The Effect Of Interest Rate On Deposit On Household Consumption In Ghana: Ardl Cointegration Analysis

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ABSTRACT

This paper presents an econometric model for household consumption in Ghana with the aim of highlighting the effect of interest rate on deposit on household consumption using time series data from 1970 to 2009. The paper also looks at other macroeconomics variables like inflation rate and GDP per Capita that have effect on household consumption. The ARDL Bound test was used to test for cointegration among these variables. The results showed that there exists a negative relationship between interest rate on deposits and household consumption both in the long run and short run. However, it was found not significant in the long run but rather in the short run.

Keywords: Household Consumption, interest rate on deposit, cointegration analysis, Autoregressive Distributed Lag

1. INTRODUCTION

The elasticities of consumption and saving to interest rate depend on the model parameters such as the intertemporal elasticity of substitution. The level of consumption may be interpreted as the result of a decision making process of households over the time structure of the allocation of their income. When interest rate rise, consumption decreases, this means that an important demand component declines. These elasticities have wide ranging implications for monetary policy, business cycles (Plosser and Rebelo, 1988) and tax incentives for saving. In Ghana, people consume wide range of consumables goods ranging from durable and non-durable goods. The levels of income receive from works they undertake influences the level of consumption. Moreover interest rate on deposit also affects the level of consumption. As most studies have found small effects of interest rates on consumption and saving (Hall, 1988). However, it remains unclear whether interest rate elasticities are truly small or these findings are spurious due to endogeneity of interest rate (Summers, Hall and Balassa, 1988). Understanding the response of personal consumption to changes in interest rates is central to many issues in economic policy; savings, lending, investment, etc.

The central question of this study is, can income alone explain bulk of the fluctuations in household consumption or there is a role for interest rate movement? By what magnitude does interest rate on deposit changes affect household consumption in Ghana if such an effect exists? Of what relevance is this to economic policies in Ghana? This study therefore seeks to answer the question, to what extent does interest rate on deposits affects household consumption in Ghana. The study is of a great concern to government and policy makers, simply because savings in Ghana is very low which compels the government and investors to attract loans from foreign donors and banks leaving the country with huge external debts. Can one put it out...
clearly that deposit rate in the country is not attractive enough for Ghanaians to save and therefore consumes more than savings? The study will look critically at this pressing issue.

The general objective of this study is to analysis the effect of interest rate on deposit on household consumption in Ghana from 1970 to 2009. Moreover to examine the effect of other key macroeconomic and policy variables (GDP per Capita and inflation) on household consumption in Ghana and to forecast the consumption model to know its level of predictive power.

2. LITERATURE REVIEW

2.1 THEORETICAL REVIEW

Consumption theories have been developed over the years to explain consumption starting from 1936, Keynesian’s absolute income hypothesis followed by James Duesenberg’s(1949) relative income hypothesis, Permanent Income hypothesis(1957) by Milton Friedman and life cycle hypothesis by Albert Ando and Franco Modigliani(1963).

Keynes specified a simple linear consumption with consumption being a positive function of disposable income in his book titled “The General theory of money, interest rate and employment (1936)”. Thus, consumption expenditure increases as disposable income increases. Though consumption depends on disposable income, there is a part of consumption which does not depend on disposable income and this is called the autonomous consumption. From the Keynes’ fundamental psychological law, consumers increase their consumption as their income increases but not as much as the increase in their income. The average propensity to consume which is the ratio of total consumption to total income falls as the level of income increases. Irving Fisher came out with inter-temporal choice which was the extension of Absolute income hypothesis. According to Keynesian’s absolute income hypothesis, current consumption depends on current income but this assumption is not always true in reality. Taken consumption and savings decision, people considers both present and future, so according to Fisher the more people consume in the current period the less they save, the less they save less they will be able consume in the next period. Deposit rate is major motivating factor for consumers to save in the current period.

One of the economists to offer a major challenge to the absolute income hypothesis was James Duesenberry. In his book “Income, Saving and the theory of Consumer Behaviour (1949)”, Duesenberry proposed an alternative theory, called the relative income hypothesis for reconciling the non-proportional (short run) and proportional (long run) consumption functions. Duesenberry’s theory was based on the rejection of two implicit assumptions underlying the micro foundations of the absolute income hypothesis. He believed (1) that household preferences for goods and services were interdependent and (2) that household consumption expenditures were irreversible overtime.
At the same time that Friedman was developing his permanent income hypothesis, Albert Ando and Franco Modigliani were formulating a similar theory called the life cycle hypothesis of consumption. According to the life cycle hypothesis, the typical individual has an income stream that is relatively low at the beginning and end of his/her life. On the other hand, the individual might be expected to maintain a more or less constant or perhaps slightly increasing level of consumption. This model suggests that in the early years of a person’s life the person is a net borrower. In the middle years, she saves to repay debt and provide for retirement. In the late years, the consumer dissaves. The consumer saves in the middle years to pay off his debts in the early stages of life and use some of his savings to smoothen his consumption towards his retirement.

