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INCOME TAXATION AND HOUSEHOLD SAVINGS : EVIDENCE FROM A DEVELOPING ECONOMY

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1. Introduction

A key tenet of the theory of public finance is that changes in rates of income tax affect private savings. To a large extent, this tenet forms the analytical basis of the stabilisation role of income taxation in most developed economies. While the way in which income tax rates affect private savings in developed economies has received substantial attention, empirical evidence on this issue for the developing economies is relatively scanty[1]. This constitutes a significant gap in the empirical basis of fiscal policy formulation in most developing economies, especially since most development economists regard the savings rate as an important indicator of the growth potential of a developing economy and income taxation as an important fiscal instrument to foster private savings (See Heller, 1967). It is against the backdrop of this general paucity of empirical evidence in developing economies that this paper analyses the effect of income taxation on the major component of private savings, namely, household savings in a key developing economy - India.

1/ For studies on developed economies refer to Boskin (1978), King (1980), Friend and Hasbrouck (1983) and Kotlikaff (1984). Whatever little evidence is available for developing economies is summarised in Mikesell and Zinser (1973).

In the public finance literature (See, for example, Musgrave, 1959; Shoup, 1969, and Atkinson and Stiglitz, 1980), the effect of income taxes on household savings is supposed to be transmitted through changes in (i) work effort, (ii) household disposable income and (iii) the rate of interest. This paper does not analyse the first of these effects. Its main focus is on the latter two effects of income taxation. Empirically, the consumption (or the savings) function is a convenient tool to analyse these effects. Accordingly, in Section 2 we specify a household consumption function for India and in Section 3 we present the relevant estimates. Using these estimates, in Section 4 we evaluate the impact and the long-run effects of a few hypothetical tax changes on household savings. In Section 5 we present the main conclusions. The sources and the problems of the data are discussed in the Annexure.

In the specification and the estimation of the consumption function, we focus on three aspects of the problem:

(i) the role of permanent income vis-a-vis absolute income in the consumption function,

(ii) the difference in the marginal propensity to consume between the agricultural and the non-agricultural sectors, and

(iii) the role of interest rate in household consumption.

Each one of these issues is important in analysing the effect of income taxes on household savings but has received insufficient attention in the Indian context.

The first issue is important in analysing the dynamic implications of income tax changes for the consumption-saving decisions of the households. The speed with which changes in income tax affect savings would depend upon whether the households base their consumption-saving decisions on permanent income or absolute income (See Friedman, 1978). Yet, very few time-series studies have tested the relevance of the permanent income hypothesis to the consumption-saving decisions of Indian households. Even among these few studies, most commit the major error of calculating permanent income as a moving average of two or three years' measured income (See Roychoudhury, 1968; Gupta 1970, and Rao, 1982)1/.

The study by Laumas and Laumas (1976), however, does not suffer from this deficiency since the measure of permanent income used by them is in line with the more standard concept suggested by Friedman (1957)2/. However, the period for which Laumas and Laumas tested the permanent income theory (i.e., 1929 to 1960) is by now around two decades old. Hence, their conclusion that

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1/ The errors involved in such an estimate of permanent income are highlighted by Laumas and Laumas (1972) and Mayer (1972).

2/ Bhalla (1980) has used an ingenious method of estimating permanent income from an 'earnings function' of the households. Such a method is, however, more appealing for a cross-section study than for estimating an aggregate time-series consumption function.

even a loose variant of the permanent income theory does not hold good in the Indian context needs a re-examination with data for the more recent years. This is done in the present paper. Interestingly enough, the results presented here differ significantly from those of Laumas and Laumas.

The issue relating to the difference in the marginal propensity to consume between the agricultural and the non-agricultural sectors gains importance in evaluating the effect on savings of any tax-transfer policy which alters the income terms of trade between these sectors. On this question, following Raj (1962), the general belief seems to be that the marginal propensity to consume is higher in the agricultural sector than in the non-agricultural sector, thereby implying that a tax-transfer policy which alters the income terms of trade in favour of the non-agricultural sector can lead to a permanent increase in the household savings rate. More recently, Krishnamurthy and Saibaba (1981) provide empirical evidence in support of such a belief. However, since Krishnamurthy and Saibaba investigate the issue within the confines of the absolute income theory, they do not distinguish between the short-run and the long-run marginal propensities to consume within the sectors. This paper examines the issue by using a more general framework which does not involve the prior restriction that the short-run and the long-run marginal propensities within a sector are the same. In such a framework, the Krishnamurthy-Saibaba result can be seen as a special case.

