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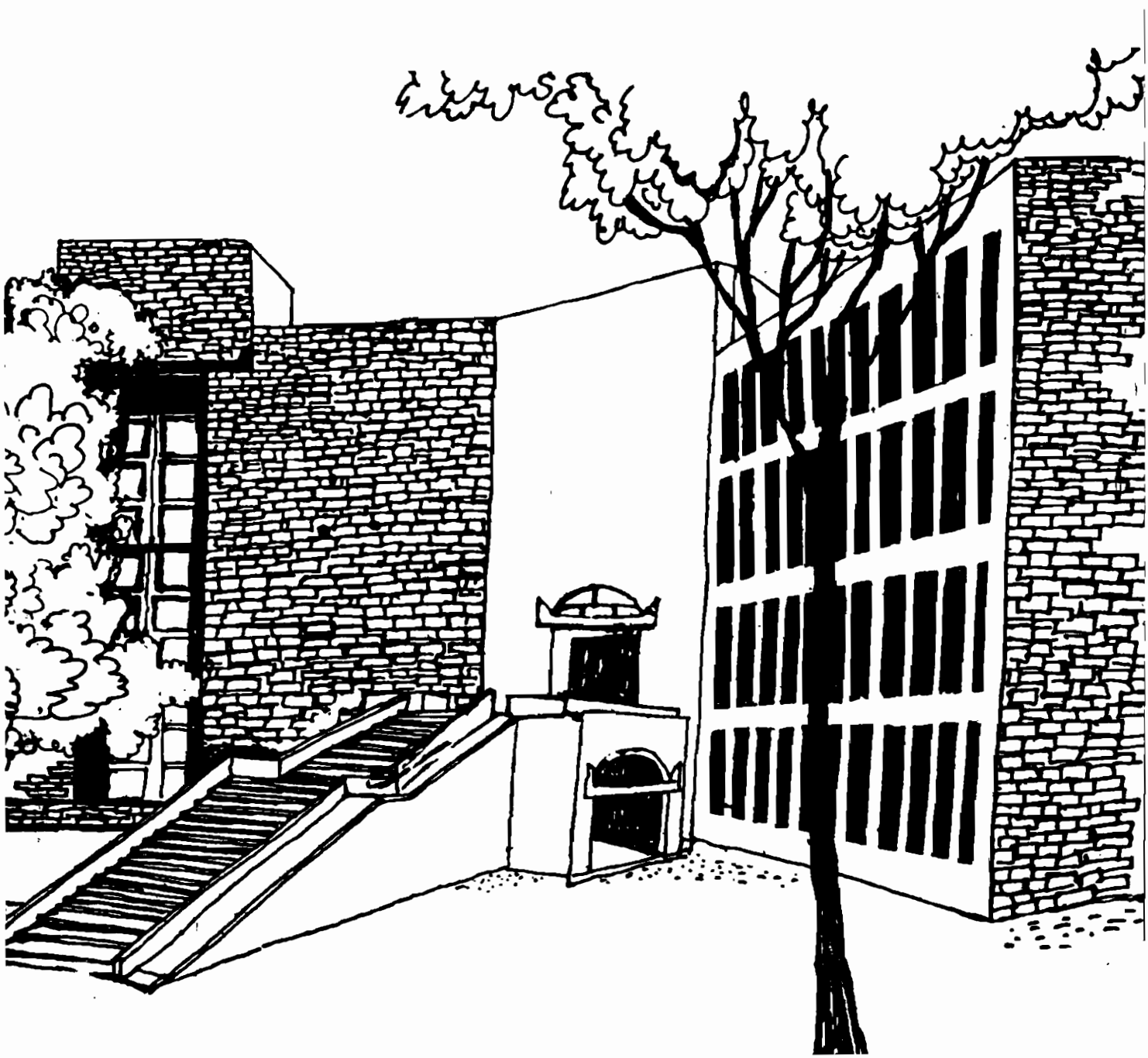

EXPENDITURE ALLOCATION AND WELFARE RETURNS TO GOVERNMENT EFFORTS - A SUGGESTED MODEL AND ITS APPLICATION

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Abstract

The paper addresses the question of government expenditure allocation among sectors by extending the model developed by Archana Dholakia (1993) and illustrates its application by using the data on major Indian states from 1971 to 1991. It is argued that on margin, the changes in the expenditure allocation are determined not by the magnitude of the marginal productivities of the government effort (as several people seem to be thinking), but by the behaviour of the marginal returns in relative terms. A lot of emphasis is put on the appropriate measurements of al the variables flowing from the theoretical framework so as to ensure proper interpretation of the coefficients of the model. The dependent variable is the disparity reduction rate (DRR) in the index of basic welfare that is measured by 9 indicators from education, health and nutrition & other sectors. The independent variables are the average per capita annual development expenditures at constant prices by state governments on revenue and capital accounts in different sectors reflecting the change in the government efforts in different directions; and the level of real per capita state income. In the illustrative exercise, the economic (physical capital) sector and social (human capital) sectors are considered. Similarly, two time periods – 1971-81 and 1981-91 are considered to examine the stability of the coefficients. Statistical tests of equality of the coefficients of revenue and capital expenditures are also carried out. The coefficients are stable and equality restrictions are valid. The government efforts on the social (human capital) sector show increasing returns whereas on the economic (physical capital) sector show diminishing returns. Based on our findings, it is advisable for the government to spend more on social sector and less on economic sectors than what it is doing in the recent past.

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I. Introduction:

Government expenditure is a relatively less researched field than taxation. Most of the studies in this field concentrate on post hoc evaluation or expenditure incidence or aggregate impact on the economy (See, Aaron and McGuire, 1970; Musgrave et al., 1974; Wulf, 1975 and 1981; A. Dholakia, 1993; Fan et al., 2000; etc). The allocation of the government expenditure among different sectors is generally considered to reflect political priorities and hence to emanate from the political process. Those familiar with the budget making exercise in the government usually argue that spending proposals are first invited from different departments under various heads and then are aggregated and pruned at the finance department to ultimately emerge with the budget allocations. Thus, the practice apparently supports the view that budget allocations are exclusively the result of a political process. However, when the finance department "prunes" the expenditure proposals from different departments, other considerations and factors do come into play. The political party in power does take a position on the development strategy and determines the expenditure priorities in the budget. Thus, the budget allocations do not reflect only the shopping list approach, but they do show the Finance Minister's and the Cabinet's perceptions about the efficiency and efficacy of different expenditures in terms of the ultimate objective

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of the government. However, very few studies have attempted to answer the practical question such as – how much should a government allocate to different sectors? (See, Mishra, 1982; A. Dholakia, 1993; Fan et al., 2000).

