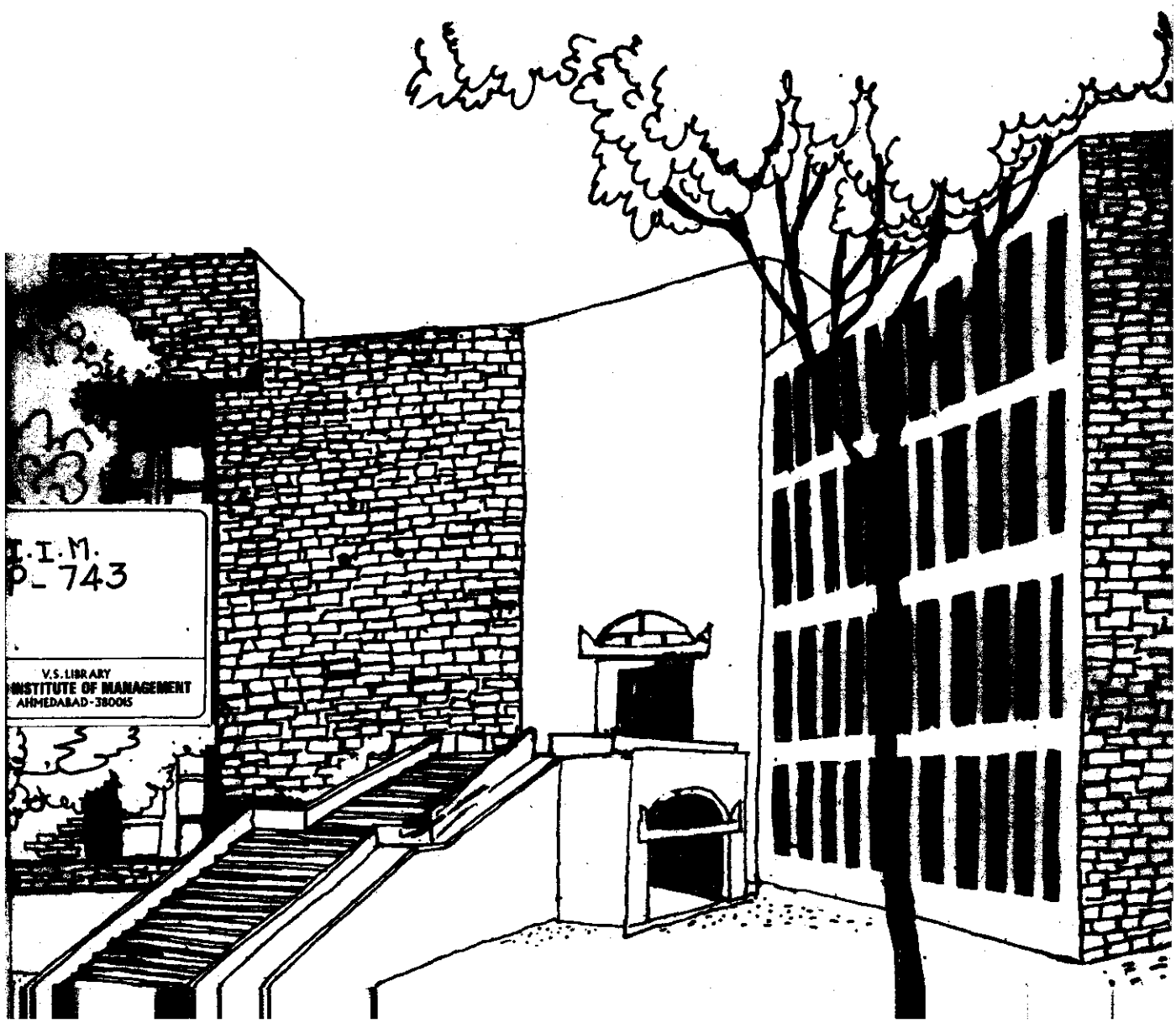
विद्याविनियोगाधिकारः
IIM
AHMEDABAD

Working Paper



DISTRIBUTIONAL IMPACT OF GOVERNMENT EXPENDITURE - A WELFARE INDICATOR APPROACH

By

Archana R. Dholakia

&

Ravindra H. Dholakia

W P No. 744
May, 1988

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD-380015
INDIA

DISTRIBUTIONAL IMPACT OF GOVERNMENT EXPENDITURE - A WELFARE INDICATOR APPROACH

by Archana R. Dholakia
and
Ravindra H. Dholakia

Abstract

Existing approaches and empirical estimation of distributional impact of government expenditure so far have been heavily dependent on several restrictive assumptions which are questionable particularly for the developing countries where phenomena of externalities and indivisibilities play a vital role. Such approaches can, therefore, seriously distort not only the evaluation of government expenditure policies but also their future directions. In the present paper we develop a simple model based on a new welfare indicator approach. Such an approach avoids almost all the restrictive unrealistic assumptions of the earlier approaches. Our approach considers basic welfare which is the minimum desired welfare level rather than the total achievable welfare level of the population. The theoretical framework developed in the present paper is also extended to analyse the government expenditure policy questions if the empirical estimates based on our approach are available for the economy.

