AFRICA DEVELOPMENT AND RESOURCES RESEARCH INSTITUTE (ADRRI) JOURNAL

*ADRRI JOURNAL (***www.adrri.org***)*

pISSN: 2343-6662 ***ISSN-L***: 2343-6662 VOL. 4 ,No.4(2), pp 133-148, January, 2014

Does Ghanaian's Consumption Function Follow the Permanent Income Hypothesis? The Cagan's Adaptive Expectation Approach

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Received: 10th December, 2013 **Accepted**: 10th January, 2014 Published **Online:** 15th January, 2014

URL: http://www.adrri.org/journal

Abstract

Consumption is a very important aspect of human life that cannot easily be done away with, which determines also the saving level, and how individuals can prepare for their future retirement and hence post retirement lifestyle. It is therefore the aim of this paper to determine the consumption function of Ghanaians under the Permanent Income Hypothesis. Using a time series data on final household consumption expenditure and real GDP from 1970 to 2010, a Cagan's adaptive expectation model was adopted to test the hypothesis that Ghanaians do plan their consumption with the view of the future. The results confirmed that indeed the Permanent Income Hypothesis holds in Ghana. Based on the findings of this paper, it can be said that post-retirement poverty is prevalent because the permanent

income itself is always very low. It is recommended that, efforts be made to raise income in general in order to improve the permanent income to be able to alleviate post-retirement poverty in Ghana.

Keywords: Consumption, Permanent Income Hypothesis, Cagan's Adaptive Expectation Model, Post-Retirement Poverty

INTRODUCTION

In 1948, the Universal Declaration of Human Rights accepted basic income security at old-age as a fundamental human right. This notwithstanding, the issue of old-age poverty is visible and can be felt and experience among the elderly in Ghana. Although poverty exists through the difference lifecycle in the country, old-age poverty is persistent for especially the rural dwellers or those without any form of regular income. A number of literature have documented that household expenditure fall drastically after retirement. This is usually referred to as the "retirement consumption puzzle" (Banks, *et al*., 1998; Bernheim, *et al*., 2001; Miniaci, *et al*., 2003; Haider and Stephens, 2007; Hurd and Rohwedder, 2008).

Using British Family Expenditure Survey, Banks, *et al*. (1988) documented that total expenditure falls sharply as soon as one retires. Bernhiem, *et al*. (2001) interprets the fall in expenditure at the onset of retirement as inadequate preparation for retirement. Banks, *et al*. (1998) interpret the decline as the presence of some unexpected news about lifetime resources that occurs at the time of retirement. Angeletos, *et al*. (2001) on the other hand interpret decline in expenditure at the time of retirement as evidence that household preferences are time inconsistent.

Fall in the consumption during retirement has several possible causes; that individuals lack foresight and are unable to plan and prepare financially for retirement to make up for the fall in their income (Aguila, *et al*., 2008). Another reason is the fall in their work related expenditure such as expenditure on transportation, apparel and eating out expenses (Banks, *et al*., 1998; Miniaci, *et al*., 2003). Apart from expenses on clothing and transportation, expenses on saving also start decreasing around retirement age (Aguila *et al*., 2008). Most often than not, the fall in consumption during retirement is a rational responds to a fall in income. Individuals who prepare for retirement and had a comfortable buffer stock of wealth experience very small changes in

their consumption (Borella, *et al*., 2011). Bernheim, *et al*. (2001) using Panel Study of Income Dynamics (PSID) data, found that: total food expenditure declines by about 30% between the pre and post retirement periods for the average household; the decline in expenditure occurs for both food purchased at grocery stores and food "away from home"; and total expenditures decline dramatically regardless of the household's position in the pre-retirement wealth distribution. The research also revealed that while the decline in expenditure is largest among low wealth households, very wealthy households and median wealth households experience similar declines in food expenditure at the time of retirement. The decline in expenditures at the time of retirement was not limited to food.

Retirement, for most households, is a discreet, planned event (Haider and Stephens, 2007). Nonetheless if an individual or household is unprepared for retirement, we would expect that individual or household to switch towards lower quality goods (fattier cuts of meat, generic brands) or to switch away from luxury goods (restaurants with table service) (Aguiar and Hurst, 2007).

