



# Macroeconomic Determinants of Household Consumption Expenditure in Ghana: A Multivariate Cointegration Approach

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## ABSTRACT

Household consumption is generally considered to be the final purpose of economic activity, and the level of consumption per person is often viewed as a central measure of an economy's productive success. Thus, consumption is among the key determinants of well-being of citizens at the global level. This study used a multivariate cointegration approach to analyse the macroeconomic determinants of household consumption expenditure in Ghana. The sample period consists of annual time series from 1961 to 2013. The vector autoregressive model and Johansen cointegration approach were used to capture the short-and long-run relationships between selected macroeconomic variables and the household consumption in Ghana. The cointegration analysis revealed a significant long-run relationship between real household consumption and selected macroeconomic variables with a marginal propensity to consume of 0.7971. Granger causality, impulse response analysis and variance decomposition showed that, in the short run, household consumption is only affected by changes in price levels, while it has a significant effect on the real exchange rate and real economic growth. Findings reported in this study are helpful in understanding the macroeconomic role of household consumption expenditure in the Ghanaian economy.

**Keywords:** Cointegration, Ghana, Household Consumption, Macroeconomic Variables, Vector Autoregressive

**JEL Classifications:** E21, C30

## 1. INTRODUCTION

Household consumption expenditure is the most important part of aggregate demand. In most countries, it represents a large proportion, which in general is in the region of 60% of gross domestic product (GDP), and therefore it is an essential variable for economic analysis of aggregate demand (Organisation for Economic Co-operation and Development (OECD), 2009). Household final consumption expenditure (also known as private consumption) is the market value of all goods and services, including durable products (such as cars, washing machines and home computers), purchased by households, and also payments and fees to governments to obtain permits and licenses (World Bank, 2015). It excludes purchases of dwellings, but includes imputed rent for owner-occupied dwellings. The pattern of expenditure changes over time as a result of changes in household income, taste and preferences, tax and subsidies, and relative prices. In the process of their income generation and expenditure, households indirectly play a role in income redistribution through

payment of income taxes and social contributions to governments (Hronova and Hindls, 2013).

Neoclassical economists (mainstream) generally consider consumption to be the final purpose of economic activity, and thus, the level of consumption per person is viewed as a central measure of an economy's productive success (Ezeji and Ajudua, 2015). Globally, household income, consumption and wealth are regarded as being among the key determinants of well-being of citizens (Slesnick, 2000; Stiglitz et al., 2009; Gerstberger and Yaneva, 2013). Thus, the study of consumption behaviour plays a central role in both macroeconomics and microeconomics. Macroeconomists are interested in aggregate consumption for two reasons. First, aggregate consumption determines aggregate saving because aggregate saving, defined as the portion of income not consumed, flows through the financial system to create the national supply of capital (Ezeji and Ajudua, 2015). Hence, both aggregate consumption and saving behaviour have a powerful influence on an economy's long-term productive capacity. Second,

since consumption expenditure accounts for most of national outputs, understanding the dynamics of aggregate consumption expenditure is essential to understanding macroeconomic fluctuations and the business cycle (Gerstberger and Yaneva, 2013). Due to its high share in GDP, consumption expenditure is taken into account in macroeconomic policies for fiscal planning. Policy makers try to predict how consumers will behave in the face of income fluctuations. In terms of consumers, consumption phenomena require a decision-making process. For that reason, the consumption function reveals a behavioural relationship in macroeconomics.

Ghana, over the years, has been experiencing periods of high debt and high inflation as well as currency depreciation with high interest rates and prime rates. These factors lead to increases in the price of goods and services, which reduces the purchasing power of the citizenry. The latest value for household final consumption expenditure in Ghana was US\$30,994,350,000 as of 2013, and it has grown by 250% over the 53 years following 1960 (World Bank, 2015). Household final consumption expenditure, as a percentage of GDP was 64.39% in 2013, and its highest value during the 53 years after 1960, was 90.82%, this being in 1983, while its lowest value was 51.02% in 2012 (OCD, 2009; World Bank, 2015). According to Ghana Statistical Service (GSS) (2008), the average annual household expenditure in Ghana was Ghana cede (GH¢) 1,918.00 (about United States dollar (US\$) 504.7) per a household, whilst the mean annual per capita consumption expenditure was GH¢ 644.00 (about US\$ 169.5). Regional differences exist with Greater Accra Region having the highest per capita expenditure of GH¢ 1,050.00 (about US\$ 276.3), whilst Upper West had the lowest, being GH¢ 166.00 (about US\$ 47.4). The average annual household expenditure was about 1.6 times higher in urban areas (US\$ 699.7) than in rural areas (US\$ 398.4) even though the household size in rural households tends to be larger than urban households (GSS, 2008).