DISTRIBUTIONAL IMPACT OF GOVERNMENT EXPENDITURE - A WELFARE INDICATOR APPROACH

by Archana R. Dholakia*
and
Ravindra H. Dholakia**

I. Background

Unlike tax incidence studies, there exists a lot of controversy over not only the measurement, but also the meaning of expenditure incidence. Musgrave et al. (1974) and Meerman (1978) define expenditure incidence as the total change in the distribution of household income including publicly provided goods and services due to government. According to Mclure (1972 and 1974), incidence on spending side can be divided into two components : (i) expenditure incidence - which deals with income distribution effects of the governmend expenditure, and (ii) benefit incidence which asks a question as to who benefits from government expenditure. Wulf (1981) however, classified various alternative approaches to measure the incidence of government expenditure into four broad categories : (a) Impact Incidence Approach in which the value of benefits is assumed to be exactly equal to the

---

*Visiting Faculty, BK School of Management, Ahmedabad

**Chairman, Economics Area, IIM, Ahmedabad.

magnitude of government expenditure and then distributed among the direct recipients of the salaries, wages, pension, etc. from the government. (b) 'On whose behalf government spends' Approach which is quite symmetrical to usual tax incidence studies. Here the accounting identity of benefits being equal to expenditure is still maintained and then these benefits are allocated among the assumed recipients of the government supplied services through various allocation formulae. A number of empirical studies have proceeded on this line as discussed by Wulf (1975, 1981) and A.R. Dholakia (1987). (c) Benefit Incidence Approach which proposes to measure the benefits from fiscal expenditure by considering the demand side of the services also. Very few scholars have attempted to analyse the impact of fiscal expenditure in this way. Those who have done, did so in the context of either project analysis or pure public goods by applying Lindhal's voluntary exchange model (See, Aaron and McGuire, 1970 and Brennan, 1976). However, the operational value of this model is quite limited due to a string of unrealistic simplifying assumptions. Moreover, for empirical exercise even this model could not dispense with the assumption of the equality of benefits to costs. (d) Expenditure Incidence Approach (Meerman, 1978) which addresses the question as to how the income distribution has changed as a

result of government expenditure. It is based on a general equilibrium framework within which changes in all macro aggregates like relative prices, output, production techniques and level of employment due to change in government expenditure are considered. This approach has, however, been hardly operationalised because of its gigantic data requirements. The developing economies, at least, cannot consider it as an effective alternative in near future.

The empirical estimation of the distributional impact of government expenditure has, thus, been heavily dependent on the assumption of equality of benefits to cost of production of the services supplied by the government. It is a valid question whether such studies make any sense particularly for the developing economies because this assumption hides many other assumptions which are more unrealistic in the case of developing economies. For example, the required implicit assumptions would include : (i) no leakage from the government expenditures, (ii) no problems of oversupply and undersupply of public goods, (iii) most effective and efficient production of public goods, etc. As it is pointed out in various studies (Wulf, 1975 and 1981, A.R. Dholakia, 1987), these are precisely the assumptions which do not hold for the Less Developed Countries (LDCs). Moreover, it can be argued that the assumption of equality of benefits and costs has inherent pro-poor bias. Such measures also

ignore the problems of benefit shifting and indirect benefits which are sizeable in certain types of fiscal expenditures. All these put together can seriously distort not only the evaluation of government expenditure policies but also their future directions.

A new approach to measure the distributional impact of government expenditure is, therefore, urgently required. Such an approach should avoid all the restrictive unrealistic assumptions of the earlier approaches, particularly the one of equality between benefits and costs of the government supplied services. It should ask a question as to what actually happens to people in terms of their level of living and certain basic qualities of life as a result of government expenditure. Moreover, unlike the earlier approaches, it should measure the welfare in real or utility terms rather than in the monetary terms. Based on such considerations, in the present paper, we develop a theoretical framework for the government expenditure policy analysis which would result in the Welfare Indicator Approach. Such an approach would be most applicable in the case of LDCs where the primary objectives of the government are (1) to remove mass poverty and severe destitution, and (2) to meet the minimum needs of the populace in terms of education, health-care, drinking water, housing, sanitation, etc. Our approach is

based on the concept of basic minimum welfare rather than the total achievable welfare in the nation. In the next section, we make an attempt to derive our Welfare Indicator Approach from the generally accepted framework of welfare theory.

II. The Framework for Identification of Welfare Indicators

A theoretical framework to derive our approach is necessary to formulate the criteria for selecting different indicators on the one hand and decide on the specification of an empirical model and methods of measurement of variables involved on the other hand. We begin by considering the standard 2 x 2 model as a reference for the theoretical structure. Thus, we divide the whole economy into two groups of individuals : the poor (A) and the non-poor (B). Similarly we consider only two commodities : the basic commodity (X) and the non-basic commodity (Y). For equilibrium in this framework, we must have a well-defined and well-behaved social welfare (W) function :

$$w = W(u, v) \qquad (1)$$

$$u = U(x, y) \qquad (2)$$

$$v = V(x, y) \qquad (3)$$

where u and v are the total utility functions of individuals A and B respectively.

It is clear from the three equations above that total welfare (W) is dependent on the consumption of the two commodities X and Y.

$$\therefore \quad \partial w/\partial x = W_u \cdot U_x + W_v \cdot V_x \qquad (4)$$

$$\partial w/\partial y = W_u \cdot U_y + W_v \cdot V_y \qquad (5)$$

$$\text{and} \quad dw = (\partial w/\partial x)\ dx + (\partial w/\partial y)\ dy \qquad (6)$$

where dw, dx and dy represent changes in total welfare, basic commodity (X) and non-basic commodity (Y) respectively. Similarly $(\partial w/\partial x)$ and $(\partial w/\partial y)$ represent the marginal welfare gains or additional total welfare generated in the economy by a unit increase in the commodity (x or y) in question other things remaining the same.

