

Lending Rate, Exchange Rate and Household Consumption Relations in Sub-saharan Africa: Mean Group Approach

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LENDING RATE, EXCHANGE RATE AND HOUSEHOLD CONSUMPTION RELATIONS IN SUB-SAHARAN AFRICA: MEAN GROUP APPROACH

Abstract

Household consumption expenditure in Africa to the world aggregate is comparatively little, considering the population of the region. But empirical credence that elucidates estimated elasticities of the exchange rate, lending rate, and consumption relations remains dimly discerned in sub-Saharan Africa (SSA) amidst a high population growth rate. Therefore, this paper present new insights into the causative structure of the cost of consumer credit and exchange rate management as leverage for mass consumption in Africa. We rely on the mean group estimator to analyse the panel data with a sample of 37 African countries in 2008 through 2017. We found that lending and exchange rate induces positive changes in household consumption in SSA. Efficient management of the cost of consumer credit and stability of the exchange rate may significantly improve consumption in the region. Policy implications were discussed.

Keywords: Household consumption; Lending rate; Exchange rate; Mean group, Panel data

JEL Classification: E21; E43; F31; C21; C23

1. Introduction

The cumulative household consumption of Africa to the world aggregate is relatively inconsiderable, considering the population of the region and even more so critical, bearing in mind that Africa is the second most populous continent after Asia. The average aggregate household consumption in 2008-2018 for sub-Sahara Africa (SSA) was 2.42% and 1.13% in North Africa when compared to the World's total household consumption expenditure. North and South America household consumption were at an average of 39.77%, while Asia and Europe had an average of 28.90% and 25.78% respectively (United Nations Statistical Database, 2020).

With the apparent relative global low consumption facing the African household, there is an urgent need to examine the essential drivers of household consumption within the context of the cost of consumer credits and exchange rate movement. In an integrated global economy amidst globalisation and increased continental trade agreements like the African continental free trade agreement (AfCTA), exchange rate movement becomes essential for consumption growth or otherwise (Bahmani-Oskooee, Kutan, & Xi, 2015). Virtually all SSA countries have had to devalue or face currency depreciation coupled with a high lending rate that has redefined their wage-inflation relations in the last decades. Considering currency devaluation that has long characterised the financial framework in sub-Sahara African countries, inflating commodity prices is inevitable for businesses to stay afloat in a dynamic, challenging and

import-dependent economic systems (Duca-Radu, Kenny, & Reuter, 2020). The inflationary inclination of essential domestic commodities erodes the market value of disposable income of SSA households leading to socio-economic hardship and widening inequality (Idrisu & Alagidede, 2020). Even when nominal national wages are reviewed upward as it is the case of the Nigerian government, yet to be fully implemented minimum wage upward review, long-adjustment lags in the wage-inflation relations will ensure household consumption fall below the inflation-triggered devaluation since household have a high marginal propensity to consume (MPC) (Alexander, 1952). Based on the foregoing, it becomes apt to lean empirical credence to the lending, exchange rate and consumption relations in SSA in order to come up with findings that can back policy reformulation and research redirections on the subject matter.

While it is essential to analyse the fundamental elements driving consumption in SSA because of its growth-inducing capacity, it is surprising to find out that lending rate, exchange rate and consumption relations have not been given the optimum research attention in Africa. Whereas, a large and active body of research on the lending, exchange rate and consumption relations have been reasonably conducted in industrialised economies (Iyke & Ho (2019); Chishti et al. (2019); Arapova (2018); Varlamova & Larionova (2015); Bahmani-Oskooee (2011) and very few on emerging economies (Bahmani-Oskooee et al., 2015) to guide to policy and determine what emboldens household consumption. This is unexpected for SSA because of the chain relationship between consumption and production. Relying on the chain relationship, lack of evidence on the testable response of household consumption expenditure to lending rate may be one of the reasons for lack of conducive policy on how SSA can enhance growth by leveraging on mass consumption. This view is not a gainsaying because evidence by a study in Asia has found that private consumption is also a driver of growth even at a higher rate than exports (Economic and Social Survey of Asia and the Pacific, 2016).

