TAXATION, GOVERNMENT EXPENDITURE AND WORK EFFORTS

In this Chapter and in the next two we shall consider the partial effects of taxes and government expenditure on work effort, savings, investment and risk-bearing, which would be followed by a Chapter giving an idea of the general equilibrium effect of the budget.

The net effect of a tax on wage income on work efforts can be broken down into an income effect and a substitution effect. The income effect shows the reaction of the taxpayer to vary his work efforts as a result of the reduction of his income following the payment of the tax. If an individual's marginal utility of income remains constant with the increase or decrease of his net income (i.e., income *minus* tax), then the individual will not obviously feel any urge to work more following the reduction of his income after paying the tax. In other words, in this case there will be no income effect and hence the individual's work efforts will not increase. At the same time, the individual will be inclined to substitute leisure for income, since, compared to the pre-tax position, in the post-tax position there will be an increase in the attractiveness of leisure relatively to income, as now the income which the individual will be able to earn by sacrificing leisure will be sliced off by the amount of the tax. Hence, we may conclude that a proportional income-tax on work efforts with the marginal utility of income constant will definitely decrease work efforts by inducing the taxpayers to substitute leisure for income.

This point may also be put in the following way : Assuming that in the pre-tax equilibrium position the individual's marginal rate of substitution of income for leisure (MS_{il}) was equal to the wage rate (W), defined as the price of leisure over price of income, in the post-tax situation MS_{il} will be greater than W, since the wage rate will be reduced by the income-tax paid, which makes leisure cheaper and income dearer than before. But in the post-tax equilibrium we must have the following condition fulfilled.

$$MS_{il} = W \text{ (net)}.$$

Now, $MS_{il} = \frac{MV_l}{MV_i}$, where MV_l and MV_i stand respectively for the marginal valuation which the individual assigns to leisure and income respectively. Hence, in equilibrium, the following condition must be fulfilled,

$$\frac{MV_l}{MV_i} = W \text{ (net)}.$$

But, as we have already seen, after the levy of the tax and before we reach the equilibrium position

$$\text{MS}_{il} > W \text{ (net)},$$

$$\text{or, } \frac{MV_l}{MV_i} > W \text{ (net)}.$$

Hence, in equilibrium, $\frac{MV_l}{MV_i}$ should be reduced. But as MV_i is constant by assumption, MV_l should be reduced in equilibrium. This condition will be fulfilled when the individual will have more leisure. Thus with MV_i constant, as income-tax will definitely reduce work efforts.

An alternative diagrammatic proof of this is given in Figure 11.1 in which leisure and income are measured on the horizontal and vertical

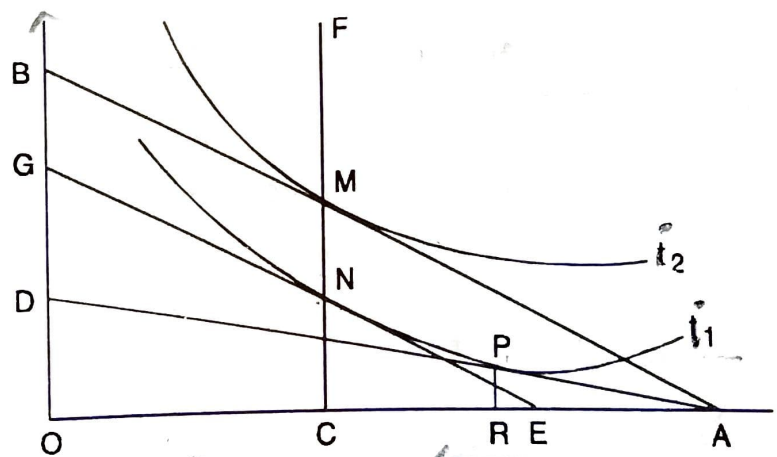
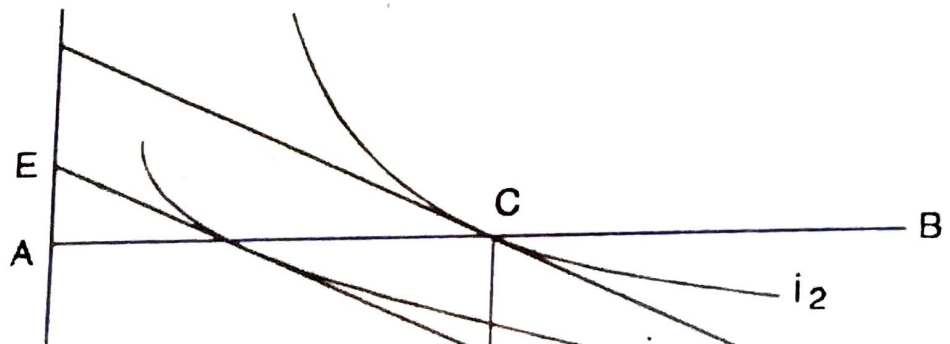


