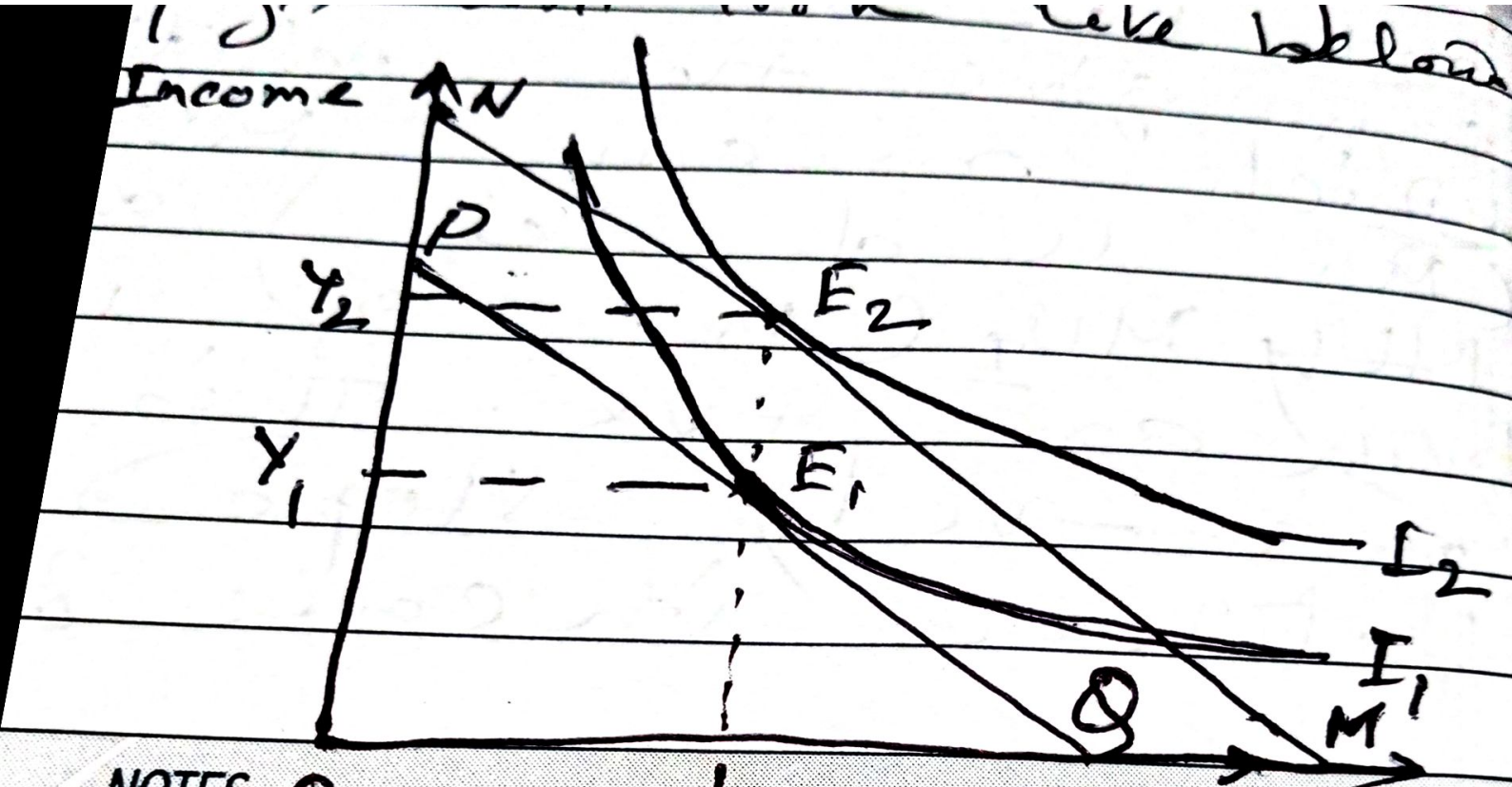