The role of the interest rate in the consumption/savings function is of crucial importance in assessing the intertemporal substitution effect of a change in the income tax on household savings. It is also important for the controversy on the relative superiority of an expenditure tax vis-a-vis the income tax (See Meade, 1978, and King, 1980). Yet there is hardly any empirical evidence on the interest elasticity of household savings in India. This paper offers some estimates of this elasticity.

2. Specification of the Model

The household consumption function that we specify is based on Darby's (1974) restatement of the permanent income theory of consumption and its later applications by other authors (Springer, 1975, and Carlino, 1982). Typically, such a consumption function is of the form[1/]:

$$(2.1) \quad C_t = a_0 + a_1 X_t^* + a_2 (X_t - X_t^*) + br_t$$

with

$$(2.2) \quad r_t = i_t (1 - M_t) - \pi_t^e$$

1/ We depart slighly from the Springer-Carlino formulation in that we introduce the rate of interest linearly whereas both Springer and Carlino make the ratio of consumption to permanent income a function of the rate of interest. We retain the linear specification mainly because it gave much better statistical results in the case of India.

where

C = consumer expenditure of the household sector,

X^* = permanent real disposable income of the household sector,

X = measured real disposable income of the household sector,

i = nominal pre-tax rate of interest on savings,

M = marginal income tax rate on interest income, and

Π^e = the expected inflation rate and the subscript t on a variable denotes time1/.

In the Indian context, equation (2.1) needs to be modified to take account of the propensity differentials between the agricultural and the non-agricultural sectors. The ideal way of taking into account the sectoral propensity differentials is to estimate the two sectoral consumption functions separately. This, however, cannot be done in the Indian context since the break-up of the household consumption or savings into its agricultural and non-agricultural components is not available. Alternatively, the sectoral propensity differentials can be taken into account by introducing the sectoral household incomes, rather than the aggregate household income, as arguments in the aggregate consumption function:

$$(2.3) \quad C_t = d_o + d_1 XA^*_t + d_2 (XA_t - XA^*_t) + d_3 XNA^*_t + d_4 (XNA_t - XNA^*_t) + br_t$$

1/ This convention applies for the rest of the paper.

where

> XA and XNA denote the real disposable incomes of the agricultural and the non-agricultural sectors, respectively, and the asterisks on XA and XNA denote that these are the permanent values.

Equation (2.3) can be derived by adding up two sectoral linear consumption functions - one for the agricultural sector and the other for the non-agricultural sector. The only restrictive assumption required for such a derivation is that the rate of interest on savings applicable to the two sectors is the same. Due to the absence of time-series data on any rural interest rates in India, such an assumption, though restrictive, seems almost unavoidable for empirical work.

The sectoral permanent incomes, XA^* and XNA^* and the expected inflation rate, π^e_t are not observable. Hence for the empirical implementation of equation (2.3), we need to approximate them in some fashion. Following Darby (1972), the permanent disposable income of the i^{th} sector, X^*_{it} can be specified in terms of the adaptive expectations framework:

$$(2.4) \quad X^*_{it} = \lambda_i X_{it} + (1-\lambda_i)(1+g_i) X^*_{it-1} \qquad 0 < \lambda_i \leq 1$$

where

> g_i is the compound rate of growth of the real disposable income of the i^{th} sector, computed from the regression of log X_{it} on a time trend variable

To estimate the coefficients of adjustment, λ_is we use the familiar grid-search method which boils down to estimating various series of X^*_{it} based on alternative values of λ_is (ranging from zero to one) and substituting these values of $X^*_{i\lambda t}$s in equation (2.3) and choosing those values of λ_is which give the minimum residual sum of squares for the consumption function of equation (2.3). The base year value of X^*_{it} for estimating the time series of X^*_{it} is given by the exponential of the constant term in the regression of log X_{it} on the time trend. Since we have two sectoral incomes, we have two values of λ_is to be estimated - one for the agricultural sector and the other for the non-agricultural sector.