Since our objective is to examine the distribution and welfare implications of the government expenditures only, we are not interested in the total change in the welfare of the society over a given period of time. If we identify commodity X as that commodity which is directly affected by the government expenditures and commodity Y as the one which is not directly affected by the government expenditures, we can say that the welfare change in which we are interested is not the one given by equation (6) but only the part of it attributable to the change in the basic commodity. In

other words, our welfare measure requires dy=o in equation (6). Thus,

$$dw' = (\partial w/\partial x)\, dx \qquad (7)$$

where dw' refers to the change in the basic welfare due only to the change in the basic commodity.

Using equation (4), equation (7) can be rewritten as:

$$dw' = (W_u.U_x + W_v.V_x)\, dx \qquad (8)$$

From equation (8) we can deduce that dw' and dx are directly and proportionately related if we assume that (i) W_u and W_v being the weights used in the social welfare function can be taken as constants over the planning horizon; and (ii) U_x abd V_x being the marginal utilities of X for the poor and non-poor respectively, can be considered as constants for the given initial amounts of consumption of X by the corresponding two groups. Similarly, considering the expressed policy concerns and planning goals of reducing disparities and alleviating poverty in LDCs, we can infer that the weight attached to the utility gain of the poor (W_u) would be much more than the weight attached to the utility gain of the rich (W_v) in our social welfare function. Therefore, if we want to consider the distribution effect simultaneously with the welfare implication of the government expenditure, we should define our basic commodity X in such a way as to make U_x always

greater than V_x*[1]. In other words, we should select our commodity definition of X in such a way that X becomes basic necessities whose consumption levels are by definition higher (or satiating) among the rich as compared to the poor - so that the marginal utility of the so-defined commodity X is always lower (almost zero) for the rich than for the poor. This is because, if U_x is greater than V_x, given that W_u is greater than W_v, definite distribution implications can be derived from equation (8) above. An increase in the basic commodity (X) in the economy under such conditions would necessarily lead to an increased share of the poor in the total basic welfare in the society. A decrease in the level of X similarly would result in the decreased share of the poor in the total basic welfare. To summarise then, we must define our X so as to fulfil basically the following two criteria : (i) X should be directly affected by the government expenditures and (ii) X should be such that its marginal utility should be higher for the poor and lower (almost zero) for the rich. Keeping these two criteria in mind, we can decompose X into three broad categories : (a) medical care and health, (b) basic literacy, and (c) food, nutrition and

---

*1. Such a statement may imply that we are making interpersonal utility comparison. Although broadly speaking this is true, we do not require any cardinal property for such comparison. Mere ordinal comparisons are sufficient for our purpose.

other minimum requirements. All of these items have a very high marginal utility to the poor, at least from the viewpoint of the government's commitment. In LDCs the major role of the government is envisaged to adequately increase the consumption of these items through various direct and indirect as well as monetary and non-monetary measures. It is possible, therefore, to develop appropriate indicators to measure X.

Moreover, we should note that equation (8) also implies that dw' and dx are directly and proportionately related. Thus, whatever measures dx would also measure dw'.

III. Interrelationship Between dw' and dw

At this stage, it is important to see the interrelationship between our concept of the change in basic welfare due only to the change in the basic commodity X (i.e. dw') and the traditional concept of the change in total welfare (i.e. dw). In order to carry out such a comparison more meaningfully, we may note at the outset that the poor in LDCs are living in such a destitution that even their basic needs are not adequately satisfied. We may, therefore, not be unjustified in assuming that non-basic commodity Y is almost out of their reach. Thus, the equation (5) becomes :

$$w/\ y = W_v V_y \qquad (9)$$

Under such conditions, any improvement in Y would result in increasing the share of the rich in the total welfare other things remaining the same. On the other hand, as we have noted, with appropriate definition of X, any improvement in X would result in the increase in the share of the poor in the total basic welfare of society, other things remaining the same. Therefore, when we consider the total change in the system over time, various possibilities would arise : (i) both dX and dY are positive; (ii) both dX and dY, are negative; (iii) dX is negative and dY is positive and (iv) dX is positive and dY is negative.

Out of these four situations, it is clear that situation 1 in relationto the initial situation O represents a clear improvement in both the basic welfare and the total welfare. Similarly situation 2 in relation to the initial situation O represents deterioration in both the basic welfare as well as the total welfare. In the remaining two situations, viz. situations 3 and 4 as compared to the initial situation O, the change in the total welfare is uncertain since they involve improvement of one group and deterioration of the other in terms of welfare. The uncertainty arises because the weights for the utility changes of the two groups in the social welfare function are not specified, so also the extent of gain and loss in individual utilities of the two groups. However, in terms of our concept of basic welfare,

Situation 3 in relation to situation O represents deterioration and situation 4 represents an improvement. Thus, in terms of our concept of the basic welfare none of the four situations presented above creates any uncertainty of outcome. This might alternatively be interpreted to mean that our concept of basic welfare can be derived from the traditional concept of total welfare by choosing nearly unity as the weight for the welfare change of the poor in the social welfare function.

