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Relevant variances and covariances

	1	2	3	4	5
1	.0705098				
2	.132290	.395040			
3	−.0123079	−.0408286	.00448628		
4	−.00783861	−.0462467	.00633514	.0152881	
5	−.00346019	−.00707766	.000686385	.000563653	.000173322

Appendix C

Volunteering and Giving in a Simple Model of Individual Behavior

The theory of labor supply provides a useful framework for incorporating decisions concerning giving and volunteering in the presence of an income tax. It is convenient to begin with an individual who values hours of leisure (H_l), hours spent volunteering (H_v), his montary contributions (D), and the consumption of other goods (X):

$$U = U(X, D, H_v, H_l). \tag{A1}$$

If this individual has a wage w, faces a tax rate t, and can itemize his deductions in calculating taxable income, his budget constraint is

$$X = [w(H^0 - H_l - H_v) + I - D](1-t), \tag{A2}$$

where H^0 is the total number of hours available and I is exogenous nonwage income. Where U_x is the marginal utility of X, U_v is the marginal utility of H_v, and so forth, the familiar first-order conditions assuming interior solutions are:

$$U_x - \mu = 0, \tag{A3}$$

$$U_D - \mu(1-t) = 0, \tag{A4}$$

$$U_v - \mu(1-t)w = 0, \tag{A5}$$

$$U_l - \mu(1-t)w = 0. \tag{A6}$$

The tax's incentive effect on donations is shown by the fact that in equilibrium the marginal rate of substitution between dollars spent on consumption and dollars donated is $U_D/U_X = (1-t)$ rather than one. The marginal rate of substitution between volunteering and donations is $U_v/U_D = w$, the same that it would be in the absence of taxation. For this

reason, as Long (1977) points out, it is neutral to allow a deduction for gifts of money but not a deduction for gifts of time since there is already an implicit deduction in the nontaxation of imputed income from the activity.

Consider now a taxpayer who is not allowed to deduct monetary donations. In this case the budget constraint is

$$X = [w(H^0 - H_1 - H_v) + I](1-t) - D. \tag{A7}$$

One first-order condition is changed:

$$U_D - \mu = 0. \tag{A8}$$

Since the marginal rate of substitution between donations and consumption in this case is unity, the tax has no price effect. The other important change is that the marginal rate of substitution between volunteering and donations becomes $U_v/U_D = (1-t)w$.

In terms of this simple model, it is possible to specify what factors will affect an individual's volunteer effort. The first-order condition in (A5), which applies regardless of the deductibility of donations, can be rewritten as:

$$B_v = (1-t)w, \tag{A9}$$

where $B_v = U_v/\mu$ is the individual's marginal valuation of an hour of volunteer work and the net wage ($(1-t)w$) is the shadow price of time, or the marginal cost of volunteer effort. From this, it is possible to see that volunteer effort will *increase* if *a*) the marginal utility of income falls, *b*) the tax rate increases, *c*) the gross wage falls, or *d*) the marginal utility of volunteering increases.

Figure 4.2 illustrates the analysis for the special case of a separable utility function in which charity is a composite commodity $C(D, H_v)$. Utility is

$$U(X, H_1, C(D, H_v)). \tag{A10}$$

This special case of *(A10)* makes it possible to examine the individual's choice between donations and volunteering given an amount of "full income" (monetary income plus nonworking time) donated to charity. In the absence of a deduction for contributions, the budget set defined by this amount of full income is given by $D + (1-t)w\,H_v = k^0$, where D is again donations, $(1-t)w$ is the net wage or shadow price of time, H_v is hours of volunteering, and k^0 is a constant.