NOTES AND MEMORANDA

INCOME, CONSUMPTION AND SAVING IN URBAN AND RURAL INDIA: A NOTE

BY K. L. GUPTA

University of Alberta

In a recent issue of the *Review of Income and Wealth*[1], Uma Datta Roy Choudhury presented some results on consumption and saving functions in India. While the study is interesting, some of the results are quite peculiar. Thus she reports a marginal propensity to save of 0.88 for the urban sector, an abnormally high figure. Other available evidence points to a much lower figure. Again she reports a negative marginal propensity to consume out of permanent income for urban households. This makes no economic sense. Furthermore her attempts at explaining urban consumption behaviour are not very successful. In this paper, we shall show that these suspicious results are the consequences of the measurement and definitions of the variables, and the specification of the functions. Once these shortcomings are removed, we obtain more satisfactory and more plausible results.

In the first section we present a critique of Mrs. Roy Choudhury's article. In the second section we present our results. The last section summarizes the conclusions.

I. A CRITIQUE OF MRS. ROY CHOUDHURY'S PAPER

Data

(a) Mrs. Roy Choudhury's income series are based on Rao's estimates for only two years, 1950–1951 and 1960–1961. It is not clear how total income was divided between the two sectors for the intervening years. A somewhat better method has in my view been suggested by the Reserve Bank of India[2]. Thus the income of the rural household sector is estimated on the basis of the estimate of agricultural income given in the C.S.O.'s National Income Estimates. Income from agriculture, animal husbandry and ancillary activities is taken to represent the personal income of the rural household sector. From this, land revenue and agricultural income tax are deducted to obtain personal disposable income of this group. The urban sector income is then estimated by deducting rural household disposable income from personal disposable income.

(b) I find Mrs. Choudhury's procedure for deflating the saving series highly questionable. Thus she leaves savings in the form of financial assets undeflated because security prices have remained relatively unchanged. This procedure would have been legitimate only if the savings in the form of financial assets had consisted largely of securities. But this was not so. Savings in the form of corporate and cooperative shares and securities contributed only 13 per cent of total financial assets.

Her procedure becomes more ambiguous when we come to the estimation of real urban and rural savings. The data on urban and rural savings is available in aggregate and is not broken down into physical and financial assets. This means that either we deflate urban and rural savings or leave them undeflated. Now if Mrs. Roy Choudhury left them undeflated then her variables are not in real terms; or if she deflated them, then to be consistent she should have deflated total savings by the same deflator. It is not clear what procedure she really followed.

(c) Mrs. Roy Choudhury estimates wealth for the household sector as a whole and uses it as an independent variable in the urban household consumption function. I find this inappropriate.

Specification Problems

I also find the specification of relationships in Mrs. Roy Choudhury's study open for criticism. To take a few examples:

(a) The effect of prices is examined by using the variables in current prices. A better procedure would have been to include the rate of change of prices as a separate variable.

(b) Wealth is included in the permanent income version only at constant prices and not in the distributed lag model. Again while measuring the effect of prices, wealth is only included in the distributed lag model at current prices. A more satisfactory way would have been to include wealth in both versions and also to include prices as a separate variable. Thus the following models could have been specified:

(1) $$C_t = f\left(Y_P,\ Y_T,\ \frac{\Delta P}{P},\ W_{-1}\right)$$

(2) $$C_t = f\left(Y,\ C_{-1},\ \frac{\Delta P}{P},\ W_{-1}\right)$$

where

C: consumption
Y_P: permanent income
Y_T: transitory income
$(\Delta P/P)$: rate of change of prices
W: wealth

(3) Mrs. Roy Choudhury confines herself to a single measure of permanent income. Since any measure of permanent income is arbitrary, alternative definitions should have been used. Similarly, some experiments should have been made with the use of permanent prices as an independent variable.

In view of the above comments, we present some new estimates using models (1) and (2). The following alternate definitions of permanent and transitory income, and the price variable were tried:

(a) Two year moving average of real per capita income. This definition, as shown by Mrs. Roy Choudhury, is equivalent to using the current and lagged values of the income variable.