The expected inflation rate, π^e_t is estimated by using the adaptive expectations model:

$$(2.5)\quad \pi^e_t = \beta\pi_{t-1} + (1-\beta)\pi^e_{t-1} \qquad 0 < \beta \leq 1$$

The procedure used to estimate β is the same as the one used to estimate λ_is.

For completeness, given an estimate of equation (2.3), household savings in real terms, S_t is simply given by the definitional relation:

$$(2.6) \quad S_t = (X_t - C_t)$$

The crucial parameters for analysing the effect of income taxation on household savings are the adjustment coefficients (λ_is), the marginal consumption propensities (d_1 through d_4) and the interest sensitivity of consumption (b). Whereas the adjustment coefficients determine the time-path of the effect of income tax changes on household savings through the disposable income channel, the marginal propensities determine the magnitude of this effect. If the λ_is are close to unity, the full effect of income tax changes on household savings would be felt instantaneously, whereas low values of λ_is would mean that this effect is distributed over a long time.

3. Estimates of the Model

We estimated the consumption function both in its aggregative version (equation (2.1)) and in its sectoral version (equation (2.3)) for alternative values of λ_is and β for the period 1950-51 to 1978-79[1/]. At the very outset, two points about these estimated equations are worth mentioning:

1/ The sources of the data and the construction of the variables used for the estimation are discussed in the Annexure.

(i) In general, the expected inflation rate (computed for values of β ranging from 0.1 to 1 with an interval of 0.1) when introduced both through the interest rate and independent of it turned out to be an unimportant argument in the consumption function.

(ii) Of the two interest rates that we tried in the estimation of the consumption function - the weighted time deposit rate and the rate of return on capital in the corporate sector - the coefficient of the former turned out to be statistically insignificant.

As a result, we dropped the time deposit rate as well as the expected inflation rate from the consumption function. The estimates of the consumption function presented here thus have the post-tax nominal rate of return on capital in the corporate sector, R_t as the interest rate variable.

When the aggregative version of the consumption function was estimated for alternative values of λ ranging between 0.1 and 1 with an interval of 0.1, a λ value of 0.1 minimised the residual sum of squares. Thus the preferred equation for the aggregative version is[1/]:

1/ In what follows, the figures below the coefficients of the variables represent their respective t-values, DW and SEE stand for the Durbin-Watson statistic and the Standard Error of the Estimate respectively.

$$(3.1)\quad C_t = 4484.5 + \underset{(22.87)}{0.7264}\, X_t^* + \underset{(3.37)}{0.3581}\,(X_t - X_t^*)$$

$$- \underset{(1.00)}{78.99}\, R_t$$

$$\bar{R}^2 = 0.993;\quad DW = 1.00;\quad SEE = 580.93\quad \alpha = 0.1.$$

Two aspects of equation (3.1) deserve special mention:

(i) It supports the permanent income theory in general and the Darby reformulation of it in particular. The coefficients of both permanent and transitory incomes are statistically significant; yet the coefficient of permanent income is more than twice that of transitory income. This is in contrast to the results obtained by Laumas and Laumas (1976) for the period 1929 to 1960. The small coefficient of transitory income coupled with a fairly low value of α implies that the effect of income taxes on savings (through the disposable income channel) is not instantaneous but distributed over a number of years.

(ii) The coefficient of the post-tax rate of interest is negative but not statistically significant. This provides somewhat inconclusive evidence on the intertemporal substitution effect of income taxation on household savings.

An important limitation of equation (3.1) is the low value of the Durbin-Watson statistic indicating positive autocorrelation of the residuals. It is possible that this is due to the mis-specification arising out of the neglect of the differences in the sectoral propensities to consume. Allowance for the marginal propensities to differ between the agricultural and the non-agricultural sectors may reduce the problem of autocorrelation. Accordingly, we estimated the sectoral version of the consumption function for alternative values of λ with interval of 0.1 between the successive λ values. The equation that minimised the residual sum of squares has λ values of 0.9 for agricultural income and 0.1 for non-agricultural income.

$$(3.2) \quad C_t = 4248.31 + \underset{(6.01)}{0.8957}\, XA_t^* - \underset{(0.59)}{0.6414}\,(XA_t - XA_t^*) + \underset{(5.91)}{0.6625}\, XNA_t^* + \underset{(3.50)}{0.3787}\,(XNA_t - XNA_t^*) - \underset{(2.43)}{152.66}\, R_t$$

$$\bar{R}^2 = 0.998; \; DW = 1.66; \; SEE = 428.89$$

$$\lambda = 0.9 \text{ for } XA_t^* \text{ and } 0.1 \text{ for } XNA_t^*$$

The significant improvement in the Durbin-Watson statistic from equation (3.1) to (3.2) indicates that the sectoral version of the consumption function is perhaps better than the aggregative version. Furthermore, equation (3.2) suggests that:

(i) The permanent income theory is more applicable to the non-agricultural sector than to the agricultural sector.