We aim to establish a clear line of thought in the lending, exchange rate and consumption relation in SSA due to the thin study on the African experience and to employ a different contemporary econometric approach that has been rarely used for this type of study in SSA. Furthermore, the sub-Saharan economy provides an essential platform to clarify salient issues relating to theory and empirics as far as consumption, exchange rate movement and cost of borrowing is concerned. Apart from income, of the many factors that have been found to be a conspicuous aid to mass consumption is the provision of credit with the attendant cost. Kumar, Bhutto, Mangrio & Kalhoru (2019); *Christensen, (2012)*; Logemann (2008); Taylor (1995); Bernanke & Getler (1995); Blare (1978). Therefore, access to credit through a liberalised credit evaluation system at affordable cost is essential in creating a consumer-led continent. Although, the theoretical and empirical literature has affirmed the response of consumption to household income since the end of the Second World War in many countries (see: Keynes, 1936; Friedman, 1957; Modigliani & Ando, (1975); Christelis et al. (2019); Bunn et al. (2018); Jappeli & Pistaferri (2010); Stevens & Unayama (2011); Mankiw &

Campbell (1991) attaining mass consumption may not be substantially achieved through disposable income source(s) alone in SSA. Based on this notion, investigating the extent to which cost of credit aids consumption or otherwise in SSA is important for policy design if the region intends to attain mass consumption.

The linkage between the exchange rate via inflation to consumption was explained by Alexander (1952). He posits that a shock to domestic inflation can be as a result of domestic currency depreciation or the appreciation of foreign currency between two countries engaged in international trade. Assuming SSA depends largely on import for the consumption of both durable and non-durable goods, the absorption theory of devaluation emphasise that currency devaluation may lead to inflationary trends in a domestic economy partly because of price adjustment caused by currency depreciation (Alexander, 1952). The inertia in wage adjustment makes a consumer in any country to adjust his consumption pattern in line with changes in domestic prices of goods gradually. The changes in nominal exchange may also account for substantial variation in the prices of imports across countries and in the course of time (Ha, Stocker &, Yilmazkuday 2019). This may be particularly prevalent in SSA, which operates few production plants but consumes largely manufactures goods.

Our conjecture for this paper is that borrowing affects consumption via changes in the lending rate, and exchange rate affects consumption through inflation. We established the steepness of lending rate applied by banks in SSA and the overriding consequences for household consumption in SSA. We further clarify age-long ambiguity in the exchange rate-consumption expenditure relations in SSA due to the high import-dependent nature of the region. The study contributes to the literature in a few ways. First, by emphasising that a specific bias arises if our empirical model is subjected to a fixed and random effects IV estimation in the face of slope heterogeneity. The response of household consumption to exchange and lending rates has been widely investigated in panel data analyses for many climes using econometric methods that assume that the elements of the cross-section are independent and the slope is homogeneous. In practice, heterogeneity of slopes is a reality among the cross-section. These estimators that have been applied over time in the literature may lead to inefficient estimates and inconsistent standard errors (Ali, Yusop, Kaliappan and Chin, 2020); (Everaert and Groote, 2014) These econometric analytical issues are borne from the fact that some unobserved common factors may affect countries uninformedly and such shocks may be time-invariant across sample countries. In addition, these unobservable common factors and the pattern of the regressors in the cross-section may lead to the violation of homogeneous slopes and cross-sectional independence Pesaran, (2006) and Eberhardt and Teal (2010).

Second, by employing the mean group (MG) estimator as a novel approach to SSA data on household consumption. Despite the challenges of overcoming problems of cross-sectional dependence and slope homogeneity in panel data estimation, Peseran and Smith (1995), Pesaran, (2006) and Eberhardt and Teal (2010) provides that in the presence of heterogeneous

slopes and cross-sectional dependence in a panel data, the empirical panel model can still be estimated using the common correlated effects mean group (CCEMG) approach or the augmented mean group (AMG) respectively. These estimators are suitable for both dynamic and static panel data analysis, and their errors can be statistically tested for a weak cross-sectional dependence (Pesaran 2015). Based on these recent econometric analytics' contribution to the literature, this study adopts the mean group (MG) approach in determining the effects of lending and exchange rates on household consumption in sub-Saharan Africa. This is perhaps, one of the contemporary papers that are applying such an econometric methodology on household consumption data in the region. Third, the inference from this study's findings affirms that the lending and exchange rates induce positive changes in household consumption in SSA. These findings provide ample evidence for policy direction on how to significantly improve household consumption in SSA and by extension a fundamental contribution to the existing literature.

