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Distributional Weights, Shadow Wages and the Accounting Rate of Interest: Estimates for India*

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Introduction

Project appraisal has traditionally concentrated on the efficiency aspects of project choice. This would be acceptable if the government could deal with the relevant equity aspects by independent tax-subsidy measures. It has been argued, however, that the government's fiscal powers to redistribute income *intra*-temporally and inter-temporally are likely to be limited in developing countries, and hence equity considerations cannot be separated from those of efficiencyin project choice. (See Little and Mirrlees [1972], Marglin [1976], UNIDO [1972].) We, thus, have to take account of the income distributional impact of the project's net benefits on social welfare in the ensuing second best world.

In project appraisal, the impact on inter-temporal income distribution via the savings-consumption distribution of the net benefits of the project, and on the iritra-temporal distribution of income via income accruals from the project to different income classes amongst contemporaries must be simultaneously taken into account.[1] In making these income/consumption changes commensurable, we need a numeraire. The choice is between Little-Mirrlees' (LM's) "uncommitted social income expressed in foreign exchange" and the UNIDO Guidelines "aggregate consumption". The former is close to public savings, and if unlike LM we do not differentiate between public and private savings, the two different aumeraires can be said to correspond to "savings" on the LM and "aggregate

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1. In large countries like India it may also be desired to take account of the effects of project choice on the inter-regional distribution of income. We abstract from this aspect in this paper, but see Lal [1973, 1975], for ways in which this aspect can be incorporated.

consumption" on the UNIDO methods of project appraisal. If "consumption" and "savings" were homogeneous "commodities", then it would be a matter of convenience which of the two numeraires we adopted (see Lal [1974]). However, consumption and savings would be homogeneous "commodities" (in the sense that the social value of one unit of the "commodity" is the same as any other unit and hence the government values each unit of consumption/savings equally no matter to whom it accrues) only if the government did not want to effect income distribution in its two dimensions through project choice.

As the need for distributional weighting in project analysis arises, precisely because this assumption does not hold, the problem then is to choose an item of national income which would be relatively invariant to this distributional weighting and hence be relatively homogeneous as a numeraire. Given the existing inequalities in consumption in India, we would clearly want to use project choice to affect this distribution, and hence to differentially weight consumption changes of different groups. But this implies that homogeneity cannot be ascribed to "current aggregate consumption", which would therefore not be an appropriate numeraire as its own "value" could change with the distributional weighting adopted.

Similar problems arise with current savings accruing to different income classes. For the savings of each group will determine its own consumption time profile and again we may not want to value the consumption profile which accrues to one group on a par with others. This has led Little-Mirrlees to recommend the use of uncommitted social income (which is close to public savings) as the numeraire for public sector project appraisal. For of the various alternatives, this item can be ascribed (at least from the government's viewpoint) the greatest degree of homogeneity. We have, however, decided not to adopt this numeraire exactly in this paper, partly as a simplification of the actual process of project appraisal, and partly because of our belief that private savings in India are probably as valuable as public savings. We, therefore, will not distinguish between different types of savings, and consider them to be equally socially valuable.[2] Given this assumption, current savings will provide us with a homogeneous numeraire. Moreover, as this numeraire is fairly close to the LM numeraire, it will enable us to use the methods they have suggested for estimating various "national parameters" required for project appraisal in India.

Our specific problems in this paper are (a) to derive distributional weights which will enable us to evaluate the interpersonal consumption changes in terms of their savings equivalent social value, and (b) to provide current saving equivalent weights for weighting the intertemporal consumption effects of projects. The

2. If, however, it is desired to adopt the LM numeraire, the shadow prices we derive in this paper would still remain valid. It would only be necessary to make further estimates of the shadow price of *private* investment (savings) in terms of uncommitted social income, if necessary, differentiated by income group.

latter problem is equivalent to deciding on a discount rate, the accounting rate of interest (ARI), for social cost-benefit analysis for India. Estimating these parameters is essentially a part of the problem of delineating the optimal economic growth path for a labour surplus economy. Though we will not solve an explicit optimal growth model in this paper, our derivation of "national parameters" may be looked upon heuristically as approximations from a long-run optimal growth model for the Indian economy. It should also be noted that as the so-called employment problem in developing countries – at least in what Sen [1975] has termed its "income" and "output" aspects – is essentially a problem of delineating the second best "optimal" distribution of inter- and intra-temporal consumption subject to various technological and political constraints (see Marglin [1976], Lal [1974]), we will also be (c) estimating the ratios of shadow to market wage rates for the economy. These will determine the second best "optimal" labour intensity for the economy on the "optimal" growth path.

In Part I we derive the various formulae from which the distributional weights and the ARI can be estimated, and in Part II, we provide our estimates. As will become apparent, in the process we also have to make estimates of various other "shadow" or social prices, namely the current premium on savings/investment (S_O), the ratio of the shadow to the market wage rate (k), and the consumption rate of interest (CRI), as these shadow prices and the ARI and distributional weights are interdependent. Moreover, in estimating these interdependent shadow prices, judgements on some "quasi-normative" parameters is required. These are discussed in Part III, which also provides our best estimates of all the key "national parameters".

I. Methodology

1.1 Distributional Weights

Assuming, for simplicity, that all wages are consumed and all profits saved, project choice will affect the intra- and inter-temporal distribution of consumption, through the distribution of project benefits in the form of wages and profits. The latter, ex hypothesi, being saved are valuable at par in terms of our numeraire, which leaves the consumption changes resulting from changes in employment which have to be made commensurable in terms of our numeraire, savings expressed in foreign exchange.

Assume that the government has some notional base level of income (b) at which it values *current* changes in consumption, socially at par. We can then postulate a social valuation function (V) which is iso-elastic in form, and which converts consumption changes into their numeraire (savings) value, as

$$V(Y) = (b^e/1-e)Y^{1-e} \tag{1}$$

where b is consumption at the base level of income, Y is the consumption level of the relevant income group, and e is the elasticity of social marginal utility of consumption. The marginal distributional weight (w_y) is then

$$w_y = (b/Y)^e \tag{2}$$

1.2 *The Premium on Savings (S)*

To determine the distributional weights, we will have to determine the value of b, which in turn will depend upon the value of S, the current premium on savings per unit of socially weighted current consumption. If we define 1 as the utility price of investment (savings), and V' is the social marginal utility of (employment generated) consumption, then by definition

$$S = \lambda/V' \tag{3}$$

from which by logarthmic differentiation it follows that[3]

$$\dot{S}/S = (\dot{\lambda}/\lambda) - (\dot{V'}/V'). \tag{4}$$

With savings (investment) as the numeraire, the accounting rate of interest (ARZ), which is the discount rate to be used in project analysis, is the proportionate rate of fall in the utility value of savings (investment), that is ARZ = $-(\dot{\lambda}/\lambda)$. Moreover, we define the consumption rate of interest (CRI) as the proportionate rate of fall of the social marginal utility of employment generated consumption over time; thus

$$\left.\begin{aligned} CRI &= -(\dot{V'}/V') \\ \text{and} \quad ARI &= -(\dot{\lambda}/\lambda) \end{aligned}\right\} \tag{5}$$