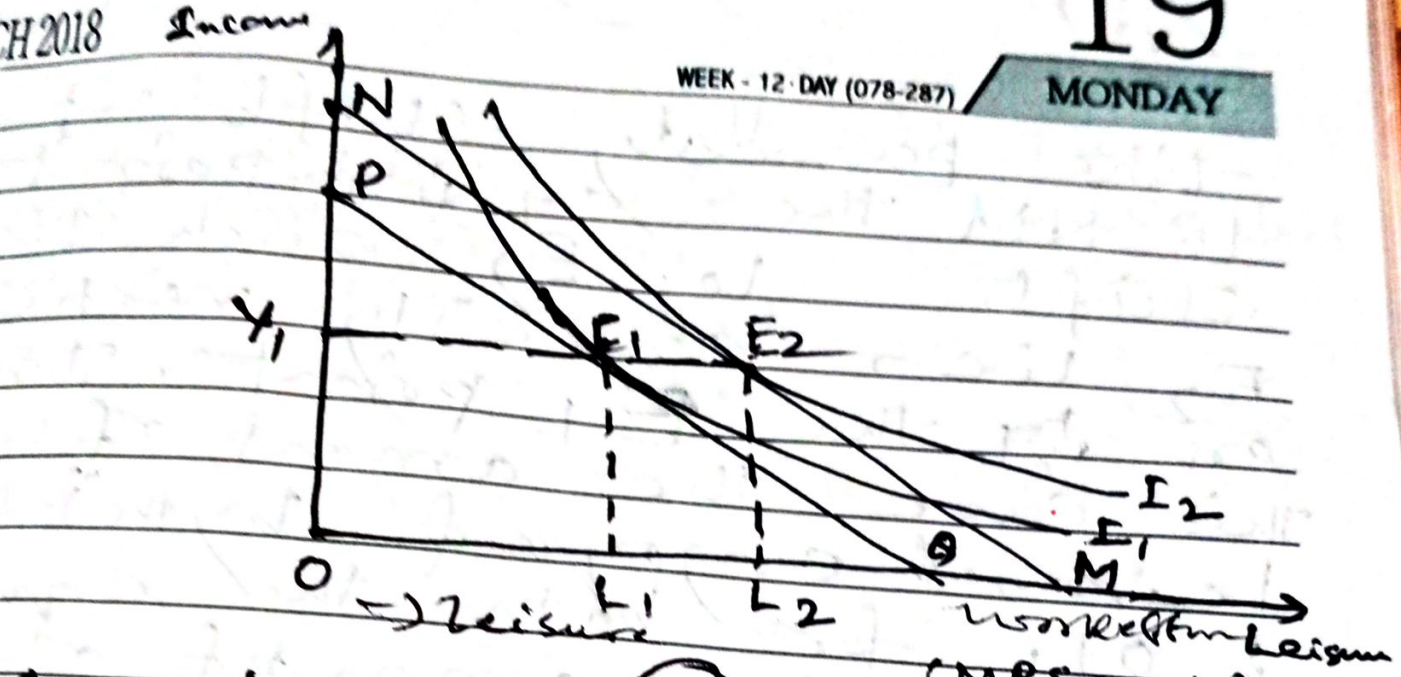