The target of every economy is to attain the highest possible level of growth. A rise in growth implies a rise in the aggregate welfare of the people. For this reason, governments of developing countries such as Ghana have been pursuing policies that would lead to economic growth. The purpose of this study is to investigate the impact of selected macroeconomic variables on household consumption expenditure in Ghana using a multivariate cointegration approach. The study also explores short-run interactions between selected variables and household consumption expenditure in Ghana. This study provides information on the effect of these macroeconomic variables on household consumption, which could be useful to government and policy makers and help them draw-up policies to control changes in these variables.

## 2. LITERATURE REVIEW

### 2.1. Theoretical Framework

The determinants of consumption expenditure have influenced economists, such as Keynes (1936), Duesenberry (1949), Friedman (1957) and Ando and Modigliani (1963), to study factors that are both quantitative and qualitative variables, such as income, wealth, interest rate, capital gain and liquid assets, which can influence

consumption. The study of such factors is because any influences on consumption expenditure play a major role in the process of economic growth in every economy (Branson, 1989). This link was established in a conceptual breakthrough by Keynes in 1936, which confirmed the relationship between income and consumer expenditure. The ratio of consumer expenditure to income varies with the level of income both cyclically and across families at any given time. Keynes (1936) laid the foundation of modern consumption theories. According to Keynes, current real income is the primary determinant of consumption, and the interest rate has no effect on consumption decisions for the reason that income and the substitution effect of the interest rate eliminate each other. Keynes made three salient points from his proposition. First, consumption expenditure depends mainly on absolute income for the current period. Second, consumption is a positive function of the absolute level of current income, and third, the more income derived, the more the consumption expenditure in that period (Jhingan, 2002).

A different theory was suggested by Duesenberry in 1949. In his analysis, Duesenberry (1949) posited that current consumption is not influenced merely by the current level of absolute and relative income but also by levels of consumption attained in the previous period. Duesenberry also put forward the theory of consumer behaviour that lays stress on the relative income of an individual rather than on absolute income as a determinant of an individual's consumption. His theory is therefore called the relative income theory of consumption. Friedman in 1957, advanced a hypothesis regarding consumption behaviour, called the permanent income hypothesis, according to which the consumption of an individual depends on permanent income rather than on the current level of income. Ando and Modigliani (1963), beginning in the early 1950s, put forward a theory known as the life-cycle hypothesis, according to which an individual plans an even consumption profile over his or her lifetime, which depends not so much on current income but on expectations of income over the whole life cycle. These theories have their similarities and differences in their implications for stabilisation policy and they seem to suggest that household consumption can indirectly be affected by macroeconomic factors that affect income.

### 2.2. Empirical Studies on Household Consumption

The link between household consumption and various macroeconomic factors has been investigated by different studies (Akekere and Yousuo, 2012; Ofwona, 2013) from developing economies. Akekere and Yousuo (2012) investigated the impact of change in GDP on private consumption expenditure in Nigeria over the period 1981-2010, and their findings showed that GDP has a positive and significant impact on private consumption expenditure. This finding suggests that an increase in economic growth would boost household consumption. This conclusion was also confirmed by Ofwona (2013) who found that income is a key determinant of household consumption in Kenya. Mishra (2011) investigated the relationship between real consumption expenditure and economic growth in India and found that real private consumption expenditure is affected by economic growth in the long run. However, Mishra (2011) did not find any short-run relationships between consumption expenditure and economic growth.

The link between income and household consumption expenditure was also established by other studies, such as those by Amin (2011), Chioma (2009), Mallik and Pradhan (2012), and Alimi (2013). Alimi (2013) investigated the relationship between consumption expenditure and income according to Keynes' absolute income hypothesis in Nigeria, and concluded that as income increases, the average propensity to consume is reduced. Mallik and Pradhan (2012) studied the relationship between per capita consumption expenditure and personal income in India, and found that changes in per capita consumption expenditure lead to changes in personal disposal income.

