THE CONSUMPTION FUNCTION

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PART 1

During the last fifty years, since J. M. Keynes presented his most famous view about economics known as "The general Theory" and summarized in his book "The general Theory of employment, interest, and money" (1936), many researchers worked on consumption function to find the correct specification of such function and design tbe most significant econometric model which has to provide the best structure of the relationship between the aggregate consumers' expenditure and the other economic variables. Such a structure seems to be of great importance in the forecasting process, thus in economic policy decisions. On the basis of statistical criteria, investigators tried to estimate both short run and long run marginal propensity to consume from the available data and when following different methods of estimation and using different statistical tests and different choice of variables methods, their results show a significant dissimilarity. For the U.K. alone, several models have been built on the basis of different economic hypothesis such as: Absolute income hypotheses (AIH), relative income hypothesis (RIH), permanent income hypothesis (PIH) and life cycle hypothesis (LIH).

Researchers supporting different economic theories such as: ,Keynes (1936), Duesenburry (1949), Brown (1952), Friedman (1957),Byton (1970), Deaton (1972), Hendry (1974), Ball (1975), Bispham (1975), Wall (1975), Townend (1976), Bean (1977), DHSY (1978), Urgen-Sternberg (1980), have contributed in a wide operation of studying and analysing the econometric structure of the consumption function in the U.K. and U.S.A. in fact their final results manifest quite dissimilar short run multiplier, lag reactions, and long-run responses.Our objective here is not going through these studies although we shall highlight some of them when necessary. Instead, we shall concentrate on the process of examining some economic hypothesis related to the consumption problem and using their context toward finding out which model best satisfies the econometric measures using time-series data. Thus, the present work is presented in two major parts. First, we shall describe and discuss theoric material and issues involving consumption function. Second, we shall summarize results derived from our empirical investigation into the relationship between aggregate consumers' expenditure and income in U.K. It should be noted here that we used both annual and quarterly data for the period 1958-1986, and we were only concerned with expenditure excluding durable goods. Finally, although the reader will notice that we went through an important piece of literature in our subject, we do not suppose that we achieved remarkable results or added a valuable material to what is published. Instead it would be more fruitful if we understood that the present work can not be separated from previous studies to be mentioned.

The consumption Function

Introductory elements of the consumption function.

In chapter 8 of his famous publication "the general theory", J.M. Keynes stated the fundamental psychological law, which has been the theory frame of the consumption function as it exists today : "Men are disposed as rule and on the average, to increase their consumption as their income increases but not as much as the increase in their income"[1].

$$C = f(Y)$$

$$0 < \frac{dc}{dY} < 1$$

where C, Y, denote consumption and income respectively. What J.M.Keynes expected is that the proportion of income consumed would decrease as income increases, hence, the redistribution of income in favour of the poor would raise aggregate demand also, changes in the money value of wealth lead to short period changes in the propensity to consume. Finally, the short run MPC is always less than long run MPC (A man's standard of living is inflexible in short run, differences between his actual income and usual expenditure going straight into saving while over a longer period of time, his standard of living will become more flexible.) The simplest linear formulation of the linear Keynesian statement found in the general theory is :

$$C = \alpha + \beta Y + \mu$$

where:

1 – Y represents personal disposable income, the correct income variable according to the general theory.

2 – An additional unit of disposable income will lead to some increase in consumption will be somewhat less than the full rise in disposable income, or the share of consumption in income (Average propensity to consume) decreases as disposable income increases. In other words, even in the long term a greater proportion of income will be saved as real income increases.

$$0 < \beta < 1$$

3 – The saving-consumption decision is assumed independent of aggregate price level, hence. The variables of consumption function are entered in real rather than in nominal terms. Deflating the current values of observed variables by an appropriate price index helps in avoiding spuriously overestimating the correlation coefficient since a log formulation is being used.

Although the Keynesian fundamental psychological law presents the theory basis of today's consumption function, criticisms have been developed against its formulation and principal objective factors. The simple formulation of Keynesian consumption function neither distinguishes between short run and long-run marginal propensity to consume, nor does it incorporate wealth effects. Also with linearisation, the redistribution argument is no longer appropriate. The rule of income saving stated by Keynes has been refuted from the aggregate point of view, especially by Klein and Kosbord.[8] They argue that the C/Y ratio has actually increased slightly over the long-run. Their long-run estimates of the upward trend in the C/Y ratio is given by:

$$C/Y = 0.9134\ (1.00129)^{t},$$

That is this ratio has increased by 0.129% each year. Thus it is still an open question whether relatively wealthy individuals save a greater proportion of their income than do poor people.

