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RESEARCH ARTICLE

EFFECT OF WEALTH ON HOUSEHOLD CONSUMPTION IN THE GHANAIAN ECONOMY: USING THE GENERALIZED AUTOREGRESSIVE CONDITIONING HETEROSCEDASTICITY (GARCH) MODEL

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ABSTRACT

Consumption is an unavoidable element or phenomenon that every economy cannot do without it. Consumption has played a crucial role in the building of the human capital as well as the development of a nation. Consumption as in its peculiar state of action has a stronger multiplier effects on the output of a nation with regard to its impact on the economic growth. The paper used a secondary data from Bank of Ghana and World Bank from 1975 to 2008. The data sets is a financial data which envisage all the necessary elements or variables that measures wealth in terms of financial wealth (financial assets) and the household consumption expenditure in the economy. The study adopted an Ordinary Least Squared model to estimate the determinants of consumption. But in the case of the marginal propensity to consume (i.e. elasticity of consumption to wealth and income), the study transformed the Ordinary Least Squared model with a natural log. In order to quantify the wealth effects on consumption, the study followed the approach of Bollerslev and Engels Generalized Autoregressive Conditioning Heteroscedasticity (GARCH) model. The study found out that financial wealth (i.e. as ratio of the money supply to GDP) has a positive impact on household consumption. The study recommended that the government should remove all forms of restriction on the interest rate (i.e. Interest rate ceiling) to attract savings in order to mount up the household endowment for future consumption, which will also in effect make funds available for investment.

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INTRODUCTION

Consumption is an unavoidable element or phenomenon that every economy cannot do without it. Consumption has played a crucial role in the building of the human capital as well as the development of a nation. Consumption as in its peculiar state of action has a stronger multiplier effects on the output of a nation with regard to the triggering impact on the economic growth. Consumption has trade-off effects on the National income of an economy as well as the disposable income of the private individual which in effects determines a nation's savings and investment level in aid of piloting development and economic growth. According to the paper consumption is defined as the acquisition and utilization of goods and services whether durable or perishable. The patronage of services could be visiting hospital when sick; reporting cases to police station etc. the purchase of goods can be attributed to the daily buying of food, clothes, etc. and also defined wealth as the individual accumulation of endowment other than their income earnings which could be an inherited assets, initial income (endowment) before getting a job, savings from personal earnings, gift receivings, assets acquired by the individuals own effort and stock of assets held by households. Wealth on the other hand can also be seen as housing wealth and financial asset or wealth. The study used the following banks deposit from private savings, stocks of money, shares and other equities as a proxy for wealth. Since independence, household wealth in Ghana rose considerably, in parallel with strong growth in private consumption and a fall in the saving rate, from close to 20% in the early 1990s to around 10 % at the end of the decade. These developments did not occur solely in Ghana but also in Portugal (Castro, 2007). Over the decades consumption has been a functional reliance on the nation's output (i.e. income) level been backed by several propounded theories but rather neglecting the other relevant determinant of consumption in an economy. Some other factors like wealth, aids, grants, loans and donors which envisage in endowment effect (i.e. autonomous part). The main objective of the study meant to estimate the wealth effect on private consumption expenditure in Ghana from the year 1975-2008 periods, by distinguishing two components from the financial wealth and the other subsidiary objective is to look at the impact of wealth and per capita income on household consumption.

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Literature Review

The wealth effect on private consumption is traditionally analyzed through life-cycle hypothesis models designed by Modigliani and Bromberg (1954). According to these models, consumption depends on the current and expected income (human wealth) and on the stock of assets held by households and the corresponding income (financial wealth). According to Bayoumi and Edison (2003), Wealth was used as collateral, and its effect on consumption largely depends on the development and depth of the financial market. According to Boone *et al.* (2001), financial liberalization caused the wealth effect to impact significantly on private consumption in the United States, the United Kingdom and Canada, while results for France and Italy are inconclusive. Again, a study done by Bonner and Dubois (1995) in France revealed that, there was no evidence of significant effects of wealth on consumption.

METHODS AND MATERIALS

The paper used a secondary time series data from Bank of Ghana and World Bank from 1975 to 2008. The data sets is a financial data which envisage all the necessary elements or variables that measures wealth in terms of financial wealth (financial assets) and the household consumption expenditure in the economy. The variables of interest to be analyzed are the stock of money supply as a proxy for financial assets or wealth, the bank deposit for private savings rate and the consumption expenditure in the Ghanaian economy. The study adopted an Ordinary Least Squared model to estimate the determinants of consumption. But in the case of the marginal propensity to consume (i.e. elasticity of consumption to wealth and income), the study transformed the Ordinary Least Squared model with a natural log. In order to quantify the wealth effects on consumption, the study followed the approach of Bollerslev and Engels Generalized Autoregressive Conditioning Heteroscedasticity (GARCH) model.