The consumption of a particular good could be influenced by the bandwagon effect. The bandwagon effect arises when the consumer preference for a particular good increase when it's patronage increases. It is quiet surprising to know that the choice of a particular good or service is sometimes based on the overall patronage of that commodity. The youth in particular prefer goods in vogue. The desire to conform to the taste and preferences of their peers motivates them to consume certain goods.

In developing countries, most households spend lavishly during weddings and funerals. This concept is referred to as conspicuous consumption, which is the buying of many things, especially expensive things, that are not necessary to one's life, and which purchases are done in a way that will make people take notice of the spending of money. It is usually motivated by the desire for prestige, public display of status, or wealth instead of the natural utility derived from the consumption of goods and services. James Duesenberry (1949), in his book *Income, Saving and the Theory of Consumer Behavior*, for example, proposed that a person's conspicuous consumption psychologically depends not only upon the actual level of spending, but also depends upon the degree of his or her spending, as compared with and to the spending of other

people. Even though 79% of Ghanaians live on less than US$2 a day, the average funeral in Ghana cost between US$2000 and US$3500 (The Economist, 2007). Same can be said of South African households as they also spend about a year's income to bury a departed member of the family (Case, *et al*., 2008). Such extravagant expenditure is intended to display the wealth of the family.

Heffetz (2007) suggest that status seeking through conspicuous spending is only relevant for the richest half of the U.S. population, nonetheless Veblen argues that "no class of society, not even the abject poor, foregoes all customary conspicuous consumption" (Veblen, 1899; 85).

Van Kempen (2003) has illustrated that in order to" keep up with the Joneses", the poor in Bolivia are ever ready to exchange their consumption of non-positional goods for the consumption of designer- label goods.

Consumption is one aspect of the human life which cannot be done away with. Every now and then individual households and the government consume in Ghana. Despite the fact that consumption is one of the fundamental determinants of aggregate economic activities there is no consensus among economists about the consumption hypothesis which represents consumer behavior. Various schools of thought have propounded ways of measuring consumption. Of all the schools of thought, the most commonly used is the Permanent Income Hypothesis. It is however not clear whether consumption in Ghana follows the Permanent Income Hypothesis or not. There is a short fall in literature to support PIH when Ghana is put under the economic microscope to study its economic function. Even though economic theory assumes that individuals derive utility from absolute levels of consumption, it is well understood that people are also concerned about how their consumption compares to that of others. One reason is that relative consumption is closely linked to social status.

Retirement under normal circumstances is supposed to be a period within which an individual relaxes and enjoys his or her accumulated wealth. This is however not the case among many civil servants in Ghana. On Wednesday January 25, 2012 the Finder news paper reported the woes of many retired civil servants who described their retirement as 'pure hell'. The paper reported an interview with a police officer who confessed, "I have always dreaded the transition between life

in the barracks and retirement and my fears have now been confirmed now that I am in retirement". A retired policeman said "You can imagine what it feels like to move away from free accommodation, water, electricity - the three most important things in life to a world of ever escalating prices, rent hikes, and other hikes in utilities. It is pure hell", he added.

The questions driving this paper are; why do most retirees find life uncomfortable? Could it be inadequate preparation and very low permanent income? What exactly motivates people to spend in Ghana? Could it be ones' current or expected income, the social status of the person, the environment of the individual or the consumption choices of others?

The objective of this paper therefore is to: estimate the consumption function for Ghana under the permanent income hypothesis; discover the possible causes of low income among retirees; and ascertain if the bandwagon effect and conspicuous consumption hold in Ghana

The main hypothesis of this paper is that, consumption in Ghana does follow the Permanent Income Hypothesis. The auxiliary hypotheses are: the consumption of individuals is not influenced by the consumption of others; and the consumption of individuals is not influenced by their desire to show their wealth.