The permanent income hypothesis is associated with the name of Milton Friedman. In “A Theory of the Consumption Function (1957)” Friedman expressed his concern with the proper definition and measurement of income. Friedman rejects the notion that, household consumption expenditures are dependent on current income since for him a year is too short a time span in which to make meaningful household spending decisions. Friedman’s hypothesis is that household consumption is based on permanent income. Thus, a household’s current measured income can either be greater or less than a household’s permanent income. Permanent income is the income that a household anticipates or expects to receive over a number of years in the future, possibly a lifetime. Permanent income, therefore, was defined in terms of concept which it was measured. Friedman breaks measured income into two components permanent income and transitory income. Transitory income results from all those factors that the household considers pure chance or unexpected.

2.2 EMPIRICAL REVIEW
Elmendorf (1996) did a work on, the effect of interest rate changes on household savings and consumption for United States of America. In order to analysis the effect of interest rate changes on consumption and savings, he decomposed the study into three pieces in order to analysis the inter-temporal elasticity of substitution and rate of time preference. The study used cross-sectional data on interest rates to estimate the inter-temporal elasticity of substitution. The research found out that, the effect of an interest rate increase is that it reduces household consumption by forgoing a dollar consumption through substitution effect whiles the individuals savings increases as a result of the reduction in consumption.

A study “Does a Decrease in the Real Interest Rate Actually Stimulate Personal Consumption?” was carried out by Nakagawa and Oshima (2000). As a remedy for Japan’s distressed economy, Professor Paul Krugman of Massachusetts Institute of Technology had suggested that a reduction in real interest rates caused by inflation expectations would stimulate personal consumption (Krugman 1998). Although there was a controversy whether inflation policy is effective or feasible, the paper sought to find out whether a decrease in
real interest rates actually stimulated personal consumption in Japan. They finally concluded that a decrease in real interest rates stimulated personal consumption, which confirms what Professor Krugman pointed out.

Kapoor and Shamika (2009) did a study on the effect of interest rate on household consumption; evidence from a natural experiment in India. As of April 2001, the Reserve Bank of India permitted and actively encouraged banks to offer higher interest rate on deposits of any size to senior citizens, defined as people over 60 years of age. Basically, the aim of the study was to find out how this new Indian banking legislation (increase in interest rate on deposits) affected the consumption of this age group. The research used the regression discontinuity approach to estimate the precise causal effect that the interest rate has on consumption of households. More specifically, when one compare 59 year old households with 60 year old households; one would found out that an increase of 50 basis points in the interest rate leads to a decline in consumption expenditure of 12 percent.

Elder and Halvorsen (2009) carried a study on the effect of a cut in the interest rate on consumption and saving in Norway. The research aimed to examine how different Norwegian consumers react to a sharp drop in the interest rates by observing their change in saving rates and also to find out how young households with negative net financial wealth, act as current-income consumers, and react differently to a drop in the interest rate than older households. The paper used panel data to examine how entire household consumers react to a sharp drop in the interest rates by observing the change in financial saving. The results found that a reduction in interest rate on deposit really decreases household savings since Norwegians save less as against increasing their personal consumption especially in the northern and central regions of Norway.

Smith and Lei (2005) carried a study on the response of consumption to income, credit and interest rates in Australia. The paper sought to find out the response of consumption to income, interest rates and credit growth in Australia and to identify the long-run relationship between consumption and permanent income, and estimate the short run response of consumption to income, interest rates and credit variables. The cross sectional data series on consumption and income which were quarterly and from the chain volume measure series in the Australia Bureau Service (ABS) National Accounts were used. Results of the paper revealed that, instrumental variable estimation of Euler equation with fixed coefficients suggested that consumption growth exhibits excess sensitivity to income growth than interest rate and credit.