(ii) The marginal propensity to consume between the agricultural and the non-agricultural sectors differs in the short run as well as in the long run; however, this difference is much less in the long run than in the short run.

(iii) The post-tax nominal rate of interest has a significant negative effect on consumption, indicating that a reduction in the tax on interest income would lead to an increase in real household savings. The interest elasticity of household savings computed at the sample means of the variables works out to be 0.88. It is much larger than the interest elasticity of savings for the United States estimated by Boskin (1978).

Since the coefficient of transitory income of the agricultural sector has an insignificant coefficient in equation (3.2) we re-estimated it by dropping this variable. The result is:

$$(3.3)\quad C_t = 4283.94 + \underset{(7.38)}{0.8401}\, XA_t^* + \underset{(7.57)}{0.6990}\, XNA_t^* + \underset{(3.65)}{0.3509}\,(XNA_t - XNA_t^*) - \underset{(2.40)}{140.94}\, R_t$$

$$\bar{R}^2 = 0.996; \; DW = 1.68; \; SEE = 423.01$$

$$\lambda = 0.9 \text{ for } XA_t^* \text{ and } 0.1 \text{ for } XNA_t^*$$

Except for minor differences, the basic message of equations (3.2) and (3.3) is the same: the sharp contrast in the λ values between the agricultural and the non-agricultural sectors. The value of λ for the non-agricultural sector is 0.1 whereas for the agricultural sector it is as high as 0.9. At such a high value of λ for the agricultural sector, there is very little difference between permanent income and absolute income; consequently, without much loss of generality one can substitute absolute income for permanent income for the agricultural sector. Accordingly, we estimated a version of the consumption function with absolute income for the agricultural sector and permanent income for the non-agricultural sector. Once again, a λ value of 0.1 for the non-agricultural sector minimised the residual sum of squares. The relevant equation is:

$$(3.4) \quad C_t = 4348.62 + \underset{(7.08)}{0.7597}\, XA_t + \underset{(8.44)}{0.7526}\, XNA_t^* + \underset{(3.25)}{0.3093}\, (XNA_t - XNA_t^*) - \underset{(2.10)}{125.87}\, R_t$$

$$\bar{R}^2 = 0.996; \; DW = 1.71; \; SEE = 434.84$$

$$\lambda = 0.1 \text{ for } XNA_t^*$$

An important feature of equation (3.4) is the equivalence of the long-run marginal propensity to consume (hence the long-run marginal propensity to save too) between the agricultural and the non-agricultural sectors - the coefficients of XA_t and XNA_t^* are very close to each other. This is in sharp contrast to the results obtained by Krishnamurthy and Saibaba (1981) who reported substanti l propensity differentials between the sectors both in the short run and the long run.

An inevitable conclusion that follows from the above results is that whereas the non-agricultural households seem to base their consumption-savings decisions on their permanent income, the agricultural households seem to base it largely on their absolute income. The greater relavance of the permanent income theory to the non-agricultural sector can probably be explained in terms of the better capital market in the non-agricultural sector than in the agricultural sector. A better capital market allows economic agents to finance present consumption out of past as well as expected future incomes, which is what the basic message of the permanent income theory is. In a sense, therefore, the behaviour of the non-agricultural households of the Indian economy in respect of the consumption-saving decisions may perhaps be quite similar to that of the households in the developed economies. What is more important in this context is that our estimate of λ for the non-agricultural sector at 0.1 is very close to the ones obtained for the United States by Darby (1974) and Seater (1982).

