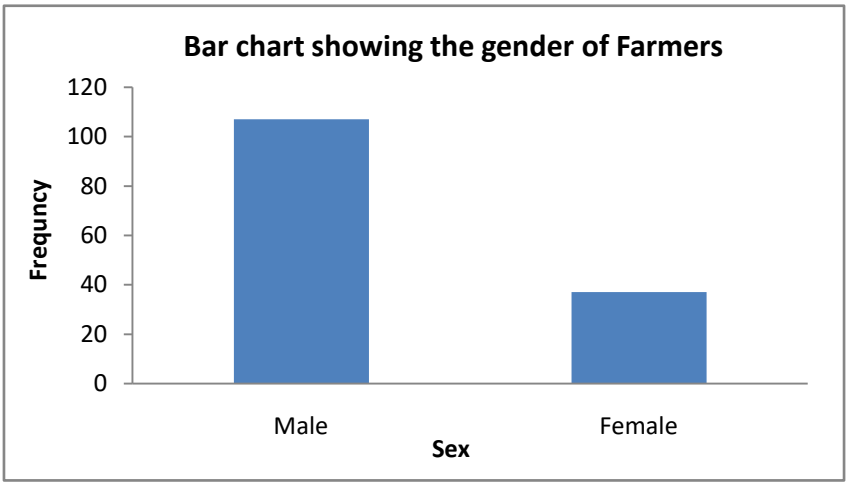


Figure 2: Frequency distribution of respondents according to their sex

Out of the total respondents, 91.7% were married, 6.9% were single, while 0.7% was a widow (er) and divorced respectively and 6.9% included single or unmarried (figure 3 and table 1). Majority of the respondents (91.7%) were married, implying that more married people are involved in tuber crops production in the study area. This is in tandem with the findings of Mbam et al. (2011), who found that 79% of sampled vegetable farmers in Ebonyi state were married. A very large proportion (90 percent) of the sample is married. Marriage is arguably one of the most respected and sacred institutions in almost all farming communities. As a result of the importance attached to the marriage institution, it is not uncommon for girls to be betrothed for marriage at a very young age. Marriage is mostly a source of prestige and may serve as a source of additional farm labour for a man and his family. A prospective husband is also a source of farm labour for his in-laws. Married farmers are more likely to take a longer time to decide as compared to unmarried farmers. Married farmers may have to either consult or reach a consensus with their spouses before making a decision such as participating in an agricultural project (Etwire et al., 2013).

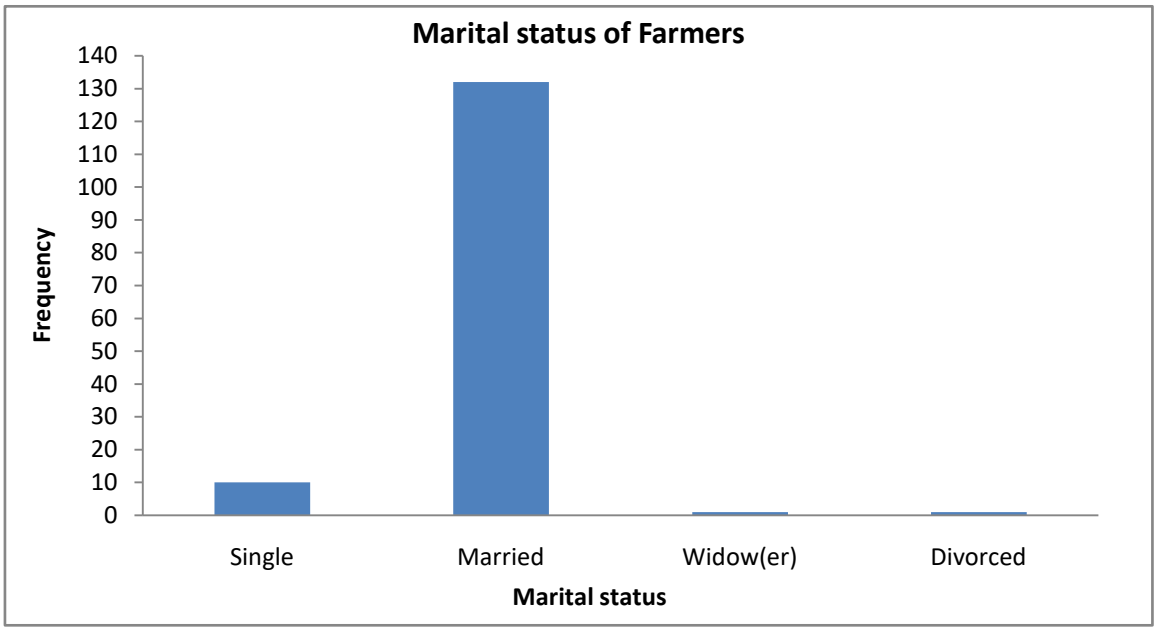


Figure 3: Frequency distribution of respondents according to their Marital Status

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The study also noted that the majority of respondents, 57%, have 6-10 years of formal education, while 29.9% of the farmers have 11-15 years of formal education, only very few of them (7.6%) have between 16-20 years of formal education. The survey also notes that only 38.9% of the farmers have a formal education while majority of respondents, 61.1% did not have formal education, only 18.8% have vocational education while 20.1% have adult literacy education (Figure 4 and 5 and Table 1). Formal education is important for impacting literacy and numeracy skills which is necessary for farm planning and budgeting as well as comprehension of good agronomic practices. Farmers will not be able to read an instruction manual or a label on a seed or agrochemical package. The educational level and knowledge of farmer's literacy status is good because it makes farm resources more efficiently. This high level of literacy no doubt could affect the level of technology adoption and skill acquisition among the farmers since education enhances technology adoption and the ability of farmers to plan and the risk. Farmers with higher levels of western education are likely to be more efficient in the use of inputs than their counterparts with little or no education. The low level of formal education may not be enough to interpret instructions on agrochemicals when extension agents are not present (Okpachu et al., 2014; Owusu, 2017; Oyekale, 2018).

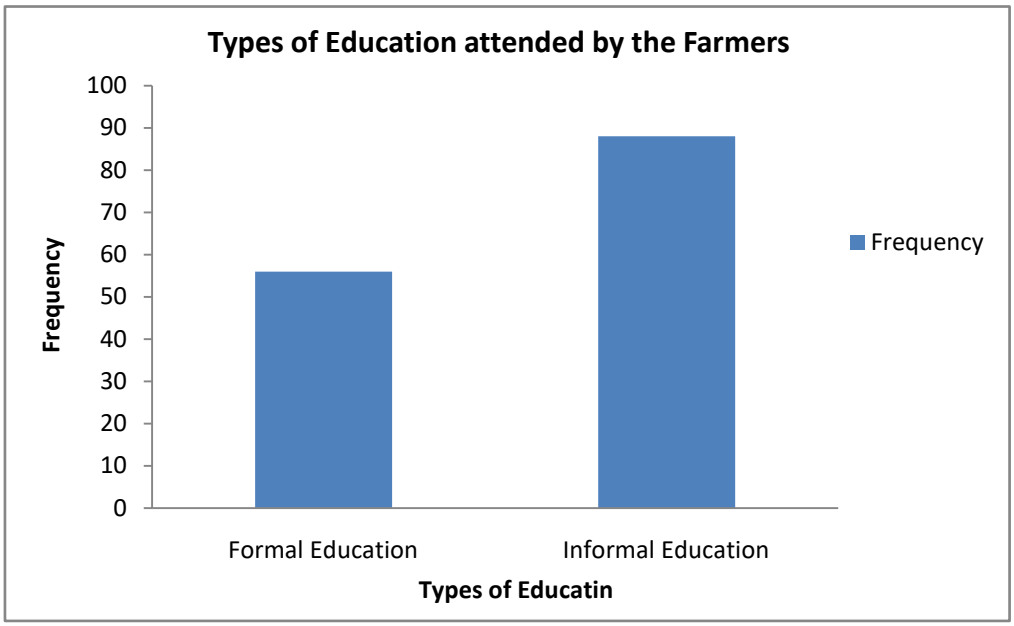


Figure 4: Frequency distribution of respondents according to their Formal Education

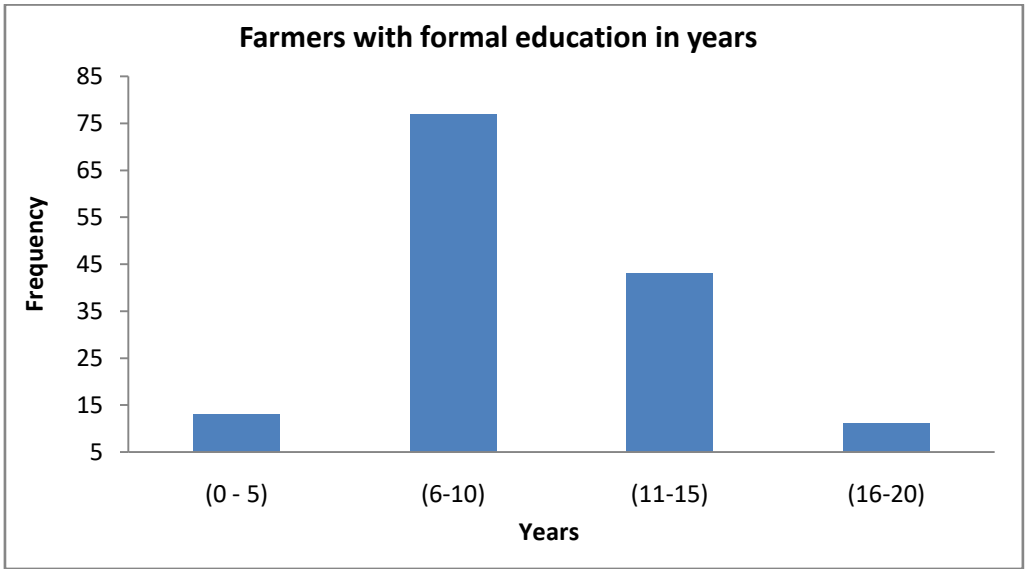


Figure 5: Frequency distribution of respondents according to their years of Education

The study also showed that a majority of the farmers are Christian (73.9%) and only a few of them are Muslim (27.1%) (Figure 6 and Table 1).

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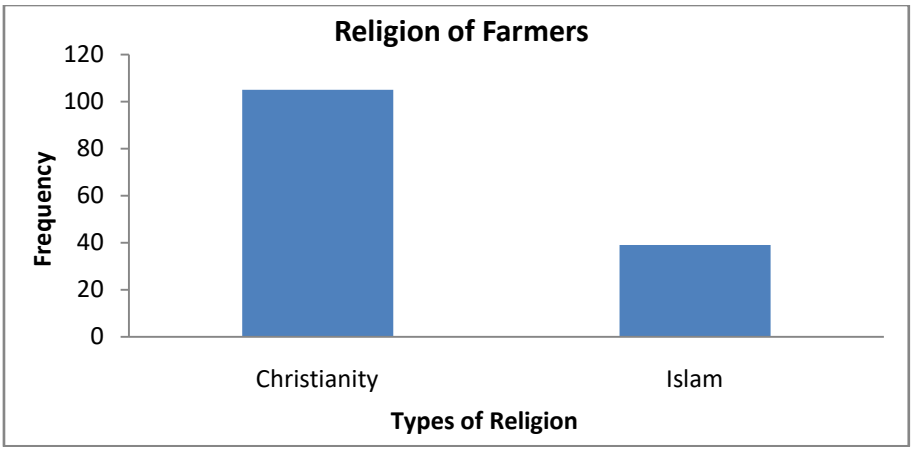


Figure 6: Frequency distribution of respondents according to their Religion

Table 1 and figure 7 also demonstrate that 18.8% of the respondents were into livestock keeping, 11.1% were into food processing, 14.6% are civil servants, 4.2% were artisans, meanwhile, 51.3% of the farmers have no secondary occupation, that means only 48.7% of the farmers have a secondary occupation. In line with this, as shown in the table, very few of the respondents obtained income from only one source as almost three-quarters of the household heads engaged in a combination of farm and nonfarm activities. Highlights of the occupational analysis of the respondents revealed that more than half of the respondents were engaged in farming as their primary occupation, indicating that farming is the predominant occupation in the study area. This is expected as most households in the rural areas depend mainly on agriculture as their primary source of livelihood. However, studies have shown that diverse income portfolio, create more income and distribute income more evenly. Thus, it is easier to adopt the combined livelihood strategies than switching full time between either of them (Adepoju and Obayelu, 2013).