Permanent Income Hypothesis has, without any reasonable doubt, very interesting policy implications. It is therefore not surprising that several economists have attempted to test its empirical validity. One policy implication is that, since transitory changes in income have little or no effect on consumption, innovative government policies would only thrive if agents reckon it as a permanent change. For instance, a cut in taxation will yield the necessary results only when economic agents consider the policy as permanent. Discovering the causes of the relatively low incomes among retirees would assist both the old (retirees) to manage their resources efficiently and the young (workers) to plan and prepare adequately for retirement. This study is also necessary because, it would add to the stock of knowledge since to the best of our knowledge, very few work has been done on the Permanent Income in Ghana.

pISSN: 2343-6662 ISSN-L: 2343-6662 VOL. 4 ,No.4(2), pp 133-148, January, 2014

LITERATURE REVIEW

Quite a lot of studies have been done on permanent income hypothesis. For example, Wang (2005) demonstrates a lower MPC out of human wealth than out of financial wealth through an explicitly solved optimal consumption models. According to him, higher income does not only imply higher level of human wealth but also means a riskier stream of future labour income which leads to higher precautionary saving. He argued that a precautionary agent rationally values a unit of human wealth than financial wealth. Following the work of Zeldas (1989) and Caballero (1990; 1991), Wang used risk adjusted measure for human capital by calculating expected income at higher discount rates. This puts risk adjusted human wealth and financial wealth on equal footing.

In his paper, Manitsaris (2006) examines the consumption function under the permanent income hypothesis. His research was based on annual data covering the period from 1980 to 2005 for selected 15 European Union member-states. He adopted the combined partial adjustment model as his specification. His analysis revealed a short run elasticity of 0.531 and a long run elasticity of 0.872 and an adaptive expectation coefficient of 0.609. This implies that, a one percent increase in income would increase current consumption by 0.531 percent. However, if there is a continual increase in income, the elasticity to consume out of permanent income will be 0.872, implying that a 1 percent increase in permanent income would increase current consumption by 0.872 percent. A comparison of the results of these two elasticities to consume shows strong support for the consumption function under the permanent income hypothesis and the adaptive expectations model.

Using alternative time series techniques to estimate private consumption for Iranian Southern Province, Saber Motaqed found out that the MPC for urban households was 66% in the long run and 55% in the short, while MPC for rural household was 86% in the long run and 66% in the short run. He fed annual data from 1983-2007 into the four essential consumption function of Keynes (1936), Friedman (1956; 1957), Ando and Modigliani (1953), and Duesenberry (1949) and found that Friedman model for urban households and Modigliani for rural households were recognized as optimal ones. He attributed the higher MPC in rural Household to the fact that rural households partly hold a higher amount of consumption (Motaqed, 2011).

In his paper, Luigi Pistaferri (2000) presented tests of the permanent income hypothesis with quadratic preferences. He then used subjective income expectations to test the hypothesis that households save only in response to transitory shocks, a prediction that derives from the assumption that the stochastic part of income is the sum of a random-walk permanent component and a serially uncorrelated transitory shock. The empirical results of the paper reveal that, savings react strongly to transitory income shocks and also, permanent income shocks are good predictors of household savings. This follows the Buffer Stock behavior as illustrated by Deaton (1991) and Carroll (2000), in which consumers are both impatient and prudent; implying that, savings does not only respond to transitory shocks but permanent shocks as well. However, the respond of savings to permanent shocks is not as massive as that of the transitory shocks. Deaton (1991) and Carroll (2000),

Nicholas S. Souleles (1999) tested the responds of household consumption to income tax refunds. He divided household consumption into food, nondurable and strictly non durables. His data was drawn from the Consumption Expenditure Survey for 1980 to 1991. He found that strictly non durable goods are excessively sensitive to tax refunds contrary to the Life-cycle theory. Souleles establish Liquidity constraint to be the main cause of the excess sensitivity in nondurable goods since the nondurable consumption of constrained households increased far more than for unconstrained households at the time of refund receipt.

The current study is significantly different from the works reviewed on many aspects. The current study used data from Ghana and also uses the Cagan's Adaptive Model which has not been used by any of the works reviewed.