IV. Functional Relationship Between Government Effort (G) and Basic Commodity (X)

Having defined our basic commodity X on the basis of criteria to identify X, derived from our basic framework, we may now proceed to investigate the basic determinants of X in the system. As we have defined X, it is clear that its level at a given point of time depends on the total effort put in by the government in the past up to the given point of time and also on other factors like geophysical environment including the availability of water and weather conditions as well as socio-cultural-demographic and attitudinal factors in the system. This is evident because, the three aspects included in our definition of X, viz., health, education and nutrition etc., are largely the matters of social consumption which, in turn, get affected by the government efforts in these directions,

besides the various physical, locational and socio-cultural environmental factors. The latter category of factors primarily determine the level of the basic relationship between the government effort and the quantity of basic commodity X. To draw a similarity of such a function with the familiar production functions in economic theory, we might say that the category of factors like physical-locational and socio-cultural environment define the nature and level of technology, while the government efforts can be considered as equivalent to inputs for the given quantity of basic commodity X as the output. We may now present the postulated functional relationship symbolically.

$$X_t = F\ (G_t,\ Z_{1t},\ Z_{2t},\ \ldots\ldots\ Z_{nt}\ ) \qquad (10)$$

where X_t is the level of basic commodity X at time t.

G_t is the cumulative stock of government effort upto time t. Z_{1t}, Z_{2t}...Z_{nt} are various geographic, locational, physical environmental and socio-cultural-attitudinal factors at time t.

From equation (1), it can be seen that it is empirically a very difficult proposition (i) to clearly identify various determinants of X, (ii) having identified the determinants, to measure them in quantitative terms and (iii) to get appropriate functional form to fit the data which are

available neither over a long time series nor across sufficient number of regional units. Moreover, as it is clear from our definition of G in equation (10)above, to fit equation (10)empirically, we would require estimation of the accumulated stock of government efforts upto the time t. This in itself is a herculian task and probably too ambitious to be accomplished satisfactorily in any economy. On the other hand, our interest is not in the level of this basic relationship as described in equation (10)

From the point of view of effective government intervention through well defined policy changes based on the right choice of strategies, the crucial variables are necessarily defined in terms of flow aggregates rather than the stock of government effort. In other words, from the point of view of policy, the government would be controlling the flow of annual expenditure to effect changes in its cumulative stocks over time. The current annual expenditure by government can be viewed as the time derivative of the stock aggregate G. This requires us to consider our model in terms of the first derivative of equation (10)with respect to time :

$$\dot{X}_t = F'_G \cdot \dot{G}_t + F'_{Z1} \cdot \dot{Z}_{1t} + F'_{Z2} \cdot \dot{Z}_{2t} + \ldots + F'_{Zn} \cdot \dot{Z}_{nt} \qquad (11)$$

where F' with different suffix represents the partial deri-

vative of the function F (...) with respect to the letter denoted by the suffix; and a dot over the letter represents as usual the time derivative of the variable. If we assume only the annual changes in different variables under consideration, we are not likely to find considerable or significant changes in the physical, locational and socio-cultural environmental factors - $Z_{1t} \ldots Z_{nt}$ implying either zero or negligible values of $\dot{Z}_{1t}$, $\dot{Z}_{2t} \ldots \dot{Z}_{nt}$. We may therefore, be justified in ignoring these values and simplifying the equation (11) as :

$$\dot{X}_t = F'_G \cdot \dot{G}_t = f(\dot{G}_t) \qquad (12)$$

It should be noted here that such a simplification is valid only when we are studying the changes in the aggregates over relatively a shorter period of time when we can justifiably ignore the changes in $Z_{1t} \ldots Z_{nt}$. Over relatively longer periods of time, however, the changes in environmental factors - $Z_{1t} \ldots Z_{nt}$, are likely to assume significant dimensions and hence, equation (12) needs modification. A careful examination of equation (11) clearly indicates the type of modification required in equation (12) if relatively longer period of time is considered for the application of equation (12) Thus, when $\dot{Z}_{1t} \ldots \dot{Z}_{nt}$ are significant, the level of relationship between $\dot{X}_t$ and $\dot{G}_t$ as described by equation (12) is likely to shift over time depending on the net

effects of changes in the environmental factors. The level of the relationship can change either because the intercept changes or because the slope parameter changes. It is clear from equation (11)that the levels of environmental factor $Z_{1t} \ldots Z_{nt}$ enter not only as the determinant of the intercept of the relationship but also the slope of the relationship between $\dot{X}_t$ and $\dot{G}_t$ as described by equation (12). Thus, it is an empirically testable proposition whether environmental factors have played any significant role in the net or in the ultimate sense to significantly affect the level of the relationship as described in equation (11) over time.

V. Interpreting the Coefficients

Having established the primary functional relationship for empirical testing in equation (12), we should now examine how we can interpret the slope and the intercept of this function. The intercept of the function would represent the autonomous rate of change in the quantity of basic commodity X, reflecting the direction and magnitude of interplay of various factors in the private economy. The intercept, in other words, represent the annual change in X_t independent of the changes in government efforts.

As far as the slope of the function as defined in equation (12)is concerned, we might proceed as follows:

$$\therefore \dot{X}_t = F'_G \cdot \dot{G}_t \qquad (12)$$

Differentiating both the sides with respect to t,

$$d\dot{X}_t/dt = d^2X_t/dt^2$$

$$= F'_G\,(d^2G_t/dt^2) + (\dot{G}_t)\,(F''_{GG}.\dot{G}_t + F''_{Z1G}.\dot{Z}_{1t} + \ldots + F''_{ZnG}.\dot{Z}_{nt})$$

$$\therefore d^2X_t/dt^2 = F'_G\,(d^2G_t/dt^2) + F''_{GG}(dG_t/dt)^2 \qquad (13)$$

Since $\dot{Z}_{1t} = \dot{Z}_{2t} = \ldots = \dot{Z}_{nt} = 0$ by assumption.

