# Poverty, Excess Sensitivity and the Permanent Income Hypothesis: Evidence from a Developing Country

**Ila Patnaik**

**National Council of Applied Economic Research, New Delhi**

Abstract

In this paper we develop a very simple test to measure 'poverty' in a developing country. From evidence on aggregate consumption we obtain an estimate of the proportion of labour income received by consumers who own no physical or financial assets or have access to credit. Evidence from a developing country - India, indicates a role for current income in explaining consumption over and above that predicted by the permanent income hypothesis. This may be attributed to 'poverty', the inability to save or borrow.

Dr. Ila Patnaik
Consultant,
National Council of Applied
Economic Research,
Parisila Bhawan
11, Indraprastha Estate,
New Delhi 110002

**Poverty, Excess Senstivity and the Permanent Income Hypothesis:**

**Evidence from a Developing Country**

In this paper we develop a very simple test to measure ‘poverty’ in a developing country. From evidence on aggregate consumption we obtain an estimate of the proportion of labour income received by consumers who own no physical or financial assets. Such consumers in a developing country may be classified as poor. According to the permanent income hypothesis consumption is determined by life-time resources rather than income in the current period. Evidence indicates a role for current income in explaining consumption over and above that which is due to a revision in expectation of future income as signalled by current income (Flavin(1981), Hayashi(1982), Hall and Mishkin (1982), Jappelli and Pagano(1989), Zeldes (1989), Chah, Ramey and Starr (1995), Engelhardt (1996)). We examine the ‘excess senstivity’ hypothesis and try to determine its sources and magnitude for consumption in India. Section 2 describes representative agent model. In Section 3 we model sources of deviation from the permanent income hypothesis. Section 4 presents our results.

## 2. A Representative Agent Model

Life-time resources represent permanent income which can be thought of as a constant resource flow that can be sustained throughout the planning horizon. If current income exceeds permanent income, the individual saves. He can acquire physical or financial assets. Both yield the same rate of return and are assumed to be perfect substitutes in his portfolio basket. If current income falls short of permanent income, the individual borrows. Debt is treated as a negative asset. There are no constraints or imperfections in the market which prevent him from borrowing at the market rate of interest.

Preferences are assumed to be intertemporally additive. Lifetime utility is the sum of the sub-utilities of consumption in each period discounted at the subjective discount rate. This reflects the impatience because of which consumers attach a lower weight to the utility of future consumption. The utility function of the representative consumer at time t may be written as

$$U_t = \sum_{i=0}^{\infty} \left( \frac{1}{1+\delta} \right)^i u(C_{t+i}) \tag{2.1}$$

where $\delta$ is the constant rate of time preference and u ( ) is a time invariant, concave utility function. As in Barro (1974) it is assumed that agents take account of the welfare and resources of their prospective descendants. This inter-generational interaction is modelled by assuming that an agent maximises utility subject to a budget constraint over an infinite horizon. Thus, although an agent has a finite life, his planning horizon is infinite to take care of his immortal extended family. The infinite planning horizon assumption thus corresponds to finite lived individuals connected via a pattern of operative inter-generational transfers. These transfers are assumed to be bequests that are based on altruism and assumed to be non-negative.

The consumer's budget identity in period t may be written as

$$V_t = (1+r)\, V_{t-1} + \Omega_t - C_t \qquad (2.2)$$

where

$V_t$ = non-human wealth at the end of period t

r = rate of interest

$C_t$ = consumption in period t

$\Omega_t$ = post tax labour income in period t

If the utility function is quadratic or, $u(C_t) = -\frac{(\overline{C} - C_t)^2}{2}$ where $\overline{C}$ is the bliss level of effective consumption and provided that the transversality condition $\lim_{i\to\infty}\left[\frac{1}{(1+r)}\right]^i V_{t+i} = 0$ holds, maximising the representative individual's objective function (2.1) subject to the intertemporal budget constraint , we obtain

$$C_t = \alpha + \beta C_{t-1}$$
$$\text{where, } \alpha = \frac{(r-\delta)}{(1+r)}\overline{C} \text{ and } \beta = \frac{(1+\delta)}{(1+r)} \qquad (2.3)$$

**3. Excess Sensitivity**

Evidence indicates a role for current income in explaining consumption over and above that which is due to a revision in expectation of future income as signalled by current income (Flavin(1981), Hayashi(1982), Jappelli and Pagano(1989)). Flavin (1981) analysed the role of current income in providing new information about the future. She found that the response of consumption to current income was beyond that attributable to the role of current income in signalling changes in permanent income. The permanent income hypothesis suggests that individual consumption depends on the resources available to the consumer over his entire lifetime. However, if a consumer is constrained by credit market imperfections and is unable to borrow and lend the amount he requires to undertake his optimal consumption plan then his desired consumption will be constrained by his current income.

To take account of the 'excess sensitivity' of consumption to current income, Hayashi (1982) explicitly included the presence of some households in the economy who consume only their current income. The 'excess sensitivity' of consumption expenditure to contemporaneous disposable income may be attributed to liquidity constraints. If liquidity constrained consumers are significant in proportion then aggregate consumption reveals excess sensitivity to current income.