FIGURE 11.1

axis respectively. Suppose AB is the pre-tax wage line of an individual which is tangential to the indifference curve i_2, indicating that the individual's work effort in the pre-tax situation is AC. Now, let a proportional tax be levied on the wage income of the individual at the rate BD/BO so that the wage line swings down to AD. Since it is

assumed that the marginal utility of income is constant, the slopes of the successive indifference curves will remain the same as we proceed upward in the Figure along a straightline, e.g., *CF*. Therefore, the slope of the indifference curve i_2 at *M* (which is measured by *AB*) will be equal to that of the indifference curve i_1 at *N* (which is measured by *EG*). Since the slope of the new (post-tax) wage line *AD* is less than the slope of *EG*, the new wage line will be tangential to the indifference curve i_1 to the right of *N* (and *M*). In the Figure, *P* is the point of tangency, with the result that in the post-tax situation the work effort is reduced to *AR*.

If, next, we allow for the possibility that the marginal utility of income increases as income is reduced by the levy of the tax, then the net effect of the proportional tax on work efforts will be indeterminate. Here we can, however, conceive of two types of situation, namely, the marginal utility of leisure is constant ; and the marginal utility of leisure is not constant. Suppose the marginal utility of income is not constant while that of leisure is constant. Suppose, further, in the pre-tax situation the following equilibrium condition holds, namely, $\frac{MV_l}{MV_i} = W$. now, W, is reduced by the tax, If, as a result the times MV_i increases are equal to the times W decreases, the left-hand side of the equation will continue to be equal to the right-hand side in the post-tax situation also without any further adjustment. Or, the work effort will remain constant. If, however, MV_i increases by times more (or less) than the decrease in W, the left-hand side, after the levy of the tax, will be less (or more) than the right-hand side.



Therefore, to restore the equilibrium, the left-hand side will have to be increased (or decreased). Since MV_l is given, this can be done if MV_i decreases (or increases). This will be so when the individual has more (or less) income. More (or less) income will require more (or less) work effort by him than in the pre-tax situation.

This is illustrated diagrammatically in Figure 11.2. In this case, since the marginal utility from leisure is assumed to be constant, the slopes of the indifference curves, i_2 and i_1 are constant if we proceed in the Figure along a horizontal line —*AB*, e.g., Suppose *C* is the pretax equilibrium. The imposition of a proportional income-tax will make the wage line swing down and its slope will be therefore less than that of *DE*. Suppose the post-tax wage-line is tangential to i_1. If the point of tangency falls on the line *CG*, work effort will not change. However, the tangency point may be either to the left or to the right of the line *CG*; in the former case it will increase, in the latter case it will decrease.

Suppose, finally, that the marginal utility of both income and leisure is not constant. Suppose, further, that in the pre-tax situation the following equilibrium condition holds, namely, $\frac{MV_l}{MV_i} = W$. Now, as before, *W* is reduced by the tax. If, as a result, MV_i increase in equal proportion to the decrease in *W*, there will be no necessity of any further adjustment and the work effort will remain the same. If, however, MV_i, increases proportionately more (or less) than the decrease in *W*, the left-hand side, after the levy, will be less (or more) than the right-hand side. Therefore, to restore the equilibrium, the left-hand side will have to be increased (or decreased). This will happen if MV_l increases (or decreases). MV_l will increase (or decrease) when the individual will have less (or more) leisure, i.e., when the individual's work effort will increase (or decrease).

This is illustrated in Figure 11.3 below where due to varying marginal utility of income and leisure, the slopes of the successive indifference curves rise if one proceeds upward along a straight line and their slopes decline if one proceeds rightward along a straight line. In this case, the levy of a proportional income-tax at the rate of *BE/BO* will have an income effect favourable to work effort (as shown by the point of tengency of i_1 with *DC*) and also a substitution effect favourable to leisure (as shown by the point of tangency of i_1 with *AE*, the post-tax wage line). In other words, the income effect of the tax will encourage persons to work more since the marginal utility of