An econometric investigation of the consumption theory in a developing country

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Abstract

The study sets out to investigate the relevance of the consumption theory to the conditions of a developing country such as Nigeria.

In pursuance of this objective a household budget survey on consumption expenditures, income and family size was conducted in eight towns randomly selected in the old Western State of Nigeria in 1975. In each of the towns, thirty households consisting of 15 self-employed and 15 wage-earners were selected randomly and interviewed. In order to develop a relevant model for the Nigerian situation, the various versions of consumption theory were reviewed. These consist of Keynes' general theory of consumption, Friedman's Permanent Income Hypothesis, Duesenberry's Relative Income Hypothesis and Kuznets' Shifting Consumption Function. This critical review led to the specification of a postulated consumption function for the Nigerian situation which represents some variants of the Relative Income and Permanent Income Hypotheses. This postulated consumption function was estimated using the Least Squares method. The following were the major findings: (i) marginal propensity to consume is greater than zero but less than one, (ii) that marginal propensity to save by the self-employed is greater than that of the wage-earners and (iii) that household consumption is greater than zero when the household's income is zero. This latter finding in our opinion is a result of the extended family system.

Introduction

For a long time Keynes' (1936) theory of consumer behaviour represented the received theory on consumption function. His theory was tested and its predicting ability confirmed. Later came the work of Kuznets (1946) on U.S.A. budget data the analysis of which conflicted with Keynes' theory and this led to several theories of consumption which we will discuss later in this paper.

These theories were set within the context of the advanced economies without reference to the developing nations whose economies we want to see developed on the basis of the received theory of economics. Keynes' theory according to Robinson (1962) has little to say, directly, to the under-developed countries, for it was framed entirely in the context of an advanced industrial economy, with highly developed financial institutions and a sophisticated business sector in addition to a highly literate and informed class. In other words there is an underlying ideology in the development of any theory. In the case of economic theory there is a very strong ideology which is hardly ever mentioned and which forms the basis of how a particular nation organizes her resources for productive use. This ideology is NATIONALISM. The very nature of economics - the science of how a particular society (or nation) solves its economic problem - is, according to Robinson (1962), rooted in nationa-

lism. Economics would never have been developed except in the hope of throwing light upon question of policy. Policy will be meaningless unless there exists an authority to accept the risk and responsibility of carrying out the policy, and authorities are national. The "Free Trade" doctrine itself, as Marshall (1920) observed, was really a project of the British national interest.

In the light of the above discussion investigators in the developing nations must accept that almost all the economic theories learned in the advanced countries were designed to describe how those societies solve their economic problems and seek methods of allocating their resources efficiently. In using these received theories to describe LDC's economies to diagnose their problems, and prescribe solutions caution must be exercised because the theoretical framework on which the prescriptions are based emanated from some theories which are not independent of an economic system or some nation's standards and values. It is therefore necessary, as a first step to the use of such theories, to establish whether or not these theories describe the state of the economy in which it is to be applied.

The objective of this paper is therefore to examine an aspect of the theory of consumer behaviour and empirically establish its goodness of fit to the consumption behaviour in selected areas of Western States of Nigeria.

Consumption theory

In the circular flow of income Friedman (1947) has described consumption as part of aggregate demand and as such it depends on income. The relation between aggregate consumption (C) and aggregate income (Y) i.e.

$$C = f(Y)$$

which is generally termed the consumption function has played a major role in economic thinking in the advanced industrialized countries since Keynes (1936) made it a keystone of his theoretical structure in **The General Theory**. Available time series and budget data confirmed Keynes's hypothesis on consumer behaviour as described by the consumption function. Analysts such as Friedman (1947) found current consumption expenditure to be highly correlated with income and also found that marginal propensity to consume (MPC) was less than one and that MPC was less than the average propensity to consume (APC). Different investigators used different national data. However. when Kuznets (1946) used USA data his findings conflicted with Keynes' (1936) theory. According to Friedman (1936, 1970) Kuznets' evidence underlined the inadequacy of a consumption function which relates consumption solely to current income. It was a case of an error of omission of a relevant variable in the equation. The function is thus a mis-specified equation.

Since a theory cannot be said to be wrong it is then the degree of explanation of the observed phenomenon that is being questioned in

Kuznets' finding. Keynes had assumed that the consumption function which he postulated was a highly dependable and stable function of income. The available data not only confirmed this postulate but also revealed that a rising proportion of income was saved by the consumers as income rises. Kuznets, on the other hand, observed that a constant proportion of income was saved, a finding which conflicted with the former finding that a rising proportion of income was being saved as income rises. This new result implied a declining MPC.