Most empirical works examined, were undertaken for developed countries and their focus was on interest rate which can either be deposit rate or lending rate on consumption (government or household). This study is different in the sense that, it was undertaken for developing country like Ghana and the primary objective was on interest rate on deposit on household consumption.
3. METHODOLOGY

3.1 MODEL SPECIFICATION

The Keynesian absolute income hypothesis specified a consumption function:

\[ C = a + \beta Y, \quad C_t = f(Y) \] \hspace{1cm} (1)

Irving Fisher inter-temporal choice model which captured interest rate on deposit was specified as:

\[ C_1 = Y_1 - S \] \hspace{1cm} (2)

\[ C_2 = Y_1 + (1+ r) S \] \hspace{1cm} (3)

Finally simply as:

\[ C_1/C_2/ (1+r) = Y_1 + Y_2/(1+r) \] \hspace{1cm} (4).

For the purposes of this study, one more relevant variable was included namely inflation rate.

Therefore the consumption function for the study is specified as:

\[ C_t = f(INT, INF, Y) \] \hspace{1cm} (5)

Where; \( C_t \) is household consumption at time \( t \), \( INT \) is the interest rate on deposits while \( INF \) is the inflation rate and \( Y \) is GDP per Capita (GDP is a proxy for income). All values used for these variables are annually.

Equation (5) can be expressed as

\[ C_t = \beta_0 INT^{\beta_1} INF^{\beta_2} Y^{\beta_3} e^{\mu_t} \] \hspace{1cm} (6)

Where \( \mu_t \) is the error term. From equation (6), the specific model for consumption for the Ghanaian economy in log-linear form is given as:

\[ \ln C_t = \beta_0 + \beta_1 \ln INT + \beta_2 \ln INF + \beta_3 \ln Y + \mu_t \] \hspace{1cm} (7)

Where the \( \beta_i \) represent the elasticity coefficients. Equation (7) above shows the long-run equilibrium relationship.

The expected impacts of the determinants (i.e. independent variables) are as follows:

As interest rate on deposit tells us what households receive, when they save their monies at the bank. Therefore as interest rate on deposit increases, households will like to earn more on savings therefore they cut down consumption in order to save more. When interest rate on deposit falls they would increase consumption by saving less. Thus, it is expected that interest rate on deposit will have inverse relationship with household consumption. Therefore, \( B_1 < 0 \).
Inflation rate is a reflection of macroeconomic instability. A high rate of inflation is generally reduce consumption because it raises the cost of living and thus lowers the rate of consumption. At low levels of inflation, cost of living falls therefore household consumption increases. Thus, inflation is expected to have a negative relationship with household consumption. Thus, its coefficient $\beta_2 < 0$.

Gross domestic Production per Capita measures the standard of living in the country; therefore an increase in GDP per Capita raises the standard of living of the individual and household consumption increases. A fall in GDP per Capita result in the fall in household consumption, all things being equal. Thus, the expected sign $\beta_3 > 0$.

3.2 DATA TYPE AND SOURCES
The study used annual time series data for the period 1970 – 2009 obtained from published sources. The major sources of data included World Bank’s World Development Indicators, 2011 CD-ROM, IMF International Financial Statistics, 2006 and African Development Indicators. Other sources included annual reports of Bank of Ghana, State of the Ghanaian Economy (various issues) by Institute of Statistical, Social and Economic Research (ISSER). All estimations as well as the various econometric tests were carried out using Stata, Eviews and Microfit 5.1 econometric software.

3.3 STATIONARITY TEST
One major problem often associated with empirical analysis is non-stationarity of time series data. When variables being used for analysis are non-stationary, it usually leads to spurious regression results. In such a case, the t-statistic, DW statistic as well as the $R^2$ values are not accurate and invalid for inference. As part of pre-estimation investigations, the study conducts unit root tests to determine the order of integration of the relevant variables.

The unit root tests in this study are based on the test procedures proposed by Phillips and Perron (1988). The Phillip and Perron (PP) test was used to test the stationary status of the variables used in the equation. The PP test is preferred to the traditional Augmented Dickey-Fuller (ADF) test because of its use of non-parametric methods to adjust for serial correlation and endogeneity of regressors thereby preventing the loss of observations implied by the ADF test.

3.4 COINTEGRATION TEST
The Autoregressive Distributed Lag (ARDL) Cointegration Test, otherwise called the Bounds Test developed by Pesaran et al., (2001) was used to test for the cointegration relationships among the series in the model. Two or more series are said to be cointegrated if each of the series taken individually is non-stationary with $I(1)$, while their linear combination are stationary with $I(0)$.
Following Pesaran et al., (2001) as summarized, the ARDL is applied by modelling the long-run equation (7) as a general vector autoregressive (VAR) model of order \( p \) in \( z_t \).

\[ z_t = \beta_0 + \alpha_t + \sum_{i=1}^{p} \phi_i z_{t-i} + \mu_t . \quad t = 1, 2, 3, \ldots, T \quad \text{...............} \quad (8) \]

Where

\( \beta_0 \) represents \((k + 1)\) – a vector of intercept (drift)

\( \alpha \) represents \((k + 1)\) – a vector of trend coefficients.