On the contrary, some studies (e.g., Parker, 1999; Guisan, 2004) failed to provide empirical evidence supporting the relationship between household consumption and economic growth or GDP (income). Guisan (2004) studied the causal relationship between real consumption and real GDP in Mexico and the United States of America, and found that there was no causality in Mexico but there was bilateral causality in the United States. Furthermore, the cointegration results showed that the long-run relationship was uncertain in the case of Mexico. Parker (1999) also found that predictable changes in income have no effect on the growth rate of consumption expenditures.

Empirical studies (e.g., Berben and Brosens, 2007; Touny, 2008; Verter and Osakwe, 2014) have also analysed the link between household consumption and macroeconomic factors such as money supply, interest, inflation and exchange rate. Touny (2008) analysed the determinants of domestic savings in Egypt and provided evidence that domestic saving is determined by per capita income, budget deficit ratio, money supply, real interest rate, inflation rate and current account deficit. Verter and Osakwe (2014) also identified net disposable income, cross-cultural dynamics, inflation rate, and saving rate as factors influencing household spending in the Czech Republic. Other empirical studies (Tellis and Ackerman, 2001; Dvořáková and Seidler, 2012; Gerstberger and Yaneva, 2013) suggest that domestic disposal income and prices levels have a significant effect on household consumption expenditure.

Backus and Smith (1993) and Chari et al. (2002) have shown that exchange rate movements are related to fluctuations in virtually any kind of fundamental variables, including household consumption. Backus and Smith (1993) showed that a feature of international business cycle models with complete markets is a perfect correlation between the consumption and the bilateral real exchange rate. Chari et al. (2002) found that household consumption is affected by changes in the real exchange rate. Choi (2005) introduced relative trade flows into her study and established a relationship between exchange rates and consumption ratios. From a risk point view, Brandt et al. (2006) identified asset markets as the primary drivers of disconnect between consumption and real exchange rates. This relationship was also confirmed by Sarkissian (2003) who showed that incomplete consumption risk sharing can generate realistic time-varying risk premiums in the foreign exchange market.

On the relationship between household consumption and inflation, some studies (Doepke and Schneider, 2006; Mian et al., 2013)

noted that in times of fixed nominal interest rates, higher inflation expectations and lower real interest rates reduce savings and stimulate consumption. Aruoba and Schorfheide (2011) argue that the effect of real interest rates on consumption depends on assumptions regarding preferences related to the type of money used by households; suggesting that households use paper money as a medium of exchange. Therefore, higher inflation is an implicit tax on paper money, and could lower economic activity. Bloom (2009), Pastor and Veronesi (2013) and Taylor (2013) contributed to the debate by concluding that higher inflation might lead to an increase in inflation uncertainty, which eventually reduces consumption spending via a precautionary savings channel. Feldstein (2002) proposes that pre-announced increases in inflation expectations may stimulate current private spending. Other studies (e.g., Krugman, 1998; Eggertsson and Woodford, 2003; Eggertsson, 2006; Werning, 2012) also confirmed that a central bank can encourage current spending by committing to higher future inflation rates. Hausman and Wieland (2014) in their study on monetary easing of the Bank of Japan and the expansionary fiscal policy, concluded that higher inflation expectations raise consumption and GDP. Thus, empirical evidence shows that changes in price levels and inflation expectations may affect household consumption.

### 3. METHODOLOGY

#### 3.1. Sample Period and Variable Description

The sample of annual time series from 1961 to 2013 was used to analyse the relationship between the real household consumption (RHC) expenditure and various macroeconomic variables in Ghana. Macroeconomic variables were selected based on the literature, but some of the variables were excluded due to the unavailability of data. Thus, the inflation rate, the real exchange rate and real income were used for this study. The RHC in the context of this study refers to real values (in US dollars) of household final consumption expenditure measured by the real market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households (World Bank, 2015). It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. The income was measured by the real GDP in US dollars. The real exchange rate (RER) was measured by the real effective exchange rate, which is a measure of the real value of a currency against a weighted average of several foreign currencies. Inflation rate was measured by growth in the consumer price index (CPI), which reflects the changes in the cost to the average consumer of acquiring a basket of goods and services. Data of all variables were obtained from the World Bank website.

