4. A MODEL OF CHARITABLE CONTRIBUTIONS

1. A Methodological Framework

CONSIDER that, one of the objectives of the Government is to provide finance to charitable organisations. Let us consider two alternatives to do so; the government can endow money to the charitable organisations through block grant or by encouraging the taxpayers, through a tax incentive, to directly contribute more to charity. Since taxpayers want to pay less taxes and also draw satisfaction from contributing to charity, tax incentives for charitable contributions assume significance. A tax incentive results in tax saving to the donor and thereby reduces price of charity to the donor. However, this results in loss in tax revenue to the exchequer. This leads to a trade-off between tax revenue forgone by the exchequer and the contributions received by charitable organisations.

Given the price of charitable contributions and other uses of income, a taxpayer, subject to his budget constraint, decides about the amount of charitable contributions. The taxpayer is presumed to maximise his utility which is taken to depend not only on his consumption of goods and services but also on the consumption of those who receive the benefits of charity.

The budget constraint of a taxpayer can be specified as:

$$M+C+T \leqslant Y$$

where Y=pre-tax income of the taxpayer,
T=actual tax liability of the taxpayer,
C=contribution to charitable organisations,
M=use of income for purposes other than payment of tax and contribution to charity.

Because of the tax incentive for charitable contributions, the

price of one unit of charitable contribution is less than unity while it is unity for other uses of income. Therefore actual cost of charitable contributions is less than the actual contribution (C) by the amount of tax saving (TS). Let P be the price of charitable contributions to the donor. Now the gross contributions can be decomposed into two components as:

$$C+C.P+TS$$

Substituting for C in the above budget constraint, we get

$$M+C.P+TS+T' \leqslant Y$$

or $$M+C.P+T' \leqslant Y$$

or $$M+C.P \leqslant Y-T'=Y^*$$

where $T'=T+TS$ and $Y^*=Y-T'$ can be interpreted respectively as tax liability and post-tax income of the taxpayer had there been no tax incentive for charitable contributions and $C.P$ can be interpreted as net cost to the taxpayer, of charitable contributions.

The price of one rupee that is contributed to a charitable organisation is measured in terms of forgone post-tax income, i.e., the gross contributions minus the tax saving. The tax saving depends on the marginal rate[1] of tax of the donor and the percentage of deduction allowed for contributions. Therefore, the price of a unit of charity varies inversely with the marginal rate of tax of the donor and the percentage of deduction allowed for contributions. For example, if 50 per cent of the contributions is deductible in calculating taxable income, then an assessee with his marginal tax rate of 60 per cent can contribute Rs. 100 to a charitable organisation by forgoing only Rs. 70. In this case the tax saving is Rs. 30 and the price of a unit of charity is 0.7. If 100 per cent of the contributions is deductible, as is the case for contributions to organisations involved in the promotion of family planning, then the price of a unit of charity for the assessee would be 0.4. Symbolically, the price of a unit of charity (P) can be expressed as follows:

$$P=1-d.m$$

where,

d = Proportion of the contributions allowed as deduction

m = Marginal rate of tax of the taxpayer.

For a deduction of 50 per cent of the contributions, d=0.5.

The income and price effects on charitable contributions can be estimated empirically by estimating plausible functional specification(s) of demand for charitable contributions. It is the price effect that is regarded as the incentive effect (Taussig, 1967, p. 3). The income effect and the price effect of the tax incentive are estimated generally in terms of respectively income and price elasticities of charitable contributions. The income and price effects may vary between different locations such as States, and between different recipient organisations such as educational and religious.

The price elasticity, as discussed later, can be used to explain the trade-off between revenue forgone by the exchequer and the contributions received by the charitable organisations due to the tax incentive.

The estimates of income and price elasticities can be used to evaluate alternative schemes of the tax incentive. The stimulative effects of alternative schemes of the tax incentive can be evaluated in terms of their efficiency[2]. Estimation of efficiency of any tax incentive scheme involves estimation of the following:

(*i*) Contributions to charitable organisations attributable purely to the tax incentive, which can be obtained with the help of price and income elasticities of charitable contributions; and

(*ii*) tax revenue forgone by the exchequer due to the tax incentive which is the same as the tax saving by the donors due to the tax incentive.

Interpretations of price elasticity are outlined in the following section. A new concept of price and other concepts of income and price used in the literature are discussed in the subsequent section. Plausible functional specifications of demand for charitable contributions and the procedure for simulation of alternative schemes of the tax incentive are presented in the

remaining two sections.