To have a firmer estimate of λ for the non-agricultural sector, we conducted a finer grid search for λ values between 0.01 and 0.3 with an interval of 0.01 between successive values of λ. Once again, we found that a λ value of 0.1 minimised the residual sum of squares although λ values of 0.08, 0.09 and 0.11 also gave near-identical residual sum of squares. We also conducted F-tests on these regressions to determine the upper limit of λ. The test showed that the value can be anywhere upto 0.24 and 0.3 at the 10 per cent and the 5 per cent levels of significance, respectively. We report a few of these regressions below:

$$(3.5) \quad C_t = 4224.51 + \underset{(7.80)}{0.7939}\, XA_t + \underset{(8.44)}{0.7298}\, XNA_t^* + \underset{(2.70)}{0.2929}\, (XNA_t - XNA_t^*) - \underset{(2.05)}{125.03}\, R_t$$

$$\bar{R}^2 = 0.996; \; DW = 1.73; \; SEE = 441.57$$

$$\lambda = 0.15 \text{ for } XNA_t^*$$

$$(3.6) \quad C_t = 4122.05 + \underset{(8.64)}{0.8354}\, XA_t + \underset{(8.41)}{0.6956}\, XNA_t^* + \underset{(2.38)}{0.2935}\, (XNA_t - XNA_t^*) - \underset{(1.94)}{121.46}\, R_t$$

$$\bar{R}^2 = 0.996; \; DW = 1.73; \; SEE = 452.39$$

$$\lambda = 0.2 \text{ for } XNA_t^*$$

$$(3.7)\quad C_t = \underset{}{4061.30} + \underset{(9.31)}{0.8661}\ XA_t + \underset{(8.41)}{0.6679}\ XNA_t^*$$

$$+ \underset{(2.23)}{0.3028}\ (XNA_t - XNA_t^*) - \underset{(1.85)}{117.71}\ R_t$$

$$\bar{R}^2 = 0.995;\ DW = 1.73;\ SEE = 461.01$$

$$\lambda = 0.24 \text{ for } XNA_t^*.$$

In general, these equations convey the same message as equations (3.2) through (3.4). In a nutshell, the empirical estimates of the consumption function suggest that (i) the permanent income theory is more relevant for the non-agricultural sector than for the agricultural sector, (ii) there is substantial difference in the marginal propensities to consume between the agricultural and the non-agricultural sectors in the short run but this difference is much less in the long run, and (iii) the post-tax nominal interest rate has a significant negative effect on household consumption. Estimates of the consumption function for the more recent sub-period 1960-61 to 1978-79 did not give different results from these; in particular, except for minor differences, the coefficient estimates of the consumption function for the sub-period were very close to the ones for the full period.

4. The Impact and the Long-run Effects of Income Taxation on Savings

With the help of the empirical results of Section 3 we can examine the effects on household savings of a few hypothetical tax-transfer policies. The specific policy effects that we consider here are the effects on household savings of:

(i) a rupee reduction in the income tax on (a) agricultural incomes and (b) non-agricultural incomes or an equivalent transfer to the two sectors,

(ii) transfer of a rupee from the agricultural to the non-agricultural sector, and

(iii) a per cent reduction in the marginal income tax rate on interest income.

The numerical magnitudes of these effects can be computed by combining the estimated consumption function(s) of Section 3 with the definitional relation (2.6) and partially differentiating household savings, S_t with respect to the relevant variable. However, the numerical magnitudes of these effects so computed would generally overestimate the true effect on household savings (as defined in the National Accounts) marginally since private final consumption expenditure and net household savings as given in the National Accounts do not add up to personal disposable income. On an average, during the sample period of the present study, the former as a ratio of the latter has varied mildly around 0.90 to 0.95. This discrepancy may perhaps be due to the differences in the method of estimation and the source-material used by the

Central Statistical Organisation (CSO) for compiling the different macro-aggregates. It may also be due to the fact that the measure of consumption used here is that of consumption expenditure 'within the domestic market' whereas a more relevant measure (for National Accounts) could be the parallel 'national' concept[1]. Due to this discrepancy, the definitional relation of equation (2.6) does not strictly hold good in practice. However, in computing the tax policy effects on household savings, we have proceeded as if the definitional equation (2.6) strictly holds good.