Pesaran et al., (2001) deduced the following vector equilibrium correction model (VECM) corresponding to (8).

\[ \Delta z_t = \beta_0 + \alpha_t + \pi z_{t-1} + \sum_{i=1}^{p} \tau_i \Delta z_{t-i} + \mu_t . \quad t = 1, 2, 3, \ldots, T \quad \text{...............} \quad (9) \]

Where

\((k + 1) \times (k + 1)\) – matrices

\[ \pi = I_{k+1} + \sum_{i=1}^{p} \psi_i, \text{ and } \tau_i = - \sum_{j=i+1}^{p} \psi_j, i = 1, 2, \ldots, p - 1 \]

contain the long-run multiplier and short-term dynamic coefficients of the VECM. \( z_t \) is the vector of variables \( c_t \) and \( x_t \) respectively; \( C_t \) is an I(1) dependent variable defined as \( \ln C_t \) (in this case \( \ln \) Household Consumption); \( x_t \) (Interest rate on deposits, Inflation, GDP per Capita,) is a vector matrix of ‘forcing’ I(0) and I(1) regressors.

Assuming further that there is unique long run relationship among the variables, the conditional VECM becomes:

\[ \Delta C_t = \beta_0 + \alpha_t + \theta \Delta C_{t-1} + \theta_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta C_{t-i} + \sum_{i=0}^{p-1} \theta \Delta x_{t-i} + \mu_{yt} \quad \text{.................} \quad \text{(10)} \]

From the equation (9), the conditional VECM can be specified as

\[ \Delta \ln C_t = \beta_0 + \alpha_t + \theta_1 \ln C_{t-1} + \theta_2 \ln INT_{t-1} + \theta_3 \ln INF_{t-1} + \theta_4 \ln Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta \ln C_{t-i} + \sum_{j=1}^{q} \beta_j \Delta \ln INT_{t-j} \]

\[ + \sum_{k=1}^{q} \beta_{3k} \Delta \ln INF_{t-k} + \sum_{m=1}^{q} \beta_{4m} \Delta \ln Y_{t-m} + \mu_t \quad \text{.........................} \quad \text{(11)} \]
The ARDL Bounds testing procedure basically involves three steps. The first step in the ARDL bounds testing approach is to estimate equation (11) by ordinary least square (OLS) in order to test for the existence or otherwise of a long-run relationship among the variables. This is done by conducting F-test for the joint significance of the coefficients of the variables. In the second stage of the ARDL bounds approach, once cointegration is established the conditional ARDL \((p, q_1, q_2, q_3, q_4)\), the long-run model for \(C_t\) can be estimated as:

\[
\ln C_t = \beta_0 + \sum_{i=1}^{p} \theta_i \ln C_{t-i} + \sum_{j=0}^{q_1} \theta_2 \ln INT_{t-j} + \sum_{k=0}^{q_2} \theta_3 \ln INF_{t-k} + \sum_{l=0}^{q_3} \theta_4 \ln Y_{t-l} + \mu_t \hspace{1cm} \text{(12)}
\]

This involves selecting the orders of the ARDL \((p, q_1, q_2, q_3)\) model in the four variables using Akaike Information Criterion (Akaike, 1973). The third and the last step in the ARDL bound approach was used to estimate an Error Correction Model (ECM) to capture short-run dynamics of the system. The ECM generally provides the means of reconciling the short-run behaviour of an economic variable with its long-run behaviour.

The ECM is specified as follows:

\[
\Delta \ln C_t = \gamma + \sum_{i=1}^{p} \beta_1 \Delta \ln C_{t-i} + \sum_{j=1}^{q} \beta_2 \Delta \ln INT_{t-j} + \sum_{k=1}^{q_1} \beta_3 \Delta \ln INF_{t-k} + \sum_{l=1}^{q_3} \beta_4 \Delta \ln Y_{t-l} + \rho \text{ECM}_{t-t} + \mu_t \\
\]

\[
\text{………………….…………………………………………………………………………………...} (13)
\]

From equation (13), \(\beta_t\) represent the short-run dynamics coefficients of the model’s convergence to equilibrium. \(\text{ECM}_{t-1}\) is the Error Correction Model.

The coefficient of the Error Correction Model, \(\rho\) measures the speed of adjustment to obtain equilibrium in the event of shocks to the system.