2. Interpretations of Price Elasticity

A negative price elasticity would mean that the tax incentive effectively enhances charitable contributions. But a negative price elasticity in itself does not imply a substantial increase in the contributions to the extent that the contributions attributable to the tax incentive exceed the tax revenue forgone by the exchequer due to the incentive.

If the price elasticity is negative and greater than unity in absolute value (i.e., <-1), the additional contributions received by charitable organisations (donees) will exceed the tax revenue forgone by the exchequer, due to the tax incentive.[3] In such a case, the efficiency of the tax incentive is said to be more than 100 per cent. So with a price elasticity that is negative and greater that unity in absolute value, it would be appropriate to subsidise the charitable organisations through an appropriately designed scheme of the tax incentive rather than through a direct subsidy through the budget.[4] Conversely, if the price elasticity is positive or negative but less than unity in absolute value (i.e., >-1), it would be appropriate to subsidise charitable organisations through a direct subsidy rather than through tax incentive provisions.

The price elasticity of exactly -1 has special implications. It would mean that the response of donors to price changes is such that the net cost of contributions to the donor remains unchanged under the tax incentive. For example, if for a donor the price of contributions changes from $p1$ to $p2$, then the contribution at price $p2$ equals the sum of contributions at price $p1$ and the additional tax relief to the donor due to the change in both the price and the contributions. Charitable organisations receive an amount equal to the net cost of charity to the donor (that remains unchanged with changes in price of a unit of charity) plus the tax revenue forgone by the exchequer. The efficiency of the tax incentive is 10 per cent, i.e., the additional funds received by the donee(s) as percentage of the tax revenue forgone by the exchequer equals 100. This would mean that in financing through the tax provisions, the level of contributions made during a reference period, the government neither gains nor loses in its financial position as compared to the alterna-

tive method of financing it through a direct subsidy. So, with a price elasticity of -1, the government would be indifferent between the tax incentive and a direct subsidy as long as the cost of administration and the scope of misuse of the provisions do not differ between these alternatives.

3. Concepts of Income and Price of a Unit of Charity

An ideal measure of economic income[5] cannot be obtained from the data contained in the assessment form. Exclusion of income from several specified sources, treatment of unrealised capital gains, and schemes of accelerated depreciation make the reported values different from the appropriate theoretical value of the income variable. Given this situation, we can only take gross income (*GI*) minus loss set-off (*LSO*) as a workable measure of economic income. We shall call it adjusted gross income (*AGI*)[6]. Various alternative measures of income based on income before tax and income after tax, and of price have been used in the literature,[7] in explaining charitable contributions. The choice of the proper measures of income and price is an issue sufficiently complex and important to require careful consideration.

(*a*) *Measures of price.* As discussed in Chapter 1, the definition of price variable is the 'net cost' of one rupee of charitable contribution, measured in terms of forgone post-tax income, i.e., the gross contribution minus the tax saving. The main issue in the choice of an appropriate measure of price is centred around the choice of an appropriate rate of tax for estimation of tax saving due to contributions. The two alternative measures of price which have been used in the literature[8] in the estimation of price effect of the incentive provisions, are given below:

(*i*) The first measure of price ($p1$) is defined as 1 minus the tax saving on one rupee of charitable contributions estimated in terms of the marginal rate of tax ($M1$) applicable to an additional rupee of charitable contributions, i.e., the last rupee of taxable income (assessed income). This tax saving or tax relief on a rupee of charitable contributions is the product of the marginal rate of tax ($M1$) and the percentage deduction (d) allowed for contributions.[9] Hence, symbolically,

$$P1 = 1 - d.M1$$

This measure of price is similar to the price variable used in Taussig (1967). The corresponding tax saving ($TR1$) on a given volume of charitable contributions (C) to the donor is given by

$$TR1 = C.\ d.\ M1$$

(*ii*) The second measure of price ($p2$) is defined as 1 minus the tax saving on one rupee of charitable contributions estimated in terms of the marginal rate of tax ($M2$) applicable to the first rupee of charitable contributions, i.e., the last rupee of income assessable before deduction for charitable contributions ($YP2$), i.e., assessed income plus deduction for contributions. This tax saving on a rupee of charitable contributions is the product of the marginal rate of tax ($M2$) and the percentage deduction (d) allowed for contributions. Hence symbolically,

$$P2 = 1 - d\ M2$$

This measure of price is similar to the price variable used in Feldstein (1975*a*). The corresponding tax saving ($TR2$) on a given volume of charitable contributions (C) to the donor is given by

$$TR2 = C.\ d.\ M2$$

The measure $P1$, unlike $P2$, depends on the amount of charitable contributions. The higher the contributions in relation to a given $YP2$, the lower the assessed income and the lower could be the marginal rate of tax $M1$ and hence the higher could be the value of the measure $P1$. This could introduce a spurious positive correlation between the contributions and the measure of price $P1$, biasing the estimate of price effect of the tax incentive. Therefore, the measure $P2$ seems to be preferable to the measure $P1$. The measures $M1$ and $M2$ and hence the measures $P1$ and $P2$ will be identical if the same marginal rate of tax is applicable to the last rupee of $YP2$ and

assessed income, e.g., under a proportional income tax, $M1$ and $M2$ would be identical.