2. Literature Review

The theoretical linkage between consumption and personal income was revolutionised by Keynes (1936). He postulated that consumption has a positive functional relationship with current disposable income, while Friedman (1957) expressed the view that consumption depends on permanent and transitory income. Duesenberry (1949) emphasised the interdependency of current personal income and private consumption and the model for a life cycle planning horizon of how consumption depends on income was discussed by Modigliani and Ando (1975). Earlier than Keynes (1936), the theoretical model, which emplaced borrowing for consumption was explained by Irving Fisher (1867-1947) using the inter-temporal budget constraint consumer choice model. He posits that in a two-period (present and future) horizon, the interest rate can influence consumption because the consumer can borrow or lend between the periods. Furthermore, on the linkage of interest rate and personal consumption, The New Keynesian views based on the model with nominal rigidities posit that the nominal interest rate affects the current consumption more than the future consumption (Cloyne, Ferreira & Surico, 2015).

The relevance of the credit channel as a transmission mechanism emphasised how the central bank can contract or expand the lending ability of commercial banks by adjusting the policy rate or buying or selling securities in the open market. The action of the monetary authorities will reduce commercial banks deposit and subsequently, their lending functions (Bernanke & Getler 1995). Although the theory has been criticised by Disyatat (2011), and he argues that the emphasis of Bernanke and Getler (1995) about changes in banks deposit due to monetary policy shocks is mislaid. Instead, he proposed that monetary transmission through the bank lending channel affects the bank's reactions through their external finance premium. Disyatat (2011) emphasised the lending rate as a constraint factor that drives loan rather than the deposit level of banks.

The linkage between exchange rate and personal consumption was primarily established by Alexander (1952). He explained that the devaluation of a country's currency affects foreign

trade in terms of import and export costs. Because import becomes more expensive due to depreciation, the elasticity of the demand for imports would determine the extent of price change. However, the excess cost due to exchange rate devaluation may be passed fully or partially to the consumer through increased prices. It is instructive to say that the theoretical literature had established the notion that consumption decisions are directly linked to income and indirectly linked to changes in the lending rate and exchange rate.

The evidence reviewed on studies relating to the linkage between the household consumption and the lending and exchange rates suggest that the results are diverse depending on the country and the type of interest rate employed by the study. Mankiw (1985), in an empirical study, examined how consumption (durable and non-durable goods) responds to the real interest rate. The findings from the study suggest that expenditure incurred on durable consumer goods is more sensitive to changes to changes in the real interest rate compared to money expended on non-durable consumer goods. Unlike Mankiw, Wilcox (1990) analysed the effect of both the real and nominal interest rates on consumption. He found that nominal interest rates have a more significant effect on consumption goods while the real interest rate does not due to the lenders prescription condition of a stipulated payment to current income ratio before lending. Furthermore, he found that interest rate not only affects the consumption of durable goods, but it affects both non-durable and services.

Acting on the argument that low-interest rate discourages United States of America (USA) banks from funding consumption need of the people Christensen (2012) found that by keeping the interest rate low in the USA the monetary authorities will be maximising consumption. He used a 50-year data to track the optimal interest rate, which supports increased consumption in the country. In Germany and contrary to the USA's experience, evidence obtained by Hermann-Josef (1996) suggest that interest rate does not play a primary role in explaining consumption in the country. Chishti, Azeem, Mahmood, and Sheikh (2019) conducted a study that compared exchange rate volatility and consumption in developed, emerging and developing economies using a panel data approach for 1995-2017. They found that exchange rate volatility affected consumption in developed countries but for emerging and developing countries, exchange rate volatility does not affect aggregate consumption. In SSA, Oseni (2016) found that exchange rate volatility has a significant negative effect on consumption in 1999-2014. Oseni's findings differ from the result of Chishti et al., which found that exchange rate volatility has no significant effect on consumption in emerging and developing economies. This may be as a result of different econometric technique for analysis as well as different study period and cross-sectional data employed.