If we assume further that $\dot{G}_t$ remains constant over time under consideration, i.e. $d^2G_t/dt^2 = 0$, we may simplify the equation (13)as :

$$d^2X_t/dt^2 = F''_{GG}(dG_t^2/dt^2)$$

$$\therefore d^2X_t/dG_t^2 = F''_{GG} \qquad (14)$$

However, d^2X_t/dG_t^2 can also be represented as the first derivative of the function in our equation (12) i.e.

$$d\dot{X}/d\dot{G}_t = d^2X_t/dG_t^2$$

$$\therefore d\dot{X}_t/d\dot{G}_t = F''_{GG} \text{ using equation (14)}$$

From this derivation, it is clear that if we measure our variable $\dot{G}_t$ appropriately to ensure that $d^2G_t/d_t^2 = 0$, then, we can interpret the slope of our primary function

in equation (12)as the second order direct partial derivative of the fundamental functional relationship between X_t and G_t. As it is wellknown, in the tradition of usual production function frame, the second order partial derivative of output (X) with respect to inputs (G_t) is interpreted as showing the direction of the marginal returns to the basic inputs. In our case, therefore, the slope of our function as described in equation (12)can be interpreted as showing the direction of marginal returns to the government efforts. If the slope is positive, it implies increasing marginal returns to the government efforts; if the slope is negative, it implies diminishing marginal returns to government effort; and if the slope is zero, it implies constant marginal returns to government efforts. Thus, if our interest is in testing the direction of the marginal returns to government efforts through equation (12), the most appropriate functional form for equation (12)could be a linear one since the linear form which implies constancy of the slope is the most suited form to test the null hypothesis of constant marginal returns to government efforts with the well defined alternative hypotheses of increasing/decreasing marginal returns to government efforts. It may finally be noted in the context of interpreting our functional relationship described in equation (12) that we cannot explicitly test the sign or the magnitude of the marginal returns to the government efforts. It is

assumed to have the expected sign and a level which is determined by host of factors as described in equation (10).

VI. Policy Implications

In order to discuss the policy implications of our model in greater detail, we need to first spell out clearly the options before the policy makers within the framework. Holding all other factors totally exogenous to our model constant, we get the following simple production function in the basic welfare level (X) and government efforts in different directions (G_1 and G_2) :

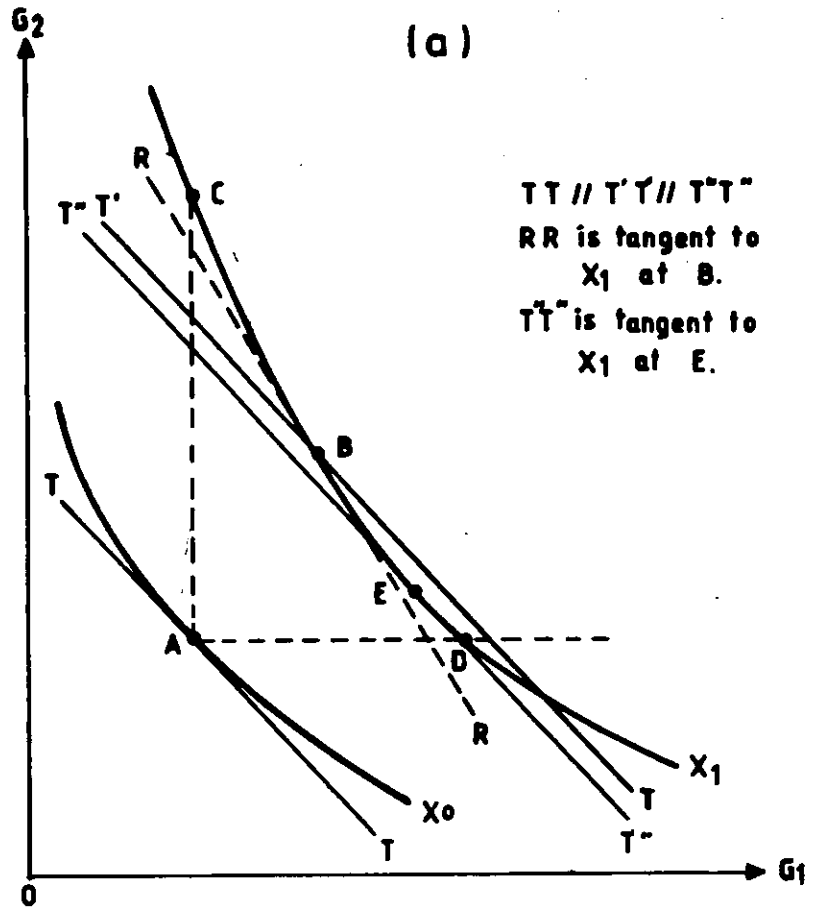
$$X = f(G_1, G_2)$$

At any given point of time on the above function, the values would exactly correspond. In other words, if we consider Diagram 1, on the $G_2O\ G_1$ plane the situation at any given point of time would be represented by a point like A. G_1 and G_2 represent cumulative government effort in directions 1 and 2. Since the point A is lying within the positive quadrant of $G_2O\ G_1$ plane, it must necessarily lie on some insoquant like X_o. The planner would face a target to achieve a higher level of basic welfare like X_1 over a given period of time.*2 The basic question is how to achieve X_1 with the help of G_1 and G_2. That G_1 and/or