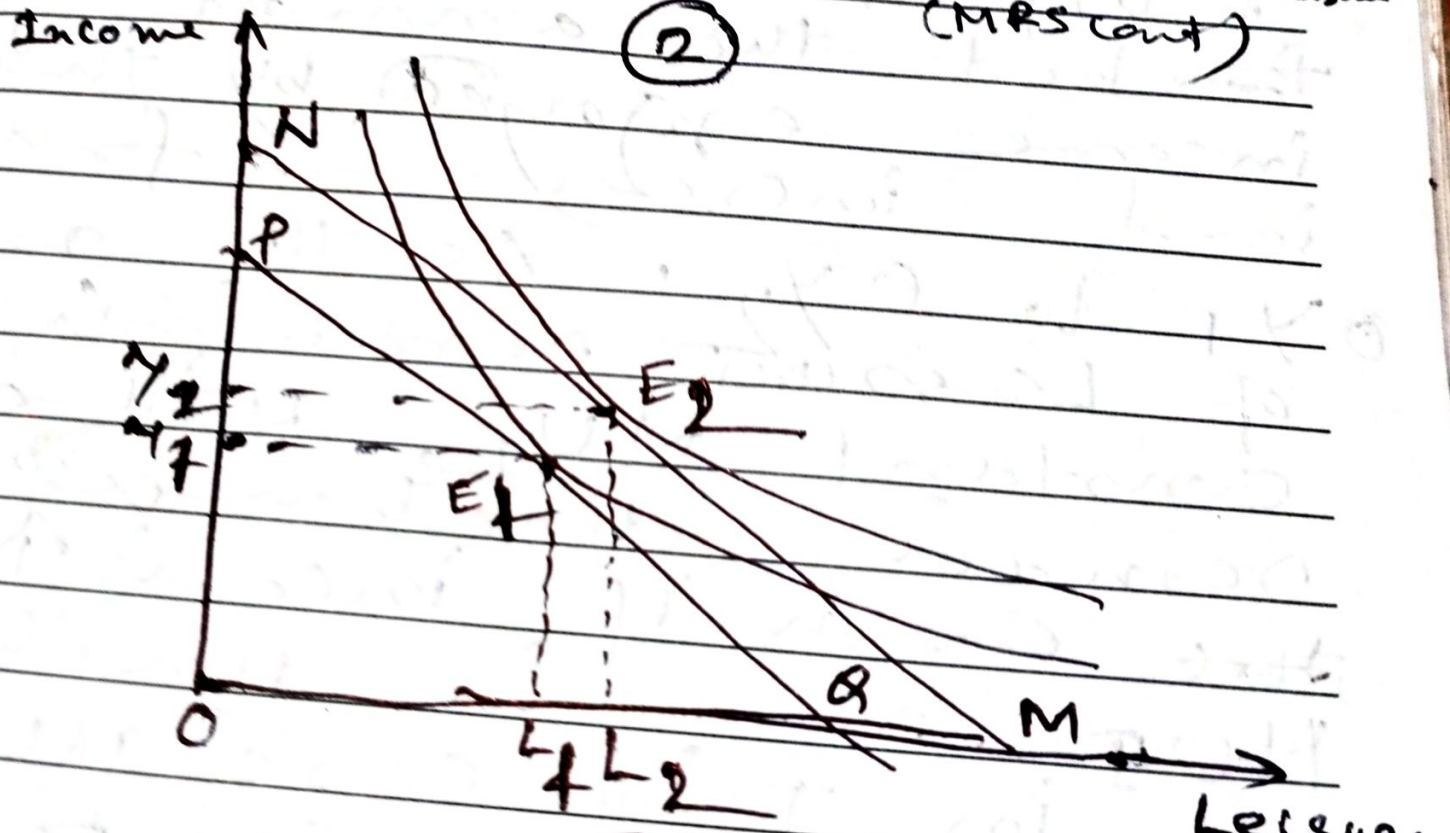


