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ESTIMATING CONSUMPTION FUNCTIONS FOR PAKISTAN

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Using a set of dummy and interactive variables, the paper obtains estimates of marginal propensity to consume (MPC) for Pakistan by combining two sets of aggregate time series data. While the short-run MPC estimates vary from 0.59 to 0.79 across specifications and techniques employed, the long-run estimates are more robust. The findings indicate that at the aggregate level, consumption behaviour in Pakistan during the twenty-year period, 1959-60 to 1978-79, is better explained by the income variable and its variants, e.g., past income or changes in income, than by habitual consumption. The results from estimation based on Parmanent Income Hypothesis, though not conclusive suggest a shorter 'horizon' for Pakistan than India.

I. Introduction

Few studies have appeared in the context of Pakistan, which present time-series aggregate consumption function or its complement, aggregate saving behaviour of the economy.[1] Domestic savings, as an effective constraint on the size of annual development programs in LDCs is well recongnized. Alternatively, in situations of rising income levels and inflation some form of demand management policies are required. Consequently, the objective here is to provide reliable estimates for MPC in Pakistan for policy purposes.

The paper is organized as follows. Section II briefly describes the data and variables used in the study. Section III briefly reviews the empirical formulations of various hypotheses viz., Absolute Income Hypothesis (AIH), Relative Income Hypothesis (RIH) of Duesenberry, and the Perma-

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[1] A notable exception is a recent study by Qureshi (1981).

nent Income Hypothesis (PIH) of Friedman. Section IV contains the results of the estimation exercise. Results of testing PIH for Pakistan under the Friedman-Cagan framework are presented in section V. The main findings are summarized in section VI.

II. Data

This study relies on the expenditure accounts data published in Pakistan Economic Surveys and Monthly Statistical Bulletins, issued by Finance Division and Statistics Division, Government of Pakistan, respectively. Yearly estimates of private consumption expenditures in these accounts emerge as a residual from the use of gross national income identity.[2] To arrive at personal disposable income capital consumption allowance (obtained from Explanatory Memorandum of National Income Accounts) and direct taxes were deducted from GNP at factor cost. Population figures for each year are based on Planning Commission estimates reported in the Economic Surveys. Private consumption expenditure and personal disposable income were estimated in terms of 1949-50 Rupees by constructing a consumer price index with the corresponding base year.

The time series extends from 1959-60 to 1978-79. However, the period of 1959-60 to 1968-69 includes figures for East Pakistan. This inclusion can be defended on the grounds that separate officially published expenditure series for East and West Pakistan are not available. Moreover where attempts have been made to provide such series, e.g., by Naseem (1975), they are based on controversial assumptions about some heads of account. Thirdly, an exercise using personal disposable income series derived from Naseem's series for West Pakistan, by this writer failed to give meaningful results.[3] Consequently, for the years 1959-60 to 1968-69 it was thought best to restrict the analysis to published figures which give totals for combined East and West Pakistan.

III. Specifications

The first specification is designed to capture the essence of Keynes' formulation of the aggregate consumption behaviour of an economy:

$$C_t = \beta_o + \beta_1 Y_t + \mu_t \qquad (3.1)$$

[2] Independent estimates of aggregate total consumption over time based on "use" definition of consumption would have been ideal for this study. The absence of such precise data leads us to sacrifice theoretical purity in favour of operational considerations.

[3] The consumption-income relationship based on consumption and national expenditure series generated by Naseem (1975) give an MPC greater than 1 for the period 1959-60 to 1978-79.

where C_t is per capita private consumption expenditure, and Y_t is personal disposable income per capita. The inadequacy of this simple Keynesian function to correctly predict the consumption behaviour in World War II period led to the reformulation of consumption theory by several economists.

Brown (1952) added lagged consumption to incorporate some measure of the slowness of consumer response to changes in income; this delay is caused due to persistence of past consumption habits. The simple Keynesian function now stood as:

$$C_t = \beta_o + \beta_1 Y_t + \beta_2 C_{t-1} + \mu_t \qquad (3.2)$$

and will be referred to as BHP (Brown's Habit Persistence Model).