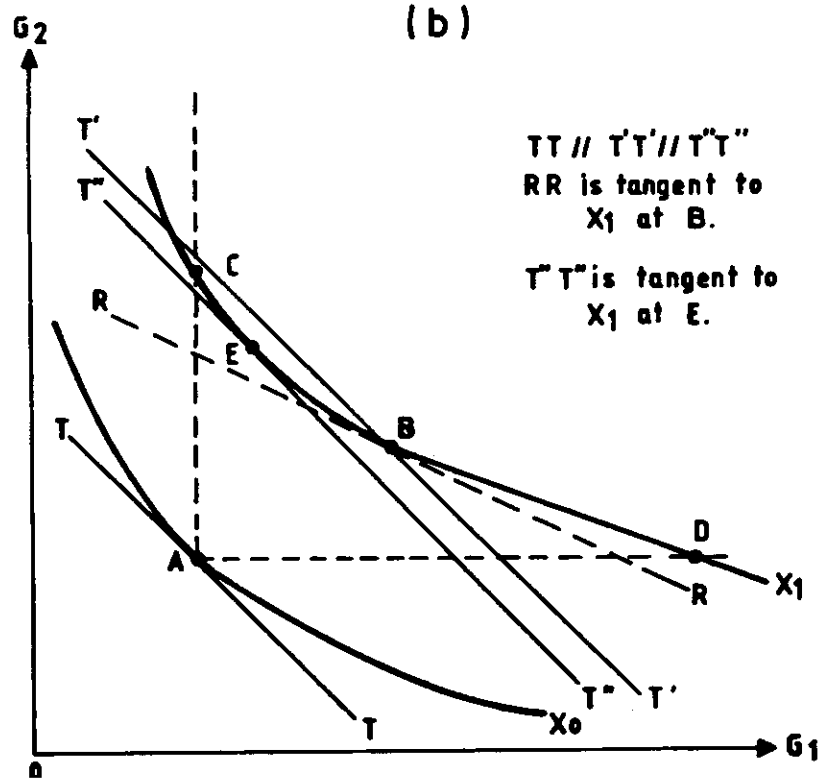
*2. In order to simplify the exposition, we assume for the time being that the new target of X_1 is such that it can be achieved by keeping the total rate of annual per capita real government expenditure the same as before.

Diagram 1

(a)


G2
R
C
T" T'
TT // T'T' // T"T"
RR is tangent to X1 at B.
T"T" is tangent to X1 at E.
B
T
E
A
D
R
X1
Xo
T
T
T"
0
G1

(b)


G2
T'
T"
C
R
E
TT // T'T' // T"T"
RR is tangent to X1 at B.
T"T" is tangent to X1 at E.
T
B
D
A
X1
R
T"
T'
T
Xo
0
G1

G_2 have to be increased is well recognised. Various options to achieve X_1 if we are on initial point like A, are given by different combinations of increases in G_1 and G_2 from their respective initial values of G_1 and G_2 at A. Usually cumulative government effort from its existing level would not absolutely decline over a period of time, given the way we have defined the term. Thus the range of choice is given by the arc DBC where AC is a vertical line and AD is a horizontal line through the point A intersecting the new isoquant X_1*[3] in point C and point D respectively.

The whole issue about choosing different expenditures could then be considered with a specific reference to the point B which is taken to represent the continuation of past trends. Thus, it is assumed that the present rate of annual government expenditures in the two directions given by $\dot{G}_1$ and $\dot{G}_2$ are remaining the same at point B. Any point on the arc BD would represent higher annual government expenditure in the direction 1 and lower annual expenditure in the direction 2 as compared to the present level.

---

*3. The new iso-quant at X_1 may or may not belong to the same production function as X_0. Since X_1 is a target to be achieved over a period of time, it is possible to envisage changes in 'other factors' held constant while drawing X_0. If these changes have taken place in a systematically predictable way, the argument in the text regarding the choice open for the policy maker would not undergo any significant change.

similarly, any point on the arc BC would represent higher expenditure in the direction 2 and lower expenditure in the direction 1 as compared to the present level.*[4]

Having put the question of choice in this framework, we need to consider the criterion for making a choice. Since planning is by definition an activity involving optimisation, it would not be unjustified to assume that the planner would like to avoid all the excess costs which are unintentional in nature. The concept of excess cost may be thought of as closely akin to the one of excess burden of taxation. The excess cost on the society or the economic system are avoided if the basic relative marginal costs of government efforts are left unaltered by the planned action to achieve the targeted basic welfare level (X_1). This would also imply minimisation of social costs at base period shadow prices to achieve the required level of basic welfare. Considering the initial point A, we can obtain the social costs of the government efforts G_1 and G_2 in the two directions by drawing a tangent to the iso-quant X_o at point A. The slope of this tangent, as is wellknown, is represented by the ratio of the marginal products of G_1 and G_2 viz. r_1 and r_2 respectively. The shadow prices of accumulated government efforts in the

*4. It should be noted here that point B representing the same rate of annual per capita real government expenditures in the two directions as before would be on the isoquant X_1 so long as we are assuming that the target of X_1 is achievable with the total government expenditure in real per capita terms remaining the same as before. If X_1 requires higher expenditure rate, point B would lie below the isoquant X_1.

two directions - G_1 and G_2 are then considered to be given by the same ratio between r_1 and r_2 in relative terms. In the absence of any explicit target about such relative social costs, the planner may aim to maintain the given parity between the social marginal costs undisturbed while planning to achieve the target X_1 for basic welfare. Therefore, the criterion of maintaining the marginal rate of substitution between the accumulated government efforts G_1 and G_2 existing at point A also at new point on the arc DBC requires us to examine the behaviour of the marginal products of accumulated government efforts G_1 and G_2 over time.