Hence, $$-\dot{S}/S = ARI\text{-}CRI. \tag{6}$$

(6) will, therefore, determine the time path of S over time. If we assume that the divergence between the ARI and CRI diminishes linearly over time, till at some date T, $ARI = CRI$, and hence S_t ($t = T, \ldots, \infty$) remains constant and equal to unity, then, the current value of S (S_0) will be given by (see LM [1969])

$$S_0 = [1 + \tfrac{1}{2}(ARI - CRI)]^T. \tag{7}$$

3. Marglin [1976] has labelled (4) *the* inter-temporal consistency condition, and as he shows it is valid not only for optimal growth paths but "whenever capital is consistently valued in terms of its product" (Marglin, p. 186–187).

But the value of S_O can also be estimated in an alternative way. Suppose that as a result of a marginal investment project in the industrial sector, there is a marginal increase in employment, which leads to workers being drawn out of various sectors in the economy. Say that the proportion of labour drawn out of sector j (j=1 ... n), is π_j, with $\Sigma\pi_j=1$. Suppose that the output foregone by withdrawing a worker from sector j is w_j, at market prices. Moreover, define accounting ratios for commodities (A_i), where $A_i = P_i^s / P_i^m$, where P_i^m is the market and P_i^s the shadow price of commodity i. Then the output foregone by creating one more industrial job will be

$$\sum_j \pi_j \cdot w_j \cdot A_j \equiv \sum_j \pi_j \cdot m_j \tag{8}$$

Moreover, if the wage paid to the worker in his new occupation is w_f, and is greater than that ($w_1 \ldots w_n$) received by the $\pi_1 \ldots \pi_n$ workers withdrawn, in their previous occupations, then in addition the economy will be committed, ceteris paribus, to providing extra resources to meet the ensuing increase in consumption. Given the expenditure weights (q_{ij}) from the pattern of consumption of different types of workers, we can define consumption conversion factors C_j for each type of labour, which convert Re.1 of consumer expenditure at ***market*** prices into values at shadow prices as

$$C_j = [\sum_j q_{ij} \cdot p_{ij}^s / \sum_j q_{ij} \cdot p_{ij}^m] \tag{9}$$

then the social cost of this incremental consumption in terms of the numeraire, savings will be

$$\sum_j \pi_j (w_f \cdot C_f - w_j \cdot C_j) \equiv \sum_j \pi_j (c - a_j) \tag{10}$$

However, to the extent that this increase in consumption accrues to relatively poor workers (or equivalently that employment creation is considered socially valuable), the increase in consumption will also have some social value, which given the social valuation function (1) will be

$$\sum_j \pi_j [V(c^*) - V(a^*_j)] n_j \tag{11}$$

where n_j are the average number of adult equivalent consumption units per household, and $c^* = c/n$ and $a^*_j = a_j/n$, that is the "per capita" consumption at shadow prices of industrial sector workers and workers in sector j's households respectively.

Thus the social value of the extra consumption generated per unit of savings

foregone will be (11)/(10), and this must by definition be equal to $1/S_0$, that is

$$S_0 = \sum_j \pi_j (c - a_j) / \sum_j \pi_j [V(c^* - a_j^*)] \tag{12}$$

and clearly, for consistency (12) = (7) (13)

1.3 *The* Accounting Rate of Interest (AIR)

It can be shown that on the "optimal" growth path $-(\dot{\lambda}/\lambda)$ which is the ARI must equal the social marginal product of capital (see LM [1974], Marglin [1976], Newberry [1972], Stern [1972]). Discounting the time stream of inputs and outputs of a marginal investment project (evaluated at shadow prices), along the optimum path by the relevant *ARI*'s will, thus, yield a zero net present value. Assume that current investment of Re.1 yields a perpetuity of Rs.$(r+w)$ of which r is saved and reinvested, and w is paid in wages and consumed in the period in which it accrues. If, moreover, the ratio of the shadow to the market industrial wage rate is k, then the ARI will be given by

$$\text{ARI} = \text{p} = \text{r} + (1 - k)w. \tag{14}$$

1.4 The Ratio of the Shadow to the Market Wage Rate (k)

Along the "optimum" path, the industrial shadow wage rate (SWR) will be given by the cost of the output foregone at shadow prices (8), plus the social cost of increased consumption (10) less the social value of this increased consumption (11), that a marginal increase in employment (in the industrial sector) entails (see LM, Stern [1972], Newberry [1972]). As the market industrial wage is w_f, this implies that k is given by

$$k = [\sum_j \pi_j m_j + \sum \pi_j (c - a_j) - \sum_j \pi_j V(c^* - a^*_j) n_j] / w_f \tag{15}$$

1.5 The Consumption Rate of *Interest* (CRI)

The CRI from (5) has been defined as the proportionate rate of fall of the social marginal utility of employment generated consumption over time. Thus, the CRI at time t, (i_t), given our general valuation function (1), will be given by

$$(1 + i_t) = (dV/dC_t) / (dV/dC_{t+1}) \tag{16}$$

that is 1 plus the *CRI* is equal to the marginal rate of substitution between con-

sumption in period t (C_t) and $t+1$ (C_{t+1}).

In deriving the CRI we need to take account of both the differing per capita consumption levels in rural and urban areas and the possibility that they will grow at different rates along the "optimum" path. Then denoting rural per capita consumption in the base period as a, and urban per capita consumption as c, and if the current proportions of the rural and urban population in total population are n_c and n_a ($n_c + n_a = 1$), and given the expected growth rates of per capita consumption as g_a for rural and g_c for urban areas, the social value of consumption in period 0, and 1, using valuation function (1) is therefore[4]

$$V(C_0) = N_0 \left[n_c \frac{[b^e . \bar{c}^{1-e}]}{1-e} + n_a \frac{[b^e . \bar{a}^{1-e}]}{1-e} \right]$$

$$V(C_1) = N_0 (1+g_n) \left[n_c \frac{[b^e . \{\bar{c}(1+g_c)\}^{1-e}]}{1-e} \right] + n_a \left[\frac{[b^e \{\bar{a}(1+g_a)\}^{1-e}]}{1-e} \right] \tag{17}$$