Bahmani-Oskooee and XI (2015) found that exchange rate volatility in the short-run affects consumption in a sample of 12 countries out of 17 (mostly advanced economies). The result is similar to that of Oseni (2016) that considered 19 countries in SSA having used different econometric approach. Kumar et al. (2019) found that interest rate and exchange rate volatility have a significant long-run impact on consumption in Pakistan. Although interest and exchange rate have a positive impact, exchange rate volatility has a negative impact on

consumption in the country. Theoretical and empirical literature discussed in this paper suggests that there is a linkage between the exchange rate, lending rate and consumption.

3. Methodology

3.1 Identification Strategy

In this study, the identification strategy that captures the response of household consumption to lending and exchange rates in SSA relies on the work of Pesaran and Smith (1995). However, improved contribution to the estimator has been advanced by Pesaran (2006) and the augmented model specified in Eberhardt and Teal (2010). Prior to the development of these estimators' panel data estimators revolves around the fixed and random effects which assumes homogeneity of regressors (fixed effects) and changes in the cross-sectional intercepts (random effects). In this paper, we compare the fixed, random and mean group estimators due to the increasing concern of slope heterogeneity and cross-sectional dependence mostly found in panel data of N by T observations.

The theoretical framework adopted for the fixed and random effects estimators relied on the regressors impulse that employs the instrumental variable (IV) model. The structure of the panel data is expressed in the form x_{it} , $i = 1, \dots, N$, $t = 1, \dots, T$. N denotes the cross-section and T the time-series dimension of the panel. Using the linear regression technique, the fixed effect estimator is consistent if $N \rightarrow \infty$ and T are finite. However, if the expected $E(x_{jit}, \varepsilon_i) = 0$ and $E(x_{jit}, \varepsilon_i) \neq 0$ the fixed effects estimation is efficient if the regressors are correlated with ε_i but less efficient than the estimation of the random effects if $E(x_{jit}, \varepsilon_i) = 0$.

Relying on Greene (2008, p 287-297), the fixed effect (FE) and random effect (RE) models in their implicit form is expressed in equations (1) and (2) respectively.

$$y_{it} = \varepsilon_i + X'_{it}\boldsymbol{\beta} + \delta_{it} \quad . \quad . \quad . \quad (1)$$

Where it represents the cross-section and time-series dimension, respectively. X represents a K vector of regressors, y is the regressand, $\boldsymbol{\beta}$ is a $[K \times 1]$ vector of slopes, ε_i is the time-invariant differences between the cross-section while δ_{it} is the error term that varies over i and t .

The random effect (RE) model in the implicit form in equation (2):

$$y_{it} = \alpha_0 + X'_{it}\boldsymbol{\beta} + \varepsilon_i + \delta_{it} \quad . \quad . \quad . \quad (2)$$

$$\varepsilon_i \sim iid(0, \sigma_\varepsilon^2) \quad \delta_{it} \sim iid(0, \sigma_\delta^2)$$

All the notations stand as previously explained in equation (1) except that the value of ε_i is one of the constituents of the error specifically for each member of the cross-section with a distribution that is independently and identically distributed with a mean of zero and constant variance. δ_{it} is another constituent of the error term with the same features of ε_i but it is not correlated to the cross-section and time dimension. In addition, α_0 , captures the overall mean, both ε_i and δ_{it} are mutually independent and are also independent of all the X_s . This study employs the generalised least square (GLS) method for analysing the baseline empirical model expressed in equation (3) because the OLS approach does not accommodate the data generating process of the error structure of equation (2).

$$\ln HCE_{it} = \vartheta_i + \gamma_t + \omega X_{it} + \beta Y_{it} + \varepsilon_{it} \quad (3)$$

The symbols in equation (3) are as follows; $\ln HCE$ is the log of real household consumption expenditure, i represent the cross-section of sample countries in SSA and t is the time-series dimension of the panel. ϑ_i is the country fixed effect, the year fixed effect is represented by γ_t . X is the vector ($K \times 1$) of regressors, which are lending rate, the exchange rate, implicit price deflator and log of real per capita income. The last two variables account for inflation and income effects to minimise the effect of omitted variable bias.