### 3.5 SUMMARY STATISTICS OF DATA

Table 1 presents the summary statistics of data used for the analysis. The mean shows the average values of consumption, inflation rate, interest rate on saving deposit, and GDP per capita respectively from 1970-2009 in the Ghanaian economy. The median, maximum and minimum are also represented for each of the variables. The values of the standard deviation measure the dispersion of the values from their various mean. A larger standard deviation implies the values are widely spread out in large range around the mean whiles smaller standard deviation shows the values are very close to the mean. Kurtosis measures the peakness and flatness of the distribution of the series. From the table below consumption, interest rate on saving deposit and inflation rate are leptokurtic relative to its normal distribution since its kurtosis values are greater than 3. However, GDP per capita is platykurtic suggesting its flatness relative to normal distribution. Skewness measures the shape of the distribution which implies consumption, inflation rate, interest rate on deposit are
skewed to the right since their values are greater than 1. Only GDP per capita is less than one hence skewed to the left.

Jarque-Bera statistic measures the difference of the skewness and the kurtosis of the series with those from the normal distribution. The null hypothesis states that the series is normally distributed. It is evident that consumption, inflation rate and interest rate on deposit are normally distributed since their probability values are less than 0.05 however GDP per capita happen to be non-normally distributed. Thus, majority of the series; consumption, inflation rate and interest rate tend to follow the normal distribution.

<table>
<thead>
<tr>
<th>Table 1: Summary statistics of data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Skewness</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
<tr>
<td>Jarque-Bera</td>
</tr>
<tr>
<td>Probability</td>
</tr>
<tr>
<td>Sum</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

Results obtained from Eviews 7.0

4. DISCUSSION OF RESULTS OF THE STUDY

Stationarity and Cointegration Analysis

Table 2 shows the stationarity test for the variables in the study (household consumption, inflation rate, Gross Domestic Product per capita and interest rate on deposit) which some of them showed stationary and non-stationary.

The results of the PP test suggests that the variables(GDP per Capita, interest rate and Household Consumption) with the exception of inflation rate are I(1) demonstrating the existence of no unit root in the data used. The implication of this is that shocks to any of the variables will have no permanent effect and hence no problem of spurious correlation.

<table>
<thead>
<tr>
<th>Table 2: Results of the Unit root test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Statistics Value</td>
</tr>
<tr>
<td>ln INT</td>
</tr>
<tr>
<td>ΔlnINT</td>
</tr>
</tbody>
</table>
\[ \text{ln}\ INF = -5.267^{**} - 2.961 - 2.614 + 0.0000 \]
\[ \text{ln}\ C = 7.597 - 2.961 - 2.613 + 1.0000 \]
\[ \Delta \text{ln}\ C = -3.515^{**} - 2.964 - 2.614 + 0.0120 \]
\[ \text{ln}\ Y = -0.275 - 2.961 - 2.613 + 1.0000 \]
\[ \Delta \text{ln}\ Y = -4.488^{**} - 2.964 - 2.614 + 0.0002 \]

**Note:** ***, **, * indicates the rejection on the null hypothesis of unit root at 1%, 5% and 10% level of statistical significance.

Table 3 also shows cointegration analysis and hence long run relationships among the variables.

**Table 3:** Testing for existence of cointegration among the variables in the ARDL model

<table>
<thead>
<tr>
<th>F-statistic/W-statistic</th>
<th>95% Lower Bound</th>
<th>95% Upper Bound</th>
<th>90% Lower Bound</th>
<th>90% Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8430</td>
<td>3.5744</td>
<td>4.8169</td>
<td>2.9211</td>
<td>4.0680</td>
</tr>
</tbody>
</table>

Results were obtained from Microfit 5.1

The computed F-statistic (8.8430) is higher than the upper bound critical value of 4.8169 at 5 percent significant level and 4.0680 at 10 percent significant level. This implies that the null hypothesis of no cointegration is rejected meaning that there exists long-run cointegration relationships among the variables. Hence we can estimate the equilibrium/level relationship between consumption expenditure by households and its potential determinants without fear of nonsensical relationships, though the underlying variables some are non-stationary.