(b) Three year moving average of real *per capita* income denoted by Y_{P_1}.

(c) The estimated value of Y from $\log Y = a + b \log t$ where Y is real per capita income. This measure of permanent income is denoted by Y_{P_2}.

(d) Three year moving average calculated as $\bar{Y}/\bar{P}$ where $\bar{Y}$ is the three year moving average of per capita nominal income and $\bar{P}$ is the three year moving average of actual prices. This measure of permanent income, in which the deflator is permanent prices, is denoted by Y_{P_3}.

(e) The last measure of permanent income, denoted by Y_{P_4} is calculated as the ratio of Y_P/P_P where Y_P is the estimated value of nominal Y from $\log Y = a + bt$ and P_P is the estimated value of actual P from $\log P = a' + b' \log t$.

(f) The rate of change of price based on actual prices is denoted by $\Delta P_1/P_1$.

(g) The rate of change of price based on the two definitions of permanent prices above is denoted respectively as $\Delta P_2/P_2$ and $\Delta P_3/P_3$.

II. The Results

The results of the per capita saving function are presented in Table 1. The subscripts u and r define variables for the urban and the rural sectors respectively. It is possible to verify that the aggregate marginal propensity to save is a weighted average of the sectoral marginal propensities to save. This can be done as follows:

Let

(1) $$\bar{S}_i = S_i/Z_i$$

where

S_i = saving of ith sector

Z_i = population of ith sector

Define

$$S = \sum_i S_i \tag{2}$$

$$Z = \sum_i Z_i \tag{3}$$

and

$$\bar{S} = \frac{S}{Z}. \tag{4}$$

Then

$$\bar{S} = \frac{S}{Z} = \sum_i \frac{S_i}{Z_i} \cdot \frac{Z_i}{Z} = \sum_i \frac{Z_i}{Z} \cdot \frac{S_i}{Z_i} = \sum_i \frac{Z_i}{Z} \bar{S}_i. \tag{5}$$

Let the micro sectoral saving function be

$$\bar{S}_i = a_i + b_i \bar{Y}_i \tag{6}$$

and

$$\bar{Y}_i = c_i + d_i \bar{Y} \tag{7}$$

where

$\bar{Y}_i$ = per capita income of ith sector

$\bar{Y}$ = per capita income of the whole economy

Then

$$\begin{aligned} \bar{S} &= \sum_i \frac{Z_i}{Z} [a_i + b_i c_i + b_i d_i \bar{Y}] \\ &= \sum_i \lambda_i (a_i + b_i c_i) + \bar{Y} \sum_i \lambda_i b_i d_i \end{aligned} \tag{8}$$

where

$$\lambda_i = Z_i / Z$$

λi is approximately defined by $\bar{Z}_i / \bar{Z}$ where $\bar{Z}_i$ and $\bar{Z}$ are the time averages of Z_i and Z. The aggregate marginal propensity to save is given by $\Sigma_i \lambda_i b_i d_i$. By substituting the values of the parameters, it turns out to be 0.25. This is fairly close to the actual marginal propensity to save of 0.30. The discrepancy could be due to the linear relationships assumed in equation (7).

A comparison of my results with those of Mrs. Roy Choudhury is revealing. Looking at Table 2, the following results appear.

(a) The urban marginal propensity to save is much lower than reported by her. My estimate appears to be more reasonable also.

(b) The marginal propensity to save of the rural sector, while still quite low, is three times higher than that reported by her:

(c) The overall marginal propensity to save is also substantially higher.

These differences are very likely due to the measurement errors in her data which were pointed out in section I.

TABLE 1

PER CAPITA SAVING FUNCTIONS

Equation No.	Dependent Variable	Intercept	Y	Y_u	Y_r	$\bar{R}^2$	d
(1)	S	−64.4065	0.30133			0.654	1.33
		(15.0388)	(0.0556)				
(2)	S_u	−238.0129		0.38709		0.487	1.2
		(85.8204)		(0.1104)			
(3)	S_r	0.73432			0.03035	0.905	0.81
		(0.43778)			(0.00283)		

LEGEND: d = Durbin–Watson statistic.