The economy is assumed to comprise of two groups of consumers - the liquidity constrained consumers and the unconstrained consumers. Aggregate consumption is assumed to be the sum of the consumption of constrained and unconstrained consumers.

$$C_t = C_t^c + C_t^u \qquad (3.1)$$

where

$C_t$ = Aggregate consumption

$C_t^c$ = Consumption of constrained consumers

$C_t^u$ = Consumption of unconstrained consumers

We assume that unconstrained consumers receive a proportion $\lambda$, of total post tax labour income, $\Omega_t$. Constrained consumers thus receive a proportion $(1 - \lambda)$ of total post tax labour income. Since they consume their current income,

$$C_t^c = (1 - \lambda)\Omega_t \qquad (3.2)$$

If the value of $\lambda$ is estimated to be unity, then one can conclude that all consumers are forward looking. The aggregate consumption function is thus a generalisation which includes the permanent income hypothesis as a special case.

The consumption of unconstrained consumers may be defined following (2.3) as

$$C_t^u = \alpha + \beta C_{t-1}^u + e_t \qquad (3.3)$$

where the error term $e_t$ is assumed to be normally distributed and uncorrelated to any information available to the consumer in period t-1 including consumption in period t-1. Since changes in current income signal changes in future income, the error term may include changes in consumption expenditure which occur due to the revision in expectation of future income.

Aggregate consumption may be defined using (3.1) and (3.3) as

$$C_t = \alpha + \beta C_{t-1}^u + C_t^c + e_t \qquad (3.4)$$

From (3.1), (3.2) and (3.4) we obtain

$$C_t = \alpha + \beta C_{t-1} + (1-\lambda)(\Omega_t - \beta\Omega_{t-1}) + e_t \qquad (3.5)$$

$\lambda$ can be interpreted as the degree of excess sensitivity of consumption to current income. If there exist no credit constraints $\lambda$ should be one.

**4. Evidence**

To test the hypothesis for India we estimate (3.3), the constrained model, and (3.5), the unconstrained model. The model is estimated using annual data for India for the period 1960-61 to 1993-94. The data source is International Financial Statistics published by the IMF and the Economic Survey published by the Government of India (various issues). Variables are measured in real per capita terms. Per capita GDP is used as an instrument for $\Omega_t$, the current disposable income. Since the error term may be correlated with $\Omega_t$, we estimate the model by using instrumental variables. The data is trending and given the small sample size it is difficult to reject the hypothesis that it is trend stationary in which case the t-statistics can still be assumed to be valid. Andrews and McDermott (1995) provide a justification for the use of standard asymptotic approximations in models with deterministically trending variables.

NLIV estimates using one period lagged values of consumption, income, private sector investment and government spending are presented in Table 1.Wald Statistic indicates that the restricted model is not the true model.

This indicates that there is evidence of excess sensitivity of consumption to income. This result is not surprising for a developing country a credit markets are imperfect and there exists a considerable proportion of the population that and cannot save or borrow because their incomes are very low and they possess no non-human wealth.

The estimate of excess sensitivity above may be biased because we have not taken into account the effect of other possible violations of the Ricardian model. For instance, the presence of finite horizons, rather than infinite horizons as assumed here, would lead to a greater response of permanent income unconstrained consumers to current income than suggested by the model above. The would mean that our estimate of the degree of excess sensitivity, $(1-\lambda)$ the proportion of income received by constrained consumers, is higher than what it would be if we took into account finite horizons.

$1-\lambda$, the proportion of post tax labour income received by the group of constrained consumers is estimated to be 55 per cent. Though the ‘constrained' group is not observable, it would not be unreasonable to suggest that the officially classified ‘poor' who live below the poverty line and constitute nearly 40 per cent of the population, might be included in this group. The poverty line definition calls those people poor who cannot afford to meet a certain daily requirement of food and the associated level of non-food items. The Planning Commission estimated that in 1979-80 about 317 million persons (48.4 per cent of the total population) lived below the poverty line which was defined as ‘the mid-point of the monthly per capita expenditure class having a daily calorie intake of 2,400 per person in rural areas and 2,100 in urban areas'. At 1979-80 prices these mid-points were Rs. 76 in rural areas and Rs. 88 in urban areas. 50.7 per cent of the rural population and 40.3 per cent of the urban population was identified as poor (Planning Commission, 1981).

This group received nearly 18 per cent of household income. Further, nearly 70 per cent of the households who have an annual income below the national average received about 35 per cent of total household income. We would consequently expect that in the relevant period the constrained group would constitute around 50 to 70 per cent of the total population and receive between 18 to 35 per cent of household income. Since labour income constitutes the major component of household income it seems reasonable to suggest that the 'poor' who own no physical or financial assets, receive 55 percent of post tax labour income.

In this paper we have demonstrated the application of a very simple analysis based on the excess sensitivity-permanent income hypothesis debate to the estimation of poverty in a developing country. Since markets for consumer credit are very limited in developing countries, the majority of the population depends on its own resources to finance consumption, evidence from consumption reveals the extent to which there is a dependence on current income.

**Table 1 : Excess Senstivity of Consumption**

| Parameter | Estimate [p values in parentheses] |
|---|---|
| $\alpha$ | 15.09 [0.039] |
| $\beta$ | 0.30 [0.111] |
| 1-$\lambda$ | 0.547 [0.000] |
| Durbin Watson Statistic | 1.93 |
| LM test for first order | |
| Serial Correlation | 0.12 [0.727] |
| LM test for functional form | 1.64 [0.201] |
| LM test for Heteroscedasticity | 2.39 [0.122] |
| LM test for Normality | 2.80 [0.247] |

Wald test of restriction ($\lambda = 1$) = 142.35

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