**Results of the Estimated Long Run Equation using the ARDL Approach**

The results of the bounds test clearly shows that long-run cointegration relationships exist among the variables, hence equation (13) is estimated using ARDL (3,0,3,2) selected based on Akaike Information Criterion (AIC). A coefficient of 17.9444 for inflation rate indicates that all things being equal, a percentage increase in inflation rate raises household consumption by approximately 17.9%. This means that inflation rate (a general increase in price level) exerts a sort of influence on household consumption. This positive relationship between inflation rate and household consumption is not consistent with economic theory, it is also not consistent with the empirical studies of Elmendorf (1996), Kapoor and Shamika (2009). Inflation rate is significant at 5% as it computed t-value (2.2020) is greater than its critical value (1.690) and moreover, its probability value (0.037) is less than 0.05. Among the variables include in the model (interest rate on deposits, inflation rate and GDP per Capita) inflation rate has strong impact on household consumption than the other variables in the long run as the results is shown in Table 4.
**Table 4: Long run ARDL estimates**

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>LnIN</td>
<td>-0.0017784</td>
<td>3.0583</td>
<td>-0.581500</td>
<td>1.000</td>
</tr>
<tr>
<td>LnINF</td>
<td>17.9444</td>
<td>8.1490</td>
<td>2.2020***</td>
<td>0.037</td>
</tr>
<tr>
<td>LnY</td>
<td>7.0647</td>
<td>9.7660</td>
<td>0.72340</td>
<td>0.476</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>-65.3094</td>
<td>72.6050</td>
<td>-0.89952</td>
<td>0.377</td>
</tr>
</tbody>
</table>

Note: *** (**) denote the rejection of the null hypotheses at 10% (5%) level of significance.

Interest rate on deposit has a coefficient of negative of -0.00178. A coefficient of -0.00178 for interest rate indicates that all things being equal, a percentage increase in interest rate reduces household consumption by approximately 0.00178%. This negative relationship between interest rate and household consumption is consistent with economic theory; it is also consistent with the empirical studies of Elmendorf (1996) and Mishkin (1995). The primary focus of the research was to establish to what extent does interest rate on deposit affect household consumption, the above analysis has revealed that its effect on household consumption is negative in the long run; however the effect is too small. Interest rate on deposit is not significant at 5% as it computed t-value (-0.581500) is less than its critical value (1.690) and more also its probability value (1.000) is greater than 0.05. In Ghana, deposit rate is too low 2-4% which is calculated on the lowest amount in every quarter of the year which indeed is not attractive for Ghanaians to save therefore it does not have strong influence on savings and hence future consumption which has accounted for it been not insignificant.

Gross Domestic Product (GDP) per Capita has a coefficient of 7.0647 which has positive impact on household consumption. The results indicate that when GDP per Capita goes up by 1 percent, household consumption also goes up by approximately 7.0647%. Obviously, it is expected that as country’s GDP per Capita increases, standard of living of the citizens are being improve all things being equal, the individuals can increase their consumption level higher than before and save part of their disposable income. It is also consistent with the findings of Orazio and Guglielmo (1993) who also found a similar long run positive relationship between Gross Domestic Product per Capita and household consumption in four Asian countries namely, Bangladesh, India, Pakistan and Sri Lanka. However, GDP per Capita is not significant at 5% as it computed t-value (0.72340) is less than its critical value (1.690) and more also its probability value (0.476) is greater than 0.05.

**Results of the Error Correction Model for the selected ARDL Model**

Generally, the Error Correction Model (ECM) provides the means of reconciling the short run behaviour of an economic variable with its long-run behaviour.
The overall regression is significant at both 5% and 1% as can be seen from the R-squared and the F-statistic. R-squared value of 0.74033 indicates that 74.03% change in the dependent variable (Consumption) is explained by changes in the independent variables.

Table 5: Error Correction Model for the Selected ARDL Model

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>dLnINT</td>
<td>-0.448600</td>
<td>0.277142</td>
<td>-4.581600***</td>
<td>0.03</td>
</tr>
<tr>
<td>dLnINF</td>
<td>0.11299</td>
<td>0.050990</td>
<td>2.2159***</td>
<td>0.035</td>
</tr>
<tr>
<td>dLnY</td>
<td>2.8481</td>
<td>0.65238</td>
<td>4.3656***</td>
<td>0.000</td>
</tr>
<tr>
<td>ecm(-1)</td>
<td>-0.25227</td>
<td>0.011121</td>
<td>-2.2684</td>
<td>0.032</td>
</tr>
</tbody>
</table>

ecm = LOGC + 0.017784*LNINT – 17.9444*LNINT- 7.0647*LNY + 65.3094*C

R-Squared = 0.74033  R-Bar-Squared = 0.62608
S.E. of Regression = 0.13847  F-stat. F(6, 22) = 7.9196[.000]
Mean of Dependent Variable = 0.31919  S.D. of Dependent Variable = 0.22644
Residual Sum of Squares = 0.47934  Equation Log-likelihood =- 27.9050
Akaike Info. Criterion = 15.9050  Schwarz Bayesian Criterion = 6.2395
DW-statistic = 2.1291

** (***) denote the rejection of the null hypotheses at 1% (5%) level of significance.

The coefficient of interest rate on deposits (-0.44860) shows that interest rate on deposit has negative effect on household consumption. It is significant at 5% as it computed t-value (4.58160) is greater than its critical value (1.690) and more also its probability value (0.03) is less than 0.05. Thus, a percentage increase in interest rate on deposits, results in a percentage reduction in household consumption by approximately 0.44860% in the short run. Which further implies that in the short run, as interest rate on deposits increases Ghanaians reduce consumption as they desire to earn more by saving, which is consistent with economic theory and empirical studies results of Summers (1984).