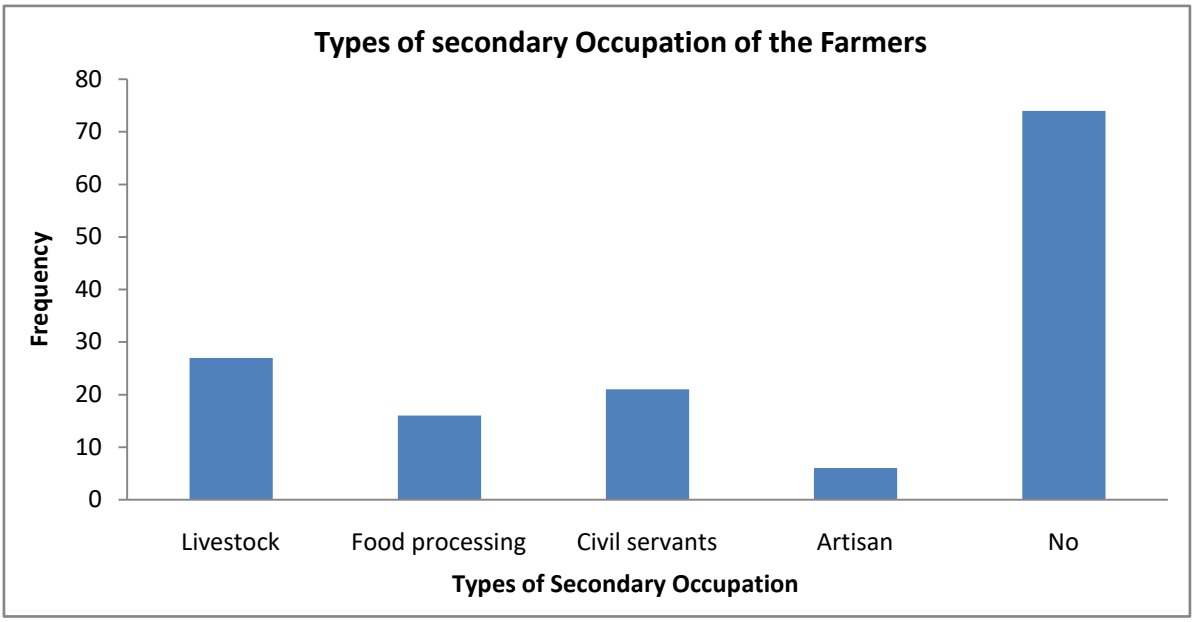


Figure 7: Frequency distribution of respondents according to Secondary Occupation

75% of the respondents had household sizes ranging from 6-10 people while 25% had 1-5 (table 1 and figure 8). Household size can be a proxy for family labour. Availability of family labour implies that the household head may have time to engage in other activities including participating in an agricultural project. Household size is also sometimes perceived as an indication of manliness or wealth (Etwire et al., 2013). Large family size serves as a means of generating family labour and since women and children can participate in crop production, processing and marketing, farming practices and use of technologies are related to family size status. The results are contrary to that of Ojiako and Ogbukwa, 2012 who in their study of loan repayment capacity of small holder cooperative farmers in Yewa North Local Government Area of Ogun State, Nigeria, found that household size impacted negatively on loan repayment performance of rural farmers.

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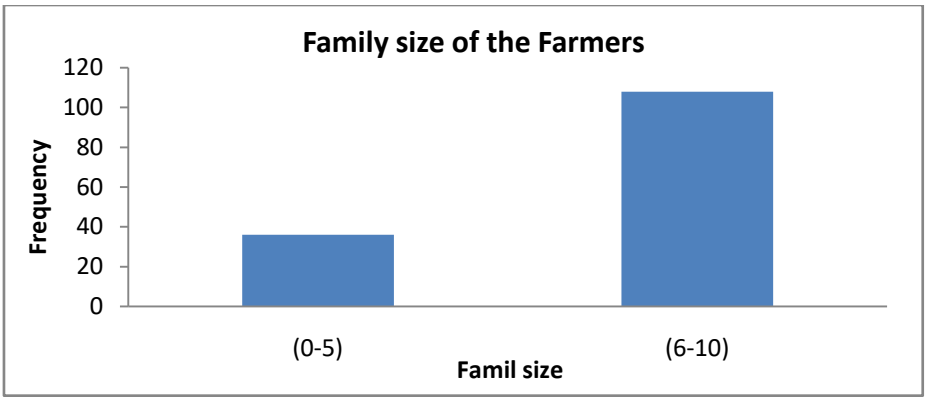


Figure 8: Frequency distribution of respondents according to the Family Size

Regarding the years of experience as farmers, 22.2% of the farmers had been practicing tuber crops farming between 1-10 years, 34.7% had been producing tuber crops f between 11-20 years, 16.7% had been engaging in this crop production between 21-30 years, 21.5% have between 31-40 years of tubers crops productions and only 4.9% of the farmers have between 41-50 years of planting and producing tubers crops (table 1 and figure 9). The relative high percentage of household size of non-beneficiaries to agricultural loans explain why this categories of farmers do not seek for credit this is because they see this large household size as aid or assistance to agricultural production.

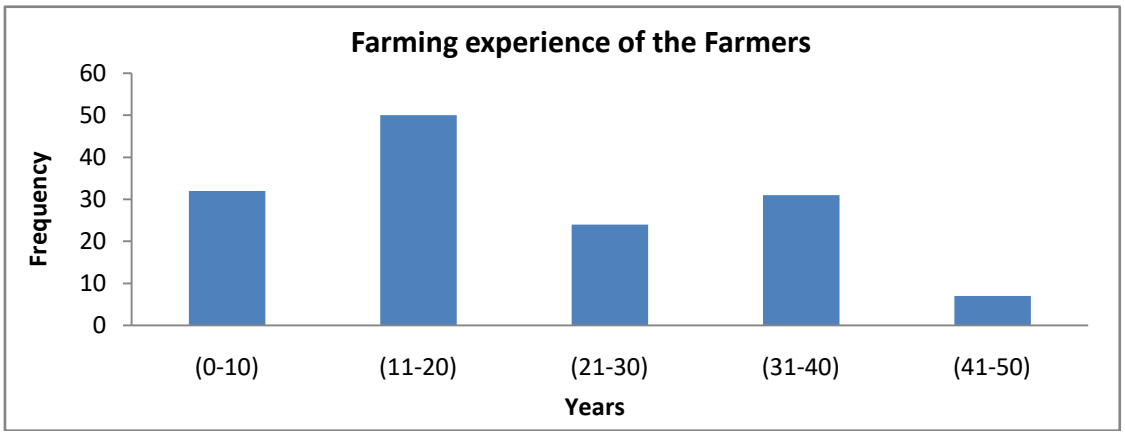


Figure 9: Frequency distribution of respondents according to the Farming Year of Experience

Table 1 and figure 11 showed that out of the root and tuber crops farmers in the locality, 59.0% of the respondents cultivating cocoyam. This might be due to the rate of consumption of these root and tuber crops constraints associated with the production of the crops and market structure of the study area.

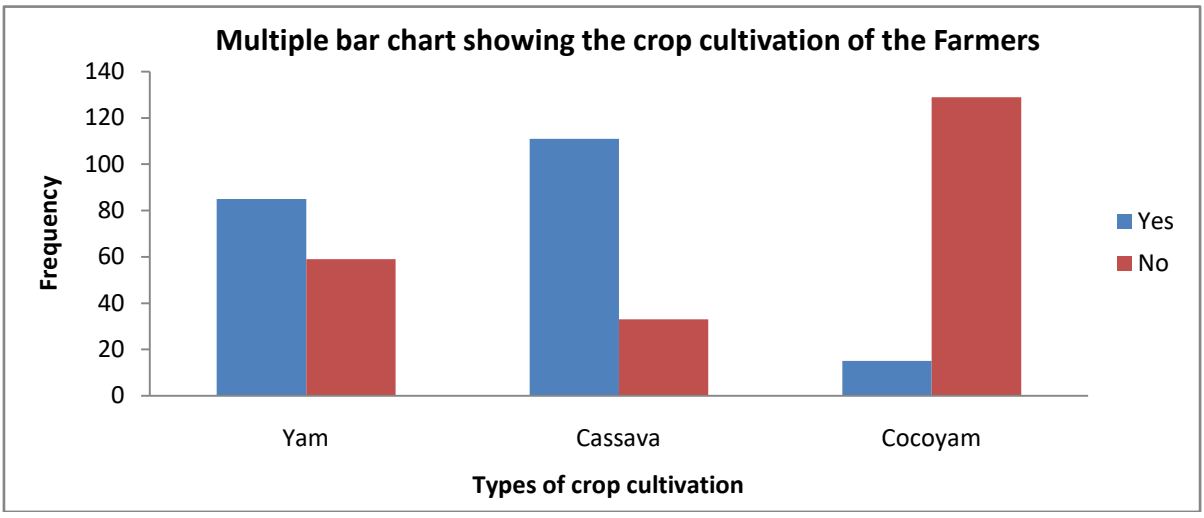


Figure 10: Frequency distribution of respondents according to Types of Crop Cultivated by the Farmers

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Table1: Socio-economic Characteristic of Root and Tuber Crops Farmers

Factor	Frequency	Percentage (%)
Age Group (years)		
21-30	6	4.2
31-40	32	22.2
41-50	50	34.7
51-60	38	26.4
61-70	18	12.5
Gender		
Male	107	74.3
Female	37	25.7
Marital Status		
Single	10	6.9
Married	132	91.7
Widow(er)	1	0.7
Divorced	1	0.7
Formal Education (years)		
(0 - 5)	13	9
(6-10)	77	53.5
(11-15)	43	29.9
(16-20)	11	7.6
Formal Education		
Vocational Education	27	18.8
Adult Literacy Education	29	20.1
No informal Education	88	61.1
Religion		
Christianity	105	73.9
Islam	39	27.1
Secondary Occupation		
Livestock	27	18.8
Food processing	16	11.1
Civil servants	21	14.6
Artisan	6	4.2
No	74	51.3
Family Size		
(0-5)	36	25
(6-10)	108	75
Farming Experience		
(1-10)	32	22.2
(11-20)	50	34.7
(21-30)	24	16.7
(31-40)	31	21.5
(41-50)	7	4.9
Yam		
Yes	85	59
No	59	41
Cassava		
Yes	111	77.1
No	33	22.9
Cocoyam		
Yes	15	10.4
No	129	89.6

Analyzed Field Survey Data, 2018

b) *Sources of Credit Available to Root and Tuber Crops Farmers*

According to figure 11 and table 2, the farmers in the study area source for credit from sources for financing their farm activities. A Large percentage (72.9%) of the tuber crop farmers are members of cooperative societies, therefore able to collect loans from this cooperative societies, while only 27.1% of the

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farmers did not source for credit from cooperative society. Only a few (21.5%) of the farmers get loans from commercial banks while a larger percentage (78.5%) did not apply for a loan in commercial banks. Only 13.9%, 14.6%, 25.7%, 29.2%, 3.5% and 25.0% of the farmers collect credit from National Agricultural Cooperative and Rural Development Bank (NACRDB), ATF, Special Programme for Food Security (SPFS), friends, money lenders and relatives respectively, while majority (86.1%, 85.4%, 74.3%, 70.8%, 96.5% and 75.0%) of them did not source for agricultural credit from these sources. This data showed that half (50.0%) of them gets their capital from group contributions (Esusu) while 50% percentage of the farmers in the study area did not source for farming credit from group contributions (Esusu).

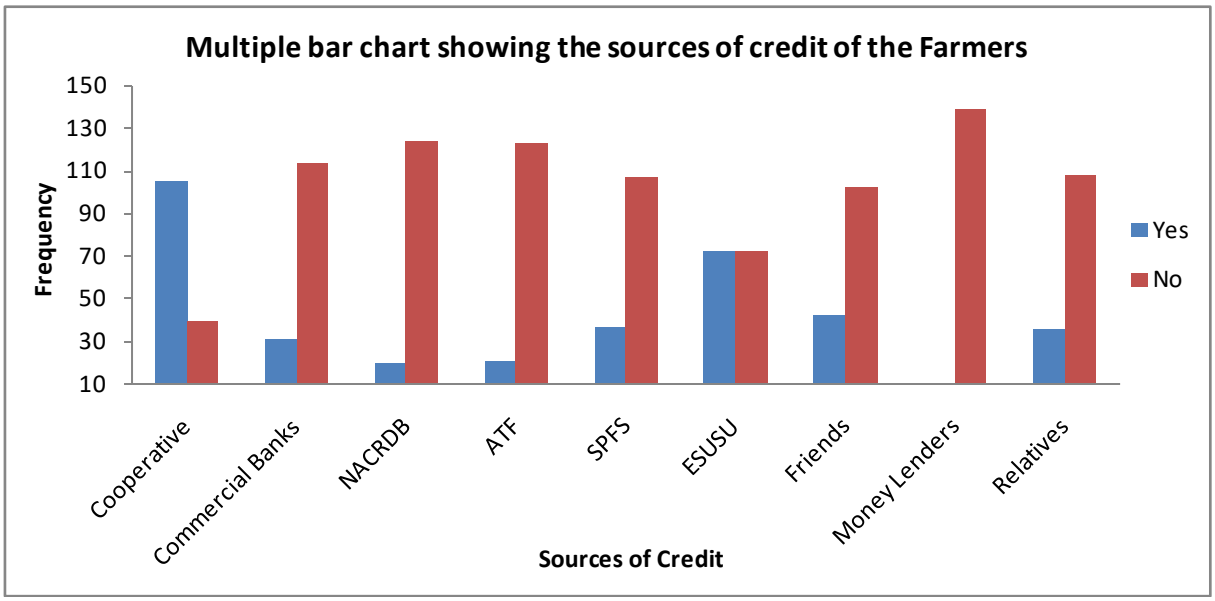


Figure 11: Frequency distribution of respondents according to Sources of Credit

Table 2: Sources of Credit Available to Root and Tuber Crop Farmers

Source	Frequency	Percentage (%)
Cooperative		
Yes	105	72.9
No	39	27.1
Commercial Banks		
Yes	31	21.5
No	113	78.5
NACRDB		
Yes	20	13.9
No	124	86.1
ATF		
Yes	21	14.6
No	123	85.4
SPFS		
Yes	37	25.7
No	107	74.3
ESUSU		
Yes	72	50
No	72	50
Friends		
Yes	42	29.2
No	102	70.8
Money Lenders		
Yes	5	3.5
No	139	96.5
Relatives		
Yes	36	25
No	108	75

Analyzed Field Survey Data, 2018

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c) *Conditions for Obtaining Credit among Root and Tuber Crop Farmers*

Based on figure 12 and table 3, A larger percentage (77.1% and 70.8%) of the root and tuber crop farmers acknowledged that being members of cooperative societies and farmers associations respectively are conditions to obtain credit. One-third (35.4%) of the farmers acknowledged ownership of collateral as condition to obtain credit will two-third (64.6%) of the farmers did not acknowledge ownership of collateral as condition to obtained credit. Moreover, only 41.7% of the farmers acknowledged participate in extension service as condition for obtaining credit.