Both measures of price have been defined in terms of the hypothetical[10] marginal rates of tax relief rather than the average[11] rate of tax relief. The latter would be different from marginal rates of tax relief if the marginal rate of tax for assessed income is different from that for $YP2$, i.e., if $M1$ and $M2$ are different. Since it is the average rate of tax relief which is the effective rate of relief, we define the third measure of price in terms of the average rate of tax relief as follows.

(*iii*) The third measure of price ($P3$) is defined as 1 minus the tax saving on one rupee of charitable contributions estimated in terms of the average rate of tax relief ($A1$) on charitable deductions. This tax saving on a rupee of contributions is the product of the average rate of tax relief and the percentage of deduction allowed for contributions. Hence symbolically,

$$P3 = 1 - d.\ A1$$

The tax saving ($TR3$) on charitable deductions to a donor is the tax liability on income $YP2$ in excess of the tax liability on assessed income. If $T1$ and $T2$ denote the tax liabilities on income $YP2$ and assessed income, respectively, then the tax saving can be expressed as

$$TR3 = T1 - T2$$

and the average rate of tax relief can be expressed as

$$A1 = TR3/DCC$$

where, DCC = Deduction for charitable contributions.

If $M1$ and $M2$ are the same, then $P1$, $P2$ and $P3$ will be identical. However, since $M1$ and $M2$ may differ, it has to be determined which price measure is preferable. For our purpose, that measure of price should be chosen which influences the

decision on contributions.

While the measure $P3$ is based on the actual rate of tax relief, the measures $P1$ and $P2$ are based on the assumed rates of tax relief on deductions for contributions. Also, when the assumed rates of tax relief are the same as the actual rate of tax relief,[12] measures $P1$ and $P2$ cease to be different from $P3$. Therefore, the measure of price $P3$ seems to be better than both the other measures of price, $P1$ and $P2$.

Moreover, if $A1$ is taken to be the effective rate of tax relief on charitable deductions, then it can be shown that the measure of price $P1$ (defined in terms of $M1$) as well as $P2$ (defined in terms of $M2$) might underestimate the price of a unit of charity for some of the donor companies and overestimate it for the other companies. This is shown in an example given below.

Let us consider two widely held companies, $WC1$ and $WC2$, with incomes of Rs. 1,30,000 and Rs. 90,000, respectively. Let us further assume that each of the two companies avails itself of deductions of Rs. 20,000 for charitable contributions. The estimates of rates of tax relief $M1$, $M2$ and $A1$ to these donor companies on deductions for contributions, obtained with the tax structure applicable in the assessment year 1978-79 are presented in Table 4.1.

A comparison of the rates $M1$ and $A1$ for the companies $WC1$ and $WC2$ reveals that M1 is an overestimate of the effective (actual) rate of tax relief ($A1$) for company $WC1$ and an underestimate for company $WC2$. Therefore, $M1$ underestimates the price of a unit of charity for company $WC1$ and overestimates it for company $WC2$. Similarly, a comparison of the rates $M2$ and $A1$ reveals that $M2$ overestimates the price of a unit of charity for company $WC1$ and underestimates it for company $WC2$. Further, it should be noted that $M1$ overestimates the rate of tax relief for company $WC1$ and $M2$ underestimates it. Conversely, for company $WC2$, $M1$ underestimates the rate of tax relief and $M2$ overestimates it. So for the same donor, $M1$ might overestimate the price while $M2$ underestimates it and, conversely $M1$ might underestimate the price while $M2$ overestimates it.

Thus, it is clear that the marginal rate of tax $M1$ as well as $M2$ may underestimate the price of a unit of charity for some of the donors and may overestimate it for the other donors.

TABLE 4.1
Estimates of Marginal/Average Rates of Tax Relief*

	Widely held company	
	WC1	*WC2*
Assessed income (Rs. thousand)	130	90
Charitable deductions (Rs. thousand)	20	20
YP2 (Rs. thousand)	150	110
M1 (per cent)	84	47.25
M2 (per cent)	57.75	84
A1 (per cent)	70.88	65.63

Notes: *These estimates are obtained with the tax structure applicable in the assessment year 1978-79. For an easy understanding of the rates given in this table, see the rate schedule given in note 8 of Chapter 3 which is equivalent to the rate structure for this year.