This conflict of evidence led to more work and more testing of hypotheses on consumption data with a view to providing adequate explanation for the observed behaviour of consumers. The most important of these hypotheses are (a) Shifting Consumption Function, (b) Relative Income and (c) Permanent Income. These hypotheses are discussed in details in most text books on macroeconomics such as the books by Lindauer (1968) and Bailey (1963), while the permanent income hypothesis is the main subject of Friedman's (1947) theory of consumption. These three main hypotheses will be examined briefly.

Various lihes of reasoning regarding the nature of the relationship between consumption and income in an economic system have been put forward and examined in the light of seeming contradiction between the implications of the budget studies and the observed relationship of consumption and income over time. Those who put forward the hypothesis of the shifting consumption function (see Lindauer, 1968) accept the idea that a consumption function for the U.S. has a declining APC because of the linear nature of the consumption function such as

$$C = Co + cY \quad \ldots\ldots 1$$

and perhaps a declining MPC. Their conclusion was based on the budget study results which indicated that individuals with higher levels of income devote a smaller proportion of their income to consumption. They argued that Kuznets' (1946) finding of positive correlation between consumption and income was a result of movement along a declining APC consumption function which shifted upward over the years instead of a movement along a constant APC consumption function. The essence of their argument is that equation 1 is different for different years. The shifts were attributed to factors such as age composition of the consumer unit, increase in consumer credit, availability of new goods, de cline in farm population, migration and so on.

The linear consumption function (equation 1) which is said to shift upward over time was based on the assumption that the proportion of income devoted to consumption depends on the absolute size of income Duesenberry (1948) disputed this assertion and postulated the Relative Income Hypothesis. He accepted Kuznets' finding of constant APC and offered an explanation for it. He argued that the reason a constant APC was observed at every level of income over time was that there are always the "relative" rich and "relative" poor no matter what happens to the absolute level of income. He further argued that individuals in the various levels of income tend to spend the same proportion of any absolute income even though there might be temporary deviations. The intercept of equation 1 is assumed to be zero in this hypothesis.

The ermanent Income Hypothesis put forward by Friedman (1947) is essentially an extension of the Relative Income Hypothesis, the difference lying in his decomposition of disposable income into two parts - permanent and transitory income. He asserts, having dismissed equation 1 as a mis-specified equation, that the true relationship between consumption and income is that consumption (C) depends on permanent disposable income, i.e.

$$C = cY_p \quad \ldots\ldots 2$$

which implies

(a) $Y = Y_t + Y_p$
(b) APC = MPC and (c) Co = 0

The consumption function under the Permanent Income Hypothesis is given by Friedman (1947) as

$$C_p = k(i, w, h)\ Y_p \quad \ldots\ldots 3$$
$$Y = Y_p + Y_t \quad \ldots\ldots 4$$
$$C = C_p + C_t \quad \ldots\ldots 5$$

Equation 3 defines the relation between permanent income (Y_p) and permanent consumption C_p and from it the ratio

$$\frac{C_p}{Y_p} = k(i,w,h), \quad \ldots\ldots 6$$

which is independent of permanent income could be specified. The ratio is however, a function of i, the rate of interest at which a consumer unit such as a household can borrow or lend money; w, the relative importance of wealth which is defined as property and non-property income; and of h, the household's tastes and preferences for consumer goods. The most significant factors which influence w and h, according to Friedman (1947) are the number of the members of a consumer unit - this means the family size in the Nigerian context; and the importance of transitory factors (C_t and Y_t). Equations 4 and 5 specify the decomposition of measured income (Y) and measured consumption (C) into permanent and transitory components. Like Duesenberry, Friedman assumed Co of equation 1 to be zero.

The permanent income hypothesis which is an improvement over the Relative Income hypothesis could provide a better explanation of consumer behaviour in LDC. Of particular interest to the Nigerian situation is the introduction of k by Friedman (1947). k is assumed to be determined by i, w and h which, when explained within the context of the Nigerian economy might lead to a postulated consumption function for Nigeria. This postulate is pursued in the next section where both the Relative Income and the Permanent Income hypotheses were empirically examined for the Nigerian case.