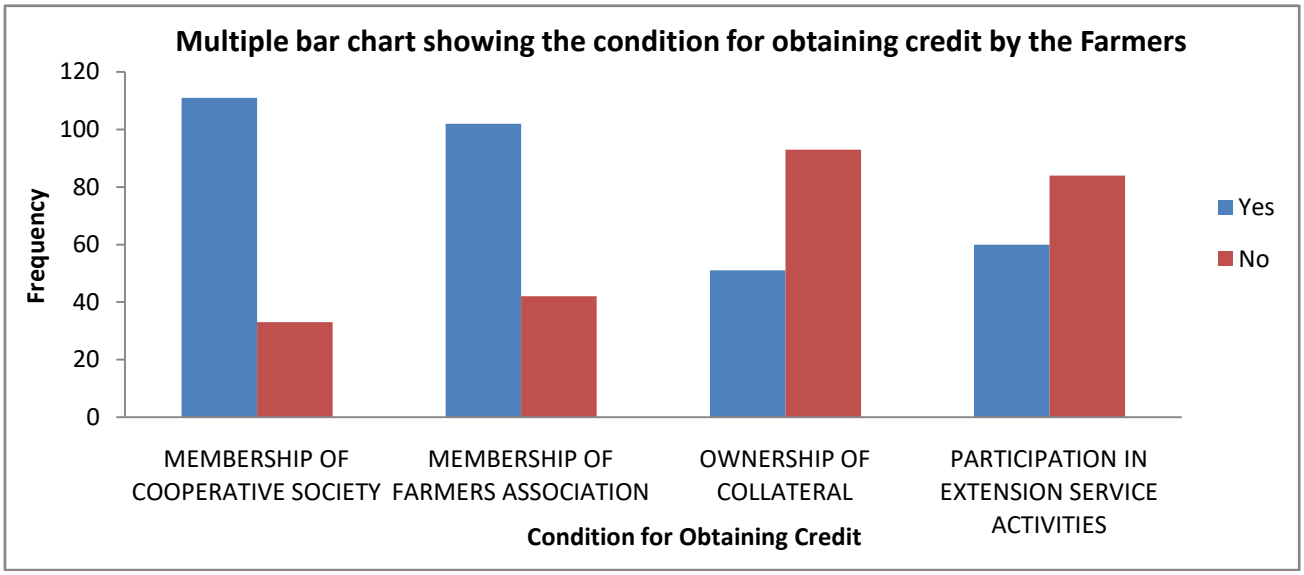


Figure 12: Frequency distribution of respondents according to Conditions of obtaining Credit

Table 3: Conditions for Obtaining Credit by Root and Tuber Crops Farmers

Condition	Frequency	Percentage (%)
Membership of Cooperative Society		
Yes	111	77.1
No	33	22.9
Membership of Farmers Association		
Yes	102	70.8
No	42	29.2
Ownership of Collateral		
Yes	51	34.4
No	93	64.6
Participation in Extension Service		
Yes	60	47.7
No	84	58.3

Analyzed Field Survey Data, 2018

d) *Factor Affecting Credit Repayment*

Logit regression analysis was carried out to determine factors that influence rural farmers' loan repayment in the study area. The result of the estimations of loan repayment is presented in table 5. Using SPSS software package, from table 1, the coefficient of determination (r^2 = 0.26) indicates that 26% of the variation in the value of all the explanatory variables (independent variables). Thus, this leaves only 74% of the variation in the dependent variable (credit repayment) to be explained by other factors. The test of significance helps to indicate the importance of the variables in explaining credit repayment by the tuber crop farmers. The variables used in the models include the followings: age, gender, marital status, secondary occupation, family size, farming experience, ownership of land, ownership car, farm machinery, storage system, low productivity, low demand for a product, health problem. From table 4 above, under exponential better (β) it can be observed that gender, marital status, secondary occupation, farming experience and storage system all have values less than one (1). This signifies that they all contribute to none repayment of credit. That is, the inability of the farmers to repay their respective loans. Logit regression estimated for the credit repayment showed that secondary occupation, family size, and farming experience are significant variables at 0.5 level of significance, while others did not contribute significantly to the credit repayment. Secondary occupation (X4) was found to have a negative sign and significant at 5% level on the agricultural credit repayment model. This means that farmers who have off-farm occupations have the chances of servicing and repaying a loan than their counterparts that depend on farming only. This finding is similar to the findings of Wongnaa and Awunyo-Vitor, 2013 from Ghana who found out that farmers who have access to off-farm income are 49.7% more likely to be able to repay their loans than yam farmers who depend solely on their farm income.

The study also showed that the family size (X5) of respondents in the study area is significantly related to the amount of credit repaid at 5% level. It bears a

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positive sign, which explains that a unit increase in family size decreases the cost of labour and increases the probability of loan repayment. This is in disagreement with the study of Haile, 2015 who found a negative relationship between family size and loan repayment performance in the Harari regional state, Ethiopia. Increasing farmers' household size by one person decreases the likelihood of been able to repay one's loan. This means that the smaller the size of the farm family, the higher the probability that farmers will be able to repay their loans and vice versa. This could have probably resulted from the fact that large household sizes increased the household head's domestic responsibilities and thereby constituted leakage to the household's income stream. As household income depleted the liability of the household increased, and there would be greater tendency to divert loans meant for production resulting in default in loan repayment (Ojiako et al., 2012). Another variable with significant positive influence on repayment capacity was the farming experience. Farming experience has a positive coefficient, and it is significant at 5% level. It explains that a unit increase in the year of farming experience increases the loan repayment ability of the farmers. This is in correlation with the study of Afolabi, 2010 who reported that positive effect of farming experience on loan repayment might be because the farmers are becoming more knowledgeable in farming practices which can increase their level of income and hence loan repayment capacity. The loan repayment capacity of farmers could increase with increases in the years of farming was not surprising. The implication was that as the farming experience years increased, they became more inclined toward commercialization and more likely to adopt improved technologies and farm management systems. This would lead to increase in their levels of efficiency and profitability and by extension capacity to repay the borrowed fund.

Table 4: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	52.629(a)	.261	.536

Table 5: Logit Regression of the Factors Affecting Loan Repayment

Factor		B	S. E.	Wald test Statistic	df	Sig.	Exponential Better (β)
Step 1(a)	Age (X1)	.076	.052	2.175	1	.140	1.079
	Gender (X2)	-1.309	1.214	1.164	1	.281	.270
	Marital Status (X3)	-1.671	1.410	1.405	1	.236	.188
	Secondary Occupation (X4)	-1.484	.552	7.231	1	.007	.227
	Family Size (X5)	1.968	.632	9.714	1	.002	7.159
	Farming Experience (X6)	-.237	.072	10.714	1	.001	.789
	Land (X7)	.295	.888	.111	1	.740	1.343
	Car (X8)	.236	1.022	.053	1	.817	1.266
	Farm Machinery (X9)	22.080	4918.124	.000	1	.996	3884284107.197
	Storage System (X10)	-2.572	1.481	3.018	1	.082	.076
	Low Productivity Due to Out Break of Pest and Diseases (X11)	1.443	1.570	.845	1	.358	4.232
	Low Demand for the Produce (X12)	1.551	1.846	.706	1	.401	4.715
	Health Problem (X13)	2.559	2.026	1.595	1	.207	12.926
	Constant (β_0)	-1.307	3.477	.141	1	.707	.271

IV. Conclusion

This study showed that majority of the root and tuber crops farmers that are loan beneficiaries in the study area were able to service and pay back their loans collected from various sources of getting agricultural credits. Logit regression analysis for the credit repayment showed that secondary occupation, family size, and farming experience are significant variables at 5% level of significance while other factors did not contribute significantly to the credit repayment. The credit institutions or lending agencies should make the agricultural credit and capitals accessible to these rural farmers, educate them through extension services to be able to properly used the loans for the purposes for which the loans were given. Farmers can be made to improve on their repayment of farm credit by adoption of income support measures which would serve as a panacea. Lending institutions should ensure that whoever they are lending to meets a minimum threshold in asset value before loans are accessed. This will also help in reducing loan defaulters. Farm records and income generated by these farmers who are loan beneficiaries should be used by the credit providers to assess the performance of farmers who utilized resources well for the provision of more agricultural credit for rural farmers. The credit providers and farmers should put in place while planning on the loan they want to obtain from any of these sources their repayment, and put your repayment plan and capability first, this is to ensure that they do not get indebted to these financial

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institutions and also be able to maximize the uses of the loan with great achievement. The study showed that improved access to credit facilities would improve farmers' production, their annual farm income, and well-being.

Conflict of Interest Statement

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of research reported.

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Camel Milk Marketing Channel Choices for Enhancing Competitiveness in Eastern Ethiopia: Multinomial Logit Approach

By Bedilu Demissie, Hussien H. Komicha, Adem Kedir & Sisay Asefa
University of Winnipeg

Abstract- Literature on camel milk market channel choices has been thin, especially in pro-poor pastoral/agro-pastoral area of sub-Saharan Africa, as a result its prudent to note that none of past studies identified factors affecting camel milk market channel choices in Eastern Ethiopia even though camel milk market access is pivotal to transform livelihood of people who live in arid and semi-arid areas of Ethiopia. Therefore, the study seeks to determine factors influencing camel milk marketing channel choice in Gursume and Babile districts of Eastern Ethiopia, with the aim of enhancing camel milk competitiveness. Data were collected from 92 camel milk producers' pastoral/agro-pastoralist by using two-stage stratified sampling. Multinomial Logit model was employed for analyzing data. Multinomial Logit model result indicated that, compared to assembler market channel outlet (base channel), the likelihood of accessing consumer market outlet was higher among pastoral/agro-pastoral who have higher educational level, better livestock extension services, better milk market information and higher income from none dairy source. The likelihood of accessing commission man milk marketing channel choice was higher for households who wanted better milk price offered by commission agent as compared to the base channel. Compared to accessing assembler market outlet, the likelihood of accessing retailer milk market outlet was higher for those who have better dairy extension services and for those who were far away from milk market.

Keywords: *camel milk, marketing channels, multinomial logit, pastoralist.*

GJMBR-B Classification: *JEL Code: M29*



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Camel Milk Marketing Channel Choices for Enhancing Competitiveness in Eastern Ethiopia: Multinomial Logit Approach

Bedilu Demissie [α], Hussien H. Komicha [σ], Adem Kedir [ρ] & Sisay Asefa [ω]

Abstract- Literature on camel milk market channel choices has been thin, especially in pro-poor pastoral/agro-pastoral area of sub-Saharan Africa, as a result its prudent to note that none of past studies identified factors affecting camel milk market channel choices in Eastern Ethiopia even though camel milk market access is pivotal to transform livelihood of people who live in arid and semi-arid areas of Ethiopia. Therefore, the study seeks to determine factors influencing camel milk marketing channel choice in Gursume and Babile districts of Eastern Ethiopia, with the aim of enhancing camel milk competitiveness. Data were collected from 92 camel milk producers' pastoral/agro-pastoralist by using two-stage stratified sampling. Multinomial Logit model was employed for analyzing data. Multinomial Logit model result indicated that, compared to assembler market channel outlet (base channel), the likelihood of accessing consumer market outlet was higher among pastoral/agro-pastoral who have higher educational level, better livestock extension services, better milk market information and higher income from none dairy source. The likelihood of accessing commission man milk marketing channel choice was higher for households who wanted better milk price offered by commission agent as compared to the base channel. Compared to accessing assembler market outlet, the likelihood of accessing retailer milk market outlet was higher for those who have better dairy extension services and for those who were far away from milk market. The study reveals to exploit the indigenous social capital of pastoral/ agro-pastoral to enhance milk marketing supply chain, in addition to strengthening the formal institution (such as education, livestock extension and develop milk collecting cooperatives) to increase the competitiveness of camel milk market in semi-arid areas of Ethiopia and sub-Saharan Africa in general.

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I. Introduction

Ethiopia is one of the richest countries in livestock inventory both regarding number and diversity. However, the benefit obtained from it is low as compared to other African countries. The livestock subsector comprised 24% of agricultural GDP between the year 1995/96 and 2005/06, and is a source of livelihood for 60 to 70% of the population (NBE, 2005/ 06), and accounts for about 12 to 15% of national export earnings (EEA, 2005). However, CPALD (2013) revealed that agricultural GDP calculations in Ethiopia underestimated the contribution of livestock to the Economy because the value of economic benefits that are derived from livestock power for farming and transport are not routinely included.

In arid and semi-arid parts of sub-Saharan Africa, pastoralism is a well-suited way of life. In Ethiopia pastoral area cover more than 62% of the national land area (EARO, 2003), which support about 9.8 million people of which 56% are pastoral, 32% are agro-pastoral and remaining 22% are urban dwellers (EEA, 2005). It contribute about 30% of the GDP and 90% of the hard currency from live animal export and employs about 27% of the national population (Amaha, 2003). However, this communities are marginalized and generally not given due consideration in wider socio-political analysis (Simenew et al., 2013) of the country relative to Highland area.