YP2 = Assessed income + charitable deductions.

M1 = Marginal rate of tax applicable to the last rupee of assessed income of the donor.

M2 = Marginal rate of tax of the donor applicable to the last rupee of income assessable before deductions (*YP2*).

A1 = Average rate of tax relief to the donor on deductions for contributions.

Though, generally speaking, the companies are taxed at flat rates of income tax, the differences in *M1*, *M2* and *A1* could arise due to special provisions of taxation of income of widely held companies and closely held industrial companies. These special provisions alongwith flat rate of taxation can be translated into a rate schedule for the companies. (For example, see note 8 of Chapter 3) for such a rate schedule for widely held companies.

Even though the measure of price *P3* seems to be superior to the other measures, we have obtained the results of our model with each of the three alternative measures of price in order to have an idea of the extent to which the results would differ with respect to the use of alternative measures of price *P1* and *P2* used in the literature.

(*b*) *Measures of income.* In explaining charitable contribu-

tions, various measures of income defined in terms of either pre-tax or post-tax income have been used in the literature. Post-tax income has been defined in two ways : income minus the actual tax liability, and income minus the tax that would have been paid if no charitable contributions had been made. While the measure of income used in Reece (1979) is defined in terms of pre-tax income, the measures used in Taussig (1967) and Feldstein (1975*a*) are defined in terms of the above definitions of post-tax income respectively. The tax that would have been paid if no charitable contributions had been made, can be estimated as the sum of the actual tax liability and tax saving of the donor due to contributions. Since the tax saving depends on the rate of tax relief under consideration, such as $M1$, $M2$ and $A1$, the tax saving and hence the measure of income based on it can be defined in three different ways:

The four measures of income which have been used in the literature or are relevant in explaining charitable contributions are as follows:

(*i*) The first measure of income ($Y1$) is defined in terms of post-tax income. It is defined as adjusted gross income minus the actual tax liability of the donor. Hence symbolically,

$$Y1 = AGI - ATD$$

This measure of income is similar to the income variable used in Taussig (1967).

(*ii*) The second measure of income ($Y2$) is defined in terms of post-tax income if no charitable contributions had been made. It is defined as adjusted gross income minus the actual tax liability minus the tax saving ($TR2$) on deductions for contributions at the marginal rate of tax $M2$. Hence symbolically,

$$\begin{aligned} Y2 &= AGI - ATD - TR2 \\ &= Y1 - TR2 \end{aligned}$$

This measure of income is similar to the basic income variable used in Feldstein (1975*a*).

(*iii*) The third measure of income ($Y3$) is also defined in

terms of post-tax income if no charitable contributions had been made. It is defined as adjusted gross income minus the actual tax liability minus the tax saving ($TR3$) on deductions for contributions at the average rate of tax $A1$. Hence symbolically,

$$Y3 = AGI - ATD - TR3$$
$$= Y1 - TR3$$

(*iv*) The fourth measure of income ($Y4$) is defined in terms of pre-tax income. It is taken to be the adjusted gross income of the donor. Hence symbolically,

$$Y4 = AGI$$

This measure of income is similar to the measure used in Reece (1979).

The main issue in the choice of a measure of income is whether pre-tax income or post-tax income is the appropriate variable that influences the decision on contributions. For our purposes a measure of income defined in terms of pre-tax income seems to be preferable.[13] In the present study, the measure $Y4$ which is defined in terms of pre-tax income is proposed only as a test of robustness. All the other three measures of income are defined in terms of post-tax income in one sense or another.

The measure $Y1$ defined as adjusted gross income minus the actual tax liability, depends on the amount of contributions. The higher the contributions, the lower the actual tax liability and hence the higher the value of the measure of income $Y1$. This introduces a spurious positive correlation between the contributions and the measure of income, leading to a bias in the estimate of income effect on the contributions. The other two measure $Y2$ and $Y3$ do not depend on the amount of contributions and thus seem to be preferable to the measure $Y1$.

The measures $Y2$ and $Y3$ differ only with respect to the estimate of tax saving on deductions for charitable contributions. While in $Y2$ the tax saving is estimated at the marginal rate of tax relief $M2$, in $Y3$ it is estimated at the average rate of tax relief $A1$ on deductions for contributions. If $M2$ equals $A1$, the

measures $Y2$ and $Y3$ will be identical. It has been argued in section 3(*a*) that the average rate of tax relief $A1$ is preferable to the marginal rate of tax relief $M2$ in the estimation of tax saving on deductions for contributions. The measure $Y3$, thus, seems to be preferable to the measure $Y2$.