A consumption function for Nigerian situation

In the Nigerian situation the variables w and h of equation 3 will lead to a modification of the linear consumption function described above if the function is to describe our society. In the first place transitory income will be assumed to be zero because the probability of a windfall gain in a consumption-oriented economy is near zero. At present most of the production activities (elements of w) are shared by foreign investors and a few Nigerians and to assume Y_t to be substantially greater than zero will be unrealistic. Having assumed Yt to be zero all the factors associated with it, especially Ct will be zero. Equations 4 and 5 which define the connection between the measured magnitudes (Y,C) and the permanent components (Y_p, C_p) will, in our cuntion, be reduced to identities, i.e.

$$Y = Y_p \quad \ldots\ldots 7$$
$$C = C_p \quad \ldots\ldots 8$$

According to Friedman C of equation 1 is given by the function:

$$C = \frac{k\Sigma(Y_p - \bar{Y}_p)^2}{\Sigma(Y - \hat{Y})^2} = kPy \quad \ldots\ldots 9$$

Where:

$$P_y = \frac{(Y_p - \bar{Y}_p)^2}{\Sigma(Y - \hat{Y})^2}$$

but by our assumption of zero Y_t and C_t, P_y becomes unity and

$$C = k \quad \ldots\ldots 10$$

It must be noted however that

$$C = k(i,w,h) \quad \ldots\ldots 11$$

which implies that three factors - i, w and h - affect C. The factor w has been used in our assumption of setting Y_t and C_t to zero. The factor, h, tastes and preferences of household members, will affect the consumption expenditures of the household in accordance with the number of members of the household, family size - one of the variables omitted in equation 1 and which led to its mis-specification - should be considered as a separate variable to be included in the consumption function. Family size is an important variable in the Nigerian economy and will therefore be included in the specification of our consumption function.

Kūznets (1946) assumed Co of equation 1 to be greater than zero while Duesenberry (1948) and Friedman (1947) assumed it to be zero. In the Nigerian situation Co is greater than zero. This assertion is a result of

the Nigerian family system. The extended family system as practised in Nigeria, particularly in the Western States of Nigeria, has a built-in informal social insurance system which performs essentially the same functions as the institutionalized social security practised in the U.S.A., for example. The family system provides security against sudden loss of income. If, for any reason, a household loses its income, Y, its consumption, C, will not be zero even though the income may be zero.

The consumption function relevant to the Nigerian situation is therefore postulated as

$$C = Co + b(i, w)Y + d(h)X \quad \ldots\ldots 12$$

Where

C = measured consumption expenditure
Y = measured income
X = family size
Co, is a constant while b and d are dependent variables.

Empirical evidence

Data collection and analysis:

A budget survey on consumption and income was conducted in eight towns of varying sizes in the Western State of Nigeria in 1975. These towns were Ibadan, Ijebu Ode, Inisha, Gbongan, Iwo, Ado-Ekiti, Okitipupa and Ilaro. At the time of our survey we discovered that a more comprehensive consumption survey was being conducted by the Federal Office of Statistics. The Federal survey covered the whole country and as soon as the data are published we will analyse them to verify the results of our small-scale survey.

In each town thirty households were selected randomly and household heads interviewed. The household heads interviewed were of two categories. Fifteen of them were self-employed while fifteen were wage-earners. Information was obtained on household consumption expenditures, income and family size among other things.

Multiple regression was used for the data. The regression equation fitted to the data was

$$C = Co + bY + dX + U \quad \ldots\ldots 13$$

which we assume satisfies all the necessary assumptions required of regression model as stated by Kmenta (1971).

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1 b and d which are dependent variables in equation 12 are now assumed to be constant parameters with the explanation that i, w and h will not change appreciably in the very short period covered by the survey. In our subsequent works however we will have a simultaneous equation system rather than a single equation such as equation 13 in order to satisfy the specifications of equation 12.

In order to examine the arguments put forward by the advocates of Relative Income Hypothesis two measures of relative income were tested. R was computed as the rank of a household head in his community and Z was computed as the ratio showing all incomes in units of the lowest income. The following equations were then estimated.

$$C = a_0 + a_1 R + E \quad \ldots\ldots 14$$
$$C = d_0 + d_1 Z + E_2 \quad \ldots\ldots 15$$

with the assumption that equations 14 and 15 satisfy all assumption for a regression model.

In order to be able to observe the assertion that the higher the level of uncertainty of income the higher the marginal propensity to save or equivalently the higher the uncertainty of income the lower the marginal propensity to consume out of a given income, we assume that wage-earners have a more certain income than the self-employed household heads. As a result we hypothesize that the MPC for wage earners would be greater than MPC for self-employed.

Estimated equations:

Equation 13 was estimated separately for wage-earners and self employed and the following are the estimated equations.