The coefficient of inflation rate (INF) was found to be 0.11299, it is significant at 5% as it computed t-value (2.2159) is greater than its critical value (1.690) and more also its probability value (0.035) is less than 0.05. Thus, a percentage increase in inflation rate, results in a percentage increase in household consumption by approximately 0.11299% in the short run. This is quite implausible since it is expected that inflation rate will reduce real income, thereby resulting in reduction of household consumption.

The sign of the coefficient of the Gross Domestic Product Per Capita variable is still positive (2.8481) which highlight its positive impact on household consumption. It is also significant at 5% level of significance since
its probability value (0.00) is less than 0.05. The results indicate that when GDP per Capita goes up by 1 percent, household consumption also goes up by approximately 2.8481% in the short run. However the impact in the long run (7.0647) is greater than that in the short run (2.8481), which implies Ghanaians prefer to save more in short run than in the long run as the country’s Per Capita Income increases.

The estimated coefficient of the error correction model (ecm) is significant at 5% level of significance and also has the appropriate negative sign. This is an indication of joint significance of the long-run coefficients. The estimated coefficient of the error correction model is -0.025227. This reflects a very low speed of adjustment to long run equilibrium after a shock. This is because approximately 2.5227% of disequilibria from the previous year’s shock converge back to the long-run equilibrium in the current year, which indeed is very low. The constant represents the value of the intercept of household consumption. Thus, it is the estimated value of household consumption when all the independent variables are zero. In the estimated long run equation, the constant is -65.3094 which represents the estimated value of household consumption when all the parameters or coefficients of the independent variables are zero.

**Forecasting Consumption Model**

In order to know how good the predictive power of the consumption model, an in-sampling forecasting was done both in the long run and short run, the results are shown in Table 6. In order to know how good predictive power of the model, we forecast the model with 1973-2000 as the estimation period and 2001-2009 as the forecast period which indicate in-sampling forecasting method. This method was chosen because data was not available on years beyond 2010 for these variables therefore in-sampling method was chosen with 1973-2000 as the estimation period and 2001-2009 as the forecast period.

Comparing the results of the actual values with the predicted values in the long run from Table 6, the actual values are higher than the predicted values with the exception of 2004 where the reverse is the situation. The errors range from -0.028170 to 1.1717 since the errors levels are not too higher the model has a good predictive power. In addition, the low value of root mean sum of squares of estimation period (1973 to 2000) and the forecast period (2001 to 2009) of 0.079334 and 0.66479 respectively also indicate the good fit of the model.

**Table 6: Long run forecast results**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Actual</th>
<th>Prediction</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>21.8769</td>
<td>21.7738</td>
<td>.10306</td>
</tr>
<tr>
<td>2002</td>
<td>22.1195</td>
<td>21.8953</td>
<td>.22428</td>
</tr>
<tr>
<td>2003</td>
<td>22.4077</td>
<td>22.1906</td>
<td>.21706</td>
</tr>
</tbody>
</table>
The results shown in Table 8 represent the forecast values of the variables at their differences. Looking at the values of the actual and predicted, they are now all in decimals due to the differencing. With some of them, actual values greater than the predicted values for these years 2001, 2002, 2005, 2006 and 2008 and the remaining values the reverse is the situation. Once again, the margins of error range between -0.00721127 to 0.65523, signifying that the model has a good predictive power. More also, the values of the root mean sum square (RMSS) confirm this result.

Table 8: Short run forecast results
Dynamic forecasts for the change in LNCON
Based on 28 observations from 1973 to 2000.
ARDL (3,3,3,2) selected using Akaike Information Criterion.