Ruth Mack [Friedman (1957)] argued that the effect of changes in income are more important than established income level, so that the propensity to consume out of these two elements of current income differed. The behaviour has been specified as:

$$C_t = \alpha_o + \alpha_1 Y_{t-1} + \alpha_2 (Y_t - Y_{t-1}) + \mu_t$$

or

$$C_t = \alpha_o + \alpha_2 Y_t + (\alpha_1 - \alpha_2) Y_{t-1} + \mu_t$$

This function alluded to as RM is estimated in the form:[4]

$$C_t = \beta_o + \beta_1 Y_t + \beta_2 Y_{t-1} + \mu_t \qquad (3.3)$$

where $\beta_1 = \alpha_2$ and $\beta_2 = \alpha_1 - \alpha_2$.

From Friedman's (1957) conception of consumption behaviour in the shape of Permanent Income Hypothesis, and subsequent modification under the Koyck scheme of lags, emerged the following formulation similar to Brown's:

$$C_t = K(1-\beta) Y_t + \beta C_{t-1} + \mu_t - (1-\beta) \mu_{t-1} \qquad (3.4)$$

where $K(1-\beta)$ is the short-run MPC. Singh and Ullah (1976) have however shown that the behavioural assumptions and properties of the estimators differ across equations (3.3) and (3.4).

[4] This function has alternatively been presented in the literature as DM (Duesenberry-Modigliani) formulation where past peak period income of the original function has been replaced by lagged income, for countries with steadily rising incomes, [Modigliani and Tarantelli (1975)].

Duesenberry's (1949) attempt to explain the fluctuations in C/Y ratio in terms of past peak period income, known as Relative Income Hypothesis (RIH) is captured by the following expression:[5]

$$(C/Y)_t = \beta_o + \beta_1(Y_t/Y_t^o) + \mu_t \qquad \beta_1 < 0$$

where Y_t^o is the past peak period inome. Davis (1953) substituted past peak period income by past peak period consumption on the ground that the standard of living and consumer habits are not so much reflected in earned income as in actual consumption, i.e.,

$$(C/Y)_t = \beta_o + \beta_1(Y_t/C_t^o) + \mu_t \qquad \beta_1 < 0$$

and C_t^o is the past peak period consumption. For Pakistan, both the versions of RIH are tested in the following form provided by Duesenberry, Eckstein and Fromm (DEF) (1966) and Singh-Kumar (SK) (1971) to include Nerlovian 'partial adjustment' behaviour;

$$(C/Y)_t = \beta_o + \beta_1(Y_t/Y_t^o) + \beta_2(C/Y)_{t-1} + \mu_t \qquad (3.5)$$

$$(C/Y)_t = \beta_o + \beta_1(Y_t/C_t^o) + \beta_2(C/Y)_{t-1} + \mu_t \qquad (3.6)$$

Percentage change in income is an essential element in Evan's (1967) explanation of consumer behaviour. It is verified for Pakistan in the following form:

$$(C/Y)_t = \beta_o + \beta_1(\Delta Y/Y)_t + \beta_2(C/Y)_{t-1} + \mu_t \qquad (3.7)$$

IV. Results

The estimation problems inherent in using combined single time series, relating to two separate underlying economic structures cannot be overlooked. Not only a shift is expected, but a change in the speed of adjustment to any economic stimuli is possible between the two different shapes of the economy. Dummy variable and its interaction with other continuous variables have extensively been used in estimation to capture the effects arising from the inclusion of data relating to combined East and West Pakistan. However, since the focus of this study is on the consumption propensities of Pakistan, discussion on various estimates will ignore the interactive variables included in the formulations.

[5] Duesenberry's original statements refer to the savings-income ratio rather than the consumption-income ratio. However, his later modifications refer to the latter ratio.

The theoretical specifications of various hypotheses in terms of the individual consumer and the likelihood of greater measurement errors at the aggregate than at the per capita level due to peculiarity of our data set, have led us to employ variables in per capita form.