TABLE 2

MARGINAL AND AVERAGE PROPENSITIES TO SAVE

	APS		MPS	
	Gupta	Choudhury	Gupta	Choudhury
Rural	0.0351	0.0206	0.0304	0.0096
Urban	0.0813	0.1752	0.3871	0.8840
Overall	0.0628	0.0561	0.3013	0.2259

I now present results on the consumption functions. I shall consider these results for one sector at a time and discuss them.

Overall Per Capita Consumption

The results are given in Tables (3) and (4). From these tables we can note the following points.

TABLE 3

PER CAPITA TOTAL HOUSEHOLD CONSUMPTION

Equation No.	Intercept	Y	C_{-1}	$(\Delta P/P)$	W_{-1}	Y_{-1}	$\bar{R}^2$	d
(1)	77.3405	0.7088	−0.0622				0.88	1.05
	(21.554)	(0.1019)	(0.1300)					
(2)	70.3289	0.81684				−0.14170	0.92	1.17
	(14.529)	(0.1004)				(0.0969)		
(3)	75.4226	0.72006	−0.0664	−0.0349			0.87	1.02
	(25.1311)	(0.1249)	(0.1377)	(0.2042)				
(4)	68.7014	0.82072		−0.0375		−0.13917	0.914	1.14
	(16.6756)	(0.1057)		(0.1636)		(0.10131)		
(5)	29.6219	0.88216	0.0081		−0.0773		0.908	0.98
	(28.5761)	(0.1182)	(0.1174)		(0.0350)			
(6)	33.7120	0.89229			−0.07196	−0.02223	0.908	1.0
	(28.3674)	(0.1157)			(0.0412)	((0.11362)		
(7)	28.1744	0.86355	0.0495	0.19764	−0.097251		0.908	1.13
	(28.5795)	(0.11958)	(0.1242)	(0.1957)	(0.0401)			
(8)	34.1117	0.88192			−0.09138	−0.09138	0.906	1.12
	(28.605)	(0.1173)			(0.0468)	(0.0468)		

TABLE 4

TOTAL HOUSEHOLD PER CAPITA CONSUMPTION
ESTIMATES BASED ON ALTERNATE DEFINITIONS OF PERMANENT INCOME

Equation No.	Intercept	Y_{P1}	Y_{T1}	Y_{P2}	Y_{T2}	Y_{P3}	Y_{T3}	Y_{P4}	Y_{T4}	$(\Delta P_2/P_2)$	W_{-1}	$\bar{R}^2$	d
(1)	75.3749	0.65425	1.0047									0.934	1.12
	(13.5549)	(0.0506)	(0.1439)										
(2)	71.0446			0.6737	0.7872							0.911	1.07
	(16.2507)			(0.0601)	(0.1330)								
(3)	74.6087					0.6571	1.0085					0.934	1.11
	(13.5051)					(0.0504)	(0.1468)						
(4)	71.0453							0.6737	0.7872			0.911	1.07
	(16.251)							(0.0601)	(0.1330)				
(5)	108.3016					0.5271	0.9889			66.6179		0.966	1.6
	(11.8301)					(0.0445)	(0.0972)			(14.810)			
(6)	72.5171					0.7092	0.9397			67.2361	−0.0590	0.971	1.64
	(22.696)					(0.1094)	(0.0927)			(13.578)	(0.0329)		

(a) The permanent income hypothesis is highly relevant. On all the definitions of the permanent income adopted in this paper, the hypothesis explains about 92 per cent of the variation in total per capita consumption. The estimates of the marginal propensity to consume out of the two types of incomes are stable from one definition to the other. This means that there is nothing to choose between the various definitions.

(b) The marginal propensity to consume out of transitory income is greater than that out of permanent income.

(c) The complete model (1) explains about 97 per cent of the variation in the total per capita consumption expenditure. The complete model specified in terms of the permanent income framework performs better than the distributed lag model.