Even though, theoretically, the measure of income $Y3$ seems to be superior to the other three measures, we have obtained the results of our model with each of the four alternative measures of income in order to observe the extent to which the results would differ with respect to the use of alternative measures of income $Y1$, $Y2$ and $Y4$ used in the literature.

(*c*) *Choice of income and price combinations.* The four alternative measures of income and the three alternative measures of price defined earlier give rise to twelve income-price combinations:

$$(Y1, P1)\ (Y2, P1)\ (Y3, P1)\ (Y4, P1)$$
$$(Y1, P2)\ (Y2, P2)\ (Y3, P2)\ (Y4, P2)$$
$$(Y1, P3)\ (Y2, P3)\ (Y3, P3)\ (Y4, P3)$$

But all the twelve income-price combinations would not be appropriate for our purposes. Since the income variables $Y2$ and $Y3$ depend on the tax saving on deductions for contributions, the appropriate income-price combinations with these measures would be those in which the tax saving in both the income and price measures is estimated at the same rate. For such chosen income-price combinations, the net cost of contributions plus other disbursements of the donor would equal his corresponding post-tax income. Hence the budget constraint would be satisfied. If, in an income price combination, the tax saving is estimated at different rates in income and price variables, then the budget constraint would not be satisfied. The income-price combination with $Y2$ and $Y3$ which would satisfy the budget constraint are $(Y2, P2)$ and $(Y3, P3)$. Among the six income price combinations with $Y2$ and $Y3$, we have chosen the abovementioned two combinations. In addition, two more alternative combinations $(Y1, P1)$ and $(Y4, P3)$ are proposed to be used as a test of robustness in our exercise of evaluation of the tax incentive provisions. The combination $(Y1, P1)$ is chosen

because it is similar to the income and marginal tax rate combination used in Taussig (1967). The measures of income $Y4$ is independent of the rate of tax saving on deductions for contributions. It could form a combination with any of the three measures of price. However, we have chosen $P3$ with $Y4$, a measure of price which seems to be superior to $P1$ and $P2$. Among these four income-price combinations, ($Y3$, $P3$) seems to be theoretically superior to the other combinations as in this combination both the income and price measures are based on the effective rate of tax saving to the donor on deductions for contributions.

4. Functional Specifications of Charitable Contributions

A variety of functional specifications relating donor's charitable contributions (C) to income (Y) and price (P) can be investigated. We estimate the income effect and the price effect of the incentive provisions in terms of income and price elasticities of contributions. The functional specifications that are estimated in the present study are described below.

(*a*) *Constant income and price elasticities.* The constant income and price elasticities can be estimated in a double-log linear specification of charitable contributions as follows:

$$\text{Log } C = a1 + a2 \text{ Log } Y + a3 \text{ Log } P + u \qquad \ldots(4.1)$$

where $a1$, $a2$ and $a3$ are parameters to be estimated. The variable u is an unobservable residual. It reflects random disturbances and specification errors. The constant income and price elasticities of contributions are given by $a2$ and $a3$. One would expect a donor to make more charitable contributions with increase in his income and decrease in price of a unit of charity to him. Therefore, the expected sign for the income elasticity ($a2$) is positive and for the price elasticity ($a3$) is negative.

An implicit assumption in the constant elasticities specification is that a constant percentage change in the explanatory variable at any level causes a constant percentage change in the dependent variable, e.g., a change of $X1$ per cent in charitable contributions due to $X2$ per cent change in the price variable irrespective of whether the change is taking place at price level

P^* or P^{**}.

(*b*) *Variable income and price elasticities.* The assumption of constant income and price elasticities is clearly a simplification. In general, the elasticities may vary with the levels of income and price. If it is so, it would be appropriate to reflect these variations in the simulation of alternative tax policies. It is worthwhile therefore to examine whether the income and price elasticities do vary with the level of income and price. This can be done in the following manner.

First, we examine whether the income elasticity does vary with income, and the price elasticity does vary with price. One way to do this is to extend the constant elasticities specification of contributions (4.1) to include the inverse of income and price variables as follows:

$$\text{Log } C = a1 + a2 \text{ Log } Y + a3 \text{ Log } P + a4\, Y^{-1} + a5 P^{-1} + u \quad \ldots(4.2)$$

where $a1$, $a2$, $a3$, $a4$ and $a5$ are parameters to be estimated. This specification (4.2), allows the income elasticity[14] to vary asymptotically with income, and the price elasticity[15] to vary asymototically with price.