Our anxiety for the possibility of endogeneity for the model (3) is the link amongst per capita income, exchange rate and household consumption expenditure. An increase in income may lead to an increase in consumption. This is expected at the aggregate level based on the consumption function theory. In addition, a shock to the exchange rate might affect household consumption, especially for durable goods if the importer adjusts up the domestic price of the goods to account for domestic currency devaluation. Given the endogenous relationship of the study variables we employ the instrumental variable (IV) econometric approach using the lag of implicit price deflator and lag of lending rate which from the results in Table 2 may be correlated with regressors but not with the errors of the dependent variable (Z_{it}).

In equations 4 - 6, relying on Pesaran and Smith (1995) and Pesaran (2006) and considering the concern for the assumption of homogeneous slope in fixed effect panel model, this study assumes a linear heterogeneous slope panel data model in the form:

$$y_{it} = \alpha_i' x_{it} + \delta_{it} \quad (4)$$

$$\delta_{it} = \varphi_{1i} + \gamma_i' f_t + \varepsilon_{it} \quad (5)$$

$$x_{it} = \varphi_{2i} + \gamma_i' f_t + \vartheta_i' g_t + \mu_{it} \quad (6)$$

where y_{it} is the log of household consumption expenditure while x_{it} represent a vector of $k \times 1$ explanatory variables, which can be observed at time t in the ith cross-section of the sample countries in SSA. α_i are individual county slopes and δ_{it} are the error term assumed to follow a white noise process with respect to the cross-section and time. In Equations (2 and 3) φ_i is the cross-section fixed effects that apprehends the time-invariant heterogeneity of the sample countries. f_t and g_t are vector of $k \times 1$ unobserved common factor loading and heterogenous factor loadings. γ_i and ϑ_i are the individual country factor loadings for the dependent and the independent variables, respectively. In accounting for the latency of unobserved common factors, Pesaran (2006) included cross-section mean of the response variable as well as the mean of the regressors in the equation estimated. The inclusion of these averages sieves out the cross-correlated effects (Pesaran, 2006). Furthermore, ϵ_{it} and μ_{it} are the error term, which are also assumed to follow a white noise process, respectively. But the inclusion of f_t in equations (2) and (3) allows for endogeneity in the baseline equation estimated (Eberhardt and Teal 2011). Based on the foregoing identification design, the paper applies the mean group approach by Pesaran and Smith (1995) estimator to derive consistent and efficient coefficient estimates for the response of household consumption to lending and exchange rates in SSA.

3.2 Empirical Model and Estimation Approach

In order to facilitate the econometric modelling of the effect of interest and exchange rates on household consumption in Sub-Sahara Africa, the study adopts a balanced panel data that relies on the mean group (MG) econometric technique. Relying on the identification scheme explained in the previous section of this paper, the baseline models that are estimated for this paper are equations 3 and 7.

$$y_{i,t} = \vartheta_i + \alpha_1 Exc_{i,t} + \alpha_2 lrt_{i,t} + \alpha_3 ipd_{i,t} + \alpha_4 lnrp_{i,t} + \epsilon_{i,t} \quad (7)$$

where $y_{i,t}$ is the log of household consumption expenditure, $Exc_{i,t}$ is the log of the exchange rate, $lrt_{i,t}$ is the lending rate and $ipd_{i,t}$ is the implicit price deflator. And $\epsilon_{i,t}$ is the error term that follows a white noise process.

The estimators employed in these studies are the generalised least squares (GLS) and mean group (MG) econometric approach. After the discussion of the descriptive statistics of the study, the study estimates the coefficient values of the empirical model using the two-stage least squares (2SLS) instrumental variable (IV) *menu* estimators, which include the fixed and the random effects estimators. The results in Tables 3 and 4 affirms the existence of slope heterogeneity and cross-sectional dependence of the sample observations. This renders the panel fixed and random effects estimators though consistent but inefficient and the standard errors, are biased and inconsistent due to the correlation between the observed regressors and unobserved common factors (Everaert and Groote 2014; Pesaran 2006). The study employs

the MG estimator that produces the cross-section average of the coefficient estimates for the countries in SSA and test for weak cross-sectional dependence propounded by Pesaran (2015). The main limitation of the paper for not considering the common correlated effects estimator is due to the fixed time (T) series, which may not provide robust estimates.