(A) Wage-earners:

$$\hat{C} = 1678.7034 + \underset{(0.0328)}{0.4471Y} + \underset{(0.78)}{2.0585X} \quad \ldots\ldots 16$$
$$R^2 = 0.6451$$

$$\hat{C} = 1742.1407 + \underset{(66.35)}{517.7123R} \quad \ldots\ldots 17$$
$$R^2 = 0.3404$$

$$\hat{C} = 8030.2880 + \underset{(0.8698)}{4.9909Z} \quad \ldots\ldots 18$$
$$R^2 = 0.2181$$

B. Self-employed

$$\hat{C} = 2130.6835 + \underset{(0.0934)}{0.3374Y} + \underset{(4.0131)}{5.6246X} \quad \ldots\ldots 19$$
$$R^2 = 0.1927$$

$$\hat{C} = 3726.6952 + \underset{(64.4785)}{340.1183R} \quad \ldots\ldots 20$$
$$R^2 = 0.1908$$

$$\hat{C} = 5483.6072 + 8.2163Z \quad \ldots\ldots 21$$
$$R^2 = 0.1798$$

It could be observed that in terms of the amount of variation in consumption (C) explained by the explanatory variables only equation 16 performed well. This implies that the postulated consumption function (equation 12) describes the measured consumption expenditures of the wage-earning household heads fairly well with R^2 equal to 0.6451. In all the other equations, e.g. equations 17-22, the amount of variation in C explained by its linear relationship with the various explanatory variables is low even though the F - test indicated that the various regression coefficients are significantly different from zero.

Equations 17, 18, 20 and 21 may be interpreted in one of two ways. The first is that R and Z are poor representations of relative income. May be, a measure of relative consumption corresponding to R and Z should have been used as the dependent variable instead of the measured consumption expenditure, C, especially for the wage-earners set of data.

When the two groups were combined the estimated equation obtained was

$$\hat{C} = 1893.00 + 0.4356Y + 2.18X \quad \text{.....22}$$
$$+ (0.0326)\ (0.8368)$$
$$R^2 = 0.4752$$

The F - test showed that the regression of C on Y and X was significant which implies that the consumption expenditure is significantly dependent on income and family size.

In order to ascertain whether or not X, family size, contributed to the explanation of the variation in C, equations 16 and 19 were run in a step-wise regression which allowed partitioning of R^2 into explanatory variables. In equation 16, X explained an additional 2% of the variation in C while in 19 it explained 1.4%. In equation 22 the additional contribution of X is 1.5%. Though the amount of information on C which was contributed by X is small yet the fact that it is positive justifies its inclusion.

In spite of the limitation observed above with respect to the low R^2 some interesting findings emerge. From equation 12 the MPC is

$$\frac{dC}{dY} = b(i,w) \quad \text{.....23}$$

and the estimate for b from equations 22, 16 and 19 are 0.4356, 0.4471 and 0.3374 respectively. These suggest that none of the MPC estimates is less than zero or greater than unity. It may therefore be correct to specify that

$$0 < MPC < 1 \quad \text{.....} \quad 24$$

for the case empirically tested. From equations 16 and 19 it is observed that MPC (self-employed) is less than MPC (wage-earners). It should be noted that the self-employed Nigerian is faced with a greater uncertainty about his income than the wage-earner.

This is borne out clearly in the adage "Oga ta, Oga o ta, owo alaru yio pe". It was observed that the self-employed group whose incomes are volatile and who engage in relatively risky enterprises have lower MPC (.3374) than the wage-earners who are more assured of their income (MPC = .4471).

This means that a wage earner is assured of his income no matter what the business sales are.

Conclusions and policy implications

It could be concluded from the foregoing that consumption in a developing country could be explained with the existing theory developed in the advanced countries provided no one particular hypothesis is assumed. It could be concluded further that (i) C_a of equation 1 is greater than zero, (ii) $0 < MPC < 1$, (iii) MPS is greater for self-employed than for the wage earners. (.6626 > .5529), and (iv) more work is required for the specific equation form of the consumption function since R^2 for equations 16 and 19 are so different that we believe it is possible that the linear equation is a mis-specified equation for the wage earners. It is, however, possible that the smallness of the sample size has an inflating effect on the adjusted sum of squares for explanatory variables. Another possibility of the violation of the assumption of homoskedastic variance. Cross-section data which we used are prone to this violation and maybe we could have specified a weighted linear regression equation instead of the simple linear. We believe, however, that these shortcomings do not invalidate our observations on the theory of consumer behaviour.

The implication of these findings, especially, that MPS for the self-employed is greater than MPS (wage earners) is that government effort toward capital formation for development should be directed to helping the self-employed who will save and invest their savings in order to increase the size of their operations. This is the surest development path in light of our evidence.

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