Mishra (1982) attempted to derive the budget allocation in nominal terms by estimating a simultaneous equation model through 2 stage least squares (2SLS) method. He considered different annual government expenditures as the dependent variables and various socio-economic-demographic indicators as the independent variables in the model to obtain the allocation of expenditures based on the targeted values of the indicators. It was more of a statistical approach to the problem than any economic theory based model. As a result, the postulated relationship as well as the measurement of variables could hardly be logically convincing. On the other hand, A. Dholakia (1993) and Fan et al. (2000) have the simultaneous equations models to examine the impact of the government expenditures on the specified target variables. Only the direction of the changes in the expenditure allocation can be obtained indirectly from their models once the desired targets are considered. However, the model of Fan et al. (2000) is not entirely based on economic logic and has clear elements of a statistical approach. It considers both the target variables and various government expenditures as the endogenous variables in the model. As a result, the allocation of government expenditures among sectors cannot be addressed seriously. The authors have still recommended the direction of changes in the expenditure allocation based on the magnitude of marginal impacts (returns) of different expenditures. Archana Dholakia's (1993) model based entirely on the economic logic is capable of being extended to consider the question of changes

in the budget allocation by considering the nature of returns to the government effort in different directions. It can also provide interesting insights which may contradict the conventional recommendation of changes in budget allocation based on the magnitude of the marginal returns (impacts) of different expenditures.

In this paper, we attempt to extend Archana Dholakia's (1993) basic model to consider budget allocations explicitly and illustrate its application by considering the case of Indian States over the period 1971-91. In the next section, we discuss the model in detail and then in the third section consider the measurement of independent variables as implied by the model. The fourth section discusses measurement of basic welfare as the dependent variable in our model. The illustrative econometric exercise with the data on 14 major Indian States over the period 1971-91 implied by the model is carried out and the results thereof are discussed in the fifth section. The last section presents summary and conclusion.

II. The Model:

In order to examine the question of budget allocation among different sectors, we have to consider the objective of the government in preparing the budget. A list of the basic objectives and targets to be achieved is quite often explicitly spelt out in the beginning of the Finance Minister's budget speech. We may compress the whole list into one broadly defined objective of the government to focus on the essential elements involved in the budget allocation among sectors. This would require either carefully worked out trade-off weights among competing objectives, if any, or appropriate measurement of the broadly

defined objective to take care of various specific concerns of the government. Such a simplification is more realistically applicable in the case of state governments than the Central government. Under the Indian Constitution, states are given the principal responsibility to look after various welfare dimensions of the population like education, health, sanitation, nutrition, crime, family welfare – particularly child and women welfare, etc. Thus, states' objectives are more likely to focus around ensuring basic welfare and improving the quality of life of the population.

In order to translate such a broad objective into implementable targets and relate them to government schemes and projects representing the government efforts, it is necessary to distinguish between the general welfare and the basic welfare of the population (See, A. Dholakia, 1990 and 1993). It is the basic welfare that is the target of the government efforts particularly at the state level. and not the "Total Welfare" or "Maximum Achievable" welfare in the economy. The latter concepts are somewhat vague and their measurement in varied types of economies has given rise to a lot of controversy. (See, Chaudhary, 1978; A. Dholakia, 1990). Economists are almost unanimous on the point that the concept of welfare has different connotations in regard to the time, place and people whose welfare we want to measure, hence a unique measure of welfare cannot be designed. (See, Gothaskar, 1978; A. Dholakia, 1990). We would, therefore, like to follow an approach that can measure the basic minimum welfare in non-monetary terms and that might be considered more appropriate for capturing the welfare achievements of the LDCs, where the primary objectives of the government are: (i) alleviation of mass poverty and (ii) meeting the basic

needs of the populace in terms of primary education, health, drinking water, etc. To develop a framework for this purpose the whole economy is divided into two groups of individuals: the poor (A) and the non-poor (B). Similarly, all commodities are divided into two groups: the basic commodity (X) and the non-basic commodity (Y). Moreover, we assume a well-defined and well-behaved social welfare function (W) with a lexicographic preference of the government for the poor. It is shown earlier (See, A. Dholakia, 1990; 1993) that under such conditions, changes in the basic welfare (dW') and changes in the consumption of basic commodities (dX) are directly and proportionately related. Thus, whatever would measure dX would also measure dW'. In order to ensure this, we have to define the basic commodity X, as the ones (i) directly affected by the government expenditure, and (ii) with *marginal utility* higher for the poor and lower (almost zero) for the rich. (A. Dholakia, ibid.). As discussed later, the basic commodity X can be decomposed into three components, viz. Health, education and nutrition and others.

The next step is to consider the determinants of the production of the basic commodity X. It is clear that the level of X at a given point of time (t) depends on the cumulative efforts put in by the government in the past up to t, geo-physical environment, socio-cultural, demographic and attitudinal factors. This is because the three aspects included in our definition of X (health, education, nutrition & others) are largely the matters of social consumption affected by government efforts besides various other factors mentioned above. The latter category of factors primarily determines the level of the relationship between the stock of government effort and the quantity of basic commodity X.

We might say that factors like physical – locational and socio-cultural environment define the nature and level of technology, while government efforts can be considered as equivalent to inputs for the production function of the basic commodity X. Thus, the postulated functional relationship is:

$$X_t = F(G_{1t}, G_{2t}, Z_{1t}, Z_{2t}, \ldots\ldots Z_{nt}) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