In order to make a policy choice, the planner should be in a position to assess the ratio of marginal products of G_1 and G_2 at point B on a new iso-quant X_1. It is important to note that the planner is not interested in the absolute estimate of the ratio r_1/r_2 at the point B nor at the point A. For the choice under consideration we need to know only the behaviour of this ratio between points A and B. Thus, for instance as shown in Diagram 1 (a), if the ratio r_1/r_2 at B is greater than the one at A, given the convexity of the isoquants, it is obvious that the point where the ratio r_1/r_2 remains constant would lie on the arc BD, implying higher expenditure in direction 1 and lower expenditure in direction 2 than before. We can similarly infer from Diagram 1(b) that the

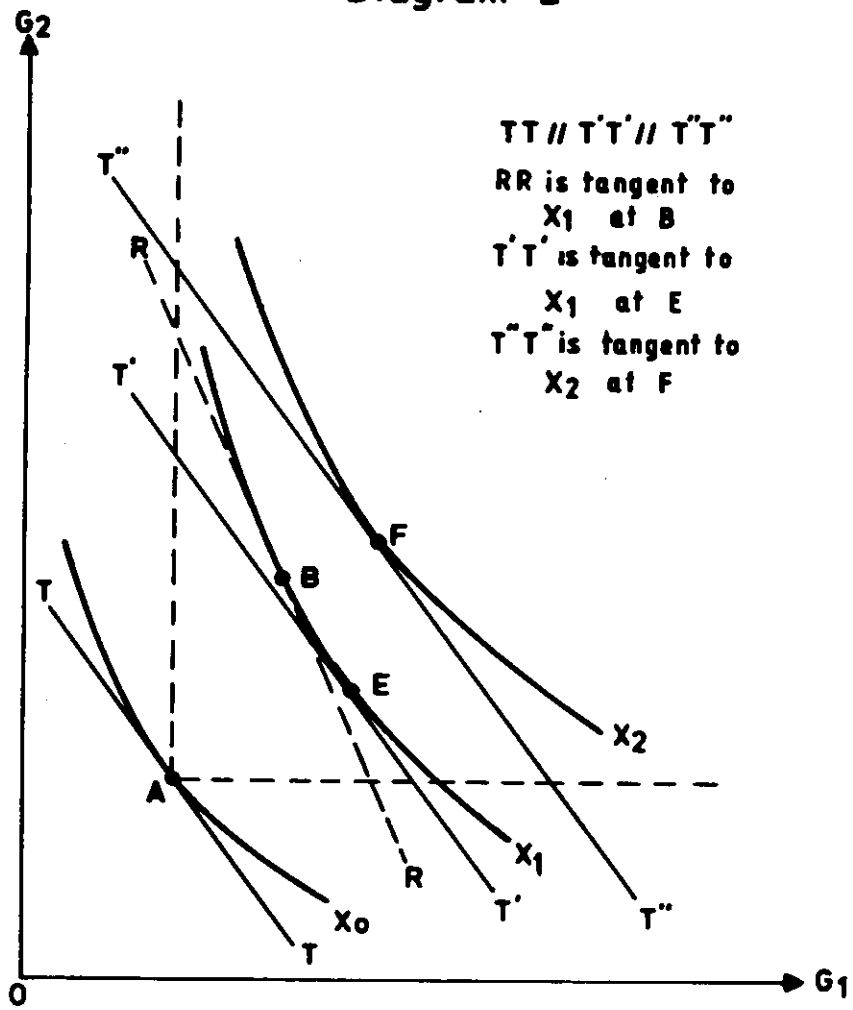
planner should increase expenditure in direction 2 and reduce the expenditure in direction 1 if the ratio r_1/r_2 at B is less than the one at A.

The crucial question to be investigated in making a policy choice in our framework thus boils down to examining the behaviour of the ratio r_1/r_2 representing the ratios of marginal products of accumulated government efforts in directions 1 and 2. Our model presented in sections 2 to 5 above finally gives the nature of returns to government efforts as the slope of the estimated equations between $\dot{X}$ and $\dot{G}_i$. In other words, our results basically show the second order direct partial derivatives of basic welfare level (X) with respect to government effort in the given direction (G_i). Assuming that cross-partial derivatives are not of substantial size, our findings about returns to government efforts in different directions can provide at least approximate answers to the direction of the ratio of marginal products of government efforts (r_1/r_2). Thus, if the returns are increasing in direction 1 and if the returns are either diminishing or constant in direction 2, the ratio of marginal products - r_1/r_2 will have a tendency to increase. In such a case it is most likely that the ratio r_1/r_2 would be higher at B than at A so that the planner is best advised to go in for higher expenditure in direction 1 and lower expenditure in direction 2 than before. Such a policy under the circumstances is likely

to leave the ratio of shadow prices of accumulated government efforts in the two directions more or less unaffected so as to ensure achievement of the targeted basic welfare level X_1 at minimum social cost calculated at the base period shadow prices.