3.3 Data and Sources

The study employs a sample of 37 countries in SSA¹ using annual data for 2008-2017. The choice preference for these countries enabled us to have a balanced panel data. Furthermore, the SSA countries that are not included in the cross-section lacks data on either the exchange rate or lending rate for the period of the study. Data are obtained from the United Nations Statistical Division database (UNSTATD) (2020) and the International Monetary Fund (IMF) country by country data of the International Financial Statistics (IFS) (2020) and World Bank database World Development Indicators (WDI) (2020). From these sources, the paper employs a balanced panel data of $N = 37$ and $T = 10$. The explained variable is the real household consumption expenditure for each of the sample countries at constant 2015 prices in the United States of America (USA) dollars. The explanatory variables are; per capita income, which is proxy for the personal income of the sample countries at constant 2015 prices in USA dollars. The exchange rate is proxy by the domestic currency of each country to the USA dollar per period average for each of the years. The other explanatory variable is the implicit price deflator of the gross domestic price index in USA dollars. The real household consumption expenditure and the per capita income are transformed into natural logarithms while the other three variables are used for estimation in their present form.

4. Results and Discussion

4.1 Results of Descriptive Statistics and Pairwise Correlation Tests

The descriptive statistic test results contained in Table 1 measures the mean, dispersion and the distribution of the variables of the study. All the variables suffer from asymmetry within the period of the study, and this may be one of the reasons for the wide dispersion between the mean and the standard deviation, especially for real household consumption. However, the covariates exhibit wide dispersion except for the lending rate.

Table 1: Descriptive Statistics

¹ Angola, Benin, Botswana, Cameroon, Carbo Verde, Central Africa, Chad, Comoros, Congo Democratic Republic, Congo Republic, Cote d'Ivoire, Equatorial Guinea, Gambia, Gabon, Guinea Bissau, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome, sierra Leone, Senegal, South Africa, Tanzania, Togo, Uganda, and Zambia.

	lnRHCE	LRT	EXCR	IPD	lnRPCI
Mean	22.595	13.421	618.937	108.826	7.144
Median	22.595	10.988	592.610	106.190	7.038
Maximum	26.695	65.420	3611.220	153.452	9.673
Minimum	17.985	2.450	3.745	72.079	5.808
Std. Dev.	1.553	11.109	433.267	15.803	0.946
Skewness	-0.046	2.157	3.729	0.478	0.772
Kurtosis	4.275	8.747	21.686	3.322	2.607
Jarque-Bera	25.196	796.059	6240.829	15.69	39.110
Probability	0.000	0.000	0.000	0.000	0.000
Observations	370	370	370	370	370

Asymmetry of the distribution of the study variables is also confirmed by the value of skewness as shown in Table 1. Three of the regressors are positively skewed while the exchange rate and household consumption expenditure are negatively skewed. This implies that the observations of the study variables are clustered in opposite directions amongst the cross-sections and time. Kurtosis estimates are too peaked. And with a positive value of more the 3, except per capita income. Other variables have heavier tails, which is higher than a normal distribution. In summary, the descriptive statistics corroborate the Jarque-Bera p-value of asymmetry of distribution of the data in time and among the cross-sections.

The pairwise correlation results in Table 2 suggests that the real household consumption significantly correlates with the real per capita income and there is no significant relationship with all other independent variables. In addition, the covariates of the study exhibit significant correlation between and among them. The inference from this result is that there may be a tendency for cross-sectional dependence between the dependent variable and its covariates. Further to the result in Table 2, the paper conducts a test of cross-sectional dependence of the sample of the study. The result is contained in Table 4.

Table 2: Correlation Results

	lnrhce	lrt	excr	ipd	lnrpci
lnrhce	1.000				
lrt	0.080 1.535	1.000			
excr	0.021 (0.421)	0.135 (2.614) *	1.000		

ipd	-0.052 (-0.995)	-0.262 (-5.200) *	-0.123 (-2.379) *	1.000	
lnrpci	0.266 (5.298) *	-0.154 (-2.982) *	-0.195 (-3.807) *	0.137 (2.655) *	1.000

* indicate "t" distribution at 5% level of significance
t-statistic is in parenthesis.

4.2 Slope homogeneity and Cross-sectional Dependence Tests

Slope homogeneity test by Pesaran and Yamagata (2008) null hypothesis is that the slope coefficients of the regressors are homogeneous. Results in Table 3 affirms that the study rejects the null hypothesis in favour of the alternate hypothesis. Despite the heterogeneity of the slope regressors, the fixed effects estimator still allows for the estimation of the panel data, which assumes that the unobservable factors are taken for granted.