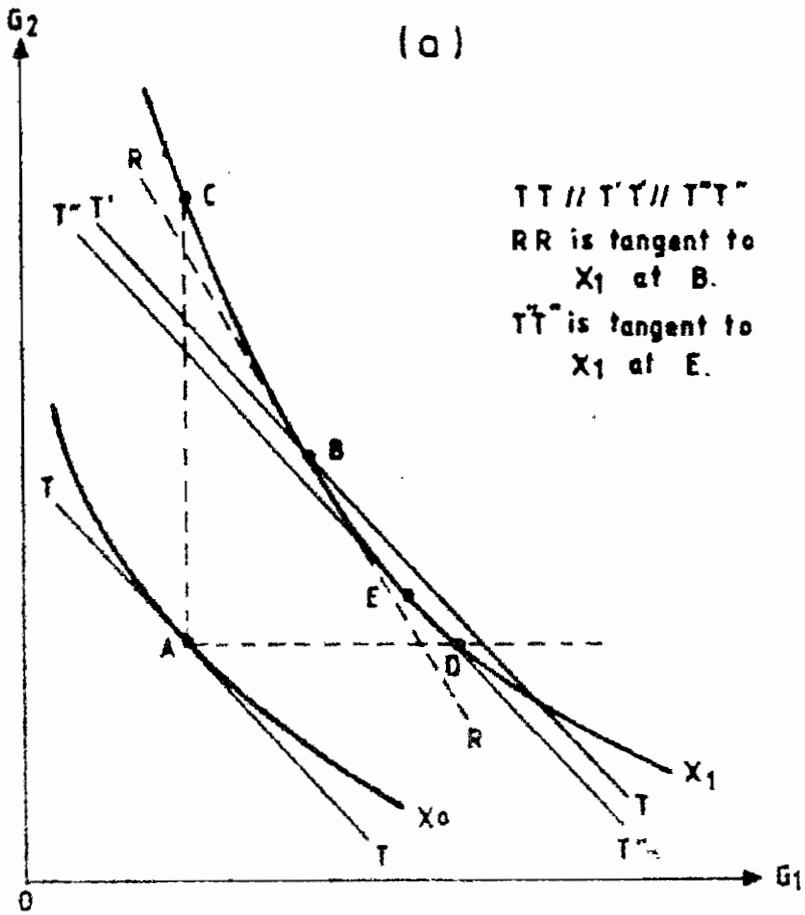
where X_t is the level of basic commodity X at time t; G_{1t} and G_{2t} are the cumulative stock of government effort up to time t in direction 1 and 2 respectively; and Z_{1t}, Z_{2t}, ... Z_{nt} are various geographic-locational, physical environmental, and socio-cultural-attitudinal factors at time t which are treated as exogenous factors here. Holding all these exogenous factors 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) :

$$X = f(G_1, G_2) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

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. 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.*[1] The basic question is how to achieve X_1 with the help of G_1 and G_2. That G_1 and/or G_2 have to be increased is well recognised. Various options to achieve X_1 if we

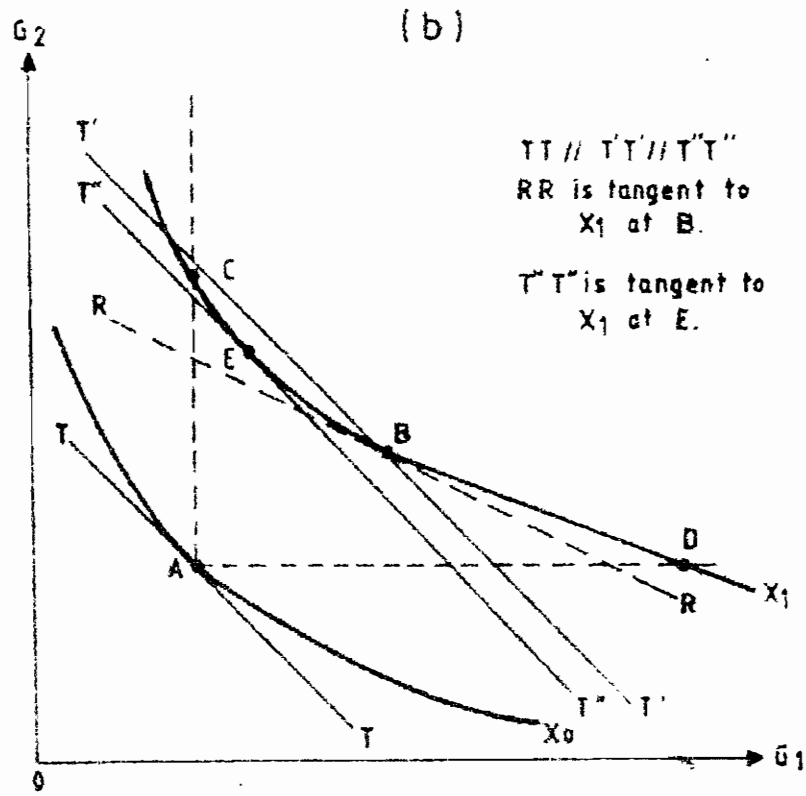
*[1] In order to simplify the exposition, we assume for the time being that the new target of X_1 is such that it can be achieved by keeping the total rate of annual per capita real government expenditure the same as before.

Diagram 1



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

like through the point A intersecting the new insoquant X_1[*2] 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 G1 and G2 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. Similarly, any point on the

*[2] The new iso-quant at X_1 may or may not belong to the same production function as Xo. 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 Xo. 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.

arc BC would represent higher expenditure in the direction 2 and lower expenditure in the direction 1 as compared to the present level.*[3]

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 optimization, 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 minimization of social costs at base period (constant) 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 well known, 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 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

*[3] 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.

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.*[4] 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.