Camels live in the vast pastoral areas in Africa and Asia, Ethiopia stands third in camel population in Africa by possesses over 2.4 million dromedary camels (FAO, 2010), which is all owned by pastoral. In this harsh area, camels produce milk even during the dry season when milk from cattle is scarce (Bekeleet al., 2002), because of this outstanding performance pastoralists of eastern Ethiopia mainly rely on camels for their livelihood, without camel their life can be jeopardized. However, despite its significant contribution camel is one of the neglected domestic livestock by the scientific community in Ethiopia (Yesihak and Bekele, 2003), until recently. Even regarding camel milk, very little is known and understood about its marketing, despite its critical and increasingly relevant role for the pastoral/agro-pastoral food security (Nori, 2010).

Ethiopia produces about 75,000 tons of camel milk (Felleke, 2003). However, pastoralists have not economically benefitted to the extent they ought to from the milk produced (Bedilu et al., 2015) because their participation in market-led dairy development has not been widespread. Hence, increasing pastoral market participation as well as developing chain competitiveness and efficiency are valuable strategies for poverty alleviation and food security in arid and semi-

Author α ρ: Department of Agricultural Economics, College of Agriculture and Environmental Science, Arsi University.
e-mails: bediluzeleke@yahoo.com, billybedilu@gmail.com
Author σ: Department of Economics, University of Winnipeg, Winnipeg, Canada.
Author ω: Department of Economics, College of Arts and Sciences, Western Michigan University (WMU).

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arid part of Ethiopia. According to CSA (2015), for the year 2014, out of the total milk production only 6% was sold. This low volume of sale is attributed to market-related issues such as, low collaboration among dairy value chain actors, bargaining on price setting, weak market integration, forging forward and backward linkages, lack of relevant market information, lack of meeting the market quality and safety requirement (Andualem, 2015; Ketema et al., 2016), and lack of market-oriented production.

One of the necessary condition for producers to reap economic benefits is the provision of assured milk market outlets (Bardhan et al., 2012). However, scant attention has been given on analyzing the factors that determine dairy producers' channel choice (Berhanu et al., 2013), especially there have been relatively few studies to quantitatively asses milk market outlet issue (Falkowski et al., 2008), even though market access is one of the major limitations in harnessing opportunities in camel milk production, as camels live most of the time in remote area their milk accessibility could be difficult. The major camel milk marketing channels[1] through which pastoral and agro-pastoral of eastern Ethiopia can deliver their camel milk are consumer channel, assembler channel, retailer channel and commission agent channel.

To maximize the benefits that pastoral and agro-pastoral earn, they have to make an appropriate decision as to where and to whom they should sell their camel milk produce. Identifying these factors is very important regarding determining areas of interventions for effective policy formulations and to integrate pastoral and agro-pastoral into the modern marketing channels. Consequently, the research is aimed at providing an empirical basis for identifying camel milk market channel choices of pastoral/agro-pastoral. In doing so, the study attempts to contribute to filling the knowledge gap by assessing factors affecting camel milk market outlet choices in eastern Ethiopia.

II. Material and Methods

a) Topography and climate of the study region

The study was conducted in the arid and semi-arid area extending from Gursum to Babile districts of Hararghe zone, Oromia Regional State of Ethiopia, along the main road to Jijjiga having an area of 967.3 km^2 and 3022.2 km^2, respectively. The camel milk-shade extends from Dire Dawa to Harar to Jijjiga milk-shade, it is not only limited to Gursum and Babile districts.

Gursume and Babile districts are characterized by warm lowlands between 1200 m to 2950 m and 950 to 2000 m above sea level, respectively. The area has a good potential for camel and camel milk production, which is mainly commenced by pastoral and agro-pastoralists households of both Oromia and Ethio-Somali tribe. The districts livestock population comprises of 125, 996 cattle, 23160 sheep and 10936 camel (East Hararghe profile, 2009).

b) Source of data and sampling techniques

The field was conducted during 2012/13 year. Data collection focused on household heads, key informants, rapid market appraisal and focus group discussions. In addition to the primary data, different sources were used to collect secondary data. The selected districts and Peasant Associations (PAs) were selected as they were considered the milk-shade due to their potential for camel milk production and commercialization. Two-stage stratified sampling was employed to select the sample households (HHs). The base for stratification of sample household was milk production types as only camel, and both camel and cow milk producers as pastoralists and agro pastorals own only camel or else both camel and cow as their livestock herd. Based on the stratification, 53 and 40 households were selected from only camel, and camel and cow milk producers, respectively. Then using probability to proportional sample size sampling technique making the sample HH level 93 households.

c) Theoretical Framework

The study is based on the theory of rational choice, which is used in modeling economic behavior. The theory assumes that pastoralists and agro-pastoralists are rational, means they will rank alternative marketing channel outlets in order of utility subject to pastoralists socio-economic, demographic and institutional factors influencing the choice entrenched in each outlet. Hence, pastoralists'/agro-pastoralists' milk marketing channel outlets choice was conceptualized using the random utility model.

The pastoral and agro-pastoral of eastern Ethiopia were mapped into four marketing channel outlets: direct consumers, assembler, retailer and commission agents. The camel milk producer pastoral/ agro-pastoral i was able to choose from a set of alternative channels (j=1,2,3,4) (which provided a certain utility level U_{ij} from each alternative, by comparison on marginal benefit and costs based on the utility that will be gained by selling to particular camel milk marketing channel.

However, according to Green (2002), it is not possible to directly observe the utilities, but the choice made by pastoral/agro-pastoral revealed which marketing outlet provides the great utility. Hence, the utility was decomposed into deterministic V_{ij} and random ε_{ij} part:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

[1] Camel milk marketing channel is a sequence of milk marketing institutions from milk producers to final consumers, including pastoral/agro-pastoral milk producers, milk traders (such as assemblers, retailers, wholesalers etc.), brokers, commission agents and the final users of camel milk, who exist for their joint opportunity in the camel milk market.

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Since it was not possible to observe the random (ε_{ij}) and predict exactly the choice of camel milk marketing channel, the probability of any particular channel choice was used in which a pastoral/agro-pastoral selected a marketing outlet $j=1$ if:

$$U_{ij} > U_{ij} \ \forall_i \neq k \qquad (2)$$

Where U_{ik} represents a random utility associated with the market channel outlet $j=k$, V_{ij} represents an index function denoted the decision maker's average utility associated with this alternative and ε_{ij} represents the random error.

d) Methods of data analysis

Both descriptive and econometric tools were used to analyze the collected data. Descriptive statistical tools were used to explain the socio-economic, demographic and institutional characteristics of camel milk market participants. While Multinomial Logistic Model (MNL) was used to identify the determinants of camel milk market channel choice decisions (Berhanu et al., 2013; Xaba and Masuku, 2013; Mukiama et al., 2014; Bezabih et al., 2015; Riziki et al., 2015) of the sampled pastoralists and agro-pastoralists, because it is the standard method for estimating unordered, multi-category dependent variables. It also assumes independence across the channel choices, that is, it does not allow correlation between alternatives (Wooldridge, 2006).

The result revealed that households accessed milk market channel outlets such as individual consumers, assembler, retailer, commission agents and the combination of thereof. However, due to mutually inclusiveness of choices, fewer representation and similar collection and operation practices, only household who had access to individual consumer, assembler, retailer and commission agents camel milk market channels were considered in multinomial logit regression. Out of these channel choices, selling camel milk to assembler was taken as a base category against which other milk market channels are going to be compared. Following Green (2003), the Multinomial Logit model for multiple choice problems takes the form:

$$\Pr(y=j) = \frac{\ell^{\beta_j x_i}}{\ell^{\beta_o x_i} + \ell^{\beta_j x_i} + \ldots + \ell^{\beta_j x_i}} \qquad or$$

$$\Pr ob(y=j) = \frac{\ell^{\sum_{k=1}^{k} \beta_{jk} x_k}}{1 + \sum_{j=1}^{J-1} \ell^{\sum_{k=1}^{k} \beta_{jk} x_k}} \qquad (3)$$

Given Prob (y =1), where $j = 1,2,3, J-1$.

The parameter β has two subscripts in the model, k for distinguishing x variables, and j for distinguishing response categories. The subscript j indicates that there are J-1 for sets of β estimates. In other words, the total number of parameter estimates is $(J-1)k$. This implies that the sample size should be larger than $(J-1)k$.

To test the potential multicollinearity problem among discrete and continuous variable (Green (2002), variance inflation factor (VIF) and contingency coefficient (CC) among explanatory variables were tested, respectively. And it was found not to have any potential influence on estimates from the model. The econometric software STATA 13 is used to estimate the parameter coefficient and predicted marginal value.

e) Variable Hypothesis

i. *Dependent Variable*

Camel milk market channels or outlets are those pathways where camel milk produce passes through to reach the final consumer. According to the consumer theory, camel milk producers are expected to choose the best channel through which they sell their camel milk depending up on various criteria. The prevailing alternative camel milk marketing channels for the sampled households include Direct to Consumer, Assembler, Retailer and Commission agent. Of which the base category is Assembler Channels only because this channel was chosen by most of the pastoral/agro-pastoral households to trade their camel milk.

Consequently, the dependent variable for the model is discrete variable taking a value of 1, 2, 3, and 4 representing the channel choices, where 1 represents selling camel milk through consumer channel; 2 represents selling camel milk through assembler channel; 3 representing selling camel milk though retailer channel; and 4 represents selling camel milk through commission agent channel.

ii. *Independent Variables*

Based on earlier works (Alemu et al., 2012; Berhanu et al., 2013;Xaba and Masuku, 2013 ; Mukiama et al., 2014; Bezabih et al., 2015; Geoffrey *et al.,* 2015; Moturi et al.,2015; Mutura et al., 2015; Riziki et al., 2015; Frank et al., 2017) and observations during field survey in arid and semi-arid area of eastern Ethiopia, the pastoral/agro-pastoral households' decision to choose a particular camel milk market channel depends on socio-economic, institutional and demography variables. The expected effects of each of these variables are summarized as follows in Table 1. The following variables were used as an independent variable: Age of the household head (AG_HH), Educational level of household head (EDL_HH), Household members under 5 years (HH_MM5_YR), Experience in livestock Production (EXP_LIV_PRO), Livestock extension service (LV_ESV), Distance to near dairy milk market (DS_MLK_MRK), Number of milk camel own (N_MIK_CAM), Milk market information (MRK_IFF), Quantity of milk sold (Q_MIK_SOLD), Income from non-dairy source (IN_NOND) and Family size (FS_HH).

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Table 1: Description of the independent variables used in the logistic regression model

Independent Variable	Type	Value	Hypothesis
AG_HH	Continuous	Number of years	+
EDL_HH	Continuous	Years of schooling	+
EXP_LIV_PRO	Continuous	Years	+
HH_MM5_YR	Continuous	Number	-
LV_ESV	Dummy	1=Yes, 0=No	+
DS_MLK_MRK	Continuous	Kilometer	-
MRK_IFF	Dummy	1=Yes, 0=No	+
N_MIK_CAM	Continuous	Number	+
Q_MIK_SOLD	Continuous	Liter	+
IN_NOND	Continuous	Birr	+
FS_HH	Continuous	Adult Equivalent	-

III. Results and Discussion

Camel milk is the vital part of a diet for pastoralist of eastern Ethiopia, especially during the drought period when pasture is scant, and it produces milk when milk from cattle is scarce (Bekele et al., 2002). In the study area camel milk is consumed mostly as a raw state, milk tea, and in the form of fermented milk without adding any value to the camel milk, because of the limited ability of camel milk to be coagulated by enzymes, due to the composition of the casein micelles (Zubeir and Jabreel, 2008). However, a small amount of milk produced in the study area is subject to butter and cheese processing by mixing it with goat and cow milk based on their endogenous knowledge, the result is in agreement with the finding of Yagil (1982). Nevertheless, it is possible to processes camel milk into cheese using Camifloc and calcium chloride (Khan et al., 2004; Zubeir and Jabreel, 2008) to preserve camel milk and create potential trade to camel keepers in semi-arid and arid areas of Eastern Ethiopia, as it can help to improve pastoral/agro-pastoral economic condition by finding a proper market for camel milk cheese, especially by exporting to Europe (Saima et al., 2003).

a) Composition and physical characteristics of camel milk

Dromedary camel milk composition is excellent in from nutritional view point (Sisay and Awoke, 2015) as it has valuable nutritional properties as it contains a high nutritional value, with vitamin C, which is three times greater than the cow's milk, iron content ten times and B vitamins present in reasonable amount (Arrowal et al.,2005). In addition to that, cow milk tends to make people fat, causing obesity but camel milk gives strength, endurance, and stamina, and attribute that pastoralists need in order to pursue a nomadic life style (Sisay et al., 2015). However, the camel milk has not been given as much attentions in research and development as the cow milk, especially in Eastern Africa.

b) Camel milk market participation by sample pastoralist and agro-pastoralists

The average milk yield per day per camel was estimated to be 4.8 liters under the desert condition for the study area. The study spotlighted that, the total camel milk produced per day in the study area was estimated to be 1720.25 liters or 12041.75 liters of milk per month, and the average milk yield per lactation per head was found to be 1391.23 liters. The study reveals that all of the camel dairy owned by sampled respondents were found to be local breeds, which are low in milk productivity as compared to Israel's' dairy camels which yield 20 liters a day or more (Yagil et al., 1994).