In the specification (4.2), positive (negative) value of $a4$ would mean that the income elasticity increases (decreases) with increases in income. The income elasticity will be positive at all levels of income only if $a2$ and $a4$ take positive and negative values, respectively, and such values of $a2$ and $a4$ would mean that the income elasticity decreases with increase in income. Conversely, if $a2$ and $a4$ take negative and positive values, respectively, the income elasticity will be negative at all levels of income, and such values of $a2$ and $a4$ would mean that the magnitude of income elasticity decreases with increase in income. Positive values of both $a2$ and $a4$ would mean that the income elasticity in the range of income in which it takes positive value, increases with increase in income, and negative values of both would mean that the magnitude of income elasticity in the range of income in which the elasticity takes negative value, increases with increase in income. The expected sign for $a2$ is positive and for $a4$ is negative.

Similarly, positive (negative) value of $a5$ would mean that the price elasticity increases (decreases) with increase in price.

The price elasticity will be negative at all levels of price only if $a3$ and $a5$ take negative and positive values, respectively, and such values of $a3$ and $a5$ would mean that the magnitude of price elasticity decreases with increase in price. Conversely, if $a3$ and $a5$ take positive and negative values, respectively, the price elasticity will be positive at all levels of price, and such values of $a3$ and $a5$ would mean that the price elasticity decreases with increase in price. Negative values of both $a3$ and $a5$ would mean that the magnitude of price elasticity in the price range in which the elasticity takes negative value, increases with increase in price, and positive values of both would mean that the price elasticity in the price range in which it takes positive value, increases with increase in price. The expected sign for $a3$ is negative and for $a5$ is positive.

If the inclusion of inverse of an explanatory variable gives rise to the problem of collinearity with its log value, then one might like to drop the inverse of this variable and examine whether the elasticity with respect to the other variable does vary with its level. For example, if inverse of price variable gives rise to the problem of collinearity with log of the price variable in specification (4.2), one can still proceed to examine whether the income elasticity does vary with level of income by using the following specification.

$$\text{Log } C = a1 + a2 \text{ Log } Y + a3 \text{ Log } P + a4 \text{ Log } Y^{-1} + u \qquad \ldots(4.3)$$

Second, we examine whether the income elasticity does vary with level of price and the price elasticity does vary with level of income. There are several ways to do this. The simplest way is to extend the constant elasticities specification of contributions (4.1) to include an interaction term, the product of the logarithm of price and the logarithm of income (Feldstein and Taylor, 1976) as follows:

$$\text{Log } C = a1 + a2 \text{ Log } Y + a3 \text{ Log } P + a4 (\text{Log } Y)(\text{Log } P) \qquad (4.4)$$

This specification (4.4) allows the price elasticity to vary continuously with income, with a constant relative sensitivity to income changes at all levels.[16] Also, it allows the income elasticity to vary monotonically and smoothly with price, with a

constant relative sensitivity to price changes.[17]

In the specification (4.4), positive (negative) value of $a4$ would mean that the income elasticity increases (decreases) with increase in price, and the price elasticity increases (decreases) with increase in income. The income elasticity will be increasing with decrease in price only if the values of $a2$ and $a4$ take opposite signs. If $a2$ and $a4$ take positive and negative values, respectively, it would mean that the income elasticity in a certain price range will be both positive and increasing with decrease in price. Conversely, if $a2$ and $a4$ take negative and positive values, respectively, it would mean that the income elasticity in a certain price range will be both negative and increasing with decrease in price. The price elasticity will be both negative and increasing with increase in income at all levels of income only if both $a3$ and $a4$ take negative values. Conversely, if both $a3$ and $a4$ take positive values, it would mean that the price elasticity takes positive value and it increases with increase in income. Positive and negative values of $a3$ and $a4$, respectively would mean that the price elasticity takes positive value and it increases with increase in income. Positive and negative values of $a3$ and $a4$, respectively, would mean that the price elasticity in the income range in which it takes negative value, increases with increase in income. On the other hand, negative and positive values of $a3$ and $a4$, respectively, would mean that the price elasticity in the income range in which it takes negative value, decreases with increase in income.

(*c*) *Separate income and price elasticities by income class.* Though the specifications (4.2) and (4.4) described earlier allow the income elasticity as well as the price elasticity to vary with either income or price, they impose particular parametric forms on the relations of the elasticities with income or price. While the specification (4.2) imposes particular parametric forms on the relations between income elasticity and income, and between price elasticity and price, the specification (4.4) imposes particular parametric forms on the relations between income elasticity and price, and between price elasticity and income.