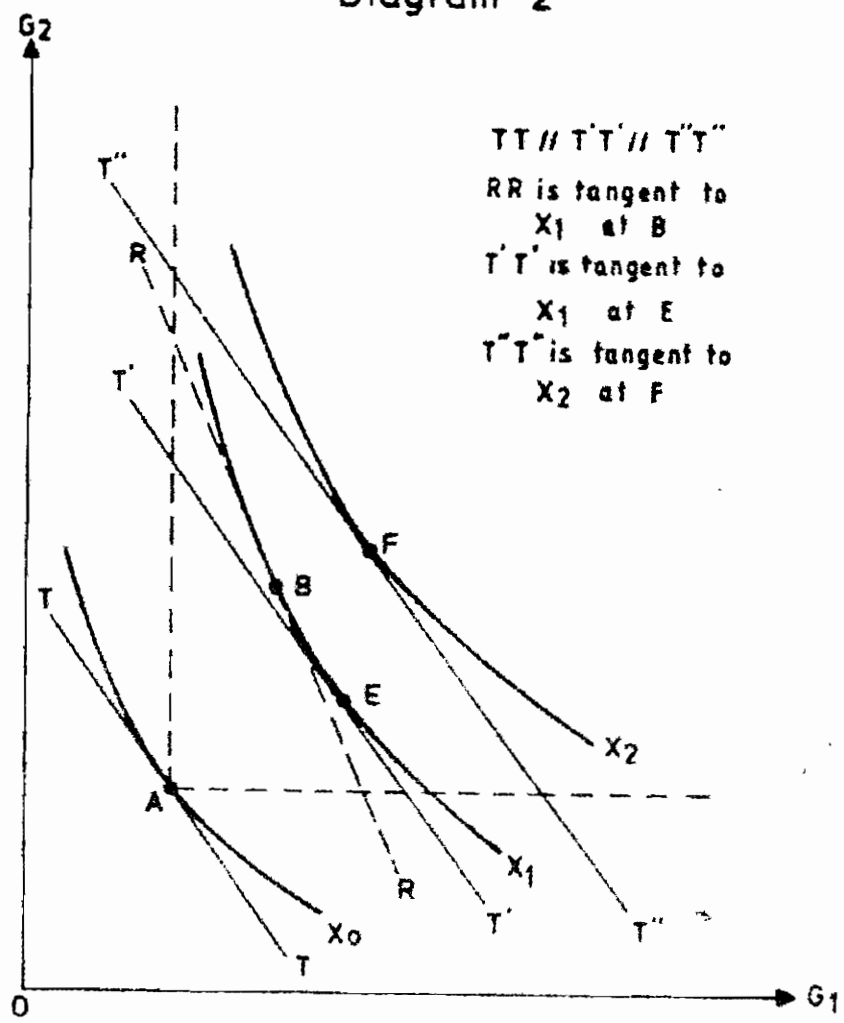
The crucial question to be investigated in making a policy choice in our framework thus boils down to examining the behaviour of the ratio r_1/r_2, *i.e.* the ratio of marginal products of accumulated government efforts in directions 1 and 2. Thus, if the returns are increasing in direction 1 and if the returns are either

*[4] It is generally thought that if the magnitude of the marginal product of G_1 is greater than the one of G_2, the planner should increase the expenditure in the direction of G_1. Fan et al. (2000) also recommend budget allocation on these lines. However, our argument here shows that this would not necessarily be a logical recommendation. We should also consider the marginal costs for G_1 and G_2, which would compel us to consider the behaviour of r_1/r_2 rather than the magnitudes of r_1 and r_2.

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 - r1/r2 is higher than at point A. In earlier case, this would imply increasing the rate of expenditure in direction 1 and reducing it 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 in direction 1 should increase, it is not necessary that the rate of expenditure in direction 2 should

Diagram 2



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.

III. Model Specification and Measurement:

From the above discussion, it is clear that the approach of production function for basic welfare with the arguments of the stocks of accumulated government efforts in different directions does provide useful guidelines for effecting changes in the budget allocations when we know the nature of marginal returns to the government efforts in different directions. It is very difficult if not impossible to measure satisfactorily the stock of accumulated government efforts in different directions upto a point in time. This is because it is not only the stock of the physical assets built by the government so far but also the way the government services are provided, their geographic spread and the maintenance and use of the government assets have a definite influence on the stock of basic welfare of the population. Thus, the government's developmental efforts are flected in both its capital and revenue expenditures over time. It is not intended to deny the existence of the qualitative aspects of the government efforts. In fact, very often the extent of the presence of government determines the culture, expectations and mindset of the people. We, therefore, postulate that the quality

of the government efforts varies directly with the quantity of the accumulated government expenditures.

Like most measurements in general and the ones in social sciences in particular, the measurement of stocks or the level of variables is far less satisfactory or feasible than the flows or the rates of change in those variables. The variable of the accumulated government efforts is no exception to this. Similarly, basic welfare and basic commodity, X in our model, are also the variables whose rates of change are more reliable than their levels. Moreover, 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, 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 accumulated stock aggregate G. All this requires us to consider our model in terms of the first derivative of eq. (1) with respect to time (t).

$$X^{o}_{t} = F'_{G1} \cdot G^{o}_{1t} + F'_{G2} \cdot G^{o}_{2t} + F'_{Z1} \cdot Z^{o}_{1t} + F'_{Z2} \cdot Z^{o}_{2t} + \ldots + F'_{Zn} \cdot Z^{o}_{nt} \quad \ldots \quad (3)$$

where F' with different suffix represents the partial derivative of the function F(...) with respect to the letter denoted by the suffix; and a superscript '^{o}' to the letter represents the time derivative of the variable. If we assume only the annual changes in different variables, we are not likely to find considerable or significant changes in the physical, locational, and socio-cultural environmental factors

$Z_{1t},...Z_{nt}$. We may, therefore, be justified in ignoring these values and simplifying eq. (3) to

$$X^{o}_{t} = F'_{G1} \cdot G^{o}_{1t} + F'_{G2} \cdot G^{o}_{2t} = f(G^{o}_{1t} \cdot G^{o}_{2t}) \quad .... \quad (4)$$

It should be noted here that such a simplification is valid only when we are studying the changes in aggregates over relatively a shorter period of time when we can justifiably ignore the changes in $Z_{1t},... ,Z_{nt}$. Over relatively longer periods of time, however, the changes in environmental factors $Z_{1t},... ,Z_{nt}$ are likely to be significant and eq. (4) would need to be modified. A careful examination of eq. (3) clearly indicates the type of modification required in eq. (4) if a relatively longer period of time is considered . Thus , when $Z^{o}_{1t},...,Z^{o}_{nt}$ are significant, the level of relationship between X^{o}_{t} and G^{o}_{t} as described by eq. (4) is likely to shift over time depending on the net effects of changes in the environmental factors. The level of the relationship can change because the intercept changes or the slope parameter changes. The levels of environmental factors $Z_{1t},... ,Z_{nt}$ enter as the determinants of not only the intercept of the relationship but also the slope of the relationship between X^{o}_{t} and G^{o}_{t} as described by eq. (4). Thus, it is an empirically testable proposition whether environmental factors have played any role to significantly affect the level of the relationship as described in eq. (4) over time. The intercept in the functional relationship like eq. (4) 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, represents the annual change in X_t independent of the changes in government efforts in different directions.

It is also possible to interpret the slope coefficients of the functional relationship in eq. (4) if the independent variables are appropriately measured. Taking time derivative of eq. (4), we get

$$dX^{\circ}_t/dt = (f_{11} \cdot G^{\circ}_{1t} + f_{12} \cdot G^{\circ}_{2t}) \cdot G^{\circ}_{1t} + f_1 \; dG^{\circ}_{1t}/dt$$

$$+ (f_{21} \cdot G^{\circ}_{1t} + f_{22} \cdot G^{\circ}_{2t}) \cdot G^{\circ}_{2t} + f_2 \; dG^{\circ}_{2t}/dt \quad \ldots\ldots\ldots (5)$$

If we assume that G°_{1t} and G°_{2t} remain constant over time, i.e.