(d) The rate of change of prices is an important determinant of personal consumption expenditure. The relevant price variable is the permanent price rather than the actual price. Its coefficient is stable from one equation to the other—see equations (5) and (6) of Table 4.

(e) While wealth is not as significant a variable as income and prices, its coefficient is still greater than its standard error and its inclusion improves the explanatory power of the model.

Urban Consumption

The results are presented in Tables 5 and 6. We may note the following points from these tables:

(a) The permanent income hypothesis is again very successful. It explains about 83 per cent of the variation in per capita urban consumption. The marginal propensity to consume out of permanent income is lower than that out of transitory income.

(b) The complete model in terms of permanent and transitory income, wealth and permanent prices explains about 94 per cent of the variation in urban consumption at the per capita level.

(c) Permanent prices and wealth are significant factors, although quantitatively the effect of permanent prices is greater than that of wealth.

TABLE 5

PER CAPITA URBAN CONSUMPTION

Equation No.	Intercept	Y	C_{-1}	$(\Delta P_1/P_1)$	W_{-1}	Y_{-1}	$\bar{R}^2$	
(1)	318.9102	0.65774	−0.1613				0.561	0.92
	(123.6927)	(0.1984)	(0.2273)					
(2)	286.9307	0.91474				−0.36789	0.828	0.96
	(68.814)	(0.1355)				(0.12821)		
(3)	298.1919	0.58059	− .0453	−1.7654			0.589	1.07
	(120.8386)	(0.2014)	(0.2383)	(1.3931)				
(4)	287.4011	1.01377		0.9279		−0.46983	0.814	0.83
	(71.4364)	(0.2339)		(1.7508)		(0.2339)		
(5)	293.0981	0.77911	−0.18376		−0.07868		0.758	1.41
	(92.2903)	(0.1532)	(0.1690)		(0.0273)			
(6)	272.6226	0.83984			−0.05304	−0.22672	0.788	1.3
	(79.5426)	(0.15273)			(0.0298)	(0.1444)		
(7)	295.1729	0.80122	−0.2065	0.3236	−0.08392		0.725	1.42
	(98.7797)	(0.1921)	(0.2078)	(1.474)	(0.0376)			
(8)	271.4009	1.03365		1.9723	−0.06393	−0.41398	0.80	1.22
	(77.2433)	(0.21747)		(1.618)	(0.0303)	(0.2080)		

TABLE 6

PER CAPITA URBAN CONSUMPTION
ESTIMATES BASED ON ALTERNATE DEFINITIONS OF PERMANENT INCOME

Equation No.	Intercept	Y_{P1}	Y_{T1}	Y_{P2}	Y_{T2}	Y_{P3}	Y_{T3}	$(\Delta P_2/P_2)$	W_{-1}	$\bar{R}^2$	d
(1)	303.6753	0.5248	0.9991							0.812	1.12
	(74.137)	(0.0956)	(0.1739)								
(2)	459.2725			0.3273	0.7373					0.729	1.57
	(122.3825)			(0.1576)	(0.1089)						
(3)	303.9561					0.5242	0.9878			0.81	1.13
	(74.6939					(0.0964)	(0.1723)				
(4)	286.1825					0.5403	1.2451	416.7024		0.787	0.91
	(83.1202)					(0.1050)	(0.2284)	(208.7634)			
(5)	186.3196					0.7464	1.1824	610.555	−0.0902	0.94	2.88
	(48.936)					(0.0711)	(0.1215)	(118.038)	(0.0194)		