Table 4.1 presents the OLS estimates of various hypotheses. The short-run MPCs in all the level functions [equations (3.1) to (3.4)] are highly significant. The negative constant terms in BHP and RM are innocuous as they are statistically insignificant: similar results have been obtained by studies on India and US [Evans (1969), and Vakil (1973)].

Comparing BHP and RM the results suggest that current consumption is more responsive to changes in income than to a measure of habitual consumption behaviour. The results of Friedman's PIH with Koyck transformation also indicate that current consumption is relatively more sensitive to past incomes than to lagged consumption.[6] There still exists the possibility mentioned by Evans (1969) that coefficients of SRMPC may be higher and those of lagged variables due to simultaneity bias. To correct for this two-stage least square technique (TSLS) was applied where variables of the National Income Identity were treated as instruments to explain the current consumption expenditure. A vector of TSLS coefficients of consumption function is derived from the following equation:

$$\beta = [Z'X\,(X'X)^{-1}\,XZ]^{-1}\;Z'X\,(X'X)^{-1}\,X'y$$

where X is a matrix of data on government expenditures, investment expenditures, imports and exports and Z is a matrix containing data on disposable income and lagged consumption expenditure, and y is a vector containing values for consumption [Intriligator (1978)].

TSLS estimates of the three level functions are given in Table 4.2. The coefficients of current income in BHP and Friedman [equations (3.2) and (3.4)] are higher in TSLS as compared to OLS estimates. Our presumption that last year's consumption expenditures play a passive role in determining current consumption expenditures in Pakistan is strengthened by the results of these estimations.

Multicollinearity and autocorrelation among the error terms render the estimates of short-run MPC suspect from an econometric standpoint. The two variants of RIH and Evans functions estimated for the case of Pakistan, it is hoped, will eliminate some of the econometric problems present in the estimation of level functions.[7]

[6] Estimation problems in using OLS technique [Singh and Ullah (1976)] render these inferences tentative and preliminary.

[7] OLS estimates of equations (3.5), (3.6) and (3.7) may still not be consistent estimates of the parameter as residuals are serially correlated [Grilliches (1961)].

TABLE 4.1

Consumption functions: OLS regression results

1. SIMPLE KEYNESIAN	$C =$	18.83	+	$0.8717Y_t$	+	$0.0111DY_t$				
		(16.88)		(0.0433)**		(0.0249)				
	$R^2 = 0.9933$		DW = 1.76		SEE = 5.24					
2. BHP	$C =$	− 4.34	+	$0.7589Y_t$	+	$0.1902C_{(t-1)}$	−	$0.0206DY_t$	+	$0.0626DC_{(t-1)}$
		(21.20)		(0.0778)**		(0.1034)*		(0.0282)		(0.0311)**
	$R^2 = 0.9936$		DW = 1.94		SEE = 4.99					
3. RM	$C =$	− 2.25	+	$0.6786Y_t$	+	$0.2520Y_{(t-1)}$	−	$0.0465DY_t$	+	$0.0898DY_{(t-1)}$
		(18.64)		(0.0941)**		(0.1075)**		(0.0313)		(0.0355)**
	$R^2 = 0.9943$		DW = 1.76		SEE = 4.71					
4. FRIEDMAN	$C =$	$0.7583Y_t$	+	$0.1787C_{(t-1)}$	−	$0.0226DY_t$	+	$0.0588DC_{(t-1)}$		
		(0.0752)**		(0.0838)**		(0.0254)		(0.0244)**		
	$R^2 = 0.9936$		DW = 1.94		SEE = 4.83					
5. DEF	$\frac{C}{Y} =$	1.3043	−	$0.2456(\frac{Y}{Y^o})_t$	−	$0.1482(\frac{C}{Y})_{t-1}$	+	0.0419D		
		(0.2840)**		(0.1227)*		(0.2352)		(0.0188)**		
	$R^2 = 0.6148$		DW = 1.54		SEE = 0.0143					
6. SK	$\frac{C}{Y} =$	1.5340	−	$0.2153(\frac{Y}{C^o})_t$	−	$0.4117(\frac{C}{Y})_{t-1}$	+	0.0411D		
		(0.3842)**		(0.1260)		(0.3028)		(0.0129)**		
	$R^2 = 0.5212$		DW = 1.44		SEE = 0.0149					
7. EVANS	$\frac{C}{Y} =$	1.0387	−	$0.2403(\frac{\Delta Y}{Y})_t$	−	$0.1242(\frac{C}{Y})_{t-1}$	+	0.0391D		
		(0.2105)**		(0.1120)**		(0.2280)		(0.0113)**		
	$R^2 = 0.6372$		DW = 1.66		SEE = 0.0141					