<table>
<thead>
<tr>
<th>Observation</th>
<th>Actual</th>
<th>Prediction</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>.32585</td>
<td>.22279</td>
<td>.10306</td>
</tr>
<tr>
<td>2002</td>
<td>.24264</td>
<td>.12142</td>
<td>.12122</td>
</tr>
<tr>
<td>2003</td>
<td>.28811</td>
<td>.29533</td>
<td>-.0072127</td>
</tr>
<tr>
<td>2004</td>
<td>.17691</td>
<td>.42214</td>
<td>-.24523</td>
</tr>
<tr>
<td>2005</td>
<td>.20234</td>
<td>-.29880</td>
<td>.50114</td>
</tr>
<tr>
<td>2006</td>
<td>.67398</td>
<td>.16415</td>
<td>.50983</td>
</tr>
<tr>
<td>2007</td>
<td>.20391</td>
<td>.67020</td>
<td>-.46629</td>
</tr>
<tr>
<td>2008</td>
<td>.30608</td>
<td>-.34915</td>
<td>.65523</td>
</tr>
<tr>
<td>2009</td>
<td>.096989</td>
<td>.24928</td>
<td>-.1522</td>
</tr>
</tbody>
</table>

Table 9: Summary Statistics for Residuals and Forecast Errors

<table>
<thead>
<tr>
<th></th>
<th>Estimation Period</th>
<th>Forecast Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1973 to 2000</td>
<td>2001 to 2009</td>
</tr>
<tr>
<td>Mean</td>
<td>.2812E-9</td>
<td>.11327</td>
</tr>
<tr>
<td>Mean Absolute</td>
<td>.063992</td>
<td>.52623</td>
</tr>
<tr>
<td>Mean Sum Squares</td>
<td>.0062939</td>
<td>.44194</td>
</tr>
<tr>
<td>Root Mean Sum Squares</td>
<td>.079334</td>
<td>.66479</td>
</tr>
</tbody>
</table>
5. POLICY IMPLICATIONS AND CONCLUSION

The findings outlined have some policy implications. The results discussed in the previous sections have actually thrown light on some policy-related variables that have significant impact on household consumption for the period under consideration.

Interest rate on deposit has a negative impact on household consumption in the long run and short run. The implication is that, increase in interest rate on deposit with the aim of ensuring that consumers will save more to make funds available for investment in Ghana both in the long run and short run will not have so much effect. Since interest rate on deposit cannot help to create enough funds through savings for investment, when a period arise in the country where private investors find it difficult to get funds for investment the government can solicit for funds from foreign donors to make it available for private firms for investment but cannot only rely on the market. In 2000, the government came out with a policy of helping promote private sector as the engine of growth made funds available at selected banks which was lend out to investors at relatively lower interest rate to promote economic growth, this step can be emulated by policy makers to ensure that funds are available for investment in times of need support household savings.

One way of motivating Ghanaians to save is by increasing the interest rate on deposit. If you look at the banking sector in the country very well, one will find out that lending rate is very high averaging around 35% - 45% but interest rate on deposit is very small 2% -4% which really is not motivating Ghanaians to save at these banks. The banks operate with these rates for their own profit seek but not because of the interest of customers. It is time for the Bank of Ghana to ensure that these banks operate within a range of responsible rates. Most at times, these banks fail to go by the rates given them, and it is the duty of Bank of Ghana to make sure that these banks face punishment or charges for that. In a study done by Kapoor and Shamika (2009), it found out that when banks were asked to increase interest rate by 50 basis points in India for people of over 60 years it led to a decline in consumption expenditure by 12 percent whiles savings increased. In the same way, we can also do likewise to help foster savings and investment in the country.

The study also showed a positive relationship between GDP per Capita and household consumption. This implies that as a country, measures should be put in place and be implemented to ensure that the economy develops; as the economy develops, unemployment rate is reduced as a lot of people secure jobs they are able to increase consumption therefore stimulating aggregate demand and enhance investment in the country. Policies promoting private sector development, reducing corruption in the country, adequate educational facilities, diversifying our exports, promoting domestic consumption of goods produced domestically, adequate health infrastructure could reduce morbidity and mortality rates and increase life expectancy, and improvement in technology all help to increase GDP per Capita.
The study found a positive and significant relationship between inflation and household consumption both in the short run and long run. Increase in inflation resulting in household consumption means that it enhances economic growth. The implication is that some level of inflation is required for GDP growth in Ghana. The challenge for the government and policy makers is to be able to identify the level of inflation which is consistent with the level of economic growth than to beat inflation rate down heavily to affect household consumption adversely.

The objective of this study was to find out the effect of the interest rate on deposit on the household consumption in Ghana. Household consumption and interest rate play a major role in economic growth in every economy. Household consumption increases aggregate demand which could boost investment in the Ghanaian economy. This calls for the need to give maximum attention to these policies recommended in the research by policy makers to set up household consumption in the Ghanaian economy.

6. REFERENCES


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The World Bank (2008), *World Development Indicators CD-ROM*