Table 3: Slope Homogeneity Test

Test	statistic	p-value
\bar{Z}	5.718	0.000*
Adj \bar{Z}	8.086	0.000*

*indicate 1% level of significance

In addition to the slope homogeneity test reported in Table 3, Table 4 contains the cross-sectional dependence test, which is another major contemporary issue in panel data analysis. The null hypothesis of the test by Pesaran (2015), Frees (1995) and Friedman (1937) is that there is of cross-sectional independence among the cross-sections that represent the sample of a panel data. Nevertheless, the null hypothesis is rejected by the three tests (see Table 4). The evidence infers that there is cross-sectional dependence among the countries of study.

Table 4 Cross-sectional dependence Test

Type of CD Test	CD Test Value	p-value	Frees LoS	Frees CV	Frees TS
Pesaran	43.359	0.000*			
Friedman	183.009	0.000*			
Frees			10%	0.2559	
Frees			5%	0.3429	
Frees			1%	0.5198	

*indicate 1% level of significance

CD – cross-sections; LoS – level of significance; CV – coefficient value; TS – test statistic

4.3 Regression Results

This section of the paper compares the differences in the coefficient estimates of the fixed and random effects as well as the mean group results of our panel data. The fixed and random effects models did not consider issues like slope heterogeneity and cross-sectional dependence in determining the coefficient estimates of the regressors. Furthermore, while the mean group derives the mean value for the coefficients of the regressors the fixed effects assumes homogeneity of slopes and random effects allows for individual cross-section effects in determining the coefficient estimates of the three methods.

Table 5: Results of Fixed and Random Effects

Variables	Coefficients	Coefficients	P-value	P-value
	Fixed Effect	Random Effect	Fixed Effect	Random Effect
lrt	-0.008314	-0.007996	0.000*	0.000*
excr	-0.000092	0.000105	0.223	0.156
lnrpci	0.949317	0.892669	0.000*	0.000*
ipd	-0.005607	-0.005505	0.000*	0.000*
_cons	16.47977	16.86153	0.000*	0.000*
rho	0.99213199	0.99195489		
F-test $u_i = 0$	p-value = 0.000*			

*; indicate 1% level of significance

Table 5 contains the coefficient estimates of the fixed and random effects models and Table 6 reports the Hausman test that confirms the preferable estimate of the two options. The results from the two methods are proximate but the Hausman test in Table 6 based of the probability of chi-square of 0.3122 infers that results of the random model is better than the that of the fixed effects.

Table 6: Hausman Test: Between Fixed and Random Models

Variable	b (fe)	B(re)	b-B difference	SE
lrt	-0.008314	-0.0079958	-0.0003182	0.0002411
excr	0.0000917	0.0001054	-0.0000137	0.0000116
ipd	-0.0056069	-0.0055049	-0.000102	0.00000988
lnrpci	0.9493171	0.8926689	0.0566481	0.0324035

Chi Sq; 4.77
 Prob of Chi Sq: 0.3122

The mean group estimator coefficient estimate in Table 7 does not assume cross-section in the estimation process, but it includes a linear trend that captures time-variant unobservables (Perasan and Smith, 1995). The coefficient of the regressors in Table 7 also represents the unweighted average of the cross-section (Eberhardt 2012). The 4 explanatory variables included in the fixed and random effect model are also modelled under the mean group estimator. But due to the detection of the existence of collinearity among the 4 variables, the real income per capita was set to zero. The mean group estimator results also affirmed that the lending rate significantly affect household consumption expenditure positively and unlike the fixed and random effect results, the exchange rate has a significant positive effect on household consumption in SSA.

