

Inflation rate volatility and household final consumption expenditure: evidence from Cameroon

Authors' contributions

The work was carried out in collaboration between both authors. Both authors read and approve the final manuscripts.

ABSTRACT

Aims: The study aims to examine the effects of inflation rate volatility on household final consumption expenditure in Cameroon. **Studies on inflation rate and household final consumption expenditure in Cameroon are limited. This study provides a new insight into how inflation rate fluctuations affect household consumption expenditure in Cameroon.**

Study design: The study made use of an ex-post facto research design **as the researcher has no control over the variables.**

Place and duration of the study: The study was conducted in Cameroon using World Bank data from 1980-2020.

Methodology of the study: **The objectives of the study were accomplished** using the autoregressive distributive lag (ARDL) bound test and error correction model(ECM) based on the conclusion of the unit root test.

Results: The findings indicate that the inflation rate has a positive **and significant effect** on household final consumption expenditure in both the short and long run.

Conclusion: **The study concludes that an unstable inflation rate has** a great impact on household final consumption expenditure in Cameroon.

Keywords: **Consumer welfare; Consumption expenditure; Household; inflation rate.**

1)INTRODUCTION

The rising commodity prices in recent time has been more worrying, especially for countries that rely on imported foodstuff for consumption. With uncertainties surrounding the world, price instability has been observed in all economies affecting household final consumption expenditure. The variability about impending prices is likely to entail hedging costs, greater risk premia, and unforeseen changes in wealth distribution(1). A high rate of inflation volatility, therefore, has the potential to do great harm to household consumption expenditure. According to (2) inflation is an implicit tax on households' use of paper money as a medium of exchange, resulting in less consumer purchasing power in an economy. Also, (3) affirmed, "Inflation is a dangerous disease that can be sometimes fatal." while the fundamental agenda of all economic policy is to sustain food prices (4), the objective is hardly attained as price instability or shock always rocks the world due to war, epidemic or changing prices of major imports or exports product which affects household consumption expenditure. These two key factors of economic progress are considered paramount, as distortion in the inflation rate affects consumption and welfare. The role of the government is, therefore, to attain a stable equilibrium between inflation rate and household consumption expenditure. Without a doubt, inflation spikes harm poor countries as they incapacitate their purchasing power through a fall in household consumption expenditure(5). Apart from the general tendency of upward price movement, episodes of inflation rate volatility have resulted in exceptional and controversial changes in the prices of commodities, leaving adverse effects on a substantial number of households in many less developed countries(6). In general commodity price is a function of household spending which in return boost growth(7). Thus, the government plays a vital role in promoting consumption to ignite aggregate demand(8).

Different researchers have proven that food price instability is detrimental to household consumption expenditure(9,10). This is so as food price is a key factor that determines the

type of food intake, especially in low-income countries, which most times find it difficult to have a saving account. The quota of food consumption expenditure in total household expenditure is therefore a significant instrument for gauging welfare levels(11). This welfare can only be stable if the inflation rate is stable. However, the inconsistency in the inflation rate had caused tremendous harm to household consumption expenditure in developing countries like Cameroon.

In recent times, the Cameroon economy has experienced rapid increases in the prices of basic commodities. The negative effects of the food price spikes are evident through decreasing the purchasing power of household consumers, under-consumption of foodstuff, and deepening food insecurity, poverty, and malnutrition. These conditions, alongside below-average incomes, are producing significant food consumption deficits and are compelling most poor households to initiate strategies to cope with the situation, especially in rural communities(12).