4. It should, however, be noted that once inter-personal consumption differences are valued differentially, consumption ceases to be homogeneous, and there is no ***unique*** consumption rate of interest (*CRI*) nor shadow price of savings (investment) in terms of consumption (S). The accounting rate of interest (*ARI*) and the shadow wage rate (SWR) are, however, clearly defined in terms of our nurneraire savings (=investment). Thus, consider a simple optimal growth model for a dual economy, in which the advanced sector draws upon an elastic supply of labour at a wage c, from the traditional sector where wages are also assumed constant, at a. Wages in both the sectors are consumed, and profi's (in the advanced sector) are saved. There is a given labour force N, of which L can be employed in the industrial sector, and this is the government's control variable. With the usual neo-classical production function in industry, the change in the capital stock K (=dk/dt) will be

$$K = f(K, L) - cL \tag{i}$$

with K, K, and L time dependent and c, ex hypothesi, constant. Total utility using the instantaneous social valuation function (1) would then be [L $V(c) + (N-L) \cdot V(a)$], or [$L\{V(c) - V(a)\} + N \cdot V(a)$]. The upper bound of social utility being $N \cdot V(c)$, the objective function would be

but with zero the upper bound

$$\int_0^\infty (L\{V(c) - V(a)\} + N \cdot V(a) - N \cdot V(c)]\, dt$$

or

$$\int_0^\infty (L - N)\,[V(c) - V(a)]\, dt. \tag{ii}$$

The Hamiltonian of the problem: Maximise (ii) subject to $0 \leqslant L \leqslant N$, and with $K \geqslant 0$ given $K(O)$, is given by

$$H = (L-N)\,[V(c) - V(a)] + \lambda[f(K, L) - cL] \tag{iii}$$

The necessary conditions for an optimal path are given by

where N_c, is the total national population at the base date and g_n is its growth r From (16) and (17), therefore,

$$1 + i_0 = \frac{(n_c/\bar{c}^e + n_a/\bar{a}^e)}{(1 + g_n)\,[(n_c/c^e\,(1 + g_c)^e) + (n_a/\bar{a}^e\,(1 + g_a)^e)]} \tag{18}$$

For the special case where the rural and urban per capita consumption growth rates are the same, say g, the above expression reduces to

$$1 + i_0 = (1 + g)^{-e}/(1 + g_n). \tag{18a}$$

1.6 The Inter-relationships of the Variables

From (7), (12), (14), (15), (18a) we can derive the following equation which relates all the various variables which will determine a consistent set of distributional

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$$H_L = 0;\ H_k = \lambda \quad \text{and} \quad \lambda_\lambda = K \tag{iv}$$

These imply $\quad f_k = \dot{\lambda}/\lambda \quad$ (v)

and $\quad f_L = c - \{V(c) - V(a)\}/\lambda \quad$ (vi)

The former, (v), states that the ARI equals the marginal product of capital at all times on the optimum path. The latter (vi) provides the expression for the SWR. There is clearly no unique S, but rather two, corresponding to $Sc = \lambda/V'c$ and $Sa = \lambda/V'a$. Nor is there a unique CRI, but rather two consumption rates of interest for the two income groups with incomes c and a. However, the inter-temporal consistency condition, in terms of the consumption of those at consumption level c, or a, still holds; for as can be checked, $\dot{S}/S = (\dot{\lambda}/\lambda) - (\dot{V}'c/V'c)$ and $\dot{S}a/Sa = (\dot{\lambda}/\lambda) - (\dot{V}'a\,V'a)$.

In a fully specified optimal growth model, there is no need to determine the S's and the *CRI*'s explicitly, as for project analysis (with savings as the numeraire), we merely require the values of the ARI, and the shadow wage rate. For numerical simulations of these "national parameters" within such a framework, see Newberry and Stern. In our more heuristic approach, however, the introduction of the CRI and S is useful.

Following Little-Mirrlees (Chps. 13 and 14), we define the CRI "as the rate of fall of the utility gain from using a unit of consumption to make possible the transfer of people from (the) occupation (with income level a to that with income level c)" (p. 302). Then defining $[V(c) - V(a)]/(c-a) = q$, as this utility gain per unit of committed consumption, we have the $CRI = -\dot{q}/q$, and a natural definition of S, is then λ/q. Again this implies that $-\dot{S}/S = \dot{\lambda}/\lambda - \dot{q}/q =$ ARZ—CRI. Moreover, the SWR in (vi) then becomes

$$SWR = f_L = c - (c - a)/S. \tag{vii}$$

Note that m does not appear in this formulation as we have implicitly assumed that $a = m$.

weights, the accounting rate of interest and the ratio of the shadow to the market wage rate. Note that we have for notational ease not transcribed the full equation (18) for i, (the CRI), but its special version (18a)

$$\frac{\sum_j \pi_j (c-a_j)}{\frac{n \cdot b^e}{1-e}\left[\sum_j \pi_j \left\{\frac{(c)^{1-e}}{(n)} - \frac{(a_j)^{1-e}}{(n)}\right\}\right]} = \left[1 + \tfrac{1}{2}\left\{r + w - \frac{w}{w_f}\left[\sum_j \pi_j m_j + \sum_j \pi_j (c-a_j) - \frac{n\,b^e}{1-e}\sum_j \pi_j (\vec{c} - \vec{a}_j)\right] - \frac{(1+g)e}{(1+gn)}\right\}\right]^T \quad (19)$$

The parameters in this messy expression are:

c = the consumption level of the industrial worker at shadow prices

a = the previous consumption level of the industrial worker at shadow prices

r = the portion of social value added of a marginal industrial project which is saved and invested

w = the portion of social value added that is paid in wages on the marginal industrial project

g = the expected rate of growth of aggregate per capita consumption

g_n = the expected rate of growth of total population

w_f = the market industrial wage

m = the output foregone by a marginal increase in industrial employment, valued at shadow prices

π_j = the proportion of workers drawn from sector j, when one extra industrial job is created

n = the number of adult equivalent consumption units per household. We are also assuming that all $n_j = n$, in (19)

$\vec{c}$ = defined as c/n, that is the "per capita" consumption at shadow prices of worker households in the industrial sector

$\vec{a}$ = defined as a_j/n, that is the "per capita" consumption at shadow prices of worker households in "sector" j

This leaves

b = the base level of income at which marginal changes in consumption are socially valued at par in terms of the numeraire (savings)

e = the elasticity of social marginal utility of consumption

T = the date at which consumption and savings are expected to be of equal social value

We can choose the values of any two of these latter variables and that will determine

the value of the third from (19). Once the values of b and e are thus determined within this consistent framework, then the distributional weights, the ARI, and the ratio of the shadow to the market wage (k) can be determined from equations (2), (14), and (15) respectively. This is the procedure we shall follow in Part II.

It should be noted that for our purposes "unemployment" will also be considered to be a sector, and the π_j terms will include the effects of rural-urban migration (see Harris-Todaro [1970], Lal [1973a]). We turn to the estimates in the nexf part.