$dG^{\circ}_{1t}/dt = dG^{\circ}_{2t}/dt = 0$, we get

$$d^2X_t/dt^2 = (f_{11} \cdot G^{\circ}_{1t} + f_{12} \cdot G^{\circ}_{2t}) \cdot G^{\circ}_{1t} + (f_{21} \cdot G^{\circ}_{1t} + f_{22} \cdot G^{\circ}_{2t}) \cdot G^{\circ}_{2t} \ldots\ldots (6)$$

This gets simplified further when we take $G^{\circ}_{2t} = 0$ as

$$d^2X_t/dt^2 = f_{11} \cdot (G^{\circ}_{1t})^2 = f_{11} \cdot (dG^{\circ}_{2t}/dt)^2$$

i.e. $d^2X_t/dt^2 = f_{11} \cdot dG^2_{1t}/dt^2$

i.e. $d^2X_t/dG^2_{1t} = \partial^2X_t/\partial G^2_{1t} = f_{11}$ .... (7)

Similarly, by taking $G^{\circ}_{1t} = 0$ in eq. (6), we get

$d^2X_t/dG^2_{2t} = \partial^2X_t/\partial G^2_{2t} = f_{22}$ .... (8)

Thus, the slope coefficients of the functional relationship in eq. (4) of our model can be interpreted as the second order direct partial derivatives of the functional relationship between X_t and G_t provided that the variables G°_{1t} and G°_{2t} are measured so as to ensure that they remain constant over the relevant time interval.

As is well-known, the second order partial derivative of output (X) with respect to inputs (G_t) is interpreted as showing the behaviour of marginal returns to basic inputs. In our case, therefore, the slope coefficients of our function as described in eq. (4) can be interpreted as showing the behaviour of marginal

returns to government efforts in different sectors. If the slope is positive, it implies increasing marginal returns; and if the slope is negative, it implies diminishing marginal returns; and if the slope is zero, it implies constant marginal returns. Thus, if our interest is in testing the direction of the marginal returns to government efforts through eq. (4), the most appropriate functional form for the equation would be linear. This is possible if we consider the real expenditure variable in such a way that the annual rate of change in the expenditure is zero. In order to ensure this, we have taken a simple arithmetic average of annual per capita real government expenditure on human capital (EHK) and physical capital (EPK) during 1970-80 and 1981-91 as our independent variables (*see*, ***Table-1***). This would also eliminate purely short-term fluctuations in real per capita government expenditures and yet retain the basic feature of the change in the government effort on annual basis.

IV. Methodology for Constructing the Basic Welfare Index:

The question which arises from the above framework is that if consumption of basic commodities, i.e. X can measure Basic Welfare, (W'); and dX, i.e. change in X can measure change in basic welfare, (dW'), how should X be measured. Some studies have attempted to measure X through private expenditure or by considering government expenditure on public services as a proxy for consumption of essential commodities by the poor, or index of social infrastructure, or combination of various social indicators (For details, See, A. Dholakia 1990). But such studies can be said to have measured 'efforts' or 'inputs' provided for the consumption rather than actual output of basic commodities, i.e. X. Such studies may, therefore, grossly overestimate the

extent of welfare, particularly when available infrastructure is not utilised efficiently due to constraints of demand or effective supply arising on account of the poor quality of public services, their ineffective delivery, corruption and lack of supplementary socio-economic inputs. In this context the PQLI approach is relatively better and appealing as it attempts to measure welfare through the indicators which are objective, reflect results or 'output' rather than inputs, simple to construct and also easy to comprehend (see Morris et al, 1979). However, it also has certain limitations. In the first place, its indicators are too few in number to give comprehensive idea even about the minimum desirable welfare. Moreover, out of the three indicators *viz.* infant mortality rate, life expectancy at age one and adult literacy rate, two indicators relate only to health. More importantly, these two variables are usually ill-measured in the LDCs. (See, A. Dholakia, 1990). Secondly, the most important component of food and nutrition is conspicuously absent. These limitation make the PQLI more unstable, unreliable and less comprehensive. Lastly, the indicators chosen for PQLI are not selected on the basis of any systematic theoretical framework. On the other hand, the Basic Welfare Index (BWI) proposed by us is constructed out of those indicators,

(i) which emerge from a theoretical model. (See, A. Dholakia, 1990);

(ii) improvement in whose values invariably and infallibly imply improved consumption of basic commodities (X), whose marginal utility for the poor is very high and that to the non-poor is very low;

(iii) which reflect output in terms of well being rather than inputs;

(iv) which have no ethnocentric biases and lend themselves to interstate and inter-country comparison among LDCs; and

(v) which represent all the three aspects of welfare, viz. health, education and nutrition.

In all nine socio-economic indicators identified by above listed criteria are selected. Final outcome of all necessary inputs for health is measured through (i) Death Rate (DR), (ii) Birth Rate (BR), and (iii) Infant Mortality Rate (IMR). Consumption of basic educational inputs is measured through : (i) Male Literacy Rate (MLR), and (ii) Female Literacy Rate (FLR). To capture nutritional and other aspects like quality of housing, drinking water, etc. the N & O component index is constructed through selection of four indicators, viz. (i) Proportion of People Below the Poverty Line (PBP), (ii) Child Worker Participation Rate (CWPR), (iii) Females' Mean Age at Marriage (FMAM), and (iv) Male Participation Rate in Non-Agricultural Sector (MPRNA).

Ideally speaking, the NSS data on poverty should satisfactorily capture the nutrition and other aspects, but they do not. The correlation coefficients between poverty rate and the remaining component index of N&O (excluding poverty rate) as estimated using the cross-section data of 14 major states for all the three periods (1971, 1981, 1991) are statistically insignificant at 5% level (0.20, 0.27, 0.45 respectively). This confirms our belief that for capturing the true extent of basic welfare, poverty rate can be one of the indicators but it alone cannot capture the general economic conditions of the poor in the population. Similarly, poor correlations between the BWI (consisting of all the three components of health, education, N & O) and poverty index for all the three periods also

suggest that the poverty data capture only partial picture of welfare and that they have to be supplemented with a set of other indicators.