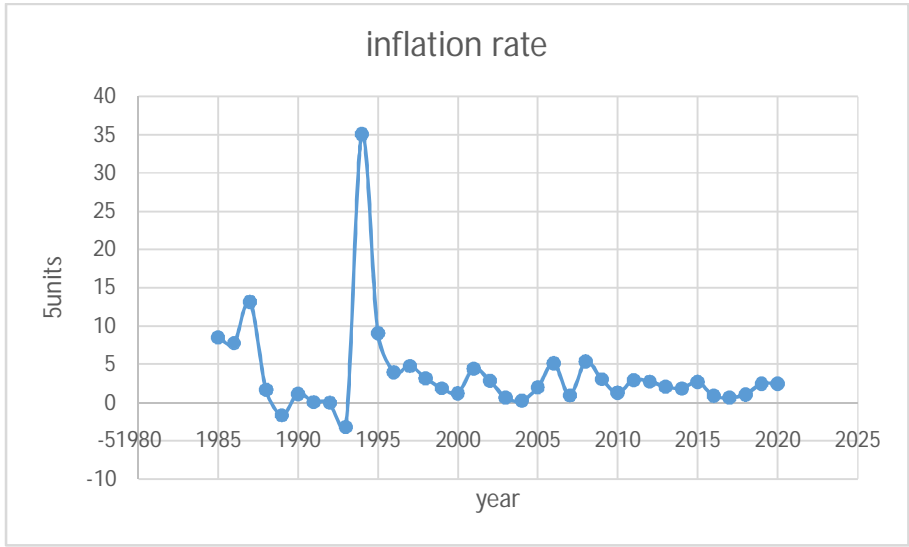
Cameroon's economic outlook for 2022 proves the economy is gradually recovering from the socio-economic impact of COVID-19. However, the Russia-Ukraine war presents a hitch to this recuperation by further increasing the already rise in global commodity prices especially as Russia supplies 46 percent of Cameroon's wheat and 43 percent of its mineral fertilizers while Ukraine supplies 35 percent of iron and steel products(13). This has caused a rise in the inflation rate across the country (Figure 1). According to the national institute of statistics (INS), Cameroon's inflation rate has been increasing since 2017 and stood at 2.43percent in 2020 (Figure 1). This has caused household final consumption expenditure to rise by 30.47% in 2020(Figure 2). The national institute of statistics further indicates that the price spike over the period is due to the surge in food prices, which rose by 7.6%, with a peak of 10.5% for imported products like rice, frozen fish, and raw materials for agricultural product on the global market(13).

The Cameroon household survey (ECAM) indicates that food consumption expenditure was highly dominating the total budget of households in both urban and rural areas in 2001 and 2007 with the food consumption share in rural areas higher than that in urban areas for both periods(11). In recent times, the government of Cameroon has continuously spent chunks of its GDP on household consumption expenditure to boost welfare though the growth rate in household final consumption expenditure has not been consistent.

With numerous causes of inflation in Cameroon such as importation, money supply, exchange rate, government expenditure, inflation, and exportation of goods and services, the quest to stabilize prices to ignite the welfare of citizens through expenditure on consumption is far-fetched as malnutrition, Food insecurity, and hunger are persistent within the rural and urban areas in Cameroon (14).

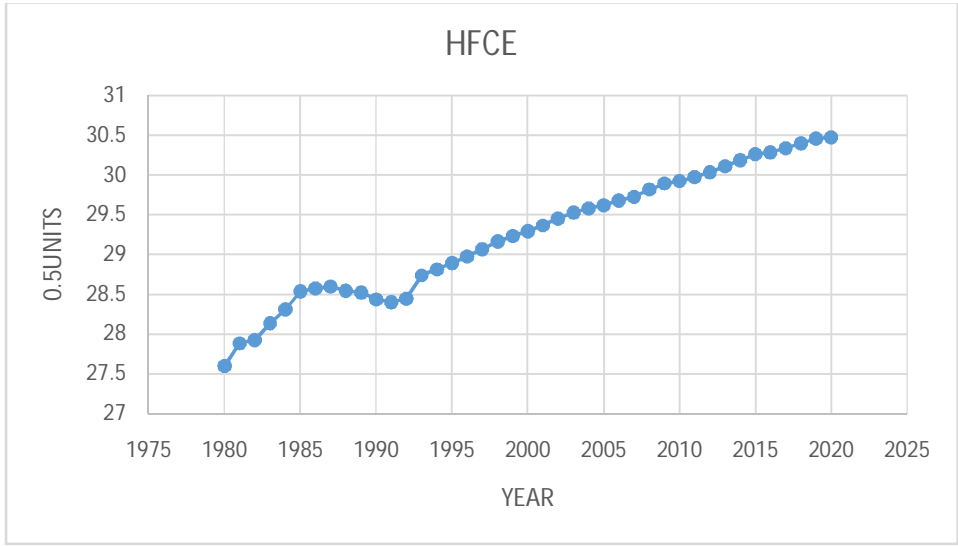
Motivated by no existing study on the effects of inflation volatility on household final consumption expenditure in Cameroon? The study, therefore, seeks to find out how inflation rate volatility affects the household's consumption expenditure in Cameroon. This study is therefore crucial to help initiate policies that are geared toward improving the well-being of Cameroonian households.