II. Estimates

2.1 *The Proportion* of *Workers Withdrawn from Sectors* (π_j)

For purposes of estimation we have divided up the Indian economy into five "employment" sectors, namely, organized urban (industrial), unorganized urban, unemployed urban, agricultural rural, and unemployed rural. We need to estimate

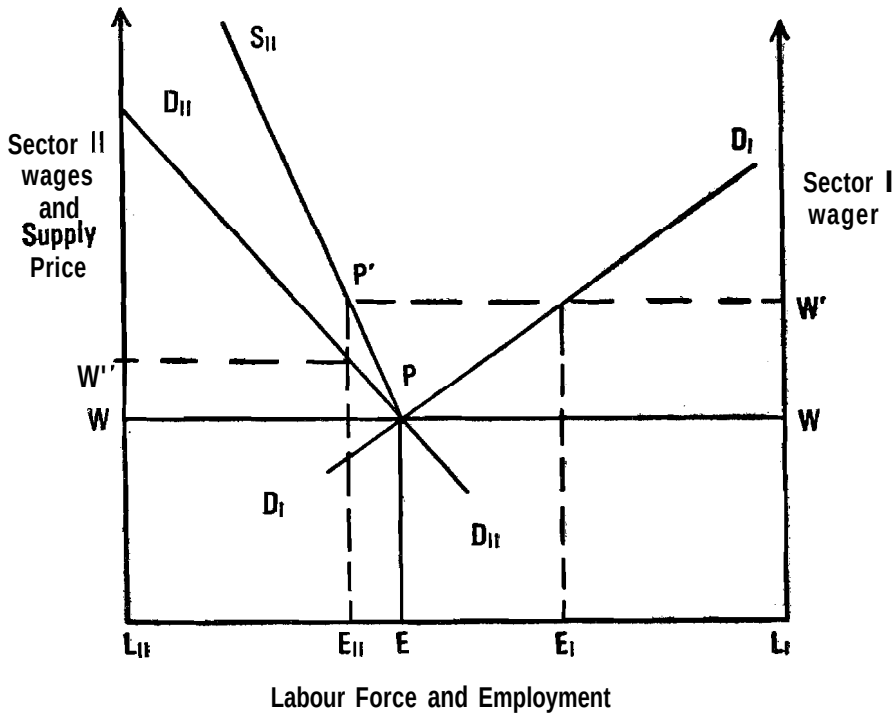

Fig. 1

the proportion of workers withdrawn from these sectors (on average) as a result of a marginal increase in industrial employment at the all-India level.

We use a model due to Scott (see Scott et al. [1976]), depicted by Fig. 1 to determine these proportions. We consider labour allocation between any two sectors I and II, but the argument holds, mutatis mutandis, for many sectors. For simplicity, initially we ignore the possibility of unemployment in the two sectors, and also assume that the wage rate is the same in both the sectors. Then if D_jD_j is the demand curve for labour in sector $j=I, II$, and S_{II} is the supply curve of labour from sector II to sector I,[5] the initial labour allocation between the two sectors will be EL_j in sector $j=1, 11$, at the wage rate W, and with a given total labour force of L_IL_{II} in the two sectors. Now suppose the demand for labour rises in sector I by E_IE_{II}. This will raise the wage rates in both the sectors. In the new equilibrium, the sector I wage will have risen by WW'; at this wage given S_{II} supply curve of labour, EE_{II} workers will move from sector II to sector I, and the wage in sector II will only rise by WW'. (There will now be a wage differential between the two sectors.) Of the increase of E_IE_{II} in sector Iemployment, EE_I will come from within the sector and EE_{II} from sector II. Hence, $\pi_I = EE_I/E_IE_{II}$ and $\pi_{II} = EE_{II}/E_IE_{II}$.

If the elasticity of the supply curve of labour from sector II is e_{sII}, and of the demand curve of labour in sector I is e_{dI}, then the slopes of the two curves S_{II} and D_I (assuming they are straight lines) will be given by

$$dS_{II}/dW = N_{II} \cdot e_{s\,II}/W$$

and $$dD_I/dW = N_I \cdot e_{dI}/W$$

where N_I and N_{II} are the labour forces in the two sectors I and II. Clearly then, it follows that

$$\pi_{II}/\pi_I = E_{II}\,E/E_I\,E = N_{II} \cdot e_{sII}/N_I \cdot e_{dI}. \tag{20}$$

Of our five "employment" sectors, three are urban and two rural. We thus first need the proportions of workers drawn from the rural and urban sectors when one extra industrial job is created. From (20), we require estimates of the two elas-

5. As drawn, we have implicitly assumed that the *effective* supply price of sector II labour to sector I is greater than the wage rate (equal to the marginal product cf labour) in sector I. This is meant to take account of various imperfections in labour markets (like imperfections in information flows) as well as psychic disutilities and various real resource costs of moving from one sector to the other. If we consider sector I to be rural and sector II to be urban, then the difference between the supply price and wage rate of rural labour will also depend upon theinstitutional features posited in the rural sector, like the relative proportion of landless and landed peasants, the extent of pure family labour operated family farms, etc. (see Lal [1976a]).

ticities e_{sII} and e_{dI} (where II is the rural and I is the urban sector). No estimates of these are available. We have, therefore, estimated the proportions π_{II}/π_I directly from a simple rural-urban migration model of the Harris-Todaro type.

In the simplest of these models, the flow of rural-urban migration resulting from a marginal increase in industrial employment depends upon the rural-urban wage differential and the probability of finding an urban sector job which is given by the ratio of vacancies to the level of urban unemployment. Thus if M is the equilibrating number of rural-urban migrants (in the relevant time period), z is the supply price of rural labour, w_f is the urban organized (industrial) wage, U_u is the level of urban unemployment, and V the number of vacancies, then the equilibrium level of rural-urban migration in the Harris-Todaro model is given by the following general function:

$$M = \Psi\,(z,\ w_f,\ U_u,\ V)$$

with $\delta M/\delta z < 0$; $\delta M/\delta w_f > 0$; $\delta M/\delta U_u < 0$; $\delta M/\delta\ V > 0$.

Expressing the numbers of migrants, unemployed (urban) and vacancies as a percentage of the urban labour force (N_u) will yield a relationship between the rural-urban migration rate $m = M/N_u$, urban unemployment rate $\mu_u = U_u/N_u$, vacancies as a percentage of the urban labour force $v = N/N_u$. In addition, it is plausible to assume that the rural-urban migration rate will also be directly related to the ***rural*** uaemployment rate μ_r. Thus our final formulation of the migration function is

$$m = \phi\,(z,\ w_f,\ \mu_u,\ \mu_r,\ v) \tag{21}$$

with $\delta m\ \delta z < 0$; $\delta m\ \delta w_f > 0$; $\delta m/\delta\mu_u < 0$; $\delta m/\delta\mu_r > 0$; $\delta m/\delta v > 0$.