NOTES


Income
N
P
Y_1
E_1
E_2
I_2
I_1
Q
M
O
L_1
L_2
Leisure
Income-Leisure
(MRS Curve)

(2)


Income
N
P
Y_2
Y_1
E_2
E_1
Q
M
O
L_1
L_2
Leisure

(3)

CHAPTER EIGHT

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_{i}^{l}) 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 ;

$$MS_{i\,l} = W \text{ (net)}.$$

Now, $MS_{i\,l} = \frac{MV_l}{MV_i}$, 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

$$MS_{i\,l} > W \text{ (net)},$$

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

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, an income tax will definitely reduce work efforts.

An alternative diagrammatic proof of this is given in Figure 12 in which leisure and income are measured on the horizontal and vertical axis respectively. Suppose AB is the pre-tax wage line of an individual which is tangential to the indifference curve

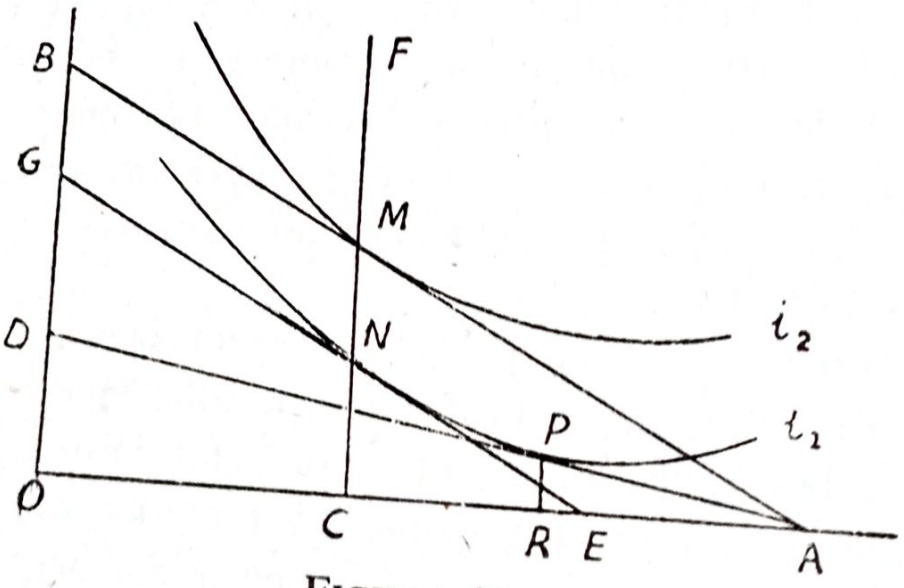


FIGURE 12

i_8, 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 utitity 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 iudividual 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 13. 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 pre-tax equilibrium. The imposition of a proportional income tax will make the wage line swing down and its slope will be therefore less then that of *DE*. Suppose the

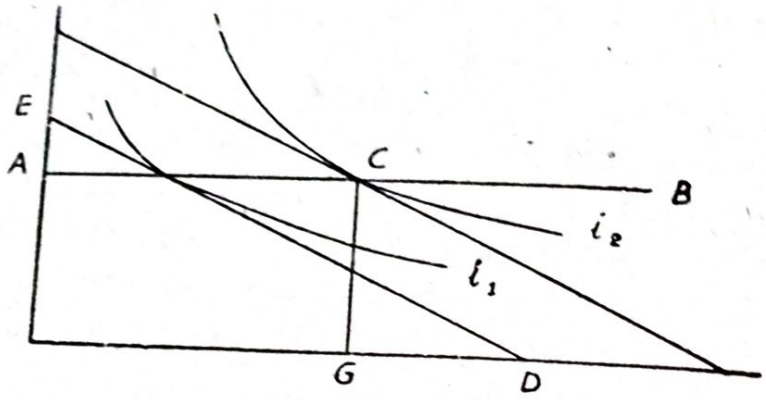


FIGURE 13

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, nemely, $\frac{MV_l}{MV_i} = W$. Now, as before, W is reduced by the tax. If, as a result, MV_i increases 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 lefthand side, after the levy, will be less (or more) than the righthand 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 decrease). MV_l will increase (or decrease) when the individual will have less (or more) leisure, i.e., when the individual's work effect will increase (or decrease).

This is illustrated in Figure 14 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

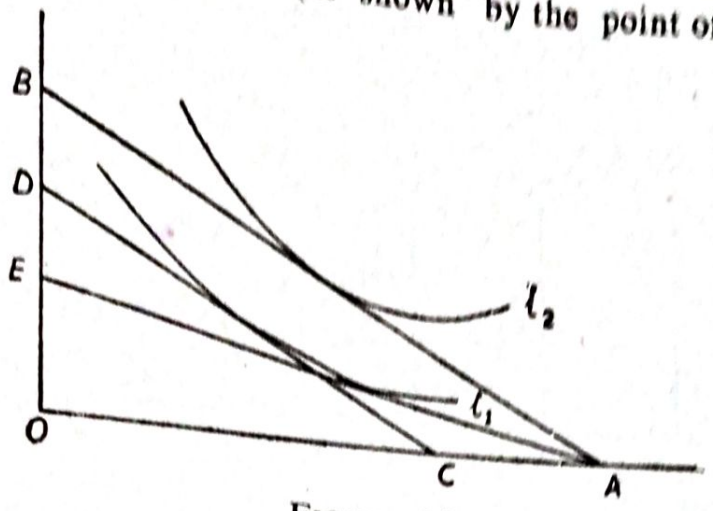


FIGURE 14

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 income in the post-tax situation is greater than in the pre-tax situation. The substitution effect will discourage work effort by reducing the reward for work. The net effect may therefore be either an increase or a decrease in the total work effort.

While we cannot say, with marginal utility of income not constant whether an individual's work effort in the post-tax position will be greater of smaller than in the pre-tax position, we can, however, successfully make a comparison between the effects on work efforts of an equal-yield poll tax, proportional tax and progressive tax. In figure 15, let us suppose that EF is the pre-tax wage line showing the combinations of income and leisure open to a person and A is his initial equlibrium point where the wage line is tangential to his highest possible indifference curve for income and leisure. (The indifference curves are not drawn to simplify the diagram). Initially the person's work effort is therefore KF (equal to the sacrifice of his leisure to earn KA amount of income). Suppose, now, a proportional income tax EG/EO is levied and the wage line swings down to FG and B in his new equilibrium point with work efforts now consequently reduced to LF. Now, if the same amount of tax

revenue is raised by a poll tax instead, the wage line will shift down parallel to *EF* passing through *B*, the *parallel* shifting