Figure 1. Evolution of the inflation rate from 1980 to 2020 in Cameroon



Source: Computed by Authors from WDI.

Figure 2. Evolution of household final consumption expenditure in dollars from 1980 to 2022 in Cameroon.



Source: Computed by Authors from WDI

2) EPISODE OF INFLATION IN CAMEROON.

Cameroon had one major episode of inflation exceeding 30 percent in 1994 where the inflation rate was 35% after the devaluation of the CFA in 1994 (figure 1). The factors responsible for this high rate stem from a serious economic crisis Cameroon experienced from 1986 to 1987, which continued from 1993 to 1994. This led to negative growth rates of 3 percent to 4 percent, which in turn led to a 50 percent devaluation of the CFA in January 1994. Price increase was evident due to the devaluation. Some of the measures adopted to curb the situation included drastic cuts in public spending in the social sectors including salary cuts by 50%, a reduction in import expenditure, and a freeze in public service recruitment.

3) THEORETICAL LITERATURE REVIEW

Empirical studies and consumption theories assert that household's consumption expenditure is mainly dependent on macroeconomic indicators such as interest rates, gross domestic product, equity prices, consumer credits volume, and house prices (15). The traditional theory of consumption is based on the intrinsic utility a consumer derives from consuming a good (16). Great thinkers in the past have brought different theories in studying household consumption expenditure as one of the key factors that determine a country's welfare (17–19). The Keynesian theory of consumption expenditure asserts that the absolute level of income determines individual and societal consumption expenditure while Duesenberry in 1949 suggests that the consumption expenditure level does not depend on absolute income but rather on an individual's income. Another theory of consumption expenditure is the "Life Cycle Theory of Consumption Expenditure" proposed by Modigliani who claims consumption expenditure depends on lifetime income planned by individuals rather than current disposable income (20). Friedman on his part introduced the Permanent Income Hypothesis suggesting that individuals' consumption expenditure depends on their permanent income and not on their present income.

Concerning theories of inflation, the Keynesian theory of Inflation argued that an increase in aggregate demand could be resulting from an increase in real factors. To him when the aggregate demand in an economy strongly outweighs the aggregate supply, inflation is imminent. The modern theory of inflation on the other hand shows that one or both of the supply-side and the demand-side factors influence the price level. The factors that are functional on the supply side are called pull factors, and those, which operate on the demand side, are called cost-push factors. The monetary theory of inflation by Robert in 1972 asserts that money supply growth is the cause of inflation in an economy. He considers money supply and inflation to have a positive relationship *ceteris paribus*. That is faster growth in the money supply causes faster inflation. Thus doubling the money supply means doubling prices.

4) EMPIRICAL LITERATURE REVIEW

Previous studies have shown that food price changes have adversely affected the purchasing power of Cameroonian households (21,22). Also, (23) in econometric models of consumption and savings functions for Cameroon from 1970 to 2007 using **Two- Stage Least Squares (2SLS) technique of estimation** found that disposable income, expected inflation, general price level, interest rate, and dependency ratio have a positive impact on private consumption. (24) noted that household consumption has a key role to play in the determination of household welfare and the dynamic effect of economic shocks.