We have used (21) to estimate a cross-section regression in which 1971 Census Statewise migration data on the percentage of male rural-urban migrants (life time) as a percentage of the male urban population[6] are regressed against (i) the Statewise estimated average supply price of rural male labour of the weaker sections of the rural population who expressed a willingness to move outside the village in the NSS 25th round (1970-71);[7] (ii) the Statewise average industrial earnings of workers earning less than Rs.400 per month;[8] (iii) the Statewise male urban and rural unemployment rates from the 1971 Census; and (iv) the Statewise percentage of

6. This is a rather crude measure of the rural-urban migration flows we need. See Lal [1974d].
7. See Lal [1976a]. The averages were derived by weighting the expected wage for full-time work outside the village, by the numbers who would be willing to move given in the NSS report.
8. The 1971 wage data from the *Annual Survey* of *Industries* were not available by State, and hence we had to use data based on the Payment of Wages Act.

vacancies in the manufacturing sector to the urban labour force.[9] Table I summarizes the data for these various variables.

TABLE I

THE DETERMINANTS OF RURAL-URBAN MIGRATION

State	m (1)	Z (2)	W_f (3)	U_r (4)	U_u (5)	v (6)
Andhra Pradesh	23·56	1102·5	2117	0·49	2·76	19·18
Assam	26·18	1800·0	2363	1·83	3·59	2·23
Bihar	24·31	1401·0	2712	1·98	5·94	5·11
Gujarat	22·42	1471·0	2820	0·67	3·41	14·76
Kerala	13·58	1165·5	2419	4·88	8·34	0·97
Madhya Pradesh	16·27	1250·0	2912	0·85	3·91	1·16
Maharashtra	30·98	1316·5	3030	1·16	5·08	5·00
Mysore	20·21	1224·5	2881	0·38	2·23	1·44
Orissa	34·24	1273·0	2899	1·02	2·07	1·27
Punjab	20·57	1802·0	2159	0·88	1·86	4·50
Rajasthan	14·73	1407·5	2492	0·42	2·51	2·33
Tamil Nadu	17·99	1179·5	2583	1·18	5·63	1·33
Uttar Pradesh	16·20	1509·5	2293	0·90	2·81	6·38

Notes:

m = Male rural-urban migrants as percentag.: of male urban population from 1971 Census.
Z = Supply price of rural labour (derived as the average 'of the supply prices of small farmer and landless labour households, from NSS 25th Round data).
W_f = Average earnings of industrial workers earnings less than Rs.400/month.
U_r = Rural male unemployed as % of male rural labour force.
U_u = Urban male unemployed as % of male urban labour force.
v = % of vacancies in manufacturing sector to urban labour force.

Source: Columns (1), (4), (5), from ***Census of India*** (1971);
(2), (6), from ***Indian Labour Statisticss***;
(3), derived from NSS 25th Round (1970–71) – ***Tables on Employment and Unemployment Situation in India,*** Provisional Tables (CSO, July 1972).

We tried both linear and loglinear forms, but as the loglinear form gave the better fit, the results from this alone are reported. The estimated equation is

9. The last date for which these data by States are available is 1965, and we have taken this to be also applicable for 1970-71.

$$\log m = -7.52 - \underset{(0.58)}{0.33} \log z + \underset{(0.68)}{1.73} \log w_f^{**} + \underset{(0.21)}{0.41} \log \mu_r^{*} - \underset{(0.31)}{0.64} \log \mu_u^{*} + \underset{(0.09)}{0.19} \log v^{*}$$

$$R^2 = 0.26; \quad F = 1.04$$

(Figures in brackets are standard errors; *significant at the 10% level; "*significant at the 5% level)

Though the F value of this regression is not significant and the value of $\bar{R}^2$ is low, making the explanatory power of the equation fairly weak, nevertheless the signs of all the independent variables are as expected, and the coefficients of w_f, μ_r, μ_u, and v are significant.

For our purposes it is the numerical value of the coefficient of v which is of significance. This gives the elasticity of the rural-urban migration rate with respect to the increase in industrial employment as a proportion of the urban labour force. It suggests that every increase in an industrial sector job draws in only approximately 0.19 of a rural worker. This in turn implies that the proportion of workers drawn from the rural and urban sectors (π_r/π_u) is $0.19/0.81 = 0.235$. From the 1971 Census, the percentage of male agricultural workers to total male workers in India was 65.7%,[10] that is $N_r/N_u = 65.7/34.3 = 1.92$. Substituting these values of π_r/π_u and N_r/N_u into (20) yields the value of the ratio of the elasticities of rural supply and urban demand for labour (e_{sr}/e_{du}) of $0.235/1.92 = 0.12$. This implies that the all-India "effective" rural supply of labour elasticity (to the urban sector) was 12% of the urban labour demand elasticity. This does not seem too implausible.

We, therefore, will use the above estimates which suggest that for every 100 industrial jobs created, 19 "workers" are drawn from the rural sector and 81 from within the urban sector. We next need to estimate the proportions in which these workers are drawn from the subsectors within the rural and urban sectors. Using the same argument as before, from (20) this will depend upon the ratios of the labour force in the various intra-urban and intra-rural sectors and on the relevant elasticities of labour demand and supply. We have no estimates for these intra-sectoral elasticities, and no basis for determining them. Following Scott (Scott et al. [1976]), we assume that they are of equal size and close to unity. Then from (20) it follows that the intra-sectoral proportions of the sources of labour will be the same as the proportions of the labour force in the different intra-sectoral sectors, it being remembered that one of these intra-sectoral sub-sectors in both rural and urban sectors is the "unemployment" sub-sector. We have used the 1971 Census data to determine the proportion of the rural and urban labour force in each of these sub-sectors. The resulting proportions of workers drawn from our

10. See J. Krishnamurty [1973], Table 5.

five sub-sectors when one extra industrial job is created is summarized in row 1 of Table II.

TABLE II

ESTIMATES OF VARIOUS LABOUR MARKET PARAMETERS

	Organized Urban (Industrial)	Unorganized Urban	Urban Unemployment	Rural Unemployment	Rural Agriculture
I. Percentage of Workers Drawn from sector (j) when one extra industrial job created (II_j)	0·190	0·585	0·035	0·002	0·188
2. Average Annual Household 'Output' (1970–71) Rs. (W_i)	2614	1307	0.000	0·000	1441
3. Accounting Ratios for Output (A_i)	0·61	0.75	—	—	0.92
4. Value of Output Foregone from withdrawal of one worker from sector j, at shadow prices (m_j) ($= W_i A_i$)	1594.54	980.25	—	—	1325.72
5. Savings Ratios	0.10	0·00	0·00	0·00	0·00
6. Average Household Consumption (Rs.)	2353	1307	650	720	1441
7. Consumption Conversion Factors (C_i)	0.86	0.86	0.86	0.82	0.82
8. Increase in average household consumption at shadow prices when one worker from sectior j moves to industrial sector ($c-a_j$)	0.00 $c=$ (2023·58)	900 aj (1124.02)	2023.58 aj (0)	2023.58 aj (0)	842 aj (1181.62)
9. Rural-Urban Price Differential (Rural Price Index = 100)	115	115	115	100	100
10. Average Household Consumption at Urban Prices (Rs.)	2353	1307	650	828	1657
11. Adult Equivalent Consumption units/household (n)	4·0	4.0	4.0	4.0	4.0
12. Per Capita Consumption at Shadow Prices Taking Account of Rural-Urban Price Differentials	506	281	140	178	356
13. (a) $\sum_j \pi_j (C-a_j) = 760$		$\frac{n \cdot b^e}{i-e} \sum_j \pi_j \left[\left(\frac{C}{n}\right)^{1-e} - \left(\frac{aj}{n}\right)^{1-e} \right]$			
(b) $\sum_1 \pi_j$ mj $= 1126$		$= 0 \cdot 00503b^2$ ($e=2$) $= 0 \cdot 00001515b^3$ ($e=3$)			