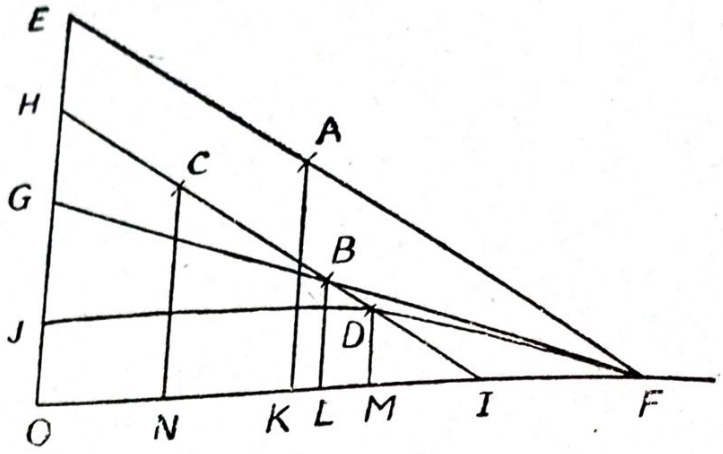


FIGURE 15

being the result of the absence of any substitution effect in the case of poll tax since this tax cannot be avoided, unlike income tax, by substituting leisure for income. In this case the post-tax equilibrium point on the wage line *IH* will be at any point to the left of *B*, say at *C*, and the work effort will be accordingly *NF*. If, thirdly, the same amount is raised by a progressive income tax instead, the wage line will be *FJ* (concave to the horizontal axis showing that with every sacrifice to leisure income increases at a decreasing *rate* since the tax *rate* rises under progressive taxation with every increase in income). The post-tax equilibrium with the same tax yield will now be *D* and work efforts will now be *MF*. Since $NF > LF > MF$ we may certainly conclude that a poll tax has less disincentive effect than an equal-yield proportional tax and a proportional tax has less disincentive effect than an equal-yield progressive tax.

It follows from above that work efforts are reduced more by a progressive tax under which the marginal rate of tax is higher than under an equal-yield proportional tax ; and the greater the rate of progression, the greater is the likely disincentive effect of the tax. We may, therefore, conclude that in a community. if the marginal rate of tax is increased and the average rate of tax is either reduced or kept constant, the community's total work efforts are likely to decrease. If, on the other hand, the average rate of tax is increased with marginal rate constant or decreased,

the community work efforts are likely to increase. So far as work efforts are concerned, the community is likely to be more sensitive to the edge of the marginal tax (i.e., the rate of progression of the tax) than to the level of the tax as such.

This conclusion may be helpful for studying the effect of, e.g., the replacement of a proportional income tax by an equal-yield progressive tax on the work efforts *of the group*. Thus

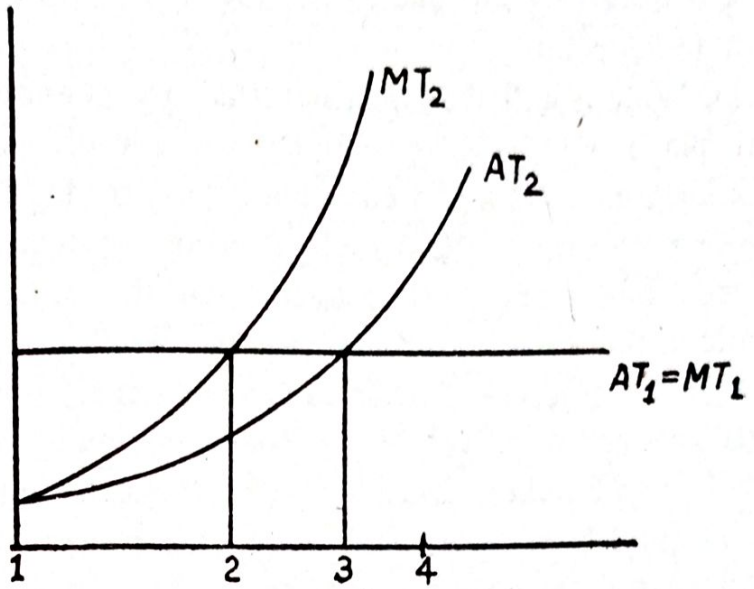


FIGURE 16

in Figure 16, where income groups and tax rates are shown respectively on the horizontal and vertical axis, suppose a proportional income tax structure is replaced by a progressive one, with the result that the horizontial average and marginal tax