With special emphasis on Nigeria and Ghana (8) using World Bank data from 1999 to 2018 indicates inflation rate exerts a positive and significant effect on household consumption expenditure. **This finding is similar to that of** (25) using Nigeria as a case study **to conclude that** inflation rate and economic growth have a positive relationship with household consumption expenditure from 1981 to 2018 using OLS. **Using data from** the third Cameroonian Household Consumption Surveys (ECAM III) to analyze the welfare effect of food price volatility in Cameroonian consumers, (26) had the following conclusion a) food

price volatility affects mostly poor households. b) The welfare losses from food price volatility depend on the extent of the price increase. The findings of (27) point out that food price instability is problematic for households if it negatively affects their consumption. This is in line with the results found by (5,9). Furthermore, (28) examine the Macroeconomic Determinants of Household Consumption Expenditure in Ghana from 1961 to 2013 using vector autoregressive model. They conclude that the consumer price index and the real effective exchange rate have a positive impact on household consumption expenditure. The conclusion is true with the findings of (29) using sub-Saharan Africa as a case study. Nonetheless, to an agricultural household, higher food prices can raise farm incomes, which is expected to enhance purchasing power (30). The study conducted by (31) on Inflation expectation and consumption expenditure using German survey data for the period from 2000 to 2013 indicates that fiscal and monetary policy measures that ignite higher inflation expectations might be successful in stimulating consumption expenditures.

The study of (32) indicated that exchange rate volatility results in high inflation, which reduces consumer purchasing power. This conclusion is supported by the findings of (33) who used South Africa as a case study to affirm that Rand appreciation increases household consumption levels.

On contrary, A meta-analysis conducted by (34) shows that an increase in food price leads to a decrease in households' consumption. This validates the findings of (33) using South Africa as a case study to conclude price levels and interest rates have a negative effect on household consumption expenditure both in the short and long run. The study of (35) to investigate Income and Household Consumption Expenditure from 1986–2020 in Nigeria using an error correction model reveals an indirect relationship exists between inflation and household consumption expenditure.

5) METHODOLOGY

This study makes use of secondary data from world development indicators from 1980-2020. Household final consumption expenditure **define** in dollars is the dependent variable while the inflation rate is the independent **variable measured by the consumer price index, which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services**. To obtain robust estimates the study included the real effective exchange rate and growth domestic product as related control variables.

The approach of the study rest within the ARDL framework. This technique, which is used when variables are integrated into different orders, has some key advantages. First, the test is more efficient in the case of small and finite sample data sizes. Secondly, the order of integration is not important as it can bypass unit root tests since it is applied in conditions of I(0) and I(1) series. In addition, the ARDL long-run estimates are unbiased(36,37). Following the(37) the ARDL (p, q, ..., q) model is specified as:

$$y_t = \gamma_0 + \sum_{j=1}^p \alpha_j y_{t-j} + \sum_{j=0}^q \beta_j x_{t-j} + \epsilon_{jt}$$

From the equation, y_t represents HFCE or inflation rate; x_t are the dependent variables that can be integrated into different orders (I(0) or I(1)), α and β are the coefficients, p, q represent the optimal lag, j is the number of variables which range from 1, ..., k, ϵ_{jt} indicate vector of error terms and γ is the intercept.

The null hypothesis of the ARDL bound test is thus; $H_0: b_{1i} = b_{2i} = b_{3i} = b_{4i} = b_{5i} = 0$, implying no co-integration against the alternatives; $H_1: b_{1i} \neq b_{2i} \neq b_{3i} \neq b_{4i} \neq b_{5i} \neq 0$, signifying co-integration. The null hypothesis is rejected if F -statistic calculated is greater than the critical value for the upper bound $I(1)$ confirming cointegration.