**Significant at 5 per cent level.
*Significant at 10 per cent level.

TABLE 4.2

Consumption functions: TSLS regression results (per capita)

2. BHP	C =	1.39	+	$0.7852Y_t$	+	$0.1447C_{(t-1)}$	−	$0.2572DY_t$	+	$0.308DC_{(t-1)}$
		(25.55)		(0.1247)**		(0.1645)		(0.5227)		(0.5543)
		R^2 = 0.9936		DW = 2.22		SEE = 5.83				
3. RM	C =	− 3.30	+	$0.5892Y_t$	+	$0.3464Y_{(t-1)}$	+	$0.4524DY_t$	−	$0.4190DC_{(t-1)}$
		(19.31)		(0.1367)**		(0.1581)**		(0.7079)		(0.7170)
		R^2 = 0.9960		DW = 1.54		SEE = 4.64				
4. FRIEDMAN	C =	$0.7843Y_t$	+	$0.1496C_{(t-1)}$		$0.2501DY_t$	+	$0.3024DC_{(t-1)}$		
		(0.1187)**		(0.1323)		(0.4853)		(0.5219)		
		R^2 = 0.9937		DW = 2.22		SEE = 5.60				

**Significant at 5 per cent level.
Standard errors in parenthesis.

The negative sign and insignificance of lagged C/Y in all of the three ratio functions [equations (3.5) to (3.7)] imply a weak habit persistence behaviour in determining current consumption. The expected signs with peak period income and consumption variables in DEF and SK support the short-run irreversibility proposition for Pakistan. However, statistically speaking, the degree of confidence placed on such an inference is relatively low. The coefficients of ratio of current income to past peak income [equation (3.5)] and past peak consumption [equation (3.6)] in both the variants of RIH are only significant at the 10 per cent level.[8]

The DEF function performs better than SK formulation, reinforcing the observation that current behaviour is geared towards past highest standard of living as indicated by income earned rather than actual consumption expenditures. This proposition receives added confirmation from the results of Evans function, where the short-run fluctuations in C/Y ratio are explained in terms of percentage changes in income. Calculations based on the estimates of this formulation revealed that a one per cent increase in income leads to 2.94 per cent (measured at mean) increase in savings.[9]

The regression results in terms of short-run and long-run marginal propensities are summarised in Table 4.3. The estimates of short-run MPC,

TABLE 4.3

Summary of various estimates

	SR MPC	LR MPC
OLS		
SIMPLE KEYNESIAN*	0.8718	—
BHP	0.7589	0.9321
RM	0.6786	0.9243
FRIEDMAN (KOYCK)	0.7583	0.9187
DEF	0.6656	0.9165
SK	0.6837	0.9158
EVANS	0.6822	0.9190
TSLS		
BHP	0.7852	0.9145
RM	0.5892	0.9269
FRIEDMAN (KOYCK)	0.7844	0.9187

*Keynesian function does not distinguish between the short-run and long-run MPC.

[8] The derivation of more reliable estimates, with smaller standard errors by employing Non-linear Iterative Least Squares (NILES) cannot be ruled out [Singh and Kumar (1978)].