Out of the total sampled household, 98.9% of sampled camel milk producers were found to participate in milk marketing. The share of camel milk sold by sample producer was 77.76%, and the mean milk production per day per dairy household during the survey period was found to be 18.48 liter, by revealing that the study area has high potential of commercialization if due attention is given regarding market-oriented milk production and liking farmers with modern market which is based on consumer needs to increase the competitiveness of camel milk in the study area specifically and in sub-Saharan African generally.

c) Market characteristics in relation to market outlets

The study reveals that most of the sampled households (35.87%) sell camel milk though the assembler channel outlet. Next, to the assembler, 29.35% of the sampled households sell their camel milk produce through direct consumer channel. The remaining pastoralists and agro-pastoralists sell their camel milk though retailer (18.49%) and commission agent (16.3%) marketing channel. In Easter Ethiopia, camel milk producers supply milk as a household and by forming informal groups of women locally called '*affosha*[2]' and the other social institution in the camel milk marketing is personalized method of economic exchange called '*maamilla*' which is based on a supplier and buyer trust-based relationship that

[2] '*Affosha*' is informal group of women who group themselves up to ten persons together to market camel milk by round up to same amount as they were agreed, especially pastoral/agro-pastoral who produce small amount of came milk use such informal grouping mechanism to reduce the transaction cost associated with selling small amount of milk at distance milk market.

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is developed from a regular exchange of camel milk with each other.

Nearly all of the camel milk trader's (especially, rural assembler and retailer) in the study area were females, this result is consistence to Nori (2012) who revealed that camel milk is predominantly marketed by women in Puntland, Somali, implying that increasing the competitiveness of the camel milk though value addition in Eastern Africa would have high importance at enhancing female milk traders empowerment, food security and poverty alleviation in arid and semi-arid parts of sub-Saharan Africa.

The mean household characteristics by camel milk market outlets are provided in Table 2. The mean age of market participant pastoralist and agro-pastoralist who used the consumer, assembler, commission agent and retailer market as marketing outlet had 41 years, 43 years, 46 years and 46 years, respectively. This implied that those respondents who sold their camel milk to the consumer were slightly younger than those who sold at the other channels. This reveal that younger people tend to market their produce at distance urban markets to reap the full benefit of price margin which goes to milk marketing middleman, even by taking the risk and transaction cost associated with trading milk in the urban market as selling camel milk via profitable channels can lead to investment in productive assets and new agricultural technology (Jensen, 2010).

Households with few numbers of children below five years old marketed their camel milk though consumer milk marketing outlet, other than assembler, commission agent and retailer because as the number of children below five years old reduce the time allotted to market milk at distance urban markets would be better off. The mean dairy farming experience was highest for pastoralist and agro-pastoralist who had access to assembler, retailer and commission agent milk market channel outlet, with 43 years, 46 years and 46 years, respectively. The main reason for this is that, most of the experienced camel milk producers had informal business tie with the milk purchaser locally called '*maamilla'* which mean customer. Most of the time experienced dairy producers do not sell camel milk unless the buyer is their customer, as this experienced dairy producers also market their camel milk in return to sugar and salt with their '*maamilla'*, and even at credit base.

The average distance traveled to the nearest urban milk market was lowest to households who had access to direct consumer channel outlet (13 km), compared to pastorals/agro-pastorals supplying to retailers outlet (20 km) and commission agent outlet (26 km). This reveals that most of the time commission agent collect camel milk from pastorals and agro-pastoralist who residence is far from town as wholesalers own track to collect and transport the camel milk to Somali land. Moreover, the research pinpointed that, the average price offered by commission agent market outlet was 5.59 Ethiopia Birr per liter, which is higher than the price offered by other market outlets as commission agent purchase camel milk in large quantity and good quality, which would be exported to Somali land.

Table 2: Mean household characteristics by camel milk market outlets

Variables	Consumer	Assembler	Commission Agent	Retailer
	Mean	Mean	Mean	Mean
Age	41(9.7)	43 (11)	46 (13.7)	46 (16.6)
Children's (<5 years)	1(1.2)	2 (1.8)	2 (1.3)	2 (1)
Experience	18(13.4)	21 (15)	24 (15)	25 (17)
Distance	13(6.8)	13 (11)	26 (18)	20 (10)
Number of milk camel	6 (1.14)	15 (2.4)	13 (2.7)	8 (1.8)
Quantity of milk sold	10(9.6)	21 (15)	24 (21)	12 (12.7)
Income from non-dairy	6038(6369.3)	6494 (12057)	1384 (2448.8)	2822 (3380)
Family size	7(3.3)	8 (5)	8 (4.5)	7 (3)
Selling price/liter	5.38 (0.15)	4.88 (0.15)	5.59(0.19)	4.93(0.2)

Source: Field data analysis, 2012/2013

The mean dairy camel ownership of households who had access to consumer, assembler, commission agent and retailer milk market outlets was 6, 15, 13 and 8 numbers, respectively. This reveals that households that owned a large number of dairy camels accessed assembler and commission agent milk market outlet because of the two-channel purchases a large amount of camel milk, especially the commission one because the camel milk purchased by commission agent is supplied to wholesalers who export camel milk to Somali land. The same holds for the quantity of camel milk sold, as we can observe that the largest amount of camel milk quantity was sold at commission agent milk market and assembler milk market channel with the mean value of 24 liters and 21 liters, respectively. The lowest quantity of camel milk was supplied to consumer milk market channel outlet with the mean value of 6 liters.

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Households with high income tend to sell their camel milk to assembler and the consumer channel outlet, with the mean value of 6494 and 6038 Ethiopia Birr, respectively. Households with lower income from nondairy source choice to sell their milk at the commission agent and retailer marketing channel outlet with the mean value of 1384 and 2822 Ethiopian Birr, respectively. The mean family size by camel milk market outlets was 7, 8, 8, and 7 with individual consumer, assembler, commission agent and retailer, respectively. The mean household size for households who accessed consumer and retailer milk market outlet was higher than the mean household size reported by Berhabu et al., (2013) for Woliata zone cow milk-shed.

The proportion of household characteristics by camel milk market outlets is given in Table 3. In term of education level, the result indicates that out of the educated respondents the market participants who used the consumer, assembler, commission agent and retailer channel outlet were 51.85%, 22.22%, 7.41% and 18.52%, respectively. It is evident that camel milk participants who sold their milk at consumer outlet had a higher percentage than others channel outlet, this was because of the fact that education enhanced milk market participant ability to perceive the high level of returns from urban milk market. Hence, there is a need to improve the dairy farming pastoralists educational level to enable them to make an informed decision on camel milk marketing channel outlet they choice.

Table 3: The proportion of household characteristics by camel milk market outlet

Variables		Consumer	Assembler	Commission Agent	Retailer
		Percentage	Percentage	Percentage	Percentage
Education status of HH	Uneducated	20	41.54	20	18.46
	Educated	51.85	22.22	7.41	18.52
Access to livestock Extension	Yes	37.5	21.88	9.38	31.25
	No	25	43.33	20	11.67
Access to milk market information	Yes	36.62	30.99	15.49	16.9
	No	4.76	52.38	19.05	23.81

Source: Field data analysis, 2012/2013

Out of the households who had access to livestock service 37.5%, 21.88%, 9.38% and 31.25% of households had accessed individual consumer, assembler, commission agent and retailer camel milk market outlets, respectively. In terms of milk market information, the result reveals that out of the sampled respondents who have milk market information 36.62%, 30.99%, 15.49% and 16.9% sold their milk at consumer, assembler, commission agent and retailer market outlet, while out of sampled respondents who had no market information only 4.76% sold their milk at consumer channel outlet. This reveals that the majority of market participants who sold at urban market directly to consumers had access to price information.

d) Determinants of Camel milk market channel choice

Out of eleven variables hypothesized to influence camel milk market channel choice, six variables were found to be significant. Table 4 presents the Multinomial logit estimates for the hypothesized variables.

Education status of the household head was positively related to a household choice of consumer channel outlet over assembler dairy marketing channel, at 5% significance level. This reveals that education increased the household likelihood of selling its camel milk through the consumer outlet over the assembler by 29.5 percent. This result is in agreement with the finding of Mamo and Degnet (2012), who revealed that educated farmers preferred selling to an actor that offered better prices.

Having access to livestock extension services is significantly associated with high probability of selling camel milk to the retailer channel as opposed to assembler channel. The possible explanation could be retailer supply camel milk to hotels, restaurants, and urban consumers with good quality. Only pastoralist and agro-pastoralist who had training on camel milk handling through extension services were able to sell their camel milk through retail channel over assembler channel. The marginal effect shows that the likelihood of accessing retailer milk market outlet increases by 35.5% as compared with assembler milk market outlet for one more member access to livestock extension services.

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Table 4: Multinomial logit estimates and marginal effects for factors influencing the choice of marketing channels

Explanatory Variable	Direct to Consumer		Commission Agent		Retailer	
	Coef.	dy/dx	Coef.	dy/dx	Coef.	dy/dx
AG_HH	0.015	0.002	0.022	.0009	0.038	0.005
EDL_HH	1.774**	0.295**	0.014	-0.053	0.575	-0.002
HH_MM5_YR	-0.542	-0.072	-0.117	0.006	-0.248	-0.017
EXP_LIV_PRO	-0.009	-0.0005	0.011	-0.0006	0.014	-0.002
LV_ESV	1.893**	0.138	0.523	-0.057	2.562***	0.355***
DS_MLK_MRK	0.006	-0.005	0.096***	0.007*	0.1**	0.015**
N_MLK_CAM	-0.138*	-0.015	-0.975	-0.004	-0.105	-0.01
MRK_IFF	3.092***	0.296***	0.413	-0.006	0.244	-0.049
Q_MIK_SOLD	-0.028	-0.004	0.049	0.006	0.024	-0.004
N_NOND	0.0013*	0.00003***	-0.003*	0.00003***	-0.0005	-7.74e-06
FS_HH	-0.708	-0.016	0.12	0.012	0.06	0.104
_cons	-2.343		-3.463		-3.305	
Number of obs.=92						
LR chi2(33)=81.80						
Prob> chi2=0.0000						
Pseudo R2=0.333						
Log likelihood= -81.945						

Source: field data analysis, 2012/13

Contrary to the expectation, *distance to market* positively influenced the likelihood that sampled pastoral and agro-pastoral will choose commission agent and retailer over the base channel outlet (assembler) at 0.7% and 1.5%, respectively. A plausible explanation for this is that household who were far from market places preferred to sell their camel milk to commission agents because commission agents collect milk from distance place. The results are consistent with findings by Moturi et al., (2015).

There was a positive relationship between choice of direct consumer market channel and access to market information. The result of the study reveals that access to market information increased the household likelihood of selling its camel milk through the direct consumer outlet over assembler by 29.6 percent, it is significance at p-value of 1 percent. The finding is in line with that of Geoffrey (2015), who revealed that increase in price information had a positive influence on the choice of selling pineapple the local market channel.

Income from nondairy source is significantly associated with a high probability of choosing direct consumer and commission agent market as compared to selling to assembler channel. The probability of choosing direct consumer and commission agent milk market channel as opposed to selling to assembler channel increases for every unit increase in the household nondairy income by 0.003% for both consumer and commission agent channel over the assembler channel outlet, it was highly significant at 1% level for both channels.

IV. Policy Implication

Using household data from Ethiopia, we have examined pastoral and agro-pastoral milk market channel choice to sell their camel milk, and based on the study result the following policy implications were forwarded for future intervention to improve the camel milk market in Eastern Ethiopia.

In the study area camel milk marketing lack inadequate horizontal and vertical integration among pastoralists and agro-pastoralists milk producers, milk assemblers, retailers, and commission agent. Sampled pastoral and agro-pastoral households supplied their milk through traditional marketing channels such as assembler channel (35.87%), direct consumer channel (29.35%), retailer channel (18.49%) and commission agent channel (16.3%), even though pastoral and agro-pastoral have social capital which is based on informal collective action institutions. However, though exploiting the indigenous knowledge of eastern Ethiopia pastoralists and agro-pastoralists such as "*affosha*", (informal types of group which supply camel milk to one another by grouping themselves up to 10 persons) and "*maamilla*" (customer based camel milk selling) it would be easy to cording and form horizontal and vertical integration among the pastoralists to enhance institutional arrangement which is based on endogenous knowledge of the pastoralist society. As organizing such informal institution into formal one such as cooperative and modern marketing channel have a great advantage to attaining competitive edge by forming a strategic alliance in the camel milk marketing channel.

As most of the milk trader who operates in all milk market outlets are females, improving milk trading practice through vertical and horizontal linkage based on endogenous knowledge would empower the female milk trader and enhance their capacity, especially the value addition one. Therefore there is a need to develop gender smart intervention approach to consider gender as a core process in the camel milk value chain, as such

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intervention brigs gender gap in the arid and semi-arid area of eastern Ethiopia.

Despite the lack of coordinated marking channel in the study area, the assemblers channel has remained the most prevalent marketing channel for the sampled pastoral and agro-pastoral households. Hence, it would be important to enhance the existing tradition marketing channel into better existing profitable market channel, i.e. in our case to the direct consumer channel and commission agent channel to empower the pastoralist and agro-pastoralist camel milk producers and to reduce poverty.

The Multinomial logit model result reveals that compared to accessing assembler milk market channel outlet, the likelihood of accessing direct consumer market outlet was higher among educated households, as educated farmers preferred to sell to an actor that offer a better price. The likelihood of accessing retailer market channel outlet was higher for households who had access to livestock extension serves over the assembler channel outlet. The possible explanation could be as retailer supply camel milk to hotels, restaurants and urban consumers at good quality, respondents who gone training on camel milk handling though training services were able to sell their camel milk. Compared to accessing the assemblers milk market channel outlet the likelihood the respondents choose commission agent and retailer outlet increases by 0.7% and 1.5%, respectively. A plausible explanation is that, household who were far from market place had not alternatives rather than selling to commission agent. The other factors which affected, milk market channel choice by sampled respondents were income from nondairy source and market information. The result of the study reveal that, access to market information increased the household likelihood of selling its camel milk through the direct consumer outlet over assembler by 29.6 percent. Therefore, as one of the key factor to boost camel milk market outlet choice, dairy extension services, camel milk collection center at distance place, information dissemination through formal source should be strengthened.