TABLE 7

PER CAPITA RURAL CONSUMPTION

Equation No.	Intercept	Y	C_{-1}	$(\Delta P/P)$	W_{-1}	Y_{-1}	R^2	d
(1)	−1.30981	0.96757	0.00604				0.99999	1.08
	(0.4845)	(0.00278)	(0.00294)					
(2)	−1.2544	0.96748				0.00558	0.99999	1.03
	(0.4593)	(0.00269)				(0.002696)		
(3)	−1.1992	0.96553	0.00739	0.00674			0.99992	1.096
	(0.5027)	(0.00351)	(0.00324)	(0.0069)				
(4)	−1.1805	0.96543		0.00701		0.00711	0.99992	1.09
	(0.4625)	(0.00325)		(0.00624)		(0.00301)		
(5)	−1.29813	0.96777	0.00609		−.00045		0.99991	1.112
	(0.5235)	(0.0032)	(0.00312)		(.0027)			
(6)	−1.2969	0.96778			−.0045	.00586	0.99991	1.11
	(0.5232)	(0.0032)			(.0027)	(.0030)		
(7)	−1.08186	0.96556	0.00834	.01009	−.0024		0.99991	1.31
	(0.5479)	(0.0037)	(0.00361)	(.00848)	(.0032)			
(8)	−1.0824	0.96557		0.010093	−.00243	0.00804	0.99991	1.3
	(0.5470)	(0.00366)		(0.0085)	(.0032)	(0.0035)		

TABLE 8

PER CAPITA RURAL CONSUMPTION
ESTIMATES BASED ON ALTERNATE DEFINITIONS OF PERMANENT INCOME

Equation No.	Intercept	Y_{P1}	Y_{T1}	Y_{P2}	Y_{T2}	Y_{P3}	Y_{T3}	Y_{P4}	Y_{T4}	$\Delta P_1/P_1$	W_{-1}	R^{-2}	d
(1)	−.1555	0.9751	0.9613									0.99994	1.22
	(0.4488)	(0.0029)	(0.0037)										
(2)	−1.3076			0.9734	0.9672							0.9999	0.64
	(0.7497)			(0.0049)	(0.0038)								
(3)	−1.5682					0.9752	0.9614					0.99993	1.19
	(0.4689)					(0.0031)	(0.0038)						
(4)	7.3116							0.9160	0.9674			0.99989	0.65
	(9.1106)							(0.0608)	(0.0038)				
(5)	−1.5053	0.9747	0.9580							0.0071		0.99994	1.42
	(0.4343)	(0.0028)	(0.0043)							(0.0052)			
(6)	−1.4663	0.9773	0.9566							0.0118	−0.0039	0.99994	2.02
	(0.4724)	(0.0034)	(0.0046)							(0.0068)	(0.0027)		

Rural Consumption

The results are given in Tables 7 and 8. We can draw the following conclusions:

(a) The simple Keynesian function, the distributed lag function and the permanent income hypothesis all perform equally well.

(b) Prices and wealth exercise very little effect.

(c) The marginal propensity to consume out of permanent income is approximately equal to that out of transitory income.

Comparisons

On the basis of the above results, we can make certain comparisons with Mrs. Roy Choudhury's study:

(a) Contrary to her results, we found significant support for the effect of price changes and wealth on total and urban per capita consumption.

(b) We were able to explain a much higher proportion of the variation in the per capita consumption for all the sectors. Our results were particularly striking for the urban sector. Whereas she could explain only about 50 per cent of the variation we were able to explain about 94 per cent of the variation.

(c) Contrary to her finding of a negative, and hence meaningless, propensity to consume out of permanent income for the urban sector, we found a positive marginal propensity to consume equal to about 0.62.

(d) We found a much stronger support for the permanent income hypothesis than she did.

(e) As against her estimates of long-run and short-run urban marginal propensity to consume of 0.02, our figure is about 0.78. In view of our estimates for the marginal propensity to save, this appears to be a more reasonable estimate.

III. Conclusions

The main conclusion of our study is that the lack of sophisticated data is no excuse for using improper definitions of the variables and misspecified functions. Careful treatment of even crude data and adequate attention to the specification of the model can yield good results. This is what we found in our exercise.

References

[1] U. D. Roy Choudhury, "Income, Consumption and Saving in Urban and Rural India," *The Review of Income and Wealth*, Series 14, No. 1, March 1968, 37–56.

[2] *Reserve Bank of India Bulletin*, Sept. 1962.

[3] *Report on Currency and Finance*, 1965–1966, S11.