METHODOLOGY

The study used data on real GDP and household final consumption expenditure from 1970 to 2010. These were derived from the United Nations Statistical division whiles data on real interest rate was derived from the Bank of Ghana. Fully modified Ordinary Least Square regression is used to estimate the Cagan's Adaptive Model**.**

pISSN: 2343-6662 ISSN-L: 2343-6662 VOL. 4 ,No.4(2), pp 133-148, January, 2014

Model Specification - Permanent income hypothesis

According to Friedman (1957) individuals consumption decisions are based on their expected or permanent income and not their current income. The consumption function under the permanent income hypothesis is therefore written as $C = f(Y_t^p)$. This implies that the individual consumes a fraction of their permanent income.

The Permanent income hypothesis is established by the following equations, (1), (2) and (3) as following;

$$C_p = K(i, w, u)Y_p \quad 1$$

$$Y = Y^p + Y^y \quad 2$$

$$C = C^p + C^t \quad 3$$

$$PY_t^p y_t^T = PC_t^p C_t^T = PY_t^p C_t^T = 0 \quad 4$$

Where, C is measured consumption, Y is measured income, Y^p is Permanent Income , $C^p$is permanent Consumption, Y^T is Transitory Income , C^p is Permanent Consumption, and $\rho_{Y_t^T C_t^T}$ is the correlation between C and Y

Under the PIH, measured income and consumption are divided into permanent and transitory as depicted in equations 2 and 3 respectively.

Permanent Consumption is determined by permanent income under the PIH, thus

$$C_t^p = \alpha + \beta Y_t^p \quad 5$$

Permanent income and consumption are ex ante variables, hence are not directly observable as a result, the adaptive rule is applied on the two variables. This means that, expectations are formed in a current period by modifying previous expectations based on actual achievements. The adaptive rule presents the unobserved variables as

$$C_t - C_{t-1} = \gamma(C_t^p - C_{t-1}) + \varepsilon \quad 0 < \gamma \leq 1 \quad 6$$

Where Υ is the partial adjustment coefficient

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$$Y^{p}{}_{t} - Y^{p}{}_{t-1} = \lambda(Y_{t} - Y^{p}{}_{t-1}) \qquad 0 < \lambda \leq 1 \qquad 7$$

where λ is the adaptive expectation coefficient and α and β are parameters to be estimated.

By substituting equation (3) into (5) a new equation is obtained which is as follows;

$$C_{t} = \alpha + \beta Y_{t}^{p} + C_{t}^{T} \qquad 8$$

Equation (8) is presented econometrically as

$$C_{t} = \alpha + \beta Y_{t}^{p} + \nu_{t} \qquad 9$$

$where\ \nu_{t} = \varepsilon_{t} + C_{t}^{T}$

Making Y_{t}^{P} the subject from (9) we have

$$Y_{t}^{p} = \frac{1}{\beta} C_{t} - \frac{\alpha}{\beta} - \frac{1}{\beta} \nu_{t} \qquad 10$$

Lag (10) by one period

$$Y^{p}{}_{t-1} = \frac{1}{\beta} C_{t-1} - \frac{\alpha}{\beta} - \frac{1}{\beta} \nu_{t-1} \qquad 11$$

Following Koutsoyiannis we substitute (10) and (11) into equation 7

$$C_{t} = \alpha\lambda + \beta\lambda Y_{t} + (1-\lambda) C_{t-1} + [\nu_{t} - (1-\lambda)\nu_{t-1}] \qquad 12$$

In the final equation all variables are estimable since they are expressed in actual terms.

$$C_{t} = \phi_{1} + \phi_{2} Y_{t} + \phi_{3} C_{t-1} + \mu_{t} \qquad 13$$

Where $= \phi_{1}$, $\beta\lambda = \phi_{2}$, $(1-\lambda) = \phi_{3}$ and $[\nu_{t} - (1-\lambda)\nu_{t-1}] = u_{t}$

The specific model for estimation is presented in the log-linear form as

pISSN: 2343-6662 ISSN-L: 2343-6662 VOL. 4 ,No.4(2), pp 133-148, January, 2014

$$\ln C_t = \phi_1 + \phi_2 \ln Y_t + \phi_3 \ln C_{t-1} + \mu_t \quad 14$$

The choice of a log-linear model is based on the fact that the paper seeks to find the percentage change in consumption as a result of a percentage change in current income and permanent income. The second model included real interest rate. This assessed the effect of interest rate on consumption. The final model is given as

$$\ln C_t = \phi_1 + \phi_2 \ln Y_t + \phi_3 \ln C_{t-1} + \phi_4 IR + \mu_t \quad 15$$

where ϕ is the elasticity coefficient.