If the ARDL bound test proves cointegration, the error correction model (ECM) is specified as follows;

$$\Delta \log hfce_t = a_{01} + \sum_{i=1}^p a_{1i} \nabla \log hfce_{t-i} + \sum_{i=1}^{q1} a_{2i} \nabla \log infla_{t-i} + \sum_{i=1}^{q2} a_{3i} \nabla \log exr_{t-i} + \sum_{i=1}^{q3} a_{4i} \Delta \log gdp_{t-1} + \lambda ECT_{t-1} + \epsilon_{1t} \dots\dots\dots 1.2$$

In the absence of cointegration, the equation looks as thus;

$$\Delta \log hfce_t = a_{01} + \sum_{i=1}^p a_{1i} \nabla \log hfce_{t-i} + \sum_{i=1}^{q1} a_{2i} \nabla \log infla_{t-i} + \sum_{i=1}^{q2} a_{3i} \nabla \log exr_{t-i} + \sum_{i=1}^{q3} a_{4i} \Delta \log gdp_{t-1} + \epsilon_{1t} \dots\dots\dots 1.3$$

Where; HFCE=household final consumption expenditure in dollars

INFLA=Inflation rate

EXR=real effective exchange rate

GDP=growth domestic product in dollars

ϵ_{1t} = error term

λ = The speed of adjustment

ECT = The error correction term

$a_{2i} a_{3i} a_{4i} a_{5i}$ = The short-run estimates,

(∇) = The difference operator.

The rationale for using this method in this study is due to the different levels of integration of the variables. Once variables are integrated into different others, the best technique to answer the research question is the ARDL bound test approach(38).

6) RESULTS

Table 1.1: Descriptive Statistics

Variable	obs	mean	Std.dev	min	max	variance	skewness	kurtosis
LogHFCE	41	29.2485	0.8054	27.5972	30.4742	0.6487493	-0.1568	1.9087
INFLA	41	4.72216	6.5332	-3.20656	35.09446	42.68221	2.7278	12.5881
EXT	41	114.236	23.2221	90.20546	169.0875	539.2662	0.9936	2.5053
LogGDP	41	23.5012	0.5816	22.61199	24.43206	0.3382155	0.1761	1.7215

Table 1.1 shows the summary statistics of the variables. From the table, the mean value of household final consumption expenditure, inflation rate, exchange rate, and growth domestic product are respectively 29.25, 4.72, 114.24, and 23.50. Their respective deviation from the sample average are 0.81, 6.53, 23.22, and 0.58. The inflation rate has the lowest minimum value while the exchange rate has the highest maximum value. The dispersion among the observation is 0.65 for HFCE, 42.68 for inflation rate, 539.67 for exchange rate, and 0.34 for growth domestic product. The statistics also reveal that inflation rate, exchange rate, and growth domestic product are positively skewed which means they have a long right tail while HFCE is negatively skewed indicating it has a long left tail. The result further shows that HFCE, exchange rate, and growth domestic product are platykurtic as their values are less than 3 indicating less extreme outliers than the normal distribution while inflation rate is leptokurtic since its value is greater than 3 indicating more extreme outliers than the normal distribution.

Table 1.2: Correlation Matric Table

variables	logHFCE	INFLA	OFFEXR	logGDP
HFCE	1.0000			
INFLA	-0.4138	1.0000		
EXR	-0.7130	0.0308	1.0000	
GDP	0.9310	-0.4827	-0.4764	1.0000

Source: computed by authors

The pairwise correlation matrix in table 1.2 reveals the leading diagonals stand at 1.000 showing that each variable is perfectly collinear to itself. The correlation table indicates that growth domestic product has a strong positive correlation with household final consumption expenditure (HFCE). This is indicated in the correlation coefficient (r) result as (0.931). This implies that as gross domestic product increases, household final consumption expenditure also increases as well. Thus, there is a direct relationship in the trend of association between both variables. Inflation rate on the other hand has a weak negative correlation (0.414) while exchange rate has a strong negative correlation (0.713) with HFCE. Thus, an increase in inflation or exchange rate will reduce HFCE. The correlation coefficients between the explanatory variables are all less than 0.75 indicating the absence of the problem of collinearity between the explanatory variables.