With the above caveat in mind, consider the case of a rupee reduction of tax on agricultural incomes. In terms of equations (3.3) through (3.7), such a tax measure results in an increase in household savings, the magnitude of the increase ranging from Rs 0.16 to Rs 0.24. There seems to be very little lag in the effect of such a tax measure on household savings. In that sense, the adjustment of household savings to variations in the tax on agricultural incomes can be termed 'instantaneous'. This is in sharp contrast to the case of a tax reduction on non-agricultural incomes, the dynamic effects of which are presented in Table 1.

Note that the impact effect of a reduction of income tax on the non-agricultural sector is to raise household savings by around 0.60 rupees whereas the

1/ For details regarding these concepts, refer to CSO (1980).

TABLE 1

The Dynamic Effect on Household Savings (in Rs.) of a Rupee (Once-and-for-all) Reduction of Tax on Non-Agricultural Incomes

Time Period (Years)	Alternative Consumption Functions				
	Equation (3.3)	Equation (3.4)	Equation (3.5)	Equation (3.6)	Equation (3.7)
1	0.6143	0.6464	0.6501	0.6261	0.6096
2	0.5816	0.6048	0.5906	0.5590	0.5401
3	0.5509	0.5657	0.5359	0.5030	0.4850
4	0.5221	0.5290	0.4911	0.4562	0.4413
5	0.4950	0.4945	0.4496	0.4171	0.4066
6	0.4696	0.4621	0.4128	0.3845	0.3791
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
Long Run Effect	0.3010	0.2474	0.2702	0.3044	0.3321

long-run effect is of much smaller magnitude, ranging from 0.25 to 0.33 rupees. What is more important, the effect is spread over a large number of years, suggesting that unlike in the case of a tax reduction on agricultural incomes, a tax reduction on non-agricultural incomes has a long distributed lag effect on household savings. This is a fresh piece of empirical evidence on the time-path of the effect of tax reductions on household savings in India.

Though the time-path of the effect on household savings of a tax reduction on the non-agricultural sector differs substantially from that of a corresponding tax reduction on the agricultural sector, the difference in the ultimate effects of the two tax measures is much smaller. This can be checked from Table 2 which presents the dynamic effects on household savings of transfer of a rupee from the agricultural to the non-agricultural sector. In terms of equations (3.4) and (3.5), though such a transfer policy has a significant positive impact effect on household savings, it has almost no long-run effect, implying that household savings rate cannot be stepped up 'permanently' by such a transfer policy. The same applies to any tax-transfer policy aimed at altering the income terms of trade between the agricultural and the non-agricultural sectors. Equations (3.3), (3.6) and (3.7), however, show sizeable long-run effect of such a transfer policy on household savings. Equation (3.7) implies the maximum long-run effect of around Rs 0.20. However, even

TABLE 2

The Dynamic Effect on Household Savings (in Rs.) of Transfer of a Rupee (Once-and-for-all) from the Agricultural to the Non-Agricultural Sector

Time Period (Years)	Alternative Consumption Functions				
	Equation (3.3)	Equation (3.4)	Equation (3.5)	Equation (3.6)	Equation (3.7)
1	0.3704	0.4061	0.4440	0.4615	0.4757
2	0.4158	0.3645	0.3845	0.3944	0.4062
3	0.3932	0.3254	0.3318	0.3384	0.3511
4	0.3652	0.2887	0.2850	0.2916	0.3074
5	0.3382	0.2542	0.2435	0.2525	0.2727
6	0.3128	0.2218	0.2067	0.2199	0.2452
.	.	.	.	.	.
.	.	.	.	.	.
.	.		.	.	.
Long Run Effect	0.1411	0.0071	0.0641	0.1398	0.1982

this is half the magnitude of the effect (of such transfer policies) indicated by the Krishnamurthy-Saibaba (1981) study.

Table 3 presents the familiar substitution effect on household savings of taxing interest income. For every one per cent reduction in the marginal tax rate on interest income, household savings increase in the range of 0.21 to 0.25 per cent. Put differently, on an average, to bring about an increase of about Rs 50 crore in household savings, the marginal tax rate needs to be reduced by around 10 per cent. A 10 per cent reduction in the latter does not seem to call for a drastic policy change since during the period of the present study

TABLE 3

The Effect of One Per Cent Reduction in the Marginal Tax Rate (on Interest Income) on Household Savings[1/]

Alternative Consumption Functions	Percentage increase in household savings per one per cent reduction in the marginal income tax rate
Equation (3.3)	0.2464
Equation (3.4)	0.2201
Equation (3.5)	0.2186
Equation (3.6)	0.2124
Equation (3.7)	0.2058

1/ These figures are computed at the sample means of the variables.