Because the selected indicators are measured in different units they have to be first converted into indices. Moreover, they have to be made unidirectional in order to meaningfully add them. The methodology adopted by us for constructing such indices is the same as followed for PQLI (See Morris et al., 1979). For each indicator the performance of an individual state is put on 0 to 100 scale where 0 represents an absolutely defined worst performance and 100 represents an absolutely defined best performance (see, **Table-2**). Selection of these values are based on the historical experiences of the third world countries in the last 40 years. Thus 0 represents worst observed and not worst possible value. Similarly 100 represents either the best achieved or targeted value of the indicator (See, U. N. Demographic Year Books). These indicator indices are then combined to construct component indexes. Within each component index the explicit weight attached to different indicator index is equal and similarly for construction of the BWI each of the three components is given equal weightage. **Table-3** presents interstate estimates of the three major components of Basic Welfare for the years 1971,1981 and 1991. The distance of each state and the country as a whole from the ideal value of indexes (=100) shows the short-fall in the basic welfare level in a state as compared to the ideal conditions already achieved elsewhere. Therefore, it shows the task lying ahead in different directions.

Table-4 gives the estimates of Basic Welfare for all the states for the three benchmark years. Figures for all-India are also given to indicate the distance of

each state from the national average and from the ideal value achieved at the international level. However, for policy purpose, we have to consider the change in the basic welfare rather than the level of the basic welfare as per our model. To measure the change in Basic Welfare Index we have employed the tool of Disparity Reduction Rate (DRR) rather than percentage growth rate for various reasons. (see, Morris et al., 1979; Dholakia, A.1990). The DRR measures the rate at which the disparity between the actual value of an index and the ideal value of the index decreases per year. In other words, it indicates the rate of improvement or movement towards the ideal or targeted value. Last two columns of **Table-4** give the DRR of BWI during 1971-81 and 1981-91. The DRR in BWI is denoted by DBWI here. As per the theoretical model discussed above, this DBWI becomes the dependent variable for both the periods.

V. Estimation of The Econometric Model:

To test our model empirically, data on 14 major states of India are considered. Multiple linear regression equations have been estimated by using the OLS method. As discussed earlier, the dependent variable for both the sub-periods *viz.* 1971-81 and 1981-91 is Disparity Reduction Rate in Basic Welfare Index (DBWI). Independent variables are developmental expenditure or its components in terms of social (i.e. huma

tructural shift in the slope parameters between the two sub-periods the technique of pulled regression with dummy variables is used. Dummies have been introduced for each parameter in the pulled regression equation. With a view to increasing the degrees of freedom and thereby the

reliability of the estimates, Restricted Least Squares (RLS) method is also used by imposing the linear restriction of equality of parameters. (See Gujarati; 1995)

We have tested the hypotheses with respect to aggregative developmental expenditure and its social and economic components to find out whether the developmental effort *per se* is important or its composition and components are relevant to improve the DBWI. For this, alternative regressions are estimated by introducing combined developmental expenditure or its components and sub-components as independent variables in the model, results of which are presented in **Table-5**. Interestingly it emerges from the results that it is not the combined developmental expenditure but its allocation to different sectors which is relevant for the rate of improvement in the basic welfare. It is the component of expenditure on human capital (or social services) which is most crucial on margin and not the expenditure on physical capital or economic services. Regression fit of a model with aggregative developmental expenditure turns out to be poor for both the sub-periods *viz.* 1971-81 and 1981-91. (see, **Equation-1 & 2 of Table-5**) On the other hand when we consider the model with separate components of Expenditure on Human Capital (EHK) and Physical Capital (EPK) along with their revenue and capital categories as explanatory variables (both with and without dummies) the fit of the model significantly improves, and becomes statistically significant. (See, **Equation-3 of Table-5**) The slope parameters of this equation show considerable stability between the two sub- periods as suggested by statistical insignificance of all dummies. Even the Chow test also indicates the same situation. Because of this, for the final estimate of the model we dropped all the dummies to improve the reliability of the

estimates of the pulled regression. (see, **Equation-4 of Table-5**) Insignificant dummy of intercept coefficient suggests that the net of changes in exogenous variables Z_1, Z_2, etc. was not significant on the slope or intercept parameters of our model. In order to find out whether the revenue and capital components of both EHK and EPK are separately required to explain variations in DBWI, we carried out the exercise of Restricted Least Squares. We put two linear restrictions on parameters of the equation to test the equality between the slope coefficients of parameters for revenue and capital components of each of the two variables, *viz.* EHK and EPK. (see, **Equation-4 in Table-5)** The required F test for testing the equality of restricted and unrestricted equations suggests that the restrictions put on the parameters are valid. In other words, instead of considering the revenue and capital expenditures separately, we can consider total expenditure on EHK and EPK as explanatory variables in the model. This further implies that we can use restricted equation instead of unrestricted one to increase the degrees of freedom and thereby reliability of the estimates. Our final estimated equation thus arrived at is pulled restricted equation presented below: **(Equation No-6 in Table-5)**

$$\textbf{DBWI} = \underset{}{\textbf{0.920}} + \underset{\textbf{(5.13)*}}{\textbf{0.021 EHK}} - \underset{\textbf{(-4.16)*}}{\textbf{0.016 EPK}} + \underset{\textbf{(0.904)}}{\textbf{0.0003 PCI}}$$

$$(R^2 = 0.581 \quad F(3, 24) = 11.09^*)$$

*statistically significant at 1% level.

The results of the above equation suggest that out of the two components of the developmental expenditure, *viz* EHK and EPK, the former yields increasing returns and the latter yields decreasing returns to government efforts.

In other words, EHK tends to increase the basic welfare (output) at an increasing rate but EPK increases it at a decreasing rate given that other factors remain constant. As per these estimates, if the government increases average annual per capita real expenditure on EHK by Rs. 50, the disparity reduction rate of basic welfare (DBWI) would increase by 1 percentage point, on an average. While the same amount if diverted to EPK has a tendency to reduce the DBWI by 1 percentage point, keeping all other factors constant. What is important to note is that the accelerating impact of EHK on basic welfare was observed for both the periods, *viz.* 1971-81 and 1981-91. (See Equation 5 in Table-5). However, the government efforts on physical capital or the economic sectors had constant returns during the seventies, but the deceleration during the eighties produced the overall diminishing returns over 1971-91.

It is interesting to observe that the slope coefficients of per capita real NSDP is statistically poor for both the sub-periods suggesting that level of developmental factors did not have influence on the rate of improvement of the basic welfare. They may be related with the **Level** of the welfare index but not the **Rate** at which it moves towards the targeted value. This has an important policy implication that we cannot depend on the level of economic development of a state to take care of basic welfare of its people.