Income Group	*Tax Rate in two Periods*	*Effect on Work Efforts*	*Net Result on Work Efforts*
1 to less than 2	$AT_2 < AT_1$ $MT_2 < MT_1$	↓ ↓	?
2	$AT_2 < AT_1$ $MT_2 = MT_1$	↓ →	↓
Above 2 to less than 3	$AT_2 < AT_1$ $MT_2 > MT_1$	↓ ↓	↓
3	$AT_2 = AT_1$ $MT_2 > MT_1$	→ ↓	↓
Above 3 to (say) 4	$AT_2 > AT_1$ $MT_2 > MT_1$	↑ ↓	?

rate line of period one ($AT_1 = MT_1$) becomes upward-sloping

in period two (AT_2, MT_2). Now, from the conclusions of the last paragraph we can write that $W.E = f(AT/MT)$, i.e., work efforts ($W.E.$) vary directly with the average rate of tax (AT) and inversely with the marginal rate of tax (MT). Hence, the effect of the replacement of a proportional tax system by a progressive one on the work efforts of the different income groups may be shown in the Table in p. 97 (The symbols ↑, →, ↓ and ? in the Table stand respectively for 'increase', 'constant', 'decrease' and 'indeterminate net result').

From the Table it will be apparent that we cannot say on theoretical plane as to how the community as a whole will adjust its work efforts under the circumstances assumed. This will depend, among others, on the structure of tax system hitherto prevailing and the one newly introduced and the concentration of the people in the various income groups. What can only be said is that if the structure of taxation is made steeply progressive and if there is a comparatively large concentration of people in the higher income brackets, work efforts of the community as a whole are likely to be adversely affected once a proportional tax system is supplanted by a progeessive one.

The above discussion requires to be supplemented by a consideration of the following additional points:

(*i*) Though the average workers have little control over their working hours, there is considerable scope of adjustments of work efforts following the leavy of an income tax by varying overtime worked, absenteeism and the amount of work done in addition to the regular jobs. Further, professional men, farmers, operators of small business, etc. have considerable scope of adjustment of work efforts.

(*ii*) Though there is little evidence to show that taxes reduce work incentives at the executives level, high marginal tax rates do reduce business mobility of executives. In other words, work efforts should not be looked upon as a homogeneous entity having no qualitative dimensions. They do have a qualitative dimension and the effect of taxes on the quality of the labour supply may sometimes be more significant from the viewpoint of the community than its mere quantity.

(*iii*) Notwithstanding the uncertainty of an income tax on the total supply of labour, the tax may have significant effect on

the supply of particular types of labour. Since, for example, the cost of training and education is not deductible from the tax base, a tax on professional income the earning of which requires long, expensive training may have an adverse effect of the incentive to take such training and thus reduce the supply of these particular types of professional men.

(*iv*) A reduction in the exemption of income tax is likely to increase work efforts since it cuts into the existing living standard which workers are likely to make good of by extra hours of work.

(*v*) If incomes are rising rapidly when the tax is introduced so that the old living standard can be maintained despite the tax, the tax is likely to discourage work efforts; *vice versa* when incomes are falling.

(*vi*) Empirical studies in Britain have confirmed that income tax has no great disincentive effect on work efforts. Fixed commitments, a strong desire amongst people to maintain the existing living standards and fondness for work played a part in minimising the effects of taxation.

(*vii*) In addition to income and substitution effects, taxes may and do have two more effects, namely, status effect and spite effect. The imposition of a tax may adversely affect the status of a particular individual or group of individuals by reducing their economic position *vis-a-vis* other individuals or groups. This may induce the former individual or group to increase their work efforts to regain the lost status. A tax may, however, give offence to the individuals affected and induce them to hit back the government by reducing their work efforts and thus spoil the government's revenue raising programme. This is called the spite effect of the tax.