(a period in which no drastic tax changes were implemented) the marginal tax rate has, in fact, varied by around 10 per cent in three years and by around 20 per cent in another two years, the average variation for the entire period being of the order of 5 per cent per year. Considered against this backdrop, the magnitude of the substitution effect of taxing interest income on household savings appears to be quite substantial. Once again, this is a fresh piece of empirical evidence since in the Indian context hardly any study has investigated the interest elasticity of household savings.

5. Conclusions

To summarise the major conclusions:

(i) The empirical evidence presented in this paper shows that income taxation in India can have significant effects on household savings both through the disposable income channel and the interest rate channel. More specifically, a reduction in the income tax rate can induce a higher household savings by shifting the household budget constraint as well as by changing its slope in favour of savings.

(ii) There is a long-held belief in India that the Keynesian absolute income theory provides a better explanation of the consumption-saving decisions of the Indian households than the permanent income hypothesis. By implication, it means that the effect of taxation or transfers on savings through the disposable income channel is 'instantaneous'. Empirical evidence for such a belief was provided by Gupta (1970) and Laumas and Laumas (1976). The results presented here indicate that whereas for the agricultural sector the absolute income theory is better applicable, for the non-agricultural sector the permanent income hypothesis offers a better explanation than the absolute income theory. This implies that the time-path of the effect on household savings of any tax-transfer policy depends crucially upon whether it benefits the agricultural sector or the non-agricultural sector. If the tax-transfer policy benefits the agricultural sector, its effect on household savings is fairly instantaneous; however, if it benefits the non-agricultural sector, the effect is spread over a large number of years, the long-run effect being much lower than the short-run effect.

(iii) Another commonly held view in India regarding the consumption-saving decisions of the households is that the marginal propensity to consume of the agricultural sector is substantially higher than that of the non-agricultural sector (Raj, 1962, and Chakravarty, 1974). Empirical evidence in support of such a view was founded by Krishnamurthy and Saibaba (1981).

By implication, it meant that Government can bring about a significant increase in the household savings rate by a tax-transfer policy which alters the income terms of trade in favour of the non-agricultural sector. The present paper supports such a view only partially - partially because it finds that whereas the short-run marginal propensity to save of the non-agricultural sector is much higher than that of the agricultural sector, the long-run marginal propensity of the former is only marginally greater than that of the latter. In fact, in certain cases it finds that the long-run marginal propensity of the two sectors are almost the same, thereby implying that tax-transfer policies which aim at altering the income terms of trade in favour of the non-agricultural sector cannot 'permanently' raise the household savings rate.

(iv) The significant positive interest elasticity of savings that we have found suggests that a reduction in the tax on interest income can lead to a substantial increase in the household savings. It also suggests that the substitution of the income tax by an expenditure tax may lead to a higher household savings rate. This is of some interest in the Indian context not only because some economists argue in favour of an expenditure tax (see Chelliah, 1980) but also because the present income tax in India is slowly tending towards an expenditure tax in that it exempts certain forms of savings and such exemptions have grown substantially over time.

DATA ANNEXURE

The Central Statistical Organisation (CSO) in its 'National Accounts Statistics' (NAS) publishes a series on 'private final consumption expenditure in the domestic market' at constant (1970-71) prices, which is available from 1950-51 onwards. It is this series that we have used as household consumption expenditure, C.

The NAS also give data on personal disposable income at factor cost at current prices from 1960-61 onwards. For the '50s we got a comparable series directly from CSO. We added 'indirect taxes less subsidies', given in the NAS to this series to derive personal disposable income at market prices. The series was deflated by the implicit price deflator for private consumption expenditure to derive personal disposable income at constant (1970-71) prices. It is this series that we have used as X_t.

To compute the implicit price deflator for private consumption expenditure, data on private consumption expenditure at current prices were not available for the '50s. Consequently, we had to derive it from the data on macro-aggregates given in the NAS by subtracting government final consumption expenditure, gross domestic capital formation and net exports (i.e., exports minus imports) of goods and services from the gross domestic product at market prices.