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Aggregate Consumption Expenditure and Economic Growth: Evidence from Bangladesh

By Sima Rani Dey & Mohammed Tareque, Ph.D (Boston)
Bangladesh Institute of Governance and Management (BIGM)

Abstract- This paper attempts to investigate the relationship between aggregate consumption expenditure and economic growth of Bangladesh using the ARDL Bounds Test approach. The study reveals that consumption expenditure and GDP have a significant impact on each other. Granger non-causality test also has been carried out, and the test reveals that unidirectional causal relationship is running from aggregate consumption expenditure to GDP. Bilateral causality exists between GDP and capital investment. The findings suggest that consumption enhancing fiscal and monetary policies can also boost the economic growth in the context of Bangladesh. That's because Bangladesh is still operating on the relatively flatter part of its long-run supply curve.

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Aggregate Consumption Expenditure and Economic Growth: Evidence from Bangladesh

Sima Rani Dey [α] & Mohammed Tareque, Ph.D (Boston) [σ]

Abstract- This paper attempts to investigate the relationship between aggregate consumption expenditure and economic growth of Bangladesh using the ARDL Bounds Test approach. The study reveals that consumption expenditure and GDP have a significant impact on each other. Granger non-causality test also has been carried out, and the test reveals that unidirectional causal relationship is running from aggregate consumption expenditure to GDP. Bilateral causality exists between GDP and capital investment. The findings suggest that consumption enhancing fiscal and monetary policies can also boost the economic growth in the context of Bangladesh. That's because Bangladesh is still operating on the relatively flatter part of its long-run supply curve.

I. Introduction

Economic growth is believed to be encouraged when there is incentive to investment; technological frontier expands, human resources improve and fewer barriers for the entrepreneurs. Therefore, economic policies that focus on supply side should be encouraged. However, on the other hand, Keynesian economists believe that a fiscal stimulus to enhance consumption would lead to an increase in aggregate output. Whatever, the traditional Keynesian theory suggests that an increase in consumption expenditure would have the multiplier effect on the real GDP[1].

Paul Krugman (2015) opined that 'not only supply creates its own demand; experience since 2008 suggests, if anything, that the reverse is largely true - specifically, that inadequate demand destroys supply'. In fact, Yegorov (2015) emphasized on the contribution of population density in any economy which is a major source of demand in reality. So, economies with persistently weak demand (low population density) seem to suffer large declines in potential as well as actual output.

Over past decades, several studies have been carried out to examine the interrelation between consumption expenditure (mostly public expenditure) and economic growth. Few types of research also attempted to highlight their causal relationship in the short run and long run for Bangladesh (Amin, 2011; Mahmud and Ahmed, 2012; Nguyen, 2015). These studies might have importance on many grounds, but yet no study has been assessed the linkage between final consumption expenditure[2] and economic growth considering the effect of control variables as well as measured the short run and long run elasticities based on recent data of Bangladesh.

This paper tries to see the relationship mainly between final consumption expenditure and GDP within a multivariate model. But it also looks into the long run equilibrium relationship along with the causal relationship between these two variables and their elastic impact on each other. Also, two dummies are incorporated to capture the effect of two significant shocks as well such as 1988's and 1998's flood in Bangladesh as internal shock and 2008's Lehman Brothers worldwide recession shock as the external shock.

Thus this paper is organized as follows: starting with the introduction, Section 2 mentions the motivations of our study and Section 3 describes literature review. Section 4 focuses on econometric methodology, and Section 5 contains data description and their properties. Section 6 analyzes the empirical results, Section 7 concludes and, finally, Section 8 suggests policy implications of the study.

II. The Motivation for the Study

Bangladesh is the fastest growing economy in South-Asia and moving very fast towards middle-income country. Last 3-4 years GDP growth (6–7 percent per annum) as well as the growth of our last decade confirms the reflection of this phenomenon. To inspect the reason behind this high and stable economic growth, I feel motivated to study the influencing factors of our developing economy. In Bangladesh, final consumption expenditure comprises almost 70% of GDP[3], which is not common in other countries economy. So sustainability of consumption expenditure to induce the GDP growth seems very important. Bangladesh's population is about 160 million and, this population dividend helps to create massive demand of

Author α: Sima Rani Dey, Assistant Professor, Bangladesh Institute of Governance and Management (BIGM). e-mail: simabd330@gmail.com
Author σ: Mohammed Tareque, Director, Bangladesh Institute of Governance and Management (BIGM). e-mail: mtareque03@gmail.com

[1]Theoretically, it is already established that the multiplier effect depends on crowding effect of the expansionary fiscal policy.

[2] Sum of household final consumption expenditure and general government final consumption expenditure.

[3] According to World Bank collection of development indicators (2016).

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consumption. The author deployed sophisticated econometric tools to check the statistical significance of final consumption expenditure in driving GDP growth.

III. Literature Review

In the last decades, several empirical works have been undertaken on consumption expenditure and economic growth. Among them, most of the studies emphasized on the government consumption expenditure on GDP as well as energy consumption expenditure on GDP using time series data of a single country and panel data of cross countries. Ram (1986), Ahsan et al., (1989), Holmes and Hutton (1990a) observed that public expenditure expansion had a significant effect on national income growth. Similarly, Landau (1983, 1986) and Barth et al., (1990) concluded that public expenditure expansion had significant effect on national income growth for both developed and less developed countries. Kolluri et al., (2000) examines Wagner' s Law of Public Expenditure using time series data drawn from the G7 industrialized countries which provides evidence on both the short-run and long-run effects of growth in national income on government expenditure.

Samudram et al., (2009) investigates the Keynesian view and the Wagner's Law on the role of public expenditure on economic growth for Malaysia (1970–2004) using the Auto Regressive Distributed Lag (ARDL) model. Their result supports both Keynes view[4] and Wagner's Law[5]. Ebaidalla (2013) determined the nature and direction of causality between government expenditure and national income in Sudan using Granger causality test and supported the Keynesian proposition. Singh and Sahni (1984) neither confirm the Wagnerian nor the Keynesian view.

Mishra (2011) attempted to investigate the dynamics of the relationship between real consumption expenditure and economic growth in India and confirms the existence of unidirectional causal relationship which runs from real private consumption expenditure to economic growth in the long-run but no short-run causality. However, Amin (2011) revealed unidirectional causality from economic growth to consumption expenditure that indicates consumption is the result rather than the cause of growth for Bangladesh. The researcher used Johansen cointegration test and ARDL estimation technique to investigate the annual data of Bangladesh from 1976-2009.

Dogan and Tang (2006) aimed to find out the direction of causality between national income and government expenditures for Indonesia, Malaysia, Philippines, Singapore, and Thailand using Granger causality tests. Unidirectional causality evidence (running from government expenditure to national income) has been found only in the case of Philippines. But there is no evidence for this hypothesis and its reverse for other countries. Chimobi (2009) tested for the direction of causality between government expenditure and national income using annual data from 1970-2005 employing cointegration test and Granger causality test. The study also reveals no long-run relationship between the variables but unidirectional causality from government expenditure to national income in Nigeria.

Cheng and Lai (1997) attempted to determine the causality between government expenditure and economic growth along with money supply by applying VAR techniques to single country data from 1954-94. Their study finds bidirectional causality between government expenditures and economic growth in South Korea. Sakthivel and Yadav (2007) explored bidirectional causality between public expenditure and national income as well for India. From the above narrative, it appears that the number of research study so far conducted in particular, on this issue is very much scanty in context of Bangladesh.

IV. Model Specification

In an attempt to investigate the association between final consumption expenditure and economic growth of Bangladesh, our study adapts popular Keynes theory. According to the Keynesian model, consumption is a function of income which is as follows:

$$Consumption = f(GDP, Deposit\ Interest\ rate, Internal\ shock, External\ shock)$$

$$GDP = f(Consumption, Investment, Internal\ shock, External\ shock)$$

Since GDP is not a sole component to affect consumption so, consumption function also considered the influence of deposit interest rate. This study is also trying to look into the relationship of GDP with consumption expenditure and capital investment.

So, our targeted log-linear form of consumption expenditure and GDP equations can be expressed as

$$LCE_t = \alpha_0 + \alpha_1 LY_t + \alpha_2 LDR_t + \alpha_3 ID_t + \alpha_4 ED_t + \varepsilon_t \quad \cdots \quad (1)$$

$$LY_t = \alpha_0 + \alpha_1 LCE_t + \alpha_2 LI_t + \alpha_3 ID_t + \alpha_4 ED_t + \varepsilon_t \quad \cdots \quad (2)$$

[4] Public expenditure is seen as an exogenous factor, which can be used as a policy instrument to influence growth.

[5] And Public expenditure is seen as an endogenous factor or as an outcome, not a cause of growth in national income.

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Where, α_0 is the intercept; CE is the final consumption expenditure; Y is real GDP; CI is the capital investment; DR is the deposit interest rate; ID and ED are the two shocks; ε_t is error term. Expected signs of the equation variables are: $\alpha_1 > 0, \alpha_2 < 0$ (Eq.1); $\alpha_1 > 0, \alpha_2 > 0$ (Eq. 2); and $\alpha_3 < 0, \alpha_4 < 0$ (Eqs. 1-2). All variables are in real and natural logarithm form.

V. Econometric Methodology of the Study

Following econometric theory, firstly author conducted the stationarity test of the time series data[6]. The equation of ADF test can be formulated as follows:

$$\Delta y_t = \mu + \beta_t + \delta y_{t-1} + \sum_{j=1}^{k} \alpha_j \Delta y_{t-j} + \varepsilon_t$$

Where, Δ is the difference operator, t is the time trend, ε is the error term, y_t is the series and, k is the lag. PP test has the same null hypothesis as ADF, and its asymptotic distribution is the same as the ADF test statistic.

A multivariate framework is used in this paper to study the relationship between aggregate consumption expenditure and economic growth. Above two equations Eq. (1-2) are tested separately using modern cointegration based on Autoregressive Distributed Lag (ARDL) "Bound Test" approach introduced by Pesaran and Shin (1999) and Pesaran et al. (2001) to analyze long-run relationship[7]. Autoregressive Distributed Lag (ARDL) model is also helpful to identify the cointegrating vector(s) and if identified, then reparameterized into ECM that ECM result gives short-run dynamics. Appropriate modification of the orders of ARDL model is sufficient to simultaneously correct for residual serial correlation and problem of endogenous variables (Pesaran and Shin, 1999).

In ARDL cointegration technique, we determine the existence of long-run relationship between the variables at first. Then the short and long-run parameters are estimated in the next step. The bound test approach is merely based on an estimate of unrestricted error-correction model (UECM) by using ordinary least squares (OLS) estimation procedure. The UECM is a simple reparameterization of a general autoregressive distributed lag (ADL) model. The consumption Eq. (1) can be expressed in the UECM version of ARDL model as follows:

$$\Delta LCE_t = \alpha_{11} + \alpha_{12} LY_{t-1} + \alpha_{13} LDR_{t-1} + \alpha_{14} LCE_{t-1} + \sum_{i=0}^{n1} \beta_{1i} \Delta LY_{t-i} + \sum_{i=0}^{n2} \gamma_{1i} \Delta LDR_{t-i} + \sum_{i=1}^{n3} \delta_{1i} \Delta LCE_{t-i} + \alpha_{15} ID_t + \alpha_{16} ED_t + \varepsilon_{1t} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (3)$$

$$\Delta LY_t = \alpha_{11} + \alpha_{12} LY_{t-1} + \alpha_{13} LDR_{t-1} + \alpha_{14} LCE_{t-1} + \sum_{i=1}^{n1} \beta_{1i} \Delta LY_{t-i} + \sum_{i=0}^{n2} \gamma_{1i} \Delta LDR_{t-i} + \sum_{i=0}^{n3} \delta_{1i} \Delta LCE_{t-i} + \alpha_{15} ID_t + \alpha_{16} ED_t + \varepsilon_{2t} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (4)$$

$$\Delta LDR_t = \alpha_{11} + \alpha_{12} LY_{t-1} + \alpha_{13} LDR_{t-1} + \alpha_{14} LCE_{t-1} + \sum_{i=0}^{n1} \beta_{1i} \Delta LY_{t-i} + \sum_{i=1}^{n2} \gamma_{1i} \Delta LDR_{t-i} + \sum_{i=0}^{n3} \delta_{1i} \Delta LCE_{t-i} + \alpha_{15} ID_t + \alpha_{16} ED_t + \varepsilon_{3t} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (5)$$

Where, all variables are as previously defined in above. The current (time t) observation of each variable depends on its own lagged values and on the lagged values of each other variable. GDP Eq. (2) also can be written in the same manner.

Pesaran et al. (2001) proposed the bound test method using Wald test (F-statistic) to determine the long-run equilibrium relationship. A joint significance test is performed assuming the null hypothesis of no cointegration of all the one lagged level variables against the alternative hypothesis of having cointegration. Only the coefficients of the one lagged level variables included in the model for Wald test. In other words, is to perform a joint significance test (Wald test) setting $H_0: \alpha_{12} = \alpha_{13} = \alpha_{14} = 0$ against $H_A: \alpha_{12} \neq \alpha_{13} \neq \alpha_{14} \neq 0$ (Eq. 3). Decisions of the bound test are made by F-statistic value that helps to conclude[8] about the long-run relationship between the variables.