A more general specification of the contributions should

impose on particular parametric form on the relations of the elasticities with income or price. Such unresticted estimates of income and price elasticities can be obtained by estimating the constant elasticities specification of contributions (4.1) separately for different income classes.[18] This would allow both the income and price elasticities to vary between different income classes and imposes no parametric form on the relations of elasticities with income. Any variation in the income and price elasticities between different income classes is important in the formulation of policies which stimulate charitable contributions and it must be reflected in the simulations of alternative schemes of the tax incentive.

(*d*) *Regional characteristics and specification of charitable contributions.* Besides the income and price variables, regional characteristics might influence decision on contributions of the companies located in the respective jurisdictions. Different regions may simply be different States and Union Territories. The regional characteristics include social and political set-up, and the orientation towards activities that are supposed to be encouraged through charitable organisations. The role of social and political pressures in obtaining charitable contributions can hardly be overlooked. The State governments with different ideologies and temper can be expected to have varying effects on the decision on contributions of the assessees located in their jurisdiction.

The exclusion of social and political factors from our functional specifications of contributions might give rise to bias in the estimates of income and price elasticities. The extent of bias would depend on the degree of association of the variables included in the specification with the excluded variabies. One might expect that the higher the income of a company and the lower the price of a unit of contribution, the more effcctive could be the social and political factors in enhancing charitable contributions. Therefore, exclusion of social and political factors is likely to lead to overestimates of both the income and price elasticities. If these factors were inoperative or ineffective in actual practice, inclusion of these factors in the functional specification of contributions might lead to underestimates of both the income and price elasticities. However, due to lack of satisfactory quantitative proxy variables for such quantitative

factors, it has not been possible to include these factors in our functional specifications of charitable contributions for the estimation of income and price effects on contributions.

5. Simulations of Alternative Tax Treatments of Charitable Contributions

Having obtained the appropriate estimates of income and price elasticities, the next step in the evaluation of the incentive provisions as stimulus to contributions would be to simulate the effects of alternative tax treatments of charitable contributions. The effect of a proposed change in the concerned tax incentive provisions on the tax revenue forgone by the exchequer, charitable contributions and the efficiency of the tax incentive can be estimated through simulation of the proposed change. In this study, simulation is used to estimate the effects of alternative schemes of tax credit and abolition of the incentive.

The contributions of a donor company after a change in the income tax law that alters the price of a unit of charity or income of the donor can be estimated as follows. Let the price of charity faced by the *i*th donor under the income tax law and after the proposed change in the income tax low be Pi and $\bar{P}i$, respectively. Further, let Ci and $\bar{C}i$ denote charitable contributions of the *i*th donor under the income tax law and after the proposed change respectively. *Ceteris paribus*, for a change in the income tax law that alters only the price of a unit of charity to the donor and not income, the change in charitable contributions of the *i*th donor is given by the following equation (Feldstein, 1976):

$$\text{Log } \bar{C}i - \text{Log } Ci = \bar{a}3 \ (\text{Log } \bar{P}i - \text{Log } Pi \qquad \ldots(4.5)$$

where $a3$ is the estimate of price elasticity. Since under the current income tax law Pi and Ci are known, the estimate of contributions ($\bar{C}i$) after the proposed change in the income tax law can be obtained from equation (4.5). If the change in the income tax law alters both the price of a unit of charity and the income of the donor, the change in contributions of the *i*th donor is given by the following equation.

$$\text{Log } \bar{C}i - \text{Log } Ci = \bar{a}2\ (\text{Log } \bar{Y}i - \text{Log } Yi) + \bar{a}3\ (\text{Log } \bar{P}i - \text{Log } Pi) \quad \ldots(4.6)$$

where Yi and $\bar{Y}i$ denote income of the ith donor under the income tax law and after the proposed change respectively. $\bar{a}2$ and $\bar{a}3$ are the estimates of income and price elasticities respectively.

The total amounts of contributions $C1$ and $C2$, respectively, under the income tax law and after the proposed change in the income tax law, can be calculated as follows:

$$C1 = \sum_{i=1}^{N} Ci \quad \ldots(4.7)$$

$$C2 = \sum_{i=1}^{N} \bar{C}i \quad \ldots(4.8)$$

where N is the number of donor companies. The change in contributions due to the change in the income tax law is given by $(C2 - C1)$.

