

A Note on The Two Concepts of Permanent Income

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I. Introduction

Friedman defines the permanent income of a consumer unit as the product of an interest rate r and the stock of wealth W ; the stock of wealth is interpreted as the present value of anticipated future receipts from both human and non-human assets. Permanent income is thus a theoretical construct. However, one can find its empirical counterpart once the wealth data is available.¹

When Friedman published his pathbreaking *A Theory of the Consumption Function*, the data on wealth for the United States either were not available or were not sufficiently refined to be used as a basis for economic policy analysis. It would appear that this led Friedman and those who followed him to estimate permanent income as the weighted average of the present and past values of measured income on the basis of aggregate data. The weighted average method of calculating permanent income has considerable backing that is rooted in consumer psychology,² yet it has been subjected to substantial criticism.³

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¹C. F. Milton Friedman, "Windfalls the 'Horizon' and Related Concepts in the Permanent Income Hypothesis," in *Measurement in Economics: Studies in Mathematical Economics and Econometrics*, by C. F. Christ, et. al., Stanford, California: Stanford University Press, 1963, p. 24.

²Prem S. Laumas and Gurcharan. S. Laumas, "On How to Calculate Permanent Income," *The Review of Income and Wealth*, December 1972.

³For details see, M. R. Darby, "The Permanent

A more significant shortcoming that exists in the literature is the fact that there hardly is any worthwhile effort to relate the concept of permanent income calculated on the basis of a weighted average to the concept of permanent income derived from a wealth construct. Because of this gap, Bowden has pointed out that it is difficult to essay any kind of answer on theoretical grounds to questions such as the meaning of "horizon" as calculated from time series studies, the likely magnitude of the weights and the correlation that should be specified between permanent and transitory components.⁴

Since the correspondence between the two concepts of permanent income is extremely important to the validity of the permanent income hypothesis (PIH), we undertake this note to verify two frequently used versions of the PIH, along with their fundamental assumptions. Section II deals with methodology, Section III is devoted to empirical results and Section IV presents concluding remarks.

II. Methodology

In this study permanent income is calculated in two ways from aggregate time series data. First, following Friedman, estimates of permanent income are made from a weighted average of the present and past values of measured income where the weights decline

Income Theory of Consumption," *The Quarterly Journal of Economics* (May 1974), p. 242.

⁴R. J. Bowden, "Some Implications of the Permanent Income Hypothesis," *The Review of Economic Studies* (1973). Bowden also points to the weak attempt made by Friedman to relate the two concepts of income.

exponentially through time. Both the weights and the number of years are allowed to be determined by the data; the weights by multiple correlation and the number of years by adding years successively until an additional year produces no significant increase in correlation.⁵

The second approach to estimating permanent income is to derive it directly from wealth data. One of us has computed permanent income on this basis in another paper.⁶ The following relation was postulated:

$$Y_p = r \cdot W \quad (1)$$

where Y_p is permanent income, r is the subjective interest rate, and W is the sum of human and non-human wealth.

However, in equation (1) only W is observable: y_p and r cannot be observed. Following Friedman, we can rewrite equation (1) as

$$y_m - y_t = rW \quad (2)$$

⁵A discrete analogue of the following equation was fitted:

$$Y_p(T) = \beta \int_{-\infty}^T e^{(\beta-\alpha)(t-T)} Y(t) dt$$

where Y_p is permanent income, Y is measured income, T is the date for which estimate is constructed, and t covers the whole range of earlier dates, $\beta = r$ is the rate of interest, $1/\beta$ is the consumers' horizon. The trend factor is α . Without the trend factor, the above equation when applied to a steadily growing series yields estimated values of permanent income systematically below their measured values. In other words, it does not take into account any past rate of increase in wealth. In order to remove this defect we adjusted the permanent income series by a trend factor α . Following Friedman, the value of α was taken to be .02 for the income series. We used the value of $\beta = .4$ based on our past research. Cf. Prem S. Laumas and Khan A. Mohabbat, "The Permanent Income Hypothesis: Evidence from Time-Series Data," *The American Economic Review* (September 1972). With $\beta = .4$ sixteen years (1929-1944) were lost in computing permanent income; the weights used were .330, .221, .148, .099, .067, .045, .030, .020, .013, .009, .006, .004, .003, .002, .001, .001, .001. The sum of these weights equals 1.