On the other hand Keynes's ideas concerning the consumption function lead to a set of attempts to test the validity of his propositions. However, the estimation of consumption functions involves a number of preliminary data problems. One of these difficulties is the flow of services from what are durable goods, since the value of this flow is an important element in consumption, it should be included in a consumer's income but data concerning it, is rarely available.

From the empirical point of view, Davis (1952) did estimate the simple linear consumption function using U.S annual data for the period 1929-1940 in billion of Dollars. His estimated equation is:

$$C_t = 11.45 + 0.78Y_t \qquad R^2 = 0.986$$
$$(0.02)$$

<u>The relative income hypothesis</u>

Duesenberry (1949) and Modigliani (1949)[9] explain independently time-series and cross sectional data through what is known as relative income hypothesis. The hypothesis states that an individual's Average propensity to consume depends on his percentile position in the income distribution of his associates, since an individual's utility is assumed to depend not only on his own consumption but also on the consumption of others. Individuals with low income emulate the consumption patterns of their wealthier neighbours. Thus, the lower an individual's percentile position in the income distribution, the higher his average propensity to consume is and if all incomes increased over time by the same proportion as the individual's APCs, the aggregate APC would not change since relative incomes remain unchanged.

Let's assume that there exist a linear dependence between the individual's APC and the ratio of the mean income of the individual's group of associates to his own incdme.

$$(1) \quad \frac{C_t}{Y_t} = \alpha_0 + \alpha_1\left(\frac{\overline{Y}_t}{Y_t}\right) : \alpha_0>0, \ \alpha_1>0$$

where C_t, Y_t denote consumption and income.

and $\overline{Y}_t = \frac{\Sigma Y_t}{n}$ is the mean income of the group. We can clearly notice that when income (Y) increases the APC rises because of the emulation effect.

$$(2) \ C_t = \alpha_0 \ \overline{Y}_t + \alpha_1 Y \quad \text{from (1)}$$

$$(3) \ C_t = \alpha_s + \alpha_0 Y_t$$

where $\alpha_s = \alpha_1 \overline{Y}$ and $\overline{Y}$ is constant, clearly the cross section consumption function is of the keynesian form.

For time-series data:

$$(4)\ \sum_{i=1}^{n} C_{it} = \alpha_o \sum_{i=1}^{n} Y_{it} + n\alpha_1 Y_t$$

$$(5)\ \overline{C}_t = \alpha_o \frac{(\sum_{i=1}^{n} Y_{it})}{n} + \alpha_1 \overline{Y}_t = (\alpha_o + \alpha_1)\overline{Y}_t$$

The long-run time series consumption function has an APC of the value of $(\alpha_o+\alpha_1)$, no intercept term and MPC of the value of $(\alpha_o+\alpha_1)$ too. Clearly, cross section MPC is less than time-series MPC.

Also according to Duessemberry and Modigliani an individual's consumption depends not only on the size of his income relative to that of his associates but also on its size relative to its previous value (peak value),and the APC of agroup of consumers depends on the size of its current income relative to its previous peak income.

$$\frac{C_t}{Y_t} = \beta_o + \beta_1 \left(\frac{Y_o}{Y_t}\right) \qquad \beta_o > 0,\ \ \beta_1 > 0.$$

$$(6)\ \ C_t = \beta_o Y_t + \beta_1 Y_o$$

where : Y_o is the previous peak income of the group.

When income increases with (g) rate :

$$Y_t = (1+g)Y_{t-1}$$

$$(7)\ \ C_t = \left(\beta_o + \frac{\beta_1}{1+g}\right)Y_t$$

In the long-run and if income is supposed to grow at a constant rate, consumption function has no intercept and its APC is given by the formula :

$$(\beta_0 + \frac{\beta_1}{1+g})$$

In the case when $Y_t < Y_o$, the case which reflects a short run cyclical fall in income, we obtain the following equation (providing that Y_o is constant).

$$(8)\ C_t = \beta_1 + \beta_0 Y_t$$

Which again meet the Keynesian form of short run consumption function.

From the above results, MPC in the long run is greater than MPC in the short run since.

$$(\beta_0 + \frac{\beta_1}{1+g}) > \beta_0$$

Now, we shall introduce a graphic explanation of the above hypothesis. Consider (Y') the initial level of income. The income grows overtime towards (Y_o). Their points are traced out along the long run function given by curve (1). Suppose once it reaches (Y_o), income starts to decline cyclically, consumption falls back along the short-run function given the curve (2). Suppose, now, income grows beyond (Y_o). Then further points are traced out on the long-run function. If our next cyclical income peak is ($Y_{o'}$), any income falls below this point causes falls in consumption along the new short run function given by the curve (3). The "ratchet effect" can be seen by comparing equation (3) with equation (2). (2) has a longer intercept term than (3).