Table 1.3: Unit Root Test

Test	variables	Test statistics at level	P-values	Test statistics at first different	p-values	decision
ADF	logHFCE	-0.834	0.8090	-2.746	0.0064	I(1)
TEST	INFLA	-4.739	0.0001	-----	-----	I(0)
	EXR	-1.447	0.5594	-4.364	0.0003	I(1)
	logGDP	-0.604	0.1850	-4.976	0.0000	I(1)

PP TEST	HFCE	-1.871	0.3457	-5.006	0.0000	I(1)
	INFLA	-4.908	0.0000	-----	-----	I(0)
	EXR	-1.528	0.5197	-5.550	0.0000	I(1)
	logGDP	-0.590	0.8733	-7.690	0.0000	I(1)

Source: computed by authors

Empirical research based on time series presumes that statistical properties such as the mean, variance, and covariance are time-invariant. However, most macroeconomic variables exhibit unit roots. Thus Before conducting any analysis in time series data, it is always of paramount importance to conduct stationarity to avoid spurious regression results (39). This study makes use of the, (40) and(41) tests. Once there is the presence of structural changes, the power of ADF unit root tests decreases to reject the unit root hypothesis(42). The decision rule is to reject the null hypothesis of a unit root if the augmented dickey fuller or Phillips Perron statistic value exceeds the critical value at a chosen level of significance in absolute terms. A max lag of two will be used in the study using Akaike information criteria (AIC) after issuing the obtain lag-order selection statistics (varsoc).

The ADF and PP results **in table 1.3** indicate the series has a mixed order of integration where some variables are stationary at levels while others are stationary after the first difference. In this case, the bound test will be used to ascertain if the model exhibit long run convergence.

Table 1.4: ARDL Bounds Test for Co-integration

Critical values	Critical bounds	
	Lower bound I(0)	Upper bound I(1)
10%	2.72	3.77
5%	3.23	4.35
1%	4.29	5.61

F-statistics	10.102
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Source: computed by authors.

The result of the bound test in table 1.4 reveals that the value of the F-statistic of 10.102 exceeds the upper bounds at all critical values. This implies that there is evidence of a long run dynamic relationship existing among the variables used in this study. This means that even if there are shocks in the short run, which affect movement in the individual series, they will converge with time in the long-run. There is therefore the need to estimate both the ARDL and ECM in this study.

Table 1.5: ARDL Estimates

VARIABLES	(1) loghfce	std.error
Shortrun estimates		
L.loghfce	0.790*	(0.061)
infla	0.005**	(0.002)
exr	-0.006*	(0.001)
L.exr	0.009*	(0.003)
L2.exr	-0.006*	(0.002)
loggdg	0.506*	(0.101)
L.loggdg	-0.611*	(0.181)
L2.loggdg	0.285**	(0.124)
Constant	2.404*	(0.659)
Longrun estimates		
Infla	0.024**	(0.013)
Exr	-0.019*	(0.003)
Loggdg	0.855*	(0.096)
Adj. coeff	-0.210*	(0.061)
Observations	39	
R-squared	0.997	
DW statistic	2.194	

Standard errors in parentheses

Source: computed by authors.

Note: *Denotes the significance level at 1% while **Denotes the significance level at 5%.

7) DISCUSSION

The result of the short-run estimates **in table 1.5** indicates that the past realization of household final consumption expenditure (HFCE) has a strong influence on itself by 79% *ceteris paribus*.

The result also reveals that the inflation **rate** has a positive effect on HFCE. That is a unit increase in inflation rate is associated with a 0.05% point increase in HFCE on average *ceteris paribus* at a 1% significant level. This is also true in the long run as a unit increase in inflation rate increases HFCE by 2.4% at a 5% significant level, *ceteris paribus*. During periods of high inflation, people spent more money which increases the cost of living especially with fixed income levels than during periods of lesser inflation. The conclusion is consistent with the findings of (8) and (25) who conclude that the inflation rate exerted a positive and significant effect on household consumption expenditure in Nigeria. It also authenticates **the Keynesian theory of inflation which asserts that when the aggregate demand in an economy strongly outweighs the aggregate supply, inflation is imminent.**

The first and second lag of **both** real effective exchange rate and economic growth has an asymmetric impact on HFCE *ceteris paribus* at a 1% and 5% significant level respectively in the short run. However, In the long run, a unit increase in real effective exchange reduces HFCE by 1.9% while a percentage point increase in economic growth increases HFCE by 85.5%, *ceteris paribus* at a 1% significant level in both cases. Exchange rates have a significant impact on the prices paid on imported goods. **Thus,** Weak currency discourages importation, which makes consumers to deviate their consumption habits to domestic production. This conclusion validates the findings of (43–45). The positive relationship between economic growth and HFCE also implies that income has an immediate impact on household consumption expenditure which is also consistent with Keynes's theory of consumption and the study of (25).