2.2 *The Social Cost of Output Foregone by Withdrawing Workers from Sectors* $(\Sigma_{1}\pi_j m_i)$

The output foregone at both market and shadow prices in the two unemployment sub-sectors (rural and urban) is obviously nought. This leaves the three sub-sectors, organized and unorganized urban, and agricultural for which we need to estimate the output foregone at market and shadow prices when one worker is withdrawn from these sectors (w_j and m_j).

From the ***Indian Labour Statistics*** the average earnings of industrial workers earning less than Rs.400 per month, in 1970-71, were Rs.2614. It is not implausible to assume that this represented their marginal product, so that output at market prices would fall by an equivalent amount if one such industrial worker were withdrawn. Elsewhere (Lal [1975a]) we have estimated that the average accounting ratio $(A;)$ for converting the market value of industrial value added into social values is 0.61. Thus the social cost of the output foregone by withdrawing one industrial worker is 2614 x 0.61 = 1594.54 (see rows 2, 3, 4 of Table II).

From the NSS 25th round data on the incomes of the weaker sections in rural India, we have computed that the average all-India earnings of agricultural labour households in 1970-71 were Rs.1441.[11] It is plausible to assume that agricultural wages in India are fairly competitive, and hence likely to represent the marginal value product of rural labour at market prices (see K. Bardhan [1973], Lal [1976]). Moreover, elsewhere we have argued that on the available evidence there is unlikely to be surplus labour in the strict sense to any appreciable extent in India (see Lal [1976a]).[12] Hence we will take the value of the average earnings of agricultural labour households to represent the loss of output at market prices, when a rural worker (with his household) transfers to the urban industrial sector. Elsewhere (Lal [1974a]) we have estimated that the all-India agricultural output conversion factor $(A,)$ is 0.92. Thus the value of the output foregone at shadow prices, when the rural worker is withdrawn is 1441 × 0.92 = 1325.72 (see rows 2, 3, 4 of Table II).

This leaves the unorganized urban sector. The only data on earnings of unskilled workers in this sector are from rather outdated NSS surveys,[13] and for

11. See NSS [1972].
12. Moreover, even if the maximal estimates of surplus labour [Lal 1976a] are assumed to be valid, given the limited extent to which rural labour is drawn upon to meet increases in industrial employment, the effects on the value of the ***SWR*** are marginal.
13. The relevant reports are: (1) NSS Report No. 94 (14th Round): ***Tables With Notes on Small-Scale Manufacturing – Rural and Urban,*** (with data for 1958-59); (2) NSS Report No. 105 (15th Round): ***Tables with Notes on Household Non-Mechanized Transport and Utilization of Working Animals*** (with data for 1959–60); and (3) NSS Report No. 159 (18th Round): ***Tables with Notes on Professionals and Liberal Arts*** (with data for 1963–64).

different years. These show that the annual net earnings per small-scale manufacturing urban household in 1958-59 were Rs.647.40; the annual earnings per worker in laundry services, domestic services and barber and beauty shops in 1963-64 were Rs.687. Assuming that real earnings per household in non-mechanized transport and small-scale manufacturing remained constant between 1958-5911959-60 and 1963-64 the comparable annual household earnings in all three types of occupation in 1963-64 (using the Industrial Consumers Price Index to make the necessary adjustments), would be

Urban small-scale manufacturing	Rs.751
Urban non-mechanized transport	Rs.542
Laundry, domestic services, barber and beauty shop workers	Rs.687

By contrast, from the *Indian Labour Statistics* the average annual earnings of industrial workers (earning less than Rs.200 per month) were Rs.1,479. This suggests that unorganized sector earnings of unskilled workers are approximately half those received by the relatively unskilled workers in manufacturing industry. For 1970-71, this would imply that unorganized sector annual household earnings would be half of those of industrial workers, viz. Rs.1,307. We will take this figure as representing the value of the output foregone at market prices when an unorganized sector worker moves to the industrial sector. To obtain the cost at shadow prices, we need an accounting ratio for unorganized sector output. We do not have any such ratio. However, the output of the unorganized sector is likely to consist largely of services, and hence the market prices of the outputs are likely to be close to their social prices, as there are not likely to be as many distortions in the form of taxes, subsidies, and controls on the inputs and outputs of this sector as compared with the organized manufacturing sector. Thus, an accounting ratio of 0.75 for unorganized sector output may not be implausible. Using this, yields an estimated social of output foregone with a transfer of an unorganized sector worker of 1307 X 0.75 = 980.25 (see rows 2, 3, 4 of Table II).

As we already have the proportions of an industrial "worker" which are drawn from our five sectors (row 1, Table II), we can obtain the social cost of the output foregone by creating one extra industrial job as $\Sigma \pi_j m_j = 1126$ (see rows 1, 4 of Table II).

2.3 *Increase in Consumption at Shadow Prices when Workers move to the Industrial Sector* $(\sum_j \pi_j (c - a_j))$

We require estimates of the average household consumption level in each of the sub-sectors from which workers are drawn into the industrial sector, for the three sub-sectors, urban organized and unorganized and rural agricultural, where the "wage" is likely to reflect the output foregone by withdrawing a worker from

the sub-sector. For the remaining two sub-sectors, urban and rural unemployment, as output elsewhere will not fall when workers are drawn from the sub-sector, total consumption will rise by the wage paid to the rural or urban unemployed worker in his new industrial job.

We already have the data on the average annual household income ("output") of the three sub-sectors (row 2, Table II) at market prices. To estimate the average annual household consumption levels, we need some estimates of saving rates. For industrial workers about 10% of earnings are saved in the form of provident funds, etc. (see Lal [1972]). For the other sectors, lacking any data we assume (though not implausibly) that the savings rate for unskilled labour in these sectors is close to zero. The resulting annual consumption levels at market prices have to be converted into their shadow price equivalents by using the relevant consumption conversion factors (19). We have estimated these elsewhere (Lal [1974b]) as 0.86 and 0.82 for urban and rural sector workers respectively (these are given as row 7 in Table II). Using these yields the average consumption levels of workers' households in the various sectors at shadow prices. The resulting increase in consumption at shadow prices, when one worker is withdrawn from each of the sub-sectors and employed at the industrial wage is then derived in row 8 of Table II. Weighting these figures by the proportion of workers drawn from each sub-sector when one industrial job is created in row 1 of Table II yields, the total change in consumption at shadow prices when one extra industrial job is created $[\sum_{I} \pi_j (c - a_j)]$ of 760.