[9] A higher figure of 4.5 per cent increase in savings obtained by Qureshi (1981) probably reflects differences in specification and type of data.

derived from different hypotheses range from 0.59 to 0.79, with four estimates falling between 0.67 to 0.68. Qureshi (1981) in his study of savings behaviour obtained similar results, with short-run MPS of 0.355 in three of his estimated functions for the period 1950-51 to 1976-77. A unique measure of short-run MPC for Pakistan could not be extracted from various hypotheses because of differences in underlying specifications and failure to satisfy all the assumptions of OLS. However, the following comments may be made: (i) The estimates derived from the ratio functions are more reliable to the extent that these formulations are themselves free from distortions of collinearity, simultaneity and autocorrelation of error terms, commonly plaguing the level functions. (ii) The long-run estimates represent a more stable and consistent view, with values ranging from 0.9321 to 0.9158 across different hypotheses. Four of the six estimates are tightly bunched around 0.9190 and 0.9158, implying that long-run implications of the respective hypotheses are similar.[10] These estimates also correspond to the observed APC of 0.9207 obtained for the twenty year period satisfying another theoretical condition that in the long-run MPC is equal to APC.

V. Friedman-Cagan Technique

To estimate consumption functions based on the original Permanent Income Hypothesis (PIH), an empirical measure of permanent income is needed. I have chosen to follow the original Friedman-Cagan method of constructing the permanent income series. The present section concentrates on the results obtained from this approach.

The Permanent Income Hypothesis can formally be stated in the following set of equations:

$$C_p = k\,(i, w, u)\, Y_p \tag{5.1}$$

$$Y = Y_p + Y_t \tag{5.2}$$

$$C = C_p + C_t \tag{5.3}$$

$$r(Y_p Y_t) = 0 \qquad r(C_p C_t) = 0$$

$$r(Y_t C_t) = 0 \tag{5.4}$$

[10] Inspite of different data sets and functional forms the long-run estimates closely resemble those arrived at by Qureshi (1981).

where:

Y = Personal disposable income.
C = Consumption of non-durables and services plus use-value of consumer durables.
k = Proportionality constant between permanent consumption and permanent income.
i = Rate of interest.
w = Ratio of non-human wealth to permanent income.
u = Other economic and demographic factore affecting k.
r = Correlation coefficient.
p,t = Subscripts representing the permanent and transitory values of the variables.

Equation (5.1) explains that permanent consumption is proportional to permanent income. The proportionality ratio k is independent of the size of income, but depends on factors such as rate of interest, i, ratio of non-human wealth to permanent income, w, and other variables, u. Equations (5.2) and (5.3) simply state that measured income and consumption are composed of permanent and transitory components of the respective variables. The independence between the permanent and transitory components of income and consumption expressed in equation (5.4) follow from the consumer behaviour hypothesized and definitions of the variables proposed by Friedman. In most studies, equation (5.4) is replaced by less stringent conditions, and a small positive correlation between Y_t and C_t is accepted. Similarly, instead of a zero MPC out of transitory income, proposed by the 'strict' version of PIH, a positive MPC out of transitory income that is less than the MPC out of permanent income, is accepted as plausible.

The exercise of estimating Permanent Income Series and verification of the above relationships between transitory and permanent components of the variables is sensitive to the quality of data employed. The results to be discussed in the rest of this section ought to be treated with caution for the following reasons: (a) The present study uses the conventional definition of consumption, which includes expenditure on consumer durables while in PIH consumption is defined as expenditure on non-durable goods plus the rental value of durable goods. (b) Measured income as used by Friedman includes such items as captial gains and receipt of inheritances while the aggregate income data obtained from National Income Accounts do not include these components. This exclusion, according to Mayer "has an important implication for some empirical test of the PIH" [Mayer (1972), p.37] . (c) Mayer has pointed out a general weakness in time series regression; he says, "it is by no means clear that the lags produced by aggregate time series regressions

show how individual households react to income change" [Mayer (1972), p. 207).