The adjustment term(-0.210) is statistically significant at 1% level suggesting that deviations from the long-run equilibrium are corrected for within the current year at a convergent speed of 21%. It, therefore, takes about 4.7 years ($1/0.210$) to restore the long-run equilibrium in real consumption expenditure. This adjustment speed is lower than 45.291 percent estimated by Forgha (2008) in Cameroon. The significance of the explanatory variables also proves there is causality between the dependent and independent variables.

Table 1.6: Results of Diagnostic Tests

specification	p-values	conclusion
White Test(heteroscedasticity)	0.423	No conditional heteroscedasticity
Breusch-Godfrey LM test(autocorrelation)	0.189	No higher-order autocorrelation
Jarque-Bera (JB) test (normality)	0.275	There is normality in residuals
Ramsey RESET Test (omitted variable)	0.201	The model is correctly specified

Source: Computed by Authors.

The results in Table 1.6 confirmed the absence of serial correlation and conditional heteroscedasticity. Also, it was found that the residual term was normally distributed and the model is well specified.

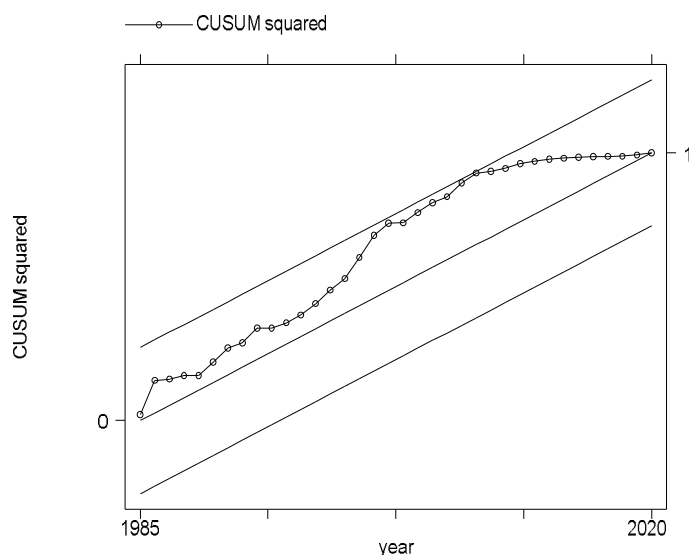


Figure 3: Plot of CUSUMSQ for Model Stability at 5% level of Significance.

Source: Computed by Authors.

The cumulative sum of squares (CUSUMSQ) test proposed by (46) is used to test for the stability of the model. The graph in figure 3 lies within the critical limits of 5%. Thus, the null hypothesis that all the coefficients are stable cannot be rejected.

7) CONCLUSION AND RECOMMENDATIONS.

This study aimed to examine the effect of inflation rate volatility on household final consumption expenditure in Cameroon. The study employed the ARDL procedure where the bound test was used to ascertain if the variables exhibit long-run relationship. The cointegration test result from the bound test reveals the presence of cointegration relation, which entails using the ARDL and ECM model. The findings indicate that inflation rate and economic growth have a positive and significant effect on household final consumption expenditure in both the short and long run while the exchange rate has a negative and significant effect on HFCE in both the short and longrun. This, therefore, indicates that changes in the price level have a great impact on household final consumption expenditure in Cameroon. Based on this conclusion, the study recommends that Policymakers should encourage stability in the price levels by managing inflation rate expectations among households. This can be done using contractionary monetary policy or issuance of government bonds to reduce the money supply in circulation.

COMPETING INTERESTS.

Authors have declared that no competing interests exist.

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