2.4 The Increase in Per *Capta* Consumption *when* Workers are drawn from the Sub-sectors $(c^* - a_j^*)$

These estimates are required to derive the social value of the increase in consumption that occurs with a marginal increase in industrial employment. We already have some estimates of the average household consumption at market prices for all the sub-sectors except the urban and rural unemployed. Lacking any direct information on these, we have assumed that they are half the level of the household consumption levels in the urban unorganized and rural agricultural sub-sectors for urban and rural unemployed households respectively.[14] (These are the figures given in row 6 of Table II.)

We next need some estimate of average household size of the workers in the different sectors. From the NSS 18th round the average household size in urban India was 4.65 and in rural India 5.17. We will, therefore, take the average household size in all the sectors as five. Furthermore, the Perspective Planning Division of the Planning Commission has estimated that an average household

14. Given the small "size" of these "sectors" as suppliers of industrial labour (row 1, Table II), clearly our final results will not be too ssnsitive to this assumption.

corresponds to approximately four male adult equivalent consuming units per worker household.[15]

Next, we need to take account of rural-urban price differentialsin assessing the real consumption increase of rural workers (those in the rural agricultural and unemployed sub-sectors) who are drawn into the industrial sector. Urban prices are about 15% higher than rural prices for the expenditure classes into which rural workers fall (Bhattacharya and Chatterjee [1969, 19711). Using this figure yields the average household income of the various sub-groups at urban prices in row 10 of Table II.

The conversion of these consumption levels into per male adult equivalent units at social prices is straightforward. The market values at urban prices of household consumption are divided by the average household "size" of 4, and multiplied by the urban consumption conversion factor of 0.86, to derive the "per capita" consumption at shadow prices (taking account of rural-urban price differentials given) in row 12 of Table II.

2.5 Social *Value* added, and Its Components (r, *w*) of a Marginal Industrial Project

Using ASI data for various years between 1958 and 1968, we have computed the social value added by Rs.100 of industrial investment on average in India (see Lal [1975a]). This declines steadily from Rs.36 per Rs.100 of investment in 1958 to Rs.22.6 per Rs.100 of investment in 1968. As this last year was in the middle of an industrial recession in India, and hence likely to represent an under-estimate of the long-run marginal social return to industrial investment in India, we will take the computed value of Rs.26 of social value added per Rs.100 of investment for 1964 (a "normal" industrial year) as representing the expected long-run marginal social return from industrial investment. In the same year the computed portion of this social value added which is saved and reinvested is Rs.1.4 per Rs.100 of investment, and the remainder Rs.24.6 is the payment to labour per Rs.100 of investment. This means that in (19) the values we will take for the marginal social product of investment are

$$r = 0.014$$
$$w = 0.246$$

2.6 The Consumption Rate of Interest (i_0)

From (18) we need estimates of the "per capita" consumption valued at shadow prices (and taking account of rural-urban price differentials for inter-sectoral

15. See Perspective Planning Division [1974].

comparability) at the base date for the "rural" and "urban" sectors.

In the five-sector labour market model outlined above, with intra-temporal distribution as an argument in the social valuation function, the consumption rate of interest (*CRI*) for the economy as a whole, is not unambiguously defined. We will, therefore, use a more aggregative framework in deriving the CRI. As, by definition the *CRI* is the rate of change over time in the social value of employment generated consumption [see equation (5)], we will derive it in terms of the rate of change of the social value from using a unit of consumption to transfer people from the agricultural (rural) sector to the unskilled industrial (organized urban) sector. The relevant values of $\bar{c}$ and $\bar{a}$ in equation 18 are then given by the per capita consumption at shadow prices in row 12 of Table II for these two sectors, namely,

$$c = 506 \text{ and } \bar{a} = 356.$$

We moreover need estimates of the proportions of the "urban" (n_c) and "rural" (n_a) populations, which from the 1971 Census are approximately

$$n_c = 0.2 \text{ and } n_a = 0.8,$$

and of the expected rate of growth of population. The "best" estimate of the likely rate of growth of population over the medium term is about 2% per annum,[16] and we take this as our value for g_n in equation (18).

This leaves the expected rate of growth of per capita consumption in our two stylized sectors. For unskilled industrial workers we assume that their consumption levels will rise in line with those projected for the urban sector as a whole whilst those for those in agriculture will be in line with projections for the rural sector. Table 111 summarizes the past rates of growth of rural and urban per capita consumption, and the various rates projected in the Draft Fifth Five Year Plan. From this table it appears that all the Plan projections are much higher than the realized growth rates of per capita consumption between 1960-61 and 1973-74. We will, therefore, estimate the *CRI* for 3 alternative consumption growth rate assumptions, namely, that (i) future growth will be at past rates, (ii) it will be at the lowest of the planners' projections, that for the period 1973-74 to 1978-79, and (iii) on the planners' projected growth rate for the medium term (for the period 1973-74 to 1985-86).

The resulting estimates of the *CRI*, on these alternative consumption growth rate assumptions, and for alternative values of the elasticity of social marginal utility of consumption *(e)*, are given in Table IV.

16. See Ambannavar [1975].

TABLE III

RATES OF GROWTH OF PER CAPITA ANNUAL CONSUMPTION, RURAL AND URBAN (AT CONSTANT PRICES)

	% compound per annum		
	Rural	Urban	All-India
	(g_a)	(g_c)	(g)
(A) Realized			
1960–61 to 1973–74	1·35	0·65	1·75
(B) Planned Projections			
(1) 1973-74 to 1985-86	4·20	3·75	3·60
(2) 1973-74 to 1978-79	2·90	2·40	3·10
(3) 1978-79 to 1985-86	5·20	4·75	3·90

Notes:

(1) For the All-India growth rates, we use first the data in Dandekar and Rath (Table 2.4, p. 23) for annual per capita private consumer expenditure at 1960–61 prices in
1960-61 – Rs.276·3;
1967-68 – Rs.287 0;
which using the All-India consumer price index numbers rise of 92% in 1971-72 over 1960-61, yields the All-India per capita consumption levels at 1971-72 prices for
1960-61 – Rs.530·49;
1967-68 – Rs.551·04.
For 1973-74, 1978-79 and 1985-86, we use the data given in Table 7, page 7 of Vol. I of the Draft Fifth Five Year Plan, to work out per capita consumption (All-India) at 1971-72 prices as follows:

	Total Private Consumption (Rs. millions)	Mid-Year Population (millions)	Per Capita Consumption (Rs.)
1973-74	383,340	577	664.36
1978-79	490,910	633	775.52
1983-84	638,150	682	935.70
1985-86	711,530	702	1,013.57

The growth rates in column (g) are then readily derived.