#### 3.2. Model Specification

In examining the relationship between the RHC expenditure and various macroeconomic variables in Ghana, the vector autoregressive model (VAR) was used. VAR is the beginning point for a multivariate analysis including the cointegration test, Granger causality test and the impulse response analysis (Brooks, 2014; Niyimbanira, 2015). The VAR model used in this study is as follows:

$$LRHC_t = \alpha_1 + \sum_{i=1}^n \beta_{1i} LRHC_{t-i} + \sum_{i=1}^n \gamma_{1i} LCPI_{t-i} + \sum_{i=1}^n \lambda_{1i} LGDP_{t-i} + \sum_{i=1}^n \delta_{1i} LRER_{t-i} + e_{1t} \quad (1)$$

$$LCPI_t = \alpha_2 + \sum_{i=1}^n \beta_{2i} LRHC_{t-i} + \sum_{i=1}^n \gamma_{2i} LCPI_{t-i} + \sum_{i=1}^n \lambda_{2i} LGDP_{t-i} + \sum_{i=1}^n \delta_{2i} LRER_{t-i} + e_{2t} \quad (2)$$

$$LGDP_t = \alpha_3 + \sum_{i=1}^n \beta_{3i} LRHC_{t-i} + \sum_{i=1}^n \gamma_{3i} LCPI_{t-i} + \sum_{i=1}^n \lambda_{3i} LGDP_{t-i} + \sum_{i=1}^n \delta_{3i} LRER_{t-i} + e_{3t} \quad (3)$$

$$LRER_t = \alpha_4 + \sum_{i=1}^n \beta_{4i} LRHC_{t-i} + \sum_{i=1}^n \gamma_{4i} LCPI_{t-i} + \sum_{i=1}^n \lambda_{4i} LGDP_{t-i} + \sum_{i=1}^n \delta_{4i} LRER_{t-i} + e_{4t} \quad (4)$$

Where: LRHC is the log of the RHC expenditure; LCPI is the log of the CPI; LGDP is the log of the real GDP; LRER is the log of the real effective exchange rate; t refers to time period;  $\beta_i, \gamma_i, \lambda_i$  and  $\delta_i$  are the coefficients to be estimated;  $\alpha_1, \alpha_2, \alpha_3$  and  $\alpha_4$  are the intercepts;  $e_1, e_2, e_3$  and  $e_4$  are the error terms; and n is the number of lags in the VAR model.

Before estimating the VAR model, it is imperative to determine whether variables are stationary or non-stationary in order to avoid the possibility of estimating spurious regressions (Muzindutsi and Maepa, 2014). This study used the Augmented Dickey-Fuller (ADF) unit root test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test to check whether the variables were stationary or not. If the observed variables are found to be stationary, then the VAR model in equations 1-4 is estimated. However, if all variables are found to be non-stationary then a cointegration test is estimated to determine whether a linear combination of such non-stationary variables is stationary (Ogbokor, 2015). This process is known as the cointegration test for a long-run relationship (Muzindutsi and Sekhampu, 2013). This study used the multivariate cointegration test by Johansen (1988 and 1991) to test for the long-run relationship between the variables. In case the non-stationary variables are not cointegrated, the VAR model is estimated in first difference. However, if variables are found to be cointegrated, then the vector error correction model (VECM) is estimated. For this study, VECM's equations derived from the VAR model, in equations 1 to 4, are as follows:

$$\Delta LRHC_t = \alpha_1 + \sum_{i=1}^n \beta_{1i} \Delta LRHC_{t-i} + \sum_{i=1}^n \gamma_{1i} \Delta LCPI_{t-i} + \sum_{i=1}^n \lambda_{1i} \Delta LGDP_{t-i} + \sum_{i=1}^n \delta_{1i} \Delta LRER_{t-i} + \phi_{1i} u_{1t-1} + e_{1t-1} \quad (5)$$

$$\Delta LCPI_t = \alpha_2 + \sum_{i=1}^n \beta_{2i} \Delta LRHC_{t-i} + \sum_{i=1}^n \gamma_{2i} \Delta LCPI_{t-i} + \sum_{i=1}^n \lambda_{2i} \Delta LGDP_{t-i} + \sum_{i=1}^n \delta_{2i} \Delta LRER_{t-i} + \phi_{2i} u_{2t-1} + e_{2t-1} \quad (6)$$

$$\Delta ECG_t = \alpha_3 + \sum_{i=1}^n \beta_{3i} \Delta LRHC_{t-i} + \sum_{i=1}^n \gamma_{3i} \Delta LCPI_{t-i} + \sum_{i=1}^n \lambda_{3i} \Delta LGDP_{t-i} + \sum_{i=1}^n \delta_{3i} \Delta LRER_{t-i} + \phi_{3i} u_{3t-1} + e_{3t-1} \quad (7)$$

$$\Delta LRER_t = \alpha_4 + \sum_{i=1}^n \beta_{4i} \Delta LRHC_{t-i} + \sum_{i=1}^n \gamma_{4i} \Delta LCPI_{t-i} + \sum_{i=1}^n \lambda_{4i} \Delta LGDP_{t-i} + \sum_{i=1}^n \delta_{4i} \Delta LRER_{t-i} + \phi_{4i} u_{4t-1} + e_{4t-1} \quad (8)$$