Estimates of Permanent Income are obtained as weighted average of the past value of measured income, the weights declining 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 the coefficient of correlation. Friedman suggested the following formula for estimating permanent income:

$$Y_p(T) = \beta \int_{\alpha}^{T} e^{(\beta - \alpha)(t - T)} Y(t)\, dt \qquad (5.5)$$

where Y_p is permanent income, Y is measured income, T is the data for which estimate is constructed, t covers the whole range of earlier dates, and $1/\beta$ is the horizon. The trend factor is α. The rate of growth of per capita disposable income for Pakistan was calculated to be 1.03 per cent for the period 1949-1978. Friedman did not suggest the exact discrete analogue of equation (5.5). However I have used the following, suggested by Hal Varian [Mayer (1972), p. 362] :

$$Y_p(T) = \sum_{t}^{T} Y(t) \exp\left[-\beta (T-t)(1-\exp(-\beta))\right] \qquad (5.6)$$

By taking different values of β, alternate estimates of Y_p series were generated from the above equation. Each of the Y_p series corresponding to different values of β, constituted the basis for our estimation exercises.[11] The results of the regression (with and without the constant) for different values of β are presented in Table A (Appendix). Among the various indicators, standard error of the regression and sum of squared residuals are relatively more sensitive than multiple correlation coefficient, R^2, to the changing values of β. Based on these three indicators permanent income series with $\beta = 1.5$ was choosen. With $\beta = 1.5$, six years were lost (1949-55) in computing Y_p. As the consumption series was available only for 1960-79, the values of permanent income for corresponding years were picked for regression purposes. Detailed results of the regression for $\beta = 1.5$ are given in Table 5.1. The corresponding weights for $\beta = 1.5$ were 0.7770, 0.1733, 0.0387, 0.0086, 0.0020 and 0.0004 which sum to unity.

Based on these results the length of 'horizon' for Pakistan works out to be even less than a year, i.e., 8 months. Following Friedman's (1963) interpretation of horizon the above results imply a greater weightage to receipts in the near future than distant receipts, by the consumers in Pakistan. A

[11] The assumption here being that measured consumption on the average equals permanent consumption for any given value of measured income.

TABLE 5.1

Regression results with $\beta = 1.5$

1.	C =	2.63	+	0.9194Y	+	$0.0330DY_p$
		(16.07)		(0.0412)**		(0.0239)
	R^2 =	0.9949		SEE = 0.64		D.W = 1.89
2.	C =	$0.9261Y_p$	+	$0.0367DY_p$		
		(0.0038)**		(0.0068)**		
	R^2 =	0.9959		SEE = 4.51		D.W = 1.87

**Significant at 1 per cent level.

higher subjective discount rate may not be uncommon in developing countries where incomes are small and poverty "enhances the utility of immediate income more than that of future income" [Fisher (1970)]. It may be noted that such a short horizon blurs the distinction between permanent and current income. Thus "it makes little difference which hypothesis is true, nearly the same conclusions follow from both" [Holbrook (1967)].[12]

However, Koerts and Arahamse (1970) suggest that high R^2 cannot be relied upon to determine the appropriate planning horizon as given by the β value. In view of this criticism, the stability of the relationship between permanent and transitory incomes, was tested by including two more values of β in addition to the one dictated by the results of the previous subsection: value of $\beta = 0.4$, i.e., 2½ years horizon corresponding to estimate for United States, and value of $\beta = 1$, i.e., 1 year horizon corresponding to the behaviour of Indian economy (1929-1960) as estimated by Laumas and Laumas (1976).

Results in Table 5.2 indicate that the relationship among the components of income is fairly sensitive to the choice of the length of horizon as determined by the reciprocal of the β value. Positive correlation between the permanent and transitory elements of income leads us to replace the strict version of PIH with a looser version for Pakistan.

Michael Darby (1974) has shown that if consumption expenditures include durables (as the variable in this study does) rather than the use-

[12] Hall (1978) by suggesting some simple tests to distinguish between PIH/LCH and other theories has extended the scope for further research on this topic.

TABLE 5.2

Descriptive statistics

β	0.4	1.0	1.5
Mean transitory income as a % of mean permanent income	5.78	1.54	0.73
Correlation between permanent and transitory income	0.7556	0.5876	0.4917

value of durables, then MPC estimates from the regressions presented in Table 5.1 may be biased. It is equally possible that some of the expenditure in the consumption total may have been out of the transitory income to build up an inventory of consumer assets. The appropriate specification suggested is then:

$$C_t = \beta_1 + \beta_2 Y_{pt} + \beta_3 Y_{tt} + \mu_t \qquad (5.7)$$

The above equation has also been estimated for the three values and the results are summarized in Table 5.3.