⁶For details see Khan A. Mohabbat and Evangelos Simos, "Consumer Horizon: Further Evidence," *Journal of Political Economy* (August 1977).

or

$$y_m = rW + y_t$$

with

$$\bar{y}_t = 0$$

where y_m is measured income whose magnitude is observable, y_t is transitory income and is not observable, and \bar{y}_t is the average value of transitory income which is assumed to be zero. Equation (2) can be used to estimate the values of r . To obtain a time path of r we use the varying parameter regression approach of estimation that has recently been advanced by Cooley and Prescott.⁷ The underpinnings of this approach are rooted in the notion that the regression parameters in an econometric model may be subject to sequential variation over time. This may be due to a host of reasons such as misspecification of the model, structural changes and problems of aggregation. This approach has the advantage of making it possible to separate parametric variations that are transitory from those that are permanent.

The relevance of the time varying parameter method of estimation can be easily seen in this study. The economic conditions in the U.S. have varied over the sample period and it would be appropriate to expect r to vary over these years; r is, after all, a weighted average index of observable and non-observable interest rates. The observable rates have fluctuated widely with variations in the levels of economic activity, and there may be little reason to assume that the non-observable rates, that are mainly dependent on household expectations have remained unchanged. Once the permanent values of r , have been computed, the required values of Y_p are

⁷T. F. Cooley and Edward Prescott, "An Adaptive Regression Model," *International Economic Review*, (June 1973) and "Systematic (Non-Random) Variation Models Varying Parameter Regression: A Theory and Some Applications," *Annals of Economic and Social Measurements*, (January 1973).

obtainable as the product of the yearly estimates of r and their contemporaneous W .

Friedman himself has not offered any specific method of computation for estimating permanent consumption, C_p . He only suggests that C_p is highly correlated with Y_p . Following this suggestion we estimated C_p from the following equation:⁸

$$C_m = a_0 + a_1 Y_p \quad (3)$$

where C_m is measured consumption.

Equation 3 is used to estimate two sets of time series values of permanent consumption. The first set is obtained when we use the values of Y_p that are calculated from the weighted average method; the second set is derived when we substitute the values of Y_p that are estimated from wealth data. By using the varying parameters method of estimation we are able to derive yearly values of marginal propensity to consume, a_1 , for each consumption series. The advantages of this method is that it also enables us to estimate any annual shift in the intercept term, a_0 , and separate its transitory movement from the permanent one.⁹ Upon estimating the time series values of a_1 and a_0 for each method, i.e., the weighted average method and the wealth method, the corresponding time series values of C_p are found by multiplying the annual marginal propensity to consume into the respective permanent income series and adding the associated annual values of the intercept. Transitory concepts of income and consumption were found by deducting their permanent components from their respective measured values.

⁸This method of computing permanent consumption, although not using the varying parameter method of estimation, is also used by D. W. Johnson and J. S. Y. Chiu, "The Savings-Income Relationships in Underdeveloped and Developed Countries," *The Economic Journal* (June 1968).

⁹See Thomas Cooley and Edward Prescott, "Estimation in the Presence of Stochastic Variation," *Econometrica* (January 1976).

III. Empirical Results

Based on the time series values of C_p computed above, this section is devoted to investigating the validity of the strict version of the PIH. According to this version permanent consumption is proportional to permanent income and the marginal propensity to consume out of transitory income is zero.¹⁰ To substantiate the efficacy of this version we fitted the following relations for the weighted average and the wealth data methods:

$$C_p = b_0 + b_1 Y_p$$

$$C_t = c_0 + c_1 Y_t \quad (4)$$

where C_t is transitory consumption. In either case we have not suppressed the intercept and have allowed the data to determine its values, if any. The results are shown in Table I.

It is important to note that, irrespective of the method of computing Y_p , the marginal propensity to consume permanent income is positive and significant at the 5 percent level. The value of MPC, .942, is larger under the weighted average method than under the wealth data method where MPC = .832. This difference is mainly attributable to the fact that the declining weight method uniformly renders smaller values for Y_p than the direct wealth method; but the magnitudes of the consumption data for the two methods are very similar. Regarding the relation between the transitory elements of income and consumption, the two methods produce results that are at variance. The declining

¹⁰Consumption as defined in the PIH consists of expenditures on nondurable goods plus the rental value of durable goods. Most previous studies have either used the conventional definition of consumption which includes the consumption of durables or they have made two sets of estimates based on consumption with and without durable goods; they presumed that the marginal propensity to consume permanent income lies somewhere in between the two estimates. Our consumption data are strictly in accord with the PIH and consists of the consumption of non-durable goods and the services of the durables.