Where:  $\Delta$  is representing the first difference of the variables in the model;  $u_{1t-1}, u_{2t-1}, u_{3t-1}$  and  $u_{4t-1}$  are error correction terms; while  $\phi_1, \phi_2, \phi_3$  and  $\phi_4$  are error correction coefficients to capture the adjustments of change to long-run equilibrium.

## 4. EMPIRICAL RESULTS AND DISCUSSION

### 4.1. Testing for Stationarity

Results for ADF unit root and KPSS stationarity tests are in Table 1. These results were used to test the following hypotheses (Brooks, 2014):

ADF unit root test

- Null hypothesis ( $H_0$ ): A variable has unit root, I(1)
- Alternative hypothesis ( $H_1$ ): A variable is stationary, I(0).

KPSS stationarity test

- $H_0$ : A variable is stationary, I(0)
- $H_1$ : A variable is not stationary, I(1).

For a variable to be stationary,  $H_0$  should be rejected under the ADF test and not rejected under the KPSS test. Results in Table 1, show that at levels the ADF t-statistic statistics for all variables are less than the critical values at 0.05 significance level. This means that the  $H_0$  for unit root cannot be rejected. With the KPSS test the LM-Statistics for all variables are greater than the critical values at 0.05 significance level, implying that the  $H_0$  for stationary is rejected. Both ADF and KPSS tests show that all variables are not stationary in the levels. At first differences, the  $H_0$  is rejected under the ADF test, while it cannot be rejected under the KPSS test. This means that all variables assumed a stationary status after first difference. Thus, all variables are I(1) and hence it is appropriate to proceed with the Johansen cointegration test.

### 4.2. Analysis of the Long-run Relationship

Before the cointegration test was conducted, lag order selection criteria were conducted to identify the number of lags in our VAR model. Results of lag length selection (not included in this study) showed that an optimum number of one lag was appropriate. Thus, one lag was used to estimate the cointegration results, reported in Table 2. The results of both trace and Eigen value tests show that there is one cointegrating equation; implying that there exists a long-run relationship between household consumption expenditure, income and other macroeconomic variables.

$$LREALHC = -15.8435 + 5.675 LCPI + 0.52234 LER + 0.7971 LGDP \quad (9)$$

The cointegrating equation (9) shows the long-run coefficients for income, inflation and the real exchange rate are positive. This means that income, inflation and the real exchange rate have a significant positive long-run effect on household consumption expenditure. The real GDP (proxy for total income) coefficient

**Table 1: Unit root and stationary tests results (with constant and no trend)**

Test variable	ADF t-statistic		KPSS LM-statistic		Order of integration
	Level	1 <sup>st</sup> difference	Level	1 <sup>st</sup> difference	
LRHC	-0.3130	-8.6371	0.9254	0.2570	I (1)
LGDP	-1.6192	-6.4463	0.9323	0.1270	I (1)
LCPI	-0.7402	-4.0023	0.8545	0.1735	I (1)
LRER	-0.8341	-6.8377	0.8468	0.0771	I (1)
Critical values @ 5%	-2.9177	-2.9188	0.4630	0.4630	

GDP: Gross domestic product, RER: Real exchange rate, CPI: Consumer price index

**Table 2: Johansen cointegration results**

Hypothesised number of CE(s)	Trace test		Maximum Eigen value test	
	Trace statistic	P-value	Max-Eigen stat.	P-value
None	57.65178	0.0046	42.61833	0.0003
At most 1	15.03345	0.7779	9.411312	0.7979
At most 2	5.622139	0.7397	5.550136	0.6714
At most 3	0.072002	0.7884	0.072002	0.7884

implies that the marginal propensity to consume is 0.7971; meaning that an increase of 1% in income causes household consumption expenditure to rise by 0.7971% in the long-run. An increase of 1% in CPI causes household consumption expenditure to rise by 5.675%. The significant long-run effect of income on household consumption expenditure in Ghana confirms the relative income hypothesis that income has a lasting effect on household consumption expenditure. This finding is similar to other studies (Chioma, 2009; Amin, 2011; Mallik and Pradhan, 2012; Alimi, 2013) that established a significant relationship between household consumption expenditure and income. The significant effect of inflation on consumption expenditure is similar to the previous studies (Krugman, 1998; Feldstein, 2002; Eggertsson, 2006; Werning, 2012) that found that inflation expectations stimulate current household consumption spending.