The results are sensitive to the β value chosen. The estimates of MPC to consume out of permanent income are in agreement with the APC estimates obtained from measured income equations estimated in section IV. The

TABLE 5.3

Marginal propensities to consume permanent and transitory incomes

β	Y_p	Y_T	R^2	SEE	D.W.
0.4	0.8782	0.6848	0.9946	5.42	1.73
1.0	0.9114	0.2075[a]	0.9953	5.06	1.78
1.5	0.9290	−0.4746[b]	0.9958	4.77	1.81

*Source Table-B (Appendix).

[a] The attached t-value is 0.54.

[b] The attached t-value is −0.80.

SEE Std. error of estimate.

behaviour of transitory income variable however is a puzzle. For series derived from $\beta = 1.5$, a very low t-statistic renders the attached negative sign with transitory income meaningless. Do the above results then indicate that for Pakistan, Friedman's hypothesis is valid i.e., transitory income has no impact on consumption behaviour? A conclusion of this nature would rest on the correctness of the estimation procedure. (a) With a high β value and resulting length of horizon in terms of months, hypothesis testing based on yearly figures may only yield a distorted view of the relationships among the variables in question. Estimates based on quarterly data would have been more reliable. (b) Darby (1974) has shown "that the relationship between changes in inventories and transitory income is such, that β_2 is a function of other variables and is not strictly a constant." Estimation techniques taking this additional information into account may help to clarify the results. In support of the above result is a strong possibility that consumption expenditure as measured in National Accounts are dominated by expenditure on non-durable goods. A similar result was obtained by Smith (1962) for U.S. while using the above as the dependent variable.

VI. Summary and Conclusions

The present study provides a macro view of the consumption behaviour in Pakistan in the last two decades. It concentrates on examining the different facets of income-consumption relationship as postulated by theories present in the literature: Absolute Income Hypothesis (AIH), Relative Income Hypothesis (RIH) of Duesenberry and Permanent Income Hypothesis (PIH) of Friedman. Consumption series employed in the study cover a period from 1959-60 to 1978-79, while disposable income series extend from 1949-50 to 1978-79. The period prior to 1969-70 includes figures on East Pakistan as well. Some important findings are summarized below:

1. Multivariate analysis to verify the phenomena of short-run irreversibility of consumption behaviour fell short of furnishing conclusive results.
2. The short-run MPC estimates obtained from fitting behavioural functions ranged from 0.59 to 0.79, with estimates from four of the functions falling in the range, 0.67 to 0.68. The long-run estimates were more consistent, with values ranging from 0.92 to 0.93. This range of values for consumption propensities gives flexibility to the policy maker in choosing a preferred estimate based on his perception of consumer behaviour in this country. However, their high magnitude leads one to reconsider the investment targets dependent on supply of domestic savings.
3. If aggregate consumption functions are assumed to be any guide to the consumption behaviour, there is a strong evidence from this study that

the consumption behaviour of the past twenty years has been more responsive to changing income than to stable consumption habits. Furthermore, the results on AIH and PIH for Pakistan weaken a frequently cited assertion popular in developing countries that low saving ratios are a consequence of low income levels.

4. Permanent income series was constructed by applying Friedman-Cagan technique. The results (subject to qualifications) point towards a short horizon for Pakistan, i.e., only 8 months compared to one year obtained for India. In other words if an increase in income persists for 8 months, individuals come to regard them as permanent. Marginal propensity to consume out of permanent income is higher than that out of measured income. A positive correlation between permanent and transitory income is observed for Pakistan.