The break-up of personal disposable income into agricultural and non-agricultural is not given in the NAS. To derive this sectoral break-up, we first computed personal disposable income of the agricultural sector at factor cost by deducting land revenue and agricultural income tax from income (net) originating from agriculture at factor cost at current prices. The latter series is not available in the NAS for the '50s but is published in CSO's 'Estimates of National Income' (ENI). These data, however, are not comparable to the revised national income data published in the NAS. Hence, we computed the ratio of income (at factor cost and at current prices) originating from agriculture to net domestic product at factor cost from the ENI and applied this ratio to the revised NAS data on net domestic product to derive income originating from agriculture at factor cost for the '50s. We then apportioned indirect taxes less subsidies between agricultural and non-agricultural sectors on the basis of the sectoral income shares, (i.e., the share of each sector's income in the net domestic product at factor cost). Once the disposable income of the agricultural sector at market prices was derived, disposable income of the non-agricultural sector was computed as a residual. We then deflated the sectoral disposable incomes at market prices by the implicit price deflator for private consumption expenditure to derive XA and XNA.

Allocation of indirect taxes according to sectoral incomes shares may not be entirely satisfactory since the consumption basket of the two sectors may be different and hence their indirect tax liabilities as a proportion of income may differ. To account for this difference, however, one needs to have information on the commoditywise indirect tax and subsidy rates and the consumption basket of the two sectors. The former is extremely difficult to obtain and hence the assumption that indirect taxes less subsidies are proportional to sectoral incomes is almost unavoidable in empirical work.

As regards the rate of interest, i, we chose two rates: (i) the weighted rate of interest on time deposits with commercial banks and (ii) the rate of return on capital employed in the corporate sector (medium and large public limited companies). In a sense, the former represents the yield on financial assets and the latter on physical or real assets. We selected the rate of return on capital rather than the usual measure of the yield rate on corporate shares (published in Reserve Bank of India Bulletins) as the rate of return on savings in physical assets on the rationale that the former not only proxies the rate of return on corporate shares better (since it includes capital gains) but also may serve as a good indicator of the rate of return on investment in the non-corporate private sector. The latter argument is especially relevant in the Indian context since in the Indian National Accounts the unincorporated business firms (and hence their incomes and savings) are included in the household sector.

The weighted rate of interest on time deposits is computed as a ratio of interest payments on time deposits by commercial banks to the average stock of time deposits with them. Data on both interest payments and time deposits are taken from the 'Statistical Tables Relating to Banks in India' published by the Reserve Bank of India (RBI). The rate of return on capital in the corporate sector is computed as a ratio of gross profits (profits before tax plus interest payments) to capital employed (net fixed assets plus net current assets) for the medium and large public limited companies. These data are taken from the 'Financial Statistics of Joint Stock Companies' published by the RBI.

The marginal tax rate, M_t is computed from the data on income-bracket-wise assessed income and tax demand relating to 'individuals' (AIITS), published by the Directorate of Inspection (Research, Statistics and Public Relations). More specifically, it is constructed as a weighted average of the income-bracket-wise marginal tax rates, the weights being the proportion of income assessed in each income bracket to the total income assessed of 'individuals'. Since the data given in the AIITS relate to assessment years and the fiscal years lag the assessment years by one period, we lagged the weighted marginal tax rate by one period in computing the post-tax nominal rate of interest.

For computing the expected inflation rate, we have used the percentage change in the wholesale price index of all commodities from 1926 onwards. The reason for going as far back as 1926 was to select the 'initial' value for the computation of the expected inflation rate from as distant a period from the first year (1950-51) of the sample period of the present study as possible, so that the resulting series on the expected inflation rate becomes quite insensitive to the 'initial' value chosen. The initial value of the expected inflation rate chosen for the present study is the average inflation rate during the three years from 1927-28 to 1929-30; it worked out to be -2.29.

Given the real disposable income-aggregate as well as its sectoral break-up, to compute the corresponding permanent incomes we need the initial values and the trend rates of growth. The values used in the present study are as follows:

	Name of the Series	Initial Value (Rs crore)	Trend Rate of Growth
(i)	Aggregate Disposable Income	15543	0.03870
(ii)	Agricultural Disposable Income	8027	0.03268
(iii)	Non-Agricultural Disposable Income	7599	0.04346

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