[6] Because it is well established that time series data are not statistically significant if they are not stationary. This stationarity decision can be verified using several tests such as Augmented Dickey-Fuller (ADF), Dickey-Fuller GLS, Kwiatkowski Phillips-Schmidt-Shin (KPSS), Philips-Perron (PP) or Ng-Perron. The null hypotheses as well as the asymptotic distribution of ADF and PP tests are same.

[7] ARDL approach has several advantages over other previous and traditional methods. The first is that it does not require all the variables under study to be integrated of the same order because it is applicable irrespective of whether the underlying variables are I(0), I(1) or a combination of both. The second is that ARDL test is relatively more proficient in case of small and finite sample data.

[8] If the F-statistic value is greater than the upper critical value bounds, then the variables are cointegrated and, if the F-statistic value is lower than the lower critical value bounds, then the variables are not cointegrated. Lastly, if the F-statistic value is between the upper critical value bounds and lower critical value bounds, then the decision is inconclusive.

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To ascertain the existence of the casual relationship between the series, we are using modified Wald test (MWALD) proposed by Toda and Yamamoto (1995)[9]. This approach involves VAR model with level variables (rather than the first differences, like Granger causality tests). Mainly, this approach artificially augments the correct VAR order, k, by the maximal order of integration, say d_{max}. Once this is done, a $(k + d_{max})^{th}$ order of VAR is estimated, and the coefficients of the last lagged d_{max} vector are ignored (see Caporale and Pittis, 1999; Rambaldi and Doran, 1996; Rambaldi, 1997; Zapata and Rambaldi, 1997). This TY procedure ensures that the usual test statistic for Granger causality which has the standard asymptotic distribution for making valid inferences.

Representations of consumption equation with GDP and deposit interest rate according to VAR system (GDP equation with consumption expenditure and capital investment can also be written in the following form), to conduct Toda and Yamamoto version of Granger non-causality models test is written as follows:

$$LCE_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} LCE_{t-i} + \sum_{j=k+1}^{d_{max}} \alpha_{2j} LCE_{t-j} + \sum_{i=1}^{n} \gamma_{1i} LY_{t-i} + \sum_{j=k+1}^{d_{max}} \gamma_{2j} LY_{t-j} + \sum_{i=1}^{k} \theta_{1i} LDR_{t-i} + \sum_{j=k+1}^{d_{max}} \theta_{2j} LDR_{t-j} + \varepsilon_{1t} \quad \cdots (6)$$

$$LY_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} LY_{t-i} + \sum_{j=k+1}^{d_{max}} \beta_{2j} LY_{t-j} + \sum_{i=1}^{n} \tau_{1i} LCE_{t-i} + \sum_{j=k+1}^{d_{max}} \tau_{2j} LCE_{t-j} + \sum_{i=1}^{k} \vartheta_{1i} LDR_{t-i} + \sum_{j=k+1}^{d_{max}} \vartheta_{2j} LDR_{t-j} + \varepsilon_{2t} \quad \cdots (7)$$

$$LDR_t = \mu_0 + \sum_{i=1}^{k} \mu_{1i} LDR_{t-i} + \sum_{j=k+1}^{d_{max}} \mu_{2j} LDR_{t-j} + \sum_{i=1}^{n} \varphi_{1i} LY_{t-i} + \sum_{j=k+1}^{d_{max}} \varphi_{2j} LY_{t-j} + \sum_{i=1}^{k} \omega_{1i} LCE_{t-i} + \sum_{j=k+1}^{d_{max}} \omega_{2j} LCE_{t-j} + \varepsilon_{3t} \quad \cdots (8)$$

The long-run elasticity can be derived from UECM that is the estimated coefficient of the one lagged explanatory variable (multiplied with a negative sign) divided by the estimated coefficient of the one lagged dependent variable (see Bardsen, 1989). The estimated coefficient of the first-differenced variable in UECM is short-run elasticity. The long-run value for the dummy variable is used directly from the estimated equation without dividing by the lag one level dependent variable (Choong, Law, Yusop, & Choo, 2005). Lastly, relevant diagnostic tests and stability tests are conducted for ensuring the goodness of fit of the model. The diagnostic tests consist of normality, serial correlation, heteroscedasticity, and structural stability tests associated with the model.

VI. Data Description and their Properties

Real GDP, gross fixed capital formation, deposit interest rate and final consumption expenditures are taken to estimate our targeted equations. Annual time series data[10] (1980-2016) were collected from the World Bank. Basic statistical information of the variables (Table 1) and the graphical presentation of our level data and stationary data (fig. 1-4) are described as well.

Table 1: Descriptive statistics, by logarithmic variable

Variable	Definition	Mean	Standard Deviation	Minimum	Maximum
LY	GDP (constant LCU[11])	1.21	0.524	0.410	2.18
LCE	Final consumption expenditure (constant LCU)	1.05	0.399	0.492	1.79
LCI	Gross fixed capital formation (constant LCU)	-0.37	0.819	-1.77	1.04
LDR	Deposit interest rate (%)	2.19	0.042	1.71	2.49
Observations	37				

[9] Toda and Yamamoto (TY) technique avoids the problems linked with standard Granger causality test that ignores any possible non-stationary or cointegration between series while testing for causality.

[10] It is to be noted that the presentation of the findings with quarterly data could be a more suitable way to accomplish such an exercise. So data availability is the limitations of the study.

[11] Local currency unit (LCU).

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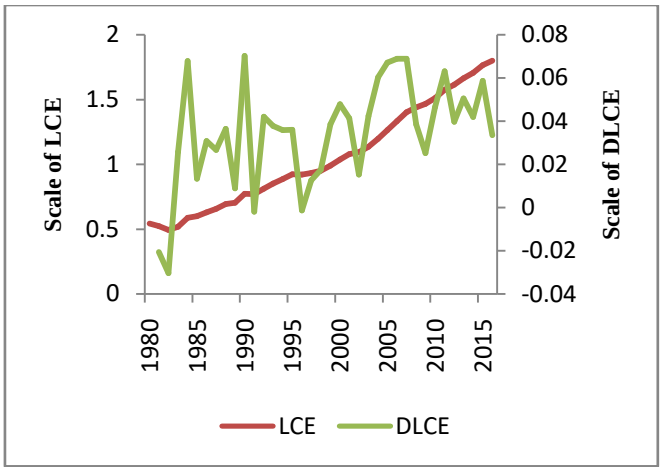


Fig. 1: Log of the level and first differenced series of CE

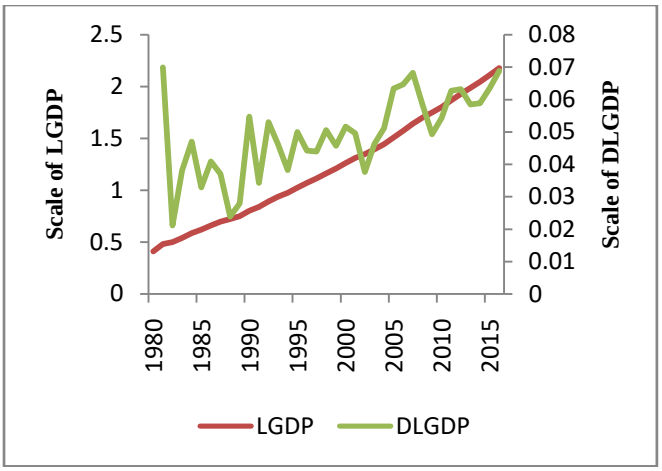


Fig. 2: Log of the level and first differenced series of GDP

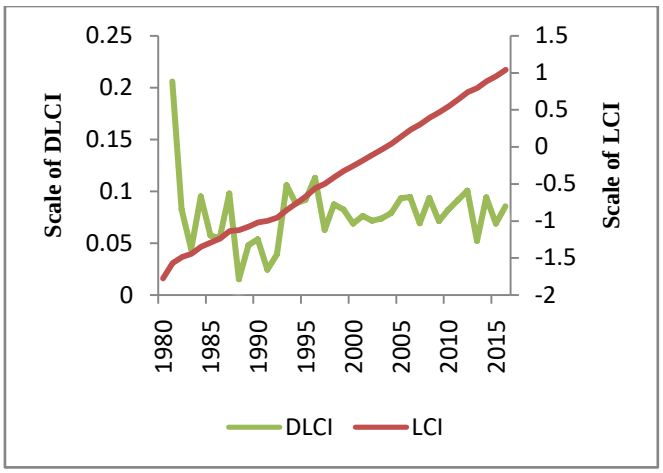


Fig. 3: Log of the level and first differenced series of CI

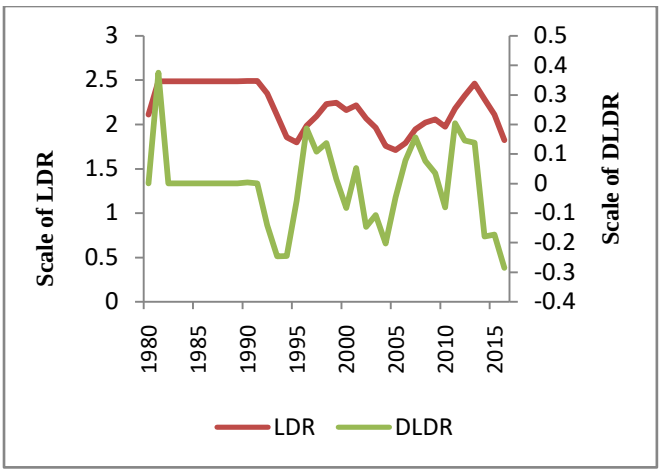


Fig. 4: Log of the level and first differenced series of DR

The figures show that both final consumption expenditure (LCE), capital investment (LCI), deposit interest rate (LDR) and GDP (LGDP) depict linear upward and deterministic trend. It also shows that the data are not stationary at level. Then we have taken their first difference to ensure their stationarity. The first differenced series of LCE, LGDP, LDR, and LCI are incorporated along with their level data in the above figures.

VII. Estimation and Empirical Results

a) *Unit Root Tests*

To transform our non-stationary series to stationary, we used Augmented Dickey-Fuller test (Dickey and Fuller 1979, 1981) and Philips-Perron (Philips and Perron, 1988) unit root tests. The reason behind for doing so has already been delineated in preceding paragraph.

Table 2: Unit root tests, by logarithmic variable

Variables	Augmented Dickey-Fuller Test				Phillips-Perron Test				Order of Integration
	Level		1st Difference		Level		1st Difference		
	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend	
LY	5.113 (1.000)	0.5269 (0.9990)	-0.9193 (0.769)	-4.509* (0.0056)	5.113 (1.000)	0.5269 (0.9990)	-4.0509* (0.0034)	-9.9154* (0.0000)	I(1)
LCE	2.876 (1.000)	-2.110 (0.5228)	-4.537* (0.0009)	-5.335* (0.0006)	3.0758 (1.000)	-2.1046 (0.5259)	-4.7386* (0.0005)	-5.3882* (0.0005)	I(1)
LCI	0.060 (0.9580)	-1.556 (0.7902)	-7.489* (0.0000)	-7.8537* (0.0000)	0.0307 (0.9553)	-1.969 (0.6095)	-7.0138* (0.0000)	-7.8250* (0.0000)	I(1)
LDR	-2.589 (0.1046)	-3.203 (0.1002)	-3.913* (0.0051)	-3.775* (0.0309)	-1.728 (0.4087)	-2.249 (0.4492)	-3.752* (0.0074)	-3.674* (0.0377)	I(1)

Figures in ( ) represents probability-values respectively

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The stationarity tests were done at the level and first difference for both possibilities intercept as well as with intercept and trend. Both ADF and PP (Table 2) test results reveal that the variables are non-stationary at the level at 5% level of significance but they became stationary at first difference level. Thus, all the variables are integrated of order one i.e., I(1) respectively[12].

b) ARDL Bound Test Approach

Since our series are integrated of order one, so it's needed to find whether the variables are cointegrated or not. Autoregressive Distributed Lag model to cointegration and error correction is applied to investigate the relationship between final consumption expenditure and GDP.

Table 3: Bound Test Results

Dependent Variable	AIC Lags	F-Statistic	Decision
Consumption Eq.			
$F_{CE}(CE \setminus Y, DR)$	3	4.85	Cointegration
$F_{Y}(Y \setminus CE, DR)$		58.44	Cointegration
$F_{DR}(DR \setminus Y, CE)$		5.99	Cointegration
GDP Eq.			
$F_{Y}(Y \setminus CE, CI)$	4	5.27	Cointegration
$F_{CE}(CE \setminus Y, CI)$		1.86	No cointegration
$F_{CI}(CI \setminus CE, Y)$		4.55	No cointegration
Lower bound critical value at 1%		3.65	
upper bound critical value at 1%		4.66	

The ARDL bound test results to determine the presence of the long-run relationship between the variables in both consumption and GDP equation are presented in Table 3. The computed F-statistic of the estimated equations exceeded the upper bounds at 1% level of significance. As per the rule, the higher F-statistic value supports the rejection of the null hypothesis. So it leads us to argue that final consumption expenditure and GDP have the long-run association.