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APPENDIX

TABLE A

Results of Friedman-Cagan regression technique

	WITH CONSTANT				WITHOUT CONSTANT		
β	MPC	R^2	SSR	SER	MPC	SSR	SER
0.3	0.8883	0.98484	1024.86	8.00	1.0149	1222.22	8.479
0.4	0.8899	0.98736	854.75	7.31	0.9857	973.75	7.570
0.5	0.8995	0.98942	715.65	6.69	0.9681	777.17	6.760
0.6	0.9086	0.99101	607.55	6.16	0.9568	636.79	6.120
0.7	0.9166	0.99221	526.55	5.73	0.9488	539.54	5.630
0.8	0.9220	0.99309	467.09	5.40	0.9431	472.64	5.270
0.9	0.9252	0.99372	424.41	5.15	0.9387	426.72	5.010
1.0	0.9263	0.99417	394.29	4.96	0.9353	395.29	4.820
1.1	0.9263	0.99447	373.64	4.83	0.9327	374.15	4.690
1.2	0.9254	0.99468	359.88	4.74	0.9306	360.22	4.600
1.3	0.9237	0.99481	351.21	4.68	0.9288	351.54	4.540
1.4	0.9218	0.99487	346.89	4.66	0.9274	347.29	4.520

1.5*	0.9194	0.99489	345.27	4.65	0.9261	345.86	4.510
1.6	0.9170	0.99488	346.36	4.65	0.9251	347.21	4.520
1.7	0.9150	0.99486	347.58	4.61	0.9243	348.76	4.530
1.8	0.9120	0.99481	350.61	4.68	0.9235	352.24	4.550
1.9	0.9100	0.99476	354.32	4.70	0.9229	356.46	4.580
2.0	0.9080	0.99467	358.53	4.73	0.9223	361.27	4.610
2.1	0.9070	0.99467	360.54	4.75	0.9221	363.32	4.620
2.2	0.9040	0.99456	367.79	4.79	0.9215	371.82	4.670
2.3	0.9020	0.99447	373.45	4.83	0.9212	378.49	4.720
2.4	0.9010	0.99442	377.04	4.85	0.9207	382.51	4.740
2.5	0.8990	0.99436	381.22	4.88	0.9205	387.47	4.770
2.6	0.8980	0.99429	385.81	4.91	0.9202	392.71	4.810
2.7	0.8960	0.99423	389.94	4.94	0.9200	397.54	4.830
2.8	0.8950	0.99417	393.90	4.96	0.9198	402.17	4.860
2.9	0.8940	0.99412	397.53	4.98	0.9197	406.43	4.890
3.0	0.8930	0.99407	401.03	5.01	0.9196	410.56	4.910

SSR, Sum of Squared Residuals.
SER, Standard error of the regression.

TABLE B

Regression results: $C_t = K_1 + K_2 Y_{Pt} + K_3 Y_{Tt} + K_4 DY_{Pt} + K_5 DY_{Tt}$

1. $\beta = 0.4$	C =	21.07	+	$0.8782Y_P$	+	$0.6848Y_T$	−	$0.0167DY_P$	+	$0.5415DY_T$
		(20.34)		(0.0510)**		(0.2178)**		(0.0507)		(0.7248)
	R^2 = 0.9946		SEE = 5.42		DW = 1.73					
2. $\beta = 1.0$	C =	7.76	+	$0.9114Y_P$	+	$0.2074Y_T$	+	$0.0128DY_P$	+	$0.9261DY_T$
		(17.93)		(0.0478)**		(0.3841)		(0.0310)		(1.1297)
	R^2 = 0.9953		SEE = 5.06		DW = 1.78					
3. $\beta = 1.5$	C =	0.4622	+	$0.9290Y_P$	−	$0.4746Y_T$	+	$0.0256DY_P$	+	$1.5633DY_T$
		(17.43)		(0.0464)**		(0.5899)		(0.0277)		(1.6449)
	R^2 = 0.9958		SSE = 4.77		DW = 1.81					

C_t = Consumption.
Y^P = Permanent Income.
Y_T = Transitory Income.
DY_P = Dummy X Permanent Income.
DY_T = Dummy X Transitory Income.

** Significant at 5 per cent level.
* Significant at 10 per cent level.
Std. errors in brackets.

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