TABLE I Marginal Propensity to Consume Permanent and Transitory Incomes in the United States 1945-69
(*t* values are in parentheses)

Method	Model	R ²
Declining Weight Method	$C_p = -22.961 + 0.942Y$ (-5.19) (79.92) ^p	.996
	$C_t = 6.012 - 0.247Y$ (2.75) (-4.15) ^t	.429
Wealth Data Method	$C_{p1} = -14.735 + .832Y$ (-3.70) (85.87) ^{p1}	.997
	$C_{t1} = 0.052 + 0.490 Y_t$ (0.22) (0.69)	0.020

Notes: The concept of measured income employed in this study is more comprehensive and consists of disposable income, corporate savings, the excess of wage accruals over wage disbursement, net government transfer payments and statistical discrepancy. This concept of measured income was initially proposed by Friedman in the context of a study on the relative stability of monetary velocity and investment multiplier and was subsequently defended by Friedman and Meiselman in "Reply to Hester," *Review of Economics and Statistics*, (November 1964), pp. 369-76. The data for measured income were supplied by Data Resources Inc.

Data Sources: Data on wealth was obtained from John W. Kendrick, *The Formation And Stock of Total Capital* (The National Bureau of Economic Research, General Series No. 100), 1976, p. 202 and p. 204.

Data on consumption was obtained from L.R. Christensen and D.W. Jorgenson, "U.S. Income, Savings and Wealth, 1929-69," *The Review of Income and Wealth* (December 1972), pp. 329-362.

weight method yields marginal propensity to consume transitory income of -0.247 which is significant at the 5 per cent level. The spuriousness of this result can be accounted for by the computational procedure employed in calculating transitory consumption compared with transitory income. Several writers have pointed out that when using the declining weight method, transitory income would also rise systematically if measured income is rising. But the derivation of transitory consumption appears to be more in line with Friedman's theoretical formulation of the PIH, and yields values of transitory consumption which are both positive and negative over

time and of relatively small magnitude. On the other hand, the marginal propensity to consume transitory income under the wealth method is statistically insignificant at the 5 per cent level.

As a final step the validity of the fundamental assumptions of the PIH regarding the no correlation thesis between the permanent and transitory elements and the transitory elements themselves was verified. The results are presented in Table II.

The declining weight method of computing permanent income does not support the assumptions of zero correlation between Y_p and Y_t , between C_t and Y_t , and C_p and C_t at

TABLE II Coefficients of Determination, R², Between Permanent and Transitory Elements and Between Transitory Elements, U.S., 1945-69

Method of Measuring Y_p	$R^2(Y_p, Y_t)$	$R^2(C_p, C_t)$	$R^2(C_t, Y_t)$
Declining Weight Method	.731	.477	.429
Wealth Data Method	.020*	.007*	.020*

Note: R² values marked with asterisks are not significant at the 5 percent level.

the 5 per cent significance level. On the other hand when Y_p is directly derived from wealth data, Friedman's zero correlation contention is strongly upheld. The corresponding values of R² under the direct wealth method are extremely small in all cases, and none of them is significantly different from zero.

IV. Concluding Remarks

It has been the purpose of this study to show that controversy about the empirical findings growing out of the PIH have been more due to the methodology of estimating permanent income than to the conceptual framework of the hypothesis. To this end we computed two series of permanent incomes for the U.S. 1945-69; one directly from the total private wealth and the other from the declining weight method. The consumption series prepared for this study are in strict accord with the PIH requirements. The strict version of the PIH which describes a state of proportionality between C_p and Y_p and no relation between C_t and Y_t was tested using both methods of estimating permanent income. Juxtaposing these results, we find

that the declining weight methodology, which has been frequently used, does not unequivocally support the PIH. The wealth data approach, on the other hand, strongly supports the basic tenets of the PIH and rejects the *a priori* view held by Bowden that there exists a negative correlation between Y_p and Y_t . Our results, based on the direct wealth method of estimation, show a zero correlation between Y_p and Y_t as they do between the other pairs of permanent and transitory elements and the transitory elements themselves.

The disparity between the estimates of the corresponding components of the PIH as derived by the two different methods leads us to view with caution some of the policy implications proposed by a number of well-known studies, including some of Friedman's, which are based on the weighted average method. Such circumspection is warranted as the estimates of Y_p based on the weighting pattern are systematically below those which are computed from the wealth data resulting in an MPC from the former to be 12% larger than from the latter.