The permanent income hypothesis

The permanent income hypothesis is connected with the problem of habit persistence and lags in consumption behaviour. Friedman (1957) stated that the consumer disregards fortuitous variations in income when drawing up his consumption plan, he considers only his expected, normal, or permanent income (Y_P) which is defined as the amount that the consumer believes he can consume while maintaining his wealth intact. In making his plan the consumer only has in mind his permanent income and according to this hypothesis, the ratio of permanent consumption to permanent income is independent of (Y_P).

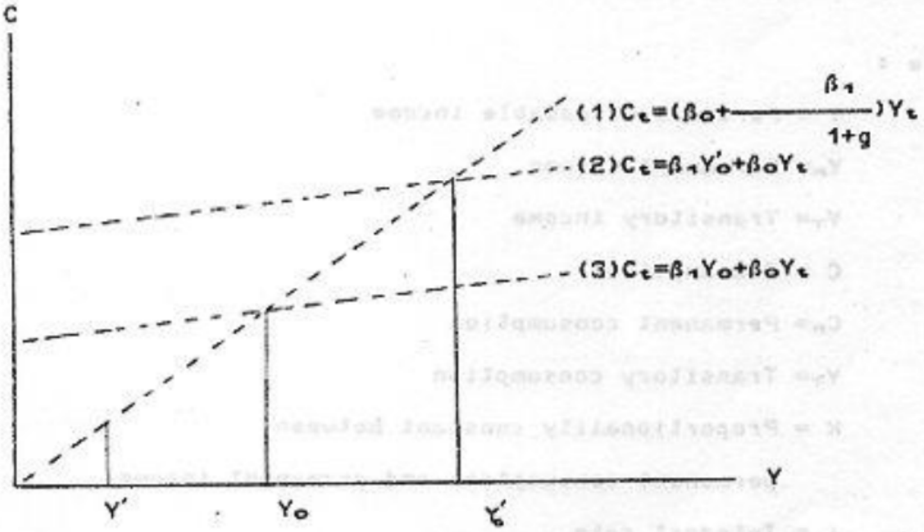
$$C_P = KY_P$$

where C_P, Y_P are respectively permanent consumption and permanent income.

In his theory of consumption function, Friedman investigates the question of lags in consumer behaviour by making a distrinction between measured income (income actually received) and the permament income on which consumer actually bases his behaviour, a similar distinction is made between measured consumption and permanent consumption *.

$$Y = Y_P + Y_T$$

$$C = C_P + C_T$$


C
(1)Ct=(β0+ β1/(1+g))Yt
(2)Ct=β1Y'o+β0Yt
(3)Ct=β1Yo+β0Yt
Y
Y'
Yo
Y'o

We can incorporate the principal hypothesis of the permanent income into a formal way as following :

$$C_P = k(i, w, u)Y_P$$

$$Y = Y_P + Y_T$$

$$C = C_P + C_T$$

$\overline{Y}_T = 0$ $\qquad e(T_P, Y_T) = 0$ $\qquad e(Y_T, C_T) = 0$

$\overline{C}_T = 0$ $\qquad e(C_P, C_T) = 0$

where :

Y = Personal disposable income

Y_P= Permanent income

Y_T= Transitory income

C = Consumption

C_P= Permanent consumption

Y_T= Transitory consumption

K = Proportionality constant between permanent consumption and permanent income.

i = Interest rate

w = Ratio of non-human wealth to permanent income

u = Other economic factors affecting (k)

e = The correlation coefficient.

Following Friedman model, the transitory components of income and consumption have zero mean. The covariances between the permanent components of income and consumption and the corresponding transitory components are zero, and the transitory components of income and consuption are uncorrelated with one another.

The specification of the consumption function under the permanent income hypothesis turns out to be that of the classical statistical "errors in variables" model. The true variables obey an exact functional relationship but they are observed with error. The result is that least squares estimation of the function : $C_P = KY_P$ using the observed variables consumption and income, gives an inconsistent estimate of (k). The observed consumption (c) is given by:

$$C = C_P + C_T = KY_P + C_T$$

and is related to observed income as follows:

$$C = KY + (C_T - KY_T)$$

This gives a linear relationship between observed variables together with an error term $(C_T - KY_T)$ which is itself a function of the two transitory components and we can see clearly that this equation does not satisfy the assumption of the classical least squares method of estimation, especially the assumption which states that the explanatory variable must be independent of the error term.

Implications and tests of PIH for time series analysis.

In the case when (i, w, u) defined above are constant the ratio of $\frac{C_P}{Y_P}$ will maintain the same value over time. If short-time run fluctuations in C and Y are averaged over time, the long-run C/Y will remain constant and will not show any trend.

TO BE CONTINUED