As far as the budget allocation between the social and economic sectors is concerned, at the policy level, it is seldom a question of exclusive choice as noted earlier. It is always a question of according priorities to different items of expenditure 'on margin' and not of scraping one to favour the other. The priority as discussed earlier depends not on the magnitude of the marginal returns but on

the behaviour of the marginal returns. In this context our model suggests tilting the balance in favour of EHK i.e expenditure on human capital as against EPK. In spite of all inefficiencies, corruption and poor delivery of publicly provided social goods, the government does matter and has a major role to play in provision of social services to move faster towards the ideal level of basic welfare. This certainly does not mean that private social sector is not important, but until we reach at certain threshold level of basic welfare, the coexistence of the government with the former in provision of social services is advisable.

VI. Summary and Conclusion:

Several measures have been developed in the literature to measure welfare of the people, like poverty rates, PQLI, LLI and HDI, to name a few. These measures are far from adequate in comprehensively measuring even the minimum desirable welfare in an economy. Moreover, they are also temporally and spatially unstable. We have suggested an alternative measure of welfare called Basic Welfare Index (BWI), to overcome some of the limitations of the above measures. BWI encompasses all the three components of minimum desirable welfare namely, Health, Education, and Nutrition & Others. It is constructed through nine indicators which are derived on the basis of standard welfare theory. Moreover, these nine indicators are objective; measure output rather than efforts; have no ethnocentric biases; and do not assume any specific pattern of economic development. (see, Dholakia, A. 1990;1993).

In order to study the role of the government in this respect, a model hypothesizing the relationship between BWI and government efforts is presented, specified and empirically tested with the data on fourteen major states of India,

for the period 1971-81 and 1981-91. The dependent variable is Disparity reduction rate in Basic Welfare Index (DBWI) and independent variables are average annual real percapita expenditure on development (or its sub-components) and percapita real NSDP (PCI). Results of the model suggest that increase in expenditure on human capital (EHK) by the government increases the basic welfare at an increasing rate and that on physical capital (EPK) increases the welfare at a decreasing rate, keeping other factors constant. It may be inferred from our results that at a policy level, where the choices are not exclusive but are only on margin, tilting the balance in favour of EHK would help achieving the targeted welfare level more efficiently than with the EPK. It emerges from the results that level of economic development does not influence the rate of movement towards the targeted welfare (DBWI) and hence cannot alone be depended upon. In spite of inefficiencies and corruption in publicly provided social goods the role of the government in accelerating basic welfare seems to have remained important in India.

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Table-1

Average Annual Per Capita Real Government Expenditure for sub-periods

STATE	EHK	EHK	EPK	EPK	PCI
	Rev. A/c	Cap A/c	Rev. A/c	Cap A/c	Real
For the Period 1971-80					
Andhra Pradesh	68.47	8.14	47.06	35.06	627.00
Bihar	37.53	5.54	22.77	22.65	415.00
Gujarat	87.13	13.59	53.05	34.70	827.00
Haryana	74.95	14.64	93.20	64.54	960.00
Karnataka	76.35	8.79	66.04	34.46	698.00
Kerala	106.57	16.39	41.71	25.83	592.00
Madhya Pradesh	58.48	7.51	43.08	31.67	534.00
Maharashtra	95.60	12.10	67.38	42.04	808.00
Orissa	64.54	8.53	60.34	35.88	473.00
Punjab	101.31	14.77	80.90	37.82	1121.00
Rajashtan	76.77	12.60	50.41	34.30	560.00
Tamil Nadu	75.80	9.34	54.90	15.81	648.00
Uttar Pardesh	47.03	5.78	40.72	28.79	497.00
West Bengal	80.45	9.68	38.81	16.46	779.00
For the Period 1981-91					
Andhra Pradesh	128.74	2.85	93.44	34.31	1380
Bihar	78.16	5.27	50.31	29.94	917
Gujarat	154.72	9.44	131.73	49.90	1940
Haryana	158.12	7.93	165.57	54.90	2370
Karnataka	131.88	2.50	102.06	42.63	1520
Kerala	153.87	9.34	63.47	29.65	1508
Madhya Pradesh	101.99	4.78	82.48	43.51	1358
Maharashtra	160.05	4.22	146.22	50.15	2435
Orissa	112.02	5.54	69.81	59.86	1314
Punjab	179.59	8.76	147.64	43.17	2674
Rajashtan	118.98	17.75	86.08	41.30	1222
Tamil Nadu	151.25	4.23	116.33	16.16	1498
Uttar Pardesh	85.70	3.97	69.68	35.19	1278
West Bengal	122.42	3.49	62.05	15.40	1773

Source: Various Issues of RBI Bulletins & Economic Surveys

Table-2

Critical Values and Formulae for Indices

Indicators	Best Value (=100)	Worst Value (=0)	Formula
1.Male Literacy Rate (%) (Above age five)	100	0	$\frac{V - 0}{100} \times 100$
2. Female Literacy Rate (%) (Above age five)	100	0	$\frac{V - 0}{100} \times 100$
3. Infant Mortality Rate (Per 1000 Live Births)	7	263	$\frac{V - 263}{7 - 263} \times 100$
4. Birth Rate (Per 1000 Population)	79	60	$\frac{V-60}{79 - 60} \times 100$
5. Death Rate (Per 1000 Population)	6	47	$\frac{V-47}{6 - 47} \times 100$
6. Child Worker Participation Rate (%) $\frac{\text{Child Workers}}{\text{Child Population (5-14)}}$	0	30	$\frac{V - 30}{0 - 30} \times 100$
7. Male Participation Rate in Non-A Sector (%) $\frac{\text{Non-A Male Workers (Main)}}{\text{Male Population (5+)}}$	45	5	$\frac{V - 5}{45 - 5} \times 100$
8. Percentage of People Below poverty line (%)	0	75	$\frac{V - 75}{0 - 75} \times 100$
9. Female Mean Age At Marriage (Years)	24	12.5	$\frac{V - 12.5}{24 - 12.5} \times 100$

Note : V = Actual Value of the Indicatior.

Source : (1) Dholakia, A. (1990) : Benefits From Government Expenditure in India: A Welfare Indicatior Approach, Himalaya Publishing House, Bombay.
(2) U.N. Demographic Year Books.
(3) Morris, Morris David & Others(1979): Measuring the Conditions of The World's Poor: The Physical Quality of Life Index.