Table 7: Mean Group Result

Variables	Coefficient	P-value
lrt	0.228	0.010**
excr	0.031	0.000*
ipd	-0.002	0.283
_cons	4.175	0.004*

* and ** indicate 1% and 5% level of significance respectively

lnrt - lending rate; lnexcr - log of exchange rate; ipd – implicit price deflator; _cons - constant

The inference from the mean group results is that a per cent increase in the lending and a unit increase in the exchange rate leads to an increase of 0.228 and 0.031 per cent increase in household consumption respectively in SSA. The study found no evidence that implicit price deflator significantly affects household consumption. The paradox of the findings from the mean group estimator is that household consumption is expected to reduce as interest rate increases, but the result infers that borrowers are generally unmindful of increasing cost of the lending rate as they tend to ask for more credit to meet their consumption needs. The exchange rate also follows the similar pattern with a relatively lower proportional increase in the household consumption pattern. A plausible explanation for increased consumption despite the depreciation of the domestic currency against foreign currency is that most of the countries in SSA are largely import-dependent.

The weak cross-sectional dependence test results (Pesaran, 2015) in Table 9 rejects the null hypothesis that errors are weakly cross-sectional dependence at 1% level of significance. The paper, therefore, affirms that after the regression analysis, mean group approach the errors are weakly cross-sectional independence.

Table 9: Pesaran (2015) test for weak cross-sectional dependence.

CD statistic	P-value
16.181	0.000*

H₀: errors are weakly cross-sectional dependent.

* indicates 1% level of significance

4.4 Discussion of Findings

Based on the mean group approach, the coefficients estimates represent an average effect of lending and exchange rate on household consumption in SSA. The result implies that even if the interest rate increases and the exchange rate depreciates household consumption increases marginally in SSA on the average. The findings of this paper have important policy implications for consumption in the region. Because a decrease in consumer credit, in particular, will encourage a higher level of consumption and this may enhance growth in the region relying on the outcome of the study by Economic and Social Survey of Asia and the Pacific (2016). The rate of increase in consumption increased at a higher lending rate compared to an increase in household consumption due to increased exchange rate. The findings imply that in SSA a relatively low lending rate for household consumables may enhance mass consumption in the region. In addition, if the exchange rate appreciates import will be cheaper and the region can improve its consumerism and subsequently the growth potentials of the region. The implication is that government need to ensure in stabilising the exchange rate by supporting the development of exportable products.

The findings of this study are similar to the findings of Kumar et al., (2019) on Pakistan. They found that the interest rate and exchange rate have a significant positive impact on consumption in Pakistan. Although Kumar et al., (2019) study is country-specific, the study is also on a developing nation; hence the economic situation in the two studies may exhibit similar characteristics. The findings by this study based on the mean group estimator differ from the work of Oseni (2016) who found that exchange rate volatility and interest rate have a significant adverse effect on consumption in a sample of 19 SSA countries. Based on the generalised method of moments (GMM) estimator. It is pertinent to say that the findings by this study based on the random effects' estimator are similar to that of Oseni (2016), but this study's coefficients elasticities (based on the mean group estimator) used the average of the cross-sectional units and time-variant unobserved factors, in the estimation of the parameter values and this was not considered by the estimator used by Oseni (2016). The mean group approach on the average may be a more representative real-life situation of the condition in SSA.

In advanced economies, which is relatively better organised than developing nations, findings on the relationship of the variables of the study suggest that interest rate affects consumption but negatively in USA (Christensen, 2012) while interest rate does not primarily affect consumption in Germany (Hermann-Josef 1995). A panel study on advanced economies by Bahmani-Oskooee and XI (2015) affirms that exchange rate volatility has negative and

positive effects respectively on different advanced countries that are included in the sample in both the short and long-run. However, the estimator used by Bahmani-Oskooee and XI (2015) differs from the one used by this study and the main explanatory variable is the volatility of the exchange rate.

5. Conclusion

The continuous study on how household consumption responds to cost of lending and exchange rate is essential due to their perceived effects on growth in SSA. Furthermore, the possible effect of improved consumption on the growth potential of the region makes it imperative to continually investigate the phenomenon for both macro, micro and financing policy guide. It is evident from our findings that the average household consumption pattern of SSA increases slightly despite the rising cost and depreciating exchange rate. This implies that a policy framework that ushers a reduced lending rate and appreciating exchange rate will in no doubt improve the household consumption level of the region and eventually, the economic growth potential of the region. Therefore, efficient management of the exchange rate that engenders a revaluation of the domestic currency would significantly improve consumption in the region. A possible area of further research on this issue is to investigate how interest rate affects the decomposed aggregate household consumption in SSA so as to formulate an appropriate consumer lending rate policy that will enhance the improvement of household consumption in SSA.

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