A tax on income from previously accumulated capital is likely to increase work efforts. This would be so because such a tax would not have any substitution effect since the assessees cannot avoid the tax by absenting from accumulating the capital and thus earning the income *now*. The tax would, however, have an income effect if the marginal utility of income of the individuals rises an income falls with the payment of the tax and this would induce the individuals to earn more and hence work more in the

tax that portion of the income designated by S in the Figure will be exempt from tax, so that the new post-expenditure-tax wage line will have to originate from M and will also have to cut the equal-yield line, i.e., GF in such a manner that the former line becomes tangential to an indifference curve. Given the usual characteristics of the indifference curves, the post expenditure tax wage line will cut the equal-yield line necessarily at a point to the right of L, say, at M, with work effort being AE. Since $AT > AE$, expenditure tax in this case will have more disincentive effect than an equal-yield income tax.

A general conclusion which follows from this is that for an individual (as also for a community) the greater the fixity of consumption and the variability of saving, the greater is the possibility that income-tax will have more disincentive effect than an equal-yield expenditure tax; and the greater the fixity of saving and variability of consumption, the greater is the possibility that expenditure tax will have more disincentive effect than an equal-yield income-tax. On theoretical plane, perhaps nothing more specific can be said on this point.

In a community where the principal objective of a tax system is mitigation of business cycles, one would consider the question of superiority of one tax over another in regard to their effects on work efforts not on the basis that the yields from the alternative taxes should be equal but on the basis of their respective capacity to realise the objective of checking the upswings and downswings. If the basis of comparison is thus altered, the consumption tax almost certainly gets more marks than income-tax (with positive savings). This is so because under an income-tax a part of the tax is generally paid out of savings and this part has therefore no effect in checking the upswings or downswings, whereas under a consumption tax the whole of the tax is paid out of consumption. As a result, the same objective of mitigating the upswing or downswing may be realised by a lower-rate and lower-yield consumption tax than income-tax. Hence in this case the substitution effect of a tax on consumption for leisure and hence against work efforts would be less than that of an income-tax.

The disincentive effect of a death duty (which may be treated as a kind of deferred income-tax) is likely to be less than that of an equal-yield income-tax. This is so since the tax payers are

generally less concerned with the pinch of the tax on their heirs than on themselves and, as a result, the substitution effect against work efforts of death duty is generally smaller than that of an equal-yield income-tax. A direct corollary of this is that a death duty in a community with a larger percentage of the population in the higher age groups is likely to have a more disincentive effect than in a community with a smaller percentage of the population in the higher age groups. A further corollary of this is that a death duty is likely to have a more disincentive effect in an advanced economy where birth rates and death rates are low and consequently there is a greater concentration of the population in the higher age groups than in a developing underdeveloped economy where birth rates are high without a corresponding decrease in death rates and, as a result, there is a greater concentration of the population in the lower age groups.

A study of the effects of budget policy, as contrasted to taxation policy, on work efforts should consider not only the taxation side of the budget but also its transfer and expenditure sides. But here also we are confronted with a large number of possibilities. If the income transfer is lumpsum to individuals (which may be looked upon as negative poll tax), then there would be no substitution effect but only income effect which would tend to decrease work efforts. If, however, the transfer is proportional or progressive (which may again be taken as negative proportional or progressive taxes) the income effect of the transfer payment would discourage people to work since they would now be able to maintain their existing living standard by less work income, the substitution effect will encourage them to work more by increasing the reward for work since transfer payment would now supplement the wage payment ; the net effect may therefore go in either direction.

The government expenditures which increase the supply of goods that are complementary to leisure are likely to decrease work efforts, while those rival to leisure are likely to increase work efforts. Again, the goods provided by the government through the budget (i.e., the social goods) may be either complementary or rival to private goods. If the social goods are complementary to private goods and private goods are rival to leisure, work efforts are likely to increase. If, on the other hand, social

goods are substitutes of private goods or private goods are complementary to leisure, work efforts are likely to decrease.

Considering all the manifold possibilities of taxes, transfer payments and governments expenditures we may finally conclude that a modern budget is not likely to decrease work efforts, it may actually increase such efforts. This conclusion is based on the following hypotheses :

(i) Since the governments are now aware of the fact that a very steeply progressive tax structure very much discourages work incentives, the edge of the progression of income-tax, if not actually reduced, is not at least likely to be increased any further.

(ii) The government expenditures would more and more be made on social goods proper which are not rival but complementary to private goods. This would tend to increase work efforts, for a larger amount of social goods would now stimulate a desire to have more private goods and hence to earn more income.

(iii) The huge increase in government expenditure is recent years on education, health and similar programmes may increase labour productivity. This is likely not only to increase the supply of labour but also to improve its quality.