Due to contributions, the estimates of tax saving to the donors or tax revenue forgone by the exchequer under the income tax law and after the proposed change $TS1$ and $TS2$, respectively, can be obtained as follows:

$$TS1 = \sum_{i=1}^{N} Ci\ (1 - Pi) \quad \ldots(4.9)$$

$$TS2 = \sum_{i=1}^{N} Ci\ (1 - \bar{P}i) \quad \ldots(4.10)$$

In order to evaluate the alternative schemes of tax incentive as stimulus to contributions, it is necessary to isolate the contributions attributable purely to the tax incentive provisions from those which would have been made even in the absence of the tax incentive. Since in the absence of the tax incentive for contributions the price of a unit of charity would be unity for all donors, the contributions that would have been made in the absence of the tax incentive can be estimated from equation (4.5) by assigning value one to $\bar{P}i$. The aggregate of so estimated contributions over all the donor companies would give the

amount of contributions which would have been made even in the absence of the tax incentive. The actual contributions minus the estimate of contributions thus obtained gives the estimate of contributions attributable to the tax incentive. Charitable contributions attributable to the tax incentive expressed as the ratio of the tax revenue forgone ($TS1$) by the exchequer gives an estimate of efficiency of the tax incentive. Similarly, the estimates of charitable contributions attributable to the tax incentive, tax revenue forgone by the exchequer, and efficiency of the tax incentive can be obtained under the alternative tax treatments of contributions.

Notes and References

1. However, it would be argued later that an average rate rather than the marginal rate of tax relief can be used to derive tax saving and, further, it would be argued that in some sense the former is better.
2. The efficiency of a scheme of tax incentive as stimulus to charitable contributions can be defined as the contributions attributable purely to the tax incentive as a percentage of the tax revenue forgone by the exchequer due to the tax incentive.
3. For a mathematical derivation of these results, see Annexure II
4. For simplicity, it is assumed that the costs of administration of a subsidy through the tax incentive provisions and through direct grant do not differ. The results have to be qualified if it is found that these two costs differ significantly.
5. As advocated by Haig (1921), p. 7 and Simons (1938), p. 50.
6. Symbolically, AGI=GI−LSO.
7. For example, see Taussig (1967), Feldstein (1975*a*), Feldstein and Taylor (1976), and Reece (1979).
8. *Ibid.*
9. While $M1$ can be interpreted as marginal rate of tax relief on deductions for contributions, the component $d.M1$ gives the marginal rate of tax relief on charitable contributions of a donor company.
10. We call these rates hypothetical, because it is assumed that tax should have been paid at the same marginal rate of tax on deductions for contributions if these were disallowed. While this assumption will be true if $M1$ and $M2$ are equal, it will not be true if these rates are different. The different values of $M1$ and $M2$ would mean that a part of deductions should have been taxed at one rate and another part at a different rate if these deductions were disallowed, and hence the tax relief on a part of deductions is at one rate and on another part is at a different rate. Therefore, it would

seem to be appropriate to use the average rate of tax relief on deductions for contributions rather than an assumed marginal rate of relief. However, when $M1$ and $M2$ are equal, the average rate of tax relief would cease to be different from $M1$ and $M2$. The extent to which the marginal and average rates of tax relief could differ will be discussed later.

11. The average rate of tax relief ($A1$) to a donor company may be defined as the ratio of tax liability on income $YP2$ (assessed income plus charitable deductions) in excess of tax liability on assessed income to deductions for contributions.
12. The actual and assumed rates of tax relief will be identical when $M1$ and $M2$ are equal.
13. It has been argued, however, in Reece (1979) that pre-tax income rather than post-tax income defined by $Y2$ or $Y3$ seems to be appropriate in explaining the contributions. He argues that charitable contributions plus other disbursements of the donor may exceed income after tax so defined, making the budget constraint endogenous. It is important to note in this context that the net cost of charitable contributions is less than the gross contributions due to the resultant tax saving. Therefore, in order to see whether the budget constraint is satisfied, it is the net cost of contributions that should be taken into consideration rather than the gross contributions. If instead of the gross contributions the net cost of contributions is taken into consideration, the budget constraint is satisfied.
14. The income elasticity is given by $e(y)=a2-a4\ Y^{-1}$.
15. The price elasticity is given by $e(p)=a3-a5\ P^{-1}$.
16. The price elasticity is given by $e(p)=a3+a4$ Log Y.
17. The income elasticity is given by $e(y)=a2+a4$ Log P.
18. Such unrestricted estimates of income and price elasticities can also be obtained by estimating the constant elasticities specification of contributions (4.1) separately for different price classes. This would allow both the income and price elasticities to vary between different price classes and imposes no parametric form on the relations of elasticities with price. However, the variation in our price variable is too small to attempt estimation of these elasticities by price class, in the present study.