Table-3

Component Indices of Basic Welfare Index

State	Health HI			Education EI			Nutrition & Others N&OI		
	1971	1981	1991	1971	1981	1991	1971	1981	1991
Andhra Pradesh	61.01	70.76	77.66	28.38	33.95	41.15	41.72	52.21	59.17
Bihar	52.89	58.57	66.68	23.01	29.78	34.64	33.96	39.18	46.52
Gujarat	53.34	64.11	76.45	41.39	49.50	57.44	52.07	62.97	70.51
Haryana	66.59	65.79	74.10	30.90	40.58	51.07	52.40	62.34	66.50
Karnataka	67.68	76.82	77.15	36.54	45.53	52.21	46.56	56.48	60.39
Kerala	75.87	83.95	91.83	69.83	79.03	85.93	59.91	70.40	78.31
Madhya Pradesh	53.14	55.94	62.77	25.93	31.79	40.53	33.19	43.36	51.65
Maharashtra	67.22	74.82	79.93	45.20	53.15	60.71	50.06	57.47	63.60
Orissa	56.95	61.11	66.89	30.40	38.66	45.85	37.40	42.08	53.53
Punjab	65.76	73.69	79.40	38.07	45.80	54.85	64.24	71.85	74.54
Rajashthan	54.39	62.37	69.62	21.97	27.70	34.83	40.93	50.27	58.56
Tamil Nadu	63.00	72.20	82.86	45.23	52.50	59.79	54.75	59.01	66.75
Uttar Pradesh	41.42	52.96	65.34	24.53	30.44	37.43	38.67	48.85	55.30
West Bengal	59.88	69.88	78.34	38.06	45.65	53.65	51.57	55.58	73.16
India	**55.72**	**64.90**	**72.14**	**38.05**	**40.98**	**48.33**	**44.91**	**53.02**	**60.53**
Best or Targeted Value	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: (a) Calculated by using formulae and indicators given in Table-1.
(b) Data on poverty rate relate to 1973,1983,& 1993. They are modified estimates of the expert group on poverty.
(c) Data on health indicators for Bihar and West Bengal were reestimated by using the probable extent of underreporting given in different SRS volumes.

Sources: (1) Vital Statistics of India (Various Volumes)
(2) Census publications of 1971,1981,1991
(3) Statistical Abstract of India (Various Volumes)

Table-4

Basic Welfare Index(BWI) & Its Disparity Reduction Rate(DRR)

State	Basic Welfare Index (BWI)			Disparity Reduction Rate (DRR)	
	1971	1981	1991	1971-81	1981-91
Andhra Pradesh	43.70	52.31	59.33	1.64	1.58
Bihar	36.62	42.51	49.28	0.97	1.25
Gujarat	48.93	58.86	68.13	2.14	2.52
Haryana	49.96	56.24	63.89	1.33	1.90
Karnataka	50.26	59.61	63.35	2.06	0.97
Kerala	68.53	77.79	85.36	3.42	4.08
Madhya Pradesh	37.42	43.70	51.65	1.05	1.51
Maharashtra	54.16	61.81	68.08	1.81	1.78
Orissa	41.58	47.28	55.42	1.02	1.66
Punjab	56.02	63.78	69.60	1.92	1.74
Rajashthan	39.09	46.78	54.34	1.34	1.52
Tamil Nadu	54.33	61.24	69.80	1.63	2.47
Uttar Pradesh	34.87	44.08	52.69	1.51	1.66
West Bengal	49.84	57.04	68.38	1.54	3.02
India	**46.23**	**52.96**	**60.33**	**1.33**	**1.69**
Best or Targeted Value	**100**	**100**	**100**	-	-

Note : (a) BWI is Calculated by using the formulae given in Table-1.

(b) Formula for DRR is :

$$DRR_t^{t+n} = \frac{-[\{X^*_{t+n}\}^{1/n} - 1]}{X^*_t} \times 100$$

Where DRR_t^{t+n} = Disparity Reducation Rate during the Period n.

X^*_{t+n} = X_{t+n} - 100 = Disparity between the actual welfare and the Ideal Welfare at the end of the period.

X^*_t = X_t - 100 = Disparity between the actual welfare and the Ideal Welfare at the start of the period.

X_{t+n} and X_t are the levels of Indexes X at time t+n and t.

Source: Same as Table-2

Table-5

Regression Results of The Model

Dependent Variable for all Regressions is Disparity Reduction Rate in Basic Welfare Index (DBWI)					
Independent Variables					
Equation No.	**Constant**	**Developmental Expenditure**	**PCI**	**R^2**	**F Value**
1	0.772	0.009 (0.885)	-0.004 (-0.336)	0.120	0.600 (5,22)
Estimated Dummy	1.219 (0.992)	-0.0120 (-1.031)	0.001 (0.671)		
2 (Without Dummy)	1.294	0.002 (0.613)	0.00008 (0.151)	0.062	0.832 (2,25)

Independent Variables								
Equation No.	**Cons-tant**	**EHK Rev. A/c**	**EHK Cap. A/c**	**EPK Rev. A/c**	**EPK Cap. A/c**	**PCI**	**R^2**	**F Value**
3	0.244	0.030 (1.375)	0.025 (0.217)	-0.006 (-0.281)	-0.001 (-0.027)	-0.001 (-0.578)	0.671	2.968 (11,16)
Estimated Dummy	0.177 (0.147)	-0.02 (-0.67)	-0.007 (-0.006)	-0.016 (-0.648)	-0.012 (-0.411)	0.001 (0.671)		
4 (Without Dummy)	0.420	0.024 (4.840)	0.034 (1.351)	-0.020 (-2.722)	-0.007 (-0.693)	0.0003 (0.643)	0.632	7.270 (5,22)

Independent Variables						
Equation No.	**Constant**	**EHK Combined**	**EPK Combined**	**PCI**	**R^2**	**F Value**
5	0.317	0.031 (3.392)	-0.004 (-0.537)	-0.001 (-0.823)	0.666	5.705 (7,20)
Estimated Dummy	0.337 (0.394)	-0.005 (-0.441)	-0.150 (-1.653)	0.001 (0.874)		
6 (Without Dummy)	0.920	0.021 (5.133)	-0.016 (-4.159)	0.0003 (0.904)	0.581	11.088 (3,24)

Source: Based on Table-2 , 3, & 4.