### 4.3. Short-run Relationships

After establishing the cointegrating relationship, the VECM was estimated to capture the short-run adjustments to the equilibrium. The error correction results (Table 3) from the VECM estimates show that only two coefficients, LHC and RER, have a desired negative sign, but only LHC is significant at 0.05 significant level. This means the household consumption equation explains the adjustment to the long-run shocks affecting natural equilibrium. The ECT coefficient implies that about 3.95% of the deviations from the equilibrium is eliminated every year. Consequently any changes in independent variables take about 25.3 (1/0.0395) years to have a full effect on household consumption expenditure. This result tends to support Friedman's (1957) permanent income hypothesis that consumption of an individual depends on permanent income rather than current level of income. Furthermore, this is in line with the life-cycle hypothesis, which states that individuals plan their consumption profile over their lifetime.

To further explore the short-run relationships between household consumption expenditure, the selected variables, impulse response analysis and variance decompositions were generated from the VECM. Impulse response analysis results, in Figure 1, show that household consumption expenditure responds to its own innovations. The direct response of household consumption

**Table 3: Error corrections**

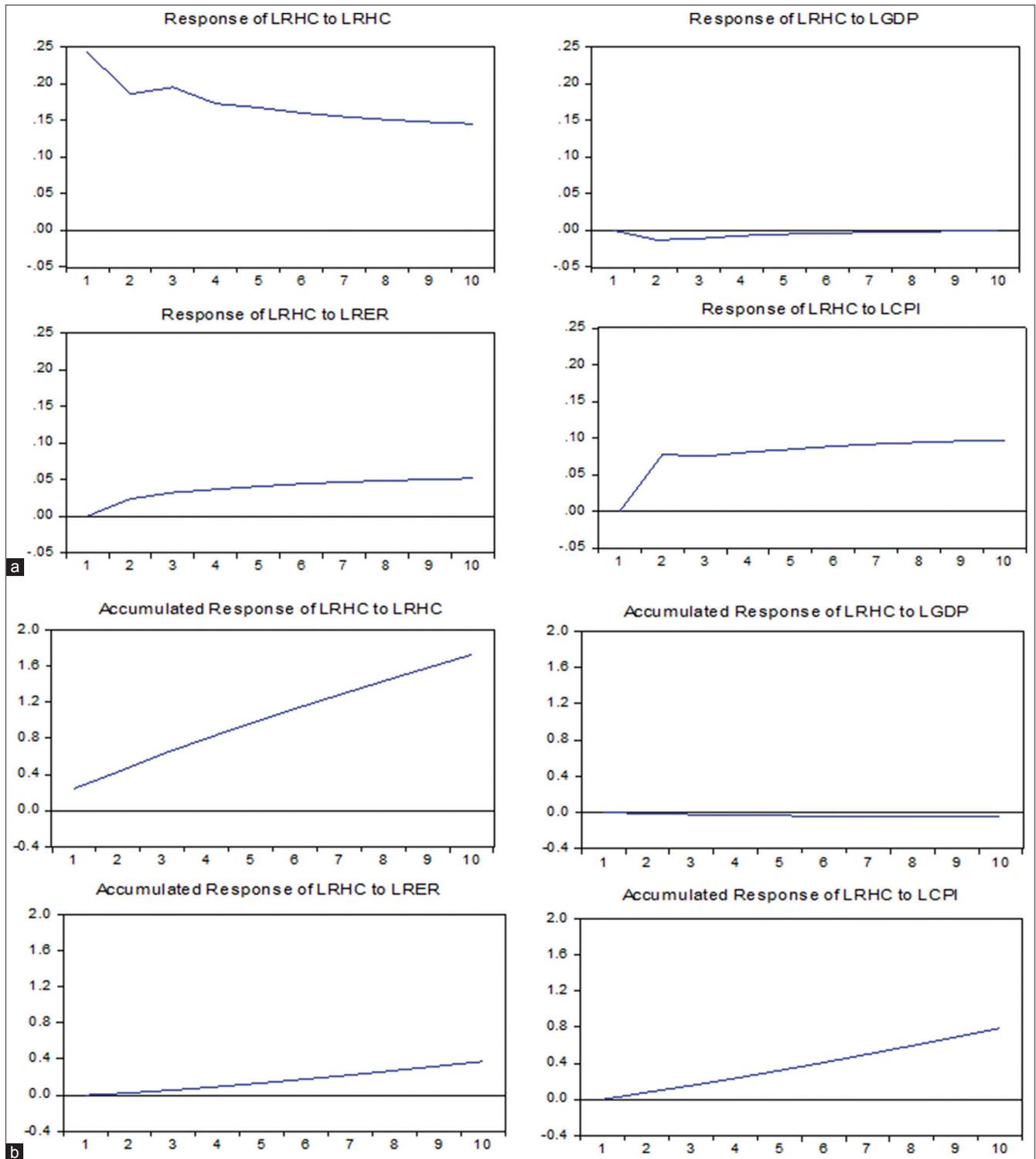
Variables	D (LHC)	D (LCPI)	D (LRER)	D (LGDP)
ECT coefficients	-0.039474	0.053389	-0.001569	1.214552
Standards errors	(0.01474)	(0.01467)	(0.01920)	(0.25845)
T-value	[-2.67763]	[3.63889]	[-0.08172]	[4.69936]