Model Design

The paper followed Autoregressive Conditional Heteroscedasticity (ARCH) model of Engle (1982), the Generalized ARCH (GARCH) model of Bollerslev (1986). The study used GARCH model to estimate the effect of wealth on household consumption in the economy. The GARCH model involves the joint estimation of a mean and conditional variance equation.

The GARCH (1, 1) model in the standard form is specified as follows.

$$Y_t = X_t\gamma + \varepsilon_t \quad \text{.....(1)}$$

Where equation 1 is the conditional mean equation with X_t being the vector of exogenous variables with an error term ε_t. The equation (2) is the conditional variance equation as stated below;

$$\sigma^2_t = \omega + \text{œ}\varepsilon^2_{t-1} + \beta\sigma^2_{t-1} \quad \text{.....(2)}$$

Where $\boldsymbol{\sigma^2_t}$ represented one period ahead of forecasted variance based on past information. This one period ahead forecast variance is called the conditional variance. The conditional variance is a function of three terms namely the mean (ω). Where $\boldsymbol{\varepsilon^2_{t-1}}$ also represents news about fluctuations from the previous period measured as the lag of squared residuals from the mean equation and σ^2_{t-1} also represents the last period's forecasted variance. In the light of the above stated equations, two different models were used to investigate into the effects of financial assets on household consumption to GDP (C_t). There are several measures/indicators of wealth; these include the banks deposit for private savings ($\mathbf{S_t}$) and the ratio of money supply to GDP (M_t) etc. The GARCH (1, 1) models are therefore stated as follows.

MODEL 1: Effects of Wealth (i.e. Supply of Money) Ratio of Household Consumption Expenditure to Gross Domestic Product

$$C_t = \lambda_1 + \lambda_2 C_{t-1} + \lambda_3 W_t + \varepsilon_t \quad \text{.....(3)}$$
$$\sigma^2_t = \omega + \text{œ}\varepsilon^2_{t-1} + \beta\sigma^2_{t-1} + \theta W_t \quad \text{.....(4)}$$

Where $\mathbf{C_t}$ = the ratio of household consumption expenditure to GDP in Ghana

$\mathbf{C_{t-1}}$= the Lag of a previous ratio of household consumption expenditure to GDP in Ghana

$\boldsymbol{\sigma^2_t}$ = conditional variance

$\mathbf{W_t}$= Wealth in terms of stock of money supply to GDP

The model above represented the GARCH model estimated for the effects of wealth on consumption in the economy taking the money stocks as a proxy for financial wealth.

Hypothesis Test for Model 1

H_0: money stock as a ratio to GDP has no impact on the household consumption

H_1: money stock as a ratio to GDP has a negative impact on the household consumption

The decision rule is such that if the z value is greater than two or equal to two then such a variable is statistically significant and the null hypothesis should be rejected in order to accept the alternative hypothesis.

Model 2: Effects of Wealth (i.e. Bank deposit for private savings rate) Ratio of Household Consumption Expenditure to Gross Domestic Product

$$C_t = \lambda_4 + \lambda_5 C_{t-1} + \lambda_6 S_t + \varepsilon_t \quad \text{.....(5)}$$
$$\sigma^2_t = \omega + \text{œ}\varepsilon^2_{t-1} + \beta\sigma^2_{t-1} + \theta S_t \quad \text{.....(6)}$$

S_t= bank deposit for private savings rate

The model above represented the GARCH model estimated for the effects of wealth on consumption in the economy by taking the bank deposit for private savings rate as a proxy for financial wealth.

Hypothesis Testing For Model 2

H_0: bank deposit for private savings rate as a ratio to GDP has no impact on the consumption

H_1: bank deposit for private savings rate as a ratio to GDP has a positive impact on the consumption

The decision rule is such that if the z value is greater than two or equal to two then such a variable is statistically significant and the null hypothesis should be rejected in order to accept the alternative hypothesis.