Table 4: ARDL Regression outputs

Dependent Variable: D(LCE)			Dependent Variable: D(LY)		
ARDL(1, 1, 2) selected based on AIC			ARDL(2, 4, 4) selected based on AIC		
Variable	Coefficient	Prob.*	Variable	Coefficient	Prob.*
C	-0.10603**	0.0078	C	0.473102**	0.0004
LCE(-1)	-0.208126*	0.0344	LY(-1)	-0.56840**	0.0008
LY(-1)	0.157696*	0.0341	LCE(-1)	0.326714**	0.0022
LD(-1)	0.041006**	0.0052	LCI(-1)	0.224546**	0.0005
D(LY)	1.457407**	0.0000	D(LY(-1))	0.713732**	0.0004
D(LD)	0.030569	0.2034	D(LCE)	0.307766**	0.0001
D(LD(-1))	-0.080384**	0.0012	D(LCE(-1))	-0.34182**	0.0017
ID	0.017227	0.1137	D(LCE(-2))	0.013170	0.8392
ED	-0.001626	0.9082	D(LCE(-3))	-0.130000	0.0538
			D(LCI)	0.223027**	0.0018
			D(LCI(-1))	-0.14775**	0.0198
			D(LCI(-2))	-0.013329	0.7932
			D(LCI(-3))	-0.076031	0.0779
			ID	-0.010022*	0.0454
			ED	-0.002331	0.7262
R-squared	0.999124		R-squared	0.999938	
F-statistic	3708.164 (0.00000)		F-statistic	20646.59 (0.00000)	
DW-statistic	1.967772		DW-statistic	2.501294	

*Figures in ( ) represents probability-values respectively, **Significance at 1% level and *Significance at 5% level*

Considering the selected lag length of AIC criterion, ARDL (1, 1, 2) model is selected as our appropriate model for consumption equation and ARDL(2, 4, 4) model for GDP equation. The results of the two models showed that a statistically significant association exists between final consumption expenditure and GDP (Table 4). Internal dummy

[12] A variable Y, is said to be integrated of order d, [I(d)] if it attains stationarity after differencing d times (Engle and Granger, 1987).

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(1988's flood and 1998's flood) is significant at 5% level though it reveals the positive impact on consumption function but negative impact on GDP. On the contrary, external dummy (2008's recession) was not significant at all for any models but negative for both equations. Intercept term of both equations became significant at 1% level of significance.

Table 5: Estimated ARDL long-run and short-run coefficients

Long-run coefficient estimates						
	Consumption Eq.			GDP Eq.		
	Constant	LY	LDR	Constant	LCE	LCI
	-0.509440 (0.1102)	0.757693 (0.0000)	0.197024 (0.0525)	0.832333 (0.0000)	0.574791 (0.0000)	0.395046 (0.0000)
Short-run coefficient estimates						
Lag order	0		1	2		3
Consumption Eq.						
ΔLY	1.457407 (0.0000)					
ΔLDR	0.030569 (0.1267)		-0.080384 (0.0002)			
ID	0.017227 (0.0687)					
ED	-0.001626 (0.9006)					
ECT_{t-1}	-0.208126 (0.0001)					
GDP Eq.						
ΔLY			0.713732 (0.0001)			
ΔLCE	0.307766 (0.0000)		-0.341818 (0.0005)	0.013170 (0.8196)		-0.130000 (0.0331)
ΔLCI	0.223027 (0.0005)		-0.147751 (0.0123)	-0.013329 (0.7604)		-0.076031 (0.0553)
ID	-0.010022 (0.0299)					
ED	-0.002331 (0.7035)					
ECT_{t-1}	-0.568405 (0.0001)					

Both short-run and long-run coefficients are providing strong evidence of having a significant association between consumption expenditure and GDP at 5% level of significance. The ECM coefficient value is negative as well as lying between 0 and 1. ECM value -0.208 and -0.57 in two equations suggest that the speed of adjustment to restore the equilibrium in the long run is 21% and 57%. It indicates that equations will restore their equilibriums by around five and two years respectively.

Table 6: Short-run diagnostic tests

Consumption Eq.		GDP Eq.	
Breusch-Godfrey Serial Correlation LM Test	[1] 0.020656 (0.8650); [2] 0.465804 (0.5200)	Breusch-Godfrey Serial Correlation LM Test	[1] 2.174534 (0.0530); [2] 1.463305 (0.0780)
Heteroskedasticity Test: ARCH	[1] 0.218446 (0.6311); [2] 0.660019 (0.4989)	Heteroskedasticity Test: ARCH	[1] 0.281664 (0.5854); [2] 0.123107 (0.8736)
Jarque-Bera normality test	0.568426 (0.752606)	Jarque-Bera normality test	1.198210 (0.549303)
Ramsey RESET test	0.163828 (0.6891)	Ramsey RESET test	0.00563 (0.9411)

Diagnostic tests results are based on F-statistic, and figures in ( ) represents probability-values respectively

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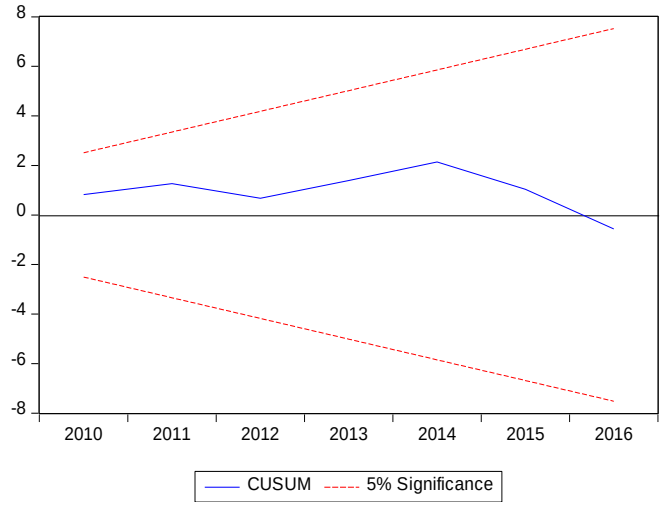


Fig. 5: Plot of CUSUM test of Consumption Eq.

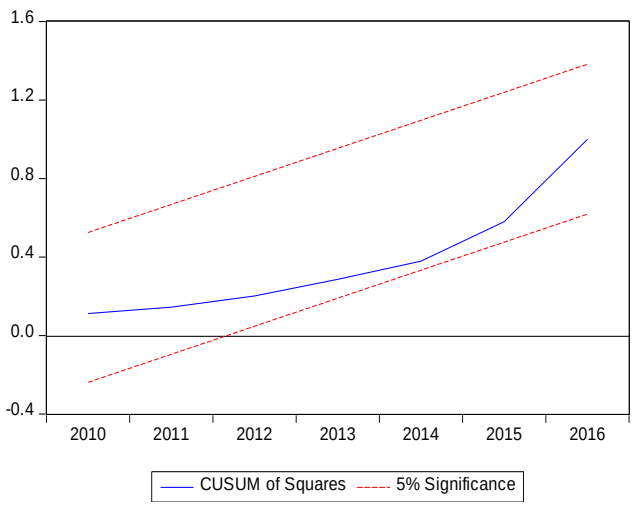


Fig. 6: Plot of CUSUM of sq. test of consumption Eq.

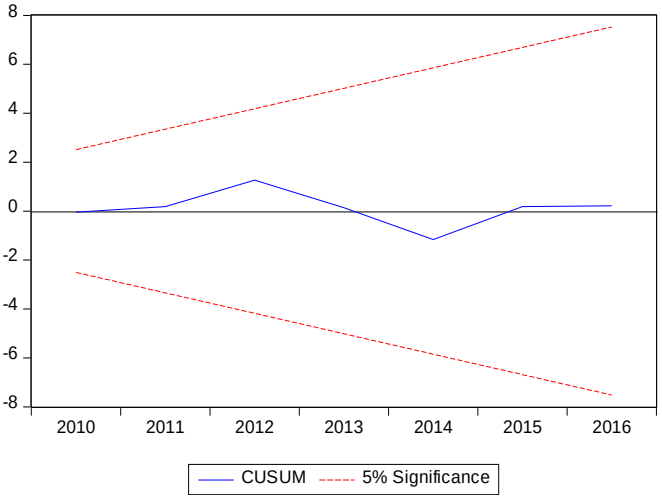


Fig. 7: Plot of CUSUM test of GDP Eq.

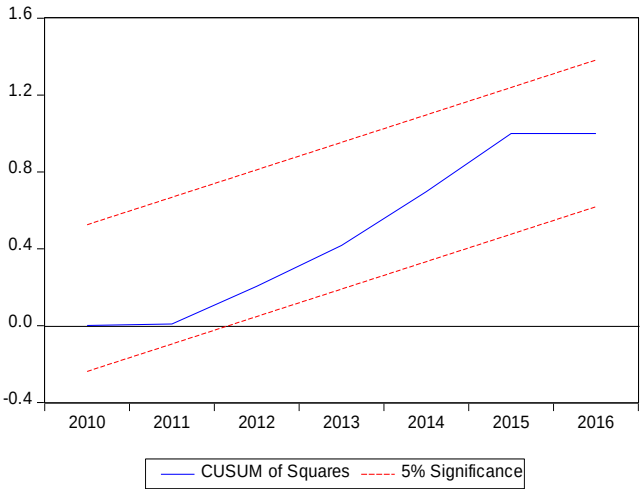


Fig. 8: Plot of CUSUM of Sq. test of GDP Eq.

Above model's ARDL equation validity is confirmed by conducting relevant diagnostic tests. It indicates that essential econometric properties are satisfied by both equations. The ARDL models are found to be robust against residual correlation, and the ARCH test confirms the homoskedasticity of the residuals in two equations. At the same time, Jarque-Bera normality test ensured that estimated residuals are normal. Ramsey RESET test, the CUSUM, and the CUSUM of Sq. test also confirmed the correct functional form of the equations.

c) Elasticity Calculation

The short run and log run elasticities of the two equations are presented in Table 8. It shows that GDP and the final consumption expenditure exert the positive impact on each other. GDP has an elastic impact on final consumption expenditure which implies that a 1% increase in real GDP could lead to an increase in the final consumption expenditure by .76% in the long run. Whereas, the short run increase in final consumption expenditure is 1.46% due to increase in GDP.

Table 7: Long run and short run elasticities

Variables	Dept. Variable D(LCE)		Variables	Dept. Variable D(LY)	
	Short run	Long run		Short run	Long run
LY(-1)	1.46**	0.76**	LCE(-1)	-0.15**	0.57**
LDR(-1)	-0.05*	0.20**	LCI(-1)	-0.02*	0.39**
ID	-	0.08	ID	-	-0.02
ED	-	-0.008	ED	-	-0.004

Besides, Final consumption expenditure has an elastic impact on GDP where 1% increase in final consumption expenditure could lead to an increase in the real GDP by 0.57% in the long run.

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d) Granger Non-Causality Test

Table 8: Granger non-causality test results

Consumption Eq.				GDP Eq.			
Dept. Variable	χ^2-Statistic			Dept. Variable	χ^2-Statistic		
	LCE	LY	LDR		LY	LCE	LCI
LCE	-	5.11	1.39	LY	-	22.6**	18.6**
LY	7.22*	-	4.32	LCE	4.10	-	11.4*
LDR	14.9**	17.2**	-	LCI	55.5**	51.0**	-
Direction of causality	CE→Y; CE→DR; Y→DR			Direction of causality	CE→Y; CE↔CI; Y↔CI		

The Granger non-causality results of Table 9 reveal that final consumption expenditure has the unidirectional causal relationship with GDP. Study results reveal new findings comparing the study of Amin (2011). Final consumption expenditure causes deposit interest rate in a unidirectional way as well. On the other hand, bidirectional causality exists between consumption expenditure and capital investment. Additionally, bidirectional causality is running between GDP and capital investment as well.

VIII. Conclusions

Long run association between final consumption expenditure and economic growth is confirmed by ARDL Bound test approach. It is evident from the findings that consumption expenditure as well as economic growth influences each other significantly. Even their estimated short and long-run coefficients are also consistent with that finding. But Granger non-causality test confirms the unidirectional relationship is running from final consumption expenditure to GDP. GDP and final consumption expenditure have the most elastic impact on each other in the long run whereas; GDP has the most elastic impact on final consumption expenditure in the short run. We didn't find any significant impact of both internal and external shocks on our economy.

IX. Policy Implication

Most of the economic researches generally suggest policies based on supply-side point of view for economic growth, but demand side is more powerful in case of Bangladesh. Since, theoretically, we are constraint by technology, infrastructure, and improved human resources. In fact, the findings show that final consumption expenditure and GDP influence each other significantly. So, higher production can provoke consumption by influencing economic growth.

On the other hand, our external income sources are stimulating our consumption behavior, such as quick cash flow like remittance mostly spent on consumption expenditure. Considering technology constraint and consumption pattern, in general, the government can take such monetary and fiscal policy that is consumption enhancing. Since our domestic market is quite large and we have the demand-driven economy, so a jump in domestic consumption can boost our production.

In Bangladesh context, fiscal and monetary policy inducing consumption will have a positive impact on growth. Demand enhancing growth can help technological innovation (it's already evident[13] in remarkable scale) and domestic industrialization through the development of the consumption based industry. As the long run curve of Bangladesh is relatively flatter so there is a window where we can use consumption enhancing policy keeping a watchful eye on the value of money and budget deficit.

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[13] Pharmaceutical industry, Engine driven boat and Engine driven rickshaw, Walton products.

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The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

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After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:



Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

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Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

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Acknowledgments

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Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
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- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
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- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

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A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
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f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

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j) There should be brief acknowledgments.
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Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

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15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

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18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

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Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

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This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

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- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



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- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
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- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
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Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

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An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

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Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

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- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



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Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

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Put figures and tables, appropriately numbered, in order at the end of the report.

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- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

A

Accession · 9
Alleviation · 37, 44
Alliance · 47

C

Camifloc · 42
Contingency · 40

D

Delinquency · 32
Dichotomous · 21, 23

E

Endogenous · 14, 42, 47

H

Harnessing · 38

I

Indigenous · 36, 47, 50

J

Jeopardized · 37

L

Lactation · 43
Liberalization · 4, 14

M

Micelles · 42
Mucilage · 21

N

Nomadic · 42

S

Speculation · 4
Stratification · 39





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