GDP: Gross domestic product, RER: Real exchange rate, CPI: Consumer price index

expenditure to inflation and real exchange rate innovations is positive, but the response to exchange rate innovations seems to be very low. On the other hand, there seems to be no direct response of household consumption expenditure to GDP innovations. The accumulated responses in household consumption expenditure to shocks from inflation and the real exchange rate generate an increase in RHC expenditure, while shocks from GDP do not affect household consumption expenditure.

Variance decomposition, which is the percentage of the variance of the error made in forecasting a variable due to a specific shock at a specific time horizon (Ogbokor, 2015), was used to analyse the fluctuations in household consumption expenditure caused by itself or by the other variables. Variance decomposition over a 10-year forecast horizon, in Table 4, shows that, in the 1<sup>st</sup> year, changes in household consumption expenditure are 100% purely explained by household consumption expenditure itself. The inflation rate seems to be the contributor to changes in household consumption expenditure during the forecast horizon. After the 2<sup>nd</sup> year, the three variables explain about 7% of the changes in household consumption expenditure, and inflation alone contributes 6%. After 10 years, 78% of changes in household consumption expenditure are explained by household consumption expenditure itself; while the other variables explain 22%. Out of this 22%, inflation contributes the most (17.76%), followed by the real exchange rate (4.13%) and GDP makes the weakest contribution (0.10%). This means that household consumption is mostly affected by its own shocks and among the three variables, inflation has a significant effect on short-run changes in household consumption expenditure. This is similar to Duesenberry's (1949) theory that consumption is also affected by levels of consumption attained in previous periods.

**Figure 1:** Impulse response analysis. (a) Response to Cholesky One S.S. Innovations, (b) Accumulated response to Cholesky One S.D. Innovations



Granger causality results, in Table 5, show that household consumption expenditure Granger cause real income (GDP) and real exchange rate, while inflation (CPI) Granger cause household consumption expenditure. This means that short-run changes in household spending are mostly driven by changes in price level, while changes in household spending lead to changes in real income and the real exchange rate. This finding confirms the impulse response analysis and variance decomposition results, which also showed that household

consumption expenditure mostly reacts to shocks from inflation. These findings suggest that inflation has a significant short-run effect on household consumption expenditure, while the adjustment in household spending has an effect on real income and the exchange rate.

Overall, findings of the current study are similar to other studies (Tellis and Ackerman, 2001; Akekere and Yousuo, 2012; Dvořáková and Seidler, 2012; Gerstberger and Yaneva, 2013;

**Table 4: Variance decomposition of household consumption expenditure**

Period	SE	LRHC	LGDP	LRER	LCPI
1	0.242793	100.0000	0.000000	0.000000	0.000000
2	0.316810	93.25784	0.173576	0.548819	6.019762
3	0.381180	90.64048	0.208663	1.083326	8.067533
4	0.427929	88.24248	0.194862	1.584706	9.977951
5	0.469044	86.19738	0.174694	2.063679	11.56425
6	0.505440	84.24933	0.156036	2.530439	13.06420
7	0.538666	82.47304	0.139702	2.972649	14.41461
8	0.569374	80.84451	0.125868	3.386853	15.64277
9	0.598138	79.36093	0.114278	3.770940	16.75386
10	0.625313	78.01029	0.104586	4.125064	17.76006