A priori Expectations for Permanent Income Hypothesis

For the purpose of this work and for lack of data, Gross Domestic Product (GDP) is used as a proxy for income as done in Manitsaris (2006). GDP is the value of output produce in a particular country over a period of one year. Consumption increases as income increases. However the increase in consumption is not as high as the increase in income. It is therefore expected that consumption will have a positive relationship with income. Thus the marginal propensity to consume is expected to be positive but less than one $(0<\phi_2<1)$.

Consumption can be defined as the value of goods and services bought by people (Piana 2001). It can also be referred to as the utilization of goods and services to satisfy wants. Data on final household consumption expenditure (2000 constant prices) is used as a proxy for consumption. Consumption is a function of income. A positive relationship is expected between current consumption (C_t) and lag of consumption or previous (C_{t-1})

Real interest rate is lending which has been adjusted for inflation. It is calculated by subtracting inflation from nominal interest rate. Data on real interest rate is obtained from the Bank of Ghana. A negative relationship is expected between interest rate and consumption.

RESULTS AND DISCUSSIONS

Table 1 shows the summary statistics of the variables used for the study.

Table 1: Summary Statistics of Variables

Variables	Minimum	Maximum	Mean	Std. Deviation
Household final real consumption expenditure (GH¢'000)	481859.30	1930785.00	884294.76	3967660.00
Real GDP (GH¢'000)	603880.80	2316152.00	1073600.00	480522.00
Real Interest rate (%)	-50.10	18.00	-7.66	18.82

Table 2: Regression results for equation (13); Dependent Variable $\ln C_t$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_Y	0.904889	0.104648	8.646958	0.0000
LN_C(-1)	0.073564	0.110175	0.667696	0.5087
IR	0.000415	0.000512	0.811991	0.4223
C	0.121036	0.349643	0.346170	0.7313

R-squared	0.984623	Mean dependent var	13.62579
Adjusted R-squared	0.983305	S.D. dependent var	0.405062
S.E. of regression	0.052337	Sum squared resid	0.095871
Durbin-Watson stat	1.639674	Long-run variance	0.001919

From Table 2 the overall significance of the model is provided by the Adjusted R-squared, which is 0.983, implying that 98.3% of the total variation in Ghana's consumption expenditure is explained by the variations in income level, interest rate and the lag of consumption expenditure.

A Durbin-Watson statistic of 1.64 reveals that there is no autocorrelation in the model as it falls within the critical zone of $d_L = 1.338$ and $d_U = 1.659$ at 5% significant level. This is the main reason for using the Fully Modified OLS to run the regression as reduces the problem autocorrelation.

The adaptive expectation coefficient is first computed to derive the long run MPC.

Adaptive expectation coefficient $\lambda = 1 - \phi_3$ 16

pISSN: 2343-6662 ISSN-L: 2343-6662 VOL. 4 ,No.4(2), pp 133-148, January, 2014

Recall from equations 12 and 13

$$C_t = \alpha\lambda + \beta\lambda Y_t + (1-\lambda)C_{t-1} + [\nu_t - (1-\lambda)\nu_{t-1}] \quad 12$$

$$C_t = \phi_1 + \phi_2 Y_t + \phi_3 C_{t-1} + \mu_t \quad 13$$

From Table 2, Adaptive expectation coefficient $\lambda = 1 - 0.073564$ 17

Adaptive expectation coefficient $(\lambda) = 0.9264$

The long run MPC or better still the elasticity of consumption out of permanent income (β) is

$$\beta = \frac{\phi_3}{1-\phi}$$

$$\beta = \frac{0.904889}{0.926436}$$

$$\beta = 0.9767$$

Estimates from equation 15, presented in Table 3 show the Fully Modified OLS results of Ghana's consumption function under the Permanent Income hypothesis. Table 3 shows Ghana's elasticity of consumption respect to actual income and permanent income as well as the adaptive expectation coefficient (λ) was derived from Table 2 which shows estimates from equation 15.