When we consider a case where total rate of annual per capita real expenditure by government increases over time, the reference point B indicating the same level of expenditure as before would lie below the iso-quant for the achievable target X_2. Diagram 2 represents such a case. Several real life situations are most likely to resemble this case. The discussion of Diagram 1 (a) totally applies to the point B in Diagram 2 as well. However, the achievable welfare level (X_1) at point B is lower than the target X_2. The implication of this particular condition is to reduce the sharpness of the conclusions regarding the nature of returns to government efforts and the direction of government expenditure. To illustrate the difference it would make in such a case, let us consider a situation where at point B, the ratio of the marginal products - r_1/r_2 is higher than at point A. In earlier case, this would imply increasing the rate of expenditure in direction 1 and reducing the rate of expenditure in direction 2. If, however, we consider the latter case when the total rate of government expenditure is higher than before, although it is necessary that rate of expenditure

Diagram 2


G2
G1
0
TT // T'T' // T"T"
RR is tangent to X1 at B
T'T' is tangent to X1 at E
T"T" is tangent to X2 at F
T"
R
T'
T
F
B
E
A
X2
X1
Xo
R
T'
T"
T

in direction 1 should increase, it is not necessary that the rate of expenditure in direction 2 should decrease. This happens because even if we move from point B to point E on the isoquant X_1 to ensure the same ratio - r_1/r_2 as at point A, it is quite conceivable that a point like F on the higher isoquant X_2 representing the target level of basic welfare may represent the same ratio - r_1/r_2. At point F, then, we cannot rule out constancy or even increase in the rate of government expenditure in direction 2 as compared to point B. On the other hand, point F would invariably represent a higher rate of expenditure in direction 1 as compared to point B.

The message from this discussion is clear. If the ratio of marginal products of the government effort in any two directions is increasing the rate of government expenditure in the direction of the numerator should increase. Whether the rate of expenditure in the direction of the denominator should increase, decrease or remain the same depends on the extent of increase in the total rate of government expenditure. Table 1 summarizes different situations under which the ratio - r_1/r_2 would increase, decrease or remain constant.

Table 1 : Likely Behaviour of the Marginal Rate of substitution (r_1/r_2) of G_1 for G_2 under different Returns to G_1 and G_2

Returns to G_2	Returns to G_1		
	Increasing	Constant	Diminishing
Increasing	Uncertain*	Fall	Fall
Constant	Rise	Constant	Fall
Diminishing	Rise	Rise	Uncertain*

*The behaviour can be predicted by considering the magnitude of the impact coefficients.

VII. Summary & Conclusion

The present paper examines closely the relationship between government effort through its annual expenditure plans and the welfare of the populace. In order to inbuild the distributional impacts of government effort, we have considered a modified concept of welfare, the improvement in which necessarily indicates improvement in the conditions of the poor. Most of the studies in the field so far resort to a straight forward allocation of government annual expenditure to get an idea of direct benefits of such expenditures to various classes of population. In fact, in such studies the indirect benefits are simply ignored and hence their findings could hardly be of relevance for underdeveloped

countries where spread effects and increasing returns to government effort are often expected to play an important role. These characteristics of the LDCs are of crucial importance since they represent a hope for the existing potential to be exploited for rapid future development. Our method, on the other hand, considers the performance in terms of final output indicators which measure the consumption of items of social priorities like basic literacy, health, nutrition and other necessities. Thus, our approach has the advantage of considering the indirect effects of government effort as well.

The present paper develops a simplistic model, based on the standard 2 x 2 general equilibrium model, in which the basic welfare is functionally related to government efforts and other environmental factors. As a corollary, change in basic welfare is functionally related to the change in government efforts, represented by flow of government expenditures over time. It is also shown that the sign of the slope of such a function would reflect nature of the returns to government effort. This framework can be extended to include various categories of government expenditures on the one hand and different categories of basic welfare indicators on the other hand.

REFERENCES

1. Aaron, H. and McGuire, M (1970) : "Public Goods and Income Distribution", Econometrica, Vol. 38, November.

2. Brennan, G. (1976) : "The Distributional Implications of Public Goods", Econometrica, Vol.44, No.2, March.

3. Dholakia, Archana (1987) : Distribution and Welfare Implications of Government Expenditure in India, Ph.D. Thesis, M.S. University of Baroda, India, April.

4. McLure, Charles (1972): "The Theory of Expenditure Incidence", Finanzarchiv, Vol. 30, No.3.

5. McLure, Charles (1974):"On the Theory and Methodology Of Estimating Benefit and Expenditure Incidence", Paper presented at the Workshop on Income Distribution and Its Role in Development, Houston, Texas Willian Marsh Rice University.

6. Meerman, Jacob (1978): "Do Empirical Studies of Budget Incidence Make Sense ?" Public Finance, Vol. 33.

7. Musgrave, R.A.; Case, C.E.; Leonard, H. (1974): "The Distribution of Fiscal Burdens and Benefits", Public Finance Quarterly, Vol. 2, No.3, July.

8. Wulf, D.L. (1975): "Fiscal Incidence Studies in Developing Countries: Survey and Critique", IMF Staff Papers, March.

9. Wulf, D.L. (1981) "Incidence of Budgetary Outlays: Where Do We Go From Here?", Public Finance, Vol. 36.