GDP: Gross domestic product, RER: Real exchange rate, CPI: Consumer price index

**Table 5: Pairwise Granger causality test**

Null hypothesis	F-statistic	P
LGDP does not Granger Cause LHC	0.80459	0.4533
LHC does not Granger Cause LGDP	5.32013	0.0083
LCPI does not Granger Cause LHC	5.62365	0.0065
LHC does not Granger Cause LCPI	0.65159	0.5259
LRER does not Granger Cause LHC	0.45103	0.6397
LHC does not Granger Cause LRER	4.48582	0.0165

GDP: Gross domestic product, RER: Real exchange rate, CPI: Consumer price index

**Table 6: Summary of diagnostic tests results**

Test	Null hypothesis (H <sub>0</sub> )	P-values	Decision
White (no cross terms)	No conditional heteroscedasticity	0.2975	Do not reject H <sub>0</sub>
LM	No serial correlation	0.3762	Do not reject H <sub>0</sub>
JB	There is normality	0.510	Do not reject H <sub>0</sub>

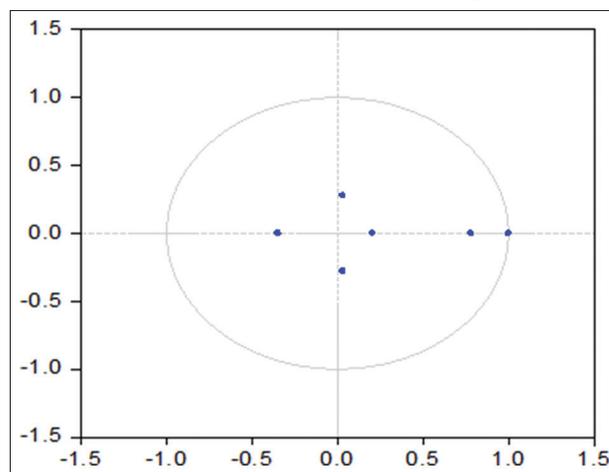
LM: Langrange multiplier, JB: Jarque-bera

Ofwona, 2013; Verter and Osakwe, 2014; Ezeji and Ajudua, 2015), which found a significant relationship between household consumption expenditure, income and other macroeconomic variables. The findings related to both short-run and long-run relationships between household consumption expenditure and inflation in Ghana are similar to those of other studies (Bloom, 2009; Pastor and Veronesi, 2013; Taylor, 2013), which concluded that high inflation increases price uncertainty, and eventually affect consumption spending. The presence of the short-run effect of household spending on the real exchange rate suggests that changes in Ghanaian household consumption patterns would affect the currency market. Hence, Ghanaian households spend a considerable amount on traded goods.

**4.4. VECM Diagnostic Checks**

To validate the robustness of the results and to test whether the established relationships are stable over the sample period, diagnostic tests were conducted and the results are summarised in Table 6 and Figure 2. These results show that there is no presence of serial correlation and conditional heteroscedasticity and the residuals are also normally distributed. All roots of AR characteristic polynomial, in Figure 2, have an absolute value less than one and fall inside the unit circle. However, one root is on the circle (modulus = 1) and this is statistically acceptable since the root does not lie outside the unit circle. This means that the model meets the stability conditions. Thus, the VECM used in this study meet all necessary econometric assumptions.

**Figure 2: Inverse roots of AR characteristic polynomial**



**5. CONCLUSIONS AND RECOMMENDATIONS**

This study used a multivariate cointegration approach to analyse the macroeconomic determinants of household consumption expenditure in Ghana. The sample period consists of annual time series from 1961 to 2013. The VAR model and Johansen cointegration approach were used to capture the short- and long-run relationships between selected macroeconomic variables (income, inflation and real exchange rate) and RHC in Ghana. Findings of this study showed that income and inflation have a long-run effect on household spending in Ghana, where about 79.71% of real income is spend on consumption. The short-run findings showed that household spending in Ghana is mostly driven by changes in price level and it has a ripple effect on real income and the real exchange rate. These findings imply that changes in household spending patterns do not only affect economic growth or income, but also affect the Ghanaian currency market. It is therefore concluded that change in price levels and inflation expectations have both a short- and long-run effect on household consumption in Ghana. Thus, policymakers can maintain stable spending patterns among households by managing inflation expectations and encouraging stability in price levels. Policymakers should also develop strategies to encourage Ghanaian households to spend on local products as high spending on traded goods seems to have a ripple effect on the Ghanaian currency.

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