Table 3: Short-Run and Long-Run Elasticity of Consumption with respect to Income and Adjustment Coefficient

Elasticity of consumption with respect to actual income	adaptive expectation coefficient (λ)	Elasticity of consumption with respect to permanent income (β)
0.90	0.93	0.98

The result shows that with an elasticity of consumption with respect to actual income at 0.90, a 1% increase in current income would increase current consumption by 0.90%. Thus the short run marginal propensity to consume out of current income is 0.90. Nonetheless, if there is a prolong

increase in income, in the long run consumption would increase by 0.98%. Thus the elasticity of consumption out of permanent income is 0.98%. This implies that a one percent increase in permanent income would increase current consumption by 0.98%.

For every average Ghanaian household, a 1% increase in current income and for that matter real GDP, would lead an increase in final household consumption expenditure by 0.9%. The short run marginal propensity to consume out of current income is highly statistically significant at 1% level and it conforms to prior expectation.

From Table 3, the marginal propensity to consume (MPC) out of permanent income implies that a sustained increase in GDP of 1% would lead to an increase in final household consumption expenditure by 0.98%. The result exhibits a strong support for the permanent income hypothesis for Ghana. An adaptive expectation coefficient of 0.93 implies that in long run expectations of households in Ghana are realized by 0.93%.

Previous consumption (C_{t-1}) was not statistically significant. Even though it has no direct relation to the paper, its insignificance implies that, previous or past consumption has no effect on current consumption as propounded by Duesenberry in the Relative income hypothesis. Thus previous household consumption expenditure has no significant effect on current household consumption expenditure. It can therefore be concluded that the relative income hypothesis does not hold in Ghana.

In order to avoid misspecification error, interest rate was included in the model. The inclusion of interest rate in the model is based on the fact that interest rate has an effect on the consumption of goods and services (Kapoor & Ravi, 2009). However in this study interest rate is statistically insignificant. This implies that in Ghana, interest rate has no effect on household final consumption expenditure.

CONCLUSION

The results show that for every average Ghanaian household, a 1% increase in current income and for that matter real GDP, would lead an increase in final household consumption expenditure by 0.9%. The short run marginal propensity to consume out of current income is highly statistically significant at 1% level and it conforms to prior expectation. MPC out of permanent income implies that a sustained increase in GDP of 1% would lead to an increase in final household consumption expenditure by 0.98%. The result exhibits a strong support for the permanent income hypothesis for Ghana. An adaptive expectation coefficient of 0.93 implies that in long run nine tenth of households expectations are realized in Ghana. The revelation from the preceding session shows that previous household consumption expenditure has no significant effect on current household consumption expenditure. It can therefore be concluded that the relative income hypothesis does not hold in Ghana. The implication is that old-age poverty in Ghana may not be attributed to that fact that Ghanaians do not plan for their future retirement but rather incomes are low and hence their permanent incomes.

Viability of the permanent income hypothesis in Ghana implies that, current consumption primarily depends on permanent (average expected life time) income. This means that in Ghana, any policy that is expected to have a temporal change on income will have no effect on consumption. This study would therefore recommend that, for any policy to have an effect on income and therefore impact on the final household consumption expenditure, policy makers must ensure that, economic policy is permanent. In other words, a fiscal policy will have the desired changes in the level of consumption only when the policy is sustained for a long time. Finally, since Ghanaian's consumption follows permanent income hypothesis, old-age and post-retirement poverty could not be attributed to poor planning but low permanent income. Hence, efforts should be made to improve on income that will increase the permanent income to solve old-age and post-retirement poverty in Ghana.

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pISSN: 2343-6662 ISSN-L: 2343-6662 VOL. 4 ,No.4(2), pp 133-148, January, 2014

This academic research paper was published by the Africa Development and Resources Research Institute's Journal (***ADRRI JOURNAL***). ***ADRRI JOURNAL*** is a double blinded peer review, open access international journal that aims to inspire Africa development through quality applied research.

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