MODEL 3: Determinants of Household Consumption

The ordinary least squared (OLS) estimation for the test of serially autocorrelation revealed the behavior of the otiose or the white noise in a given sample size (T) of 33.

$$C_t = \beta_1 + \beta_2 C_{t-1} + \beta_3 Y_t - \beta_4 S_t - \beta_2 W_t + \varepsilon \ldots\ldots\ldots (7)$$

The equation (7) above is a general model for the household consumption behavior towards an individual wealth. The household consumption is the dependent variable and it is been explained by the following independent variables which includes; the lag of the dependent variable as argued by Robert Hall ($\mathbf{C_{t-1}}$) and it is expected to be positively related to current consumption, the income level of an individual as also argue by Maynard Keynes, which is also expected to be positively related to financial wealth or assets such as bank deposit for private savings rate ($\mathbf{S_t}$) and the ratio of stock of money supply to GDP (W_t). The a priori expectation of the model for the bank deposit of the private savings rate is expected to be positively related to household consumption. This is because as an individual asset increases, it increases their purchasing power of the inhabitants which will in effect increases, the consumption for goods and services in the economy. The a priori expectation for the stock of money supply is expected to be negatively related to the household consumption due to inflation as argued by Milton Friedman that inflation is a monetary phenomenon which in tend reduces the real money value on goods and services even though there will be more money available for consumption.

Empirical Estimation

The Ordinary Least Squared Regression Result for the Determinants of Household Consumption Model

$C_t = 0.514 + 0.397\ C_{t-1} - 0.00214\ Y_t - 0.00138\ S_t - 0.000424\ W_t$

SE	(0.148)	(0.171)	(0.00636)	(0.00104)	(0.00168)
t-ratio	3.467	2.318	0.3366	-1.322	-0.2528
				R-squared	0.216
				Durbin's h	3.934809

The ordinary least square estimation is a biased estimation for the model above which leads to the insignificance of the variables of interest. The constant term and the lag dependent variable of consumption were statistically significant but the savings rate and the money stock were not statistically significant to the model at 5% significance level. Also, the overall R-squared (R^2) was very small and according to Durbin-h statistics, the model was fraud with a negative serially autocorrelation and this leads to the adoption of the Bollerslev and Engels GARCH model as stated above.

Model 1: regression estimation results for the effects of wealth (i.e. supply of money ratio to gdp**) on household consumption expenditure using engel's-garch model**

The regression result for the estimated model 1

$$C_t = 0.44189 + 4.42987C_{t-1} + 0.449302W_t$$

SE	(0.1618)	(0.2927)	(0.1995)
Z	2.7317	2.3480	2.2519
P-value	0.00630	0.0243	0.0318

From the estimated model, the financial wealth indicator thus the ratio of the money supply to GDP is statistically significant with the z value of 2.2519 which is greater than two and even its associated p value of 0.03175 was less than 0.05 (5%) significance level. The variable exhibited a positive impact on household consumption. This implies that, as financial wealth (i.e. ratio of the money supply to GDP) in the economy increase by 1%, the household consumption in the economy will also increase by 0.4493%.

Model 2. Regression estimation results for the effects of wealth (i.e. bank deposit for private savings rate) ratio of household consumption expenditure to gross domestic product using engel's-garch model

The regression result for the estimated model 2

$$\mathbf{C_t} = 0.467887 + 0.45967\mathbf{C_{t-1}} + 0.00244657\mathbf{S_t}$$

SE	(0.0855)	(0.1088)	(0.00087)
Z	5.4751	4.2242	2.8136
P-value	0.00001	0.00002	0.00002

From the estimated model, the financial wealth indicator thus the bank deposit for private savings rate is statistically significant with the z- value of 4.2242 which is greater than two and even the p value (0.00002) was less than 0.05 (5%) significant level. In relation to the result, a 1% increase in the bank deposit for the private savings rate in the economy will cause about 0.00245% increase in the household consumption. This implies that, as savings rate increases, future consumption pattern of the household will also increase to boost industry and business in the economy. This will in effect bring about economic growth and development to the economy in the long-run.

Conclusion and Policy Recommendations

From the overall analysis the impacts of the various financial wealth to household consumption were statistically significant and this therefore implies that as wealth in the country increased, more money will be available for the household to increase consumption. This in effect raises the individuals' purchasing power through the increase in ones endowment or assets accumulations.

- The study recommend that people should be encourage to trade with the banks in order to increase their demand deposit towards unforeseen contingencies and also funds

available for both businesses and private consumption. In practice, this will help the economy to expand since aggregate demand will increase through investment and consumption components to bring about growth in the economy.

- The study also recommends that the government and other stakeholders (i.e. monetary authority's e.t.c.) should bring out more affirmative policies and measures to enhance growth in the financial market in order to entice the people to join such market.
- The study recommends that the government should remove all forms of restriction on the interest rate (i.e. Interest rate ceiling) to attract savings in order to mount up the household endowment for future consumption, which will also in effect make funds available for gross private investment.

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