(2) For the rural and urban per capita growth rates, we obtained the 1960-61 levelsfrom Dandekar and Rath (Tables 2.5 and 2.6, pp. 25 and 29), which were at 1960-61 prices. Adjusting these by the 92% rise in the general consumer price index yields the values of per capita annual consumption in rural and urban areas given below:

For 1973-74 and 1978-79, we used the data given in the Draft Fifth Plan's Technical Note (Tables 7.1 and 7.2, pp. 20 and 21) for the preferred variant of the annual per capita

TABLE IV

VALUES OF *CRI* (i)

g's		$e = 2$	$e = 3$
(A)	$g_c = 0.65\%$)	0·006	0·019
	$g_a = 1.35\%$)		
	$g_c = g_a = g = 1.75\%$	0·015	0·033
(B)	$g_c = 2.4\%; g_a = 2.9\%$	0·037	0·067
	$g_c = g_a = g = 3.1\%$	0·042	0·074
(C)	$g_c = 3.75\%; g_a = 4.2\%$	0·066	0·108
	$g_c = g_a = g = 3.6\%$	0·052	0·090

Note: $(1+i) = \dfrac{(n_c/c^{-e}) + n_a/a^{-e})}{[(n_c/c^{-e}(1+g_c)^e + (n_a/a^{-e}(1+go)!]\ (1+g_n)}$

$\bar{c} = 506; \bar{a} = 356; n_c = .2; n_a = .8; g_n = 0.02.$

consumption in rural and urban areas at constant 1971-72 prices.

For 1985-86, though we have the All-India annual per capita consumption figure from the Draft Fifth Plan document, no breakdown into rural-urban consumption levels is given. However, the Draft Fifth Plan's Technical Note (p. 5) states that "the total private consumption levels for the rural and urban areas have been obtained through applying an assigned ratio of per capita consumption in the urban area to that in the rural area". The ratios adopted were:

1.356 in 1968-69
1.260 in 1973-74
1.238 in 1978-79

No ratio is given for 1985-86. We have assumed that this will be 1.2. Then if in 1985-86 rural per capita consumption is C_r and if urban per capita consumption is kC_r, and if the urban population is u million and rural population is $(702-u)$ million, then $[B_r(702-u) + kC_r u]\ 702 = 1013.57$. As u from the Draft Fifth Plan (Table on p. 2) is expected to be 168.8 million, and k, by assumption, is 1.2, so that we have $B_r = 967.06$, and $C_u = 1160.47$.

The resulting estimates of annual per capita consumption levels in rural and urban areas from which the growth rates in colums g_c and g_a above are derived are

	Rural	Urban	(Annual Per Capita Consumption Level (Rs.) at Constant 1971-72 Prices)
1960-61	496·89	684·28	
1973-74	591.24	744.96	
1978-79	679·08	840·72	
1985-86	967.06	1160.47	

2.7 *The Value of the Accounting Rate of Interest (ρ), Ratio of Shadow to Market Wage Rate (k), and the Base Consumption Level* (b) *for Different Values of e, T and g_a/g_c*

We now have all the necessary components for determining ρ, k, s, and b, given alternative values of e, T, and g_a/g_c (which determine the ***CRI***). The resulting estimatesfor the various *CRI* values in Table IV, and for $e = 2$, 3, and $T = 30$, 50, and 100, derived from equations (19), (15), (14), and (12) are summarized in Table V.

From Table V, it appears that the accounting rate of interest ρ is relatively insensitive to the alternative assumptions about ***e***, T, and g_c/g_a. It varies from 8.29% to 13.21%. Similarly, the ratio of shadow to market wages of unskilled industrial labour ***k*** varies between 0.52 and 0.72, and is relatively insensitive to the alternative values of the abovevariables. However, the value of s (the premium on savings relative to consumption) varies widely from 1.44 to 46.19, as does the value of b (the base consumption level at which current consumption accruals are valued socially at par) from Rs.56.91 to Rs.326.77. How do we choose the appropriate values for India from this range?

It may be argued that, given the best estimate of the growth rate of consumption, the values of all the other national parameters should be derived by setting the base consumption level b equal to the national poverty line. For India, the ***Draft Fifth Five Year Plan*** (Vol. *1*, p. 6) provides an estimate of Rs.40.6 per capita ***per month*** at 1972-73 ***market*** prices as the national poverty line. As all our consumption estimates are at 1970-71 prices; this poverty level would correspond to a per capita consumption level of Rs.432 ***per annum*** at 1970-71 prices (using the all-India working class consumer price index values of 186 in 1970-71 and 207 in 1972-73 to convert 1972-73 into 1970-71 values). Next, we need to convert this value at market prices into its shadow price equivalent, to make it comparable with our estimates of b which are at shadow prices. As the poverty level was 'presumably derived on the basis of nutritional requirements, and costed at average all-India prices, the appropriate consumption conversion factor would appear to be our rural ratio of 0.82, as the rural consumption weights and prices would tend to dominate any all-India average estimates of the national poverty line. Using this ratio of 0.82 yields the shadow price value of the poverty line in 1970-71 as Rs.354.24 $\approx$ 354, per capita per annum.

From Table II, row 12, it can be seen that this value is fairly close to our estimated per capita consumption level at shadow prices of agricultural labour households. If we fix the value of b at this poverty level, and solve for alternative values of T for $e = 2$, 3, in equation (19), we find that the value of T ranges from 1 to 5 years on the alternative per capita consumption growth rate assumptions. It is clearly implausible to suggest that consumption and savings are likely to be equally valuable in India within 1-5 years. But this must be the implication if

TABLE V

VALUES OF i, b, S, k, ρ, ON ALTERNATIVE ASSUMPTIONS ABOUT e, T, and g_c/g_a[1]

			T=											
			30 years				50 years				100 years			
e	g_c, g_a	i	b[2]	S[3]	k[4]	ρ[5]	b	S	k	ρ	b	S	k	ρ
I. $e = 3$														
g_c=0.65% g_a=1.35%		0·019	244·04	3·45	0·64	0·1026	199·74	6·30	0·68	0·0927	124·29	26·13	0·71	0·0829
g_c=g_a=1.75%		0·033	256·78	2·96	0·62	0·1075	217·65	4·87	0·66	0·0976	150·59	14·69	0·70	0·0878
g_c=2.4%, g_a=2.9%		0·067	288·39	2·09	0·58	0·1173	262·28	2·78	0·62	0·1075	220·95	4·65	0·66	0·0976
g_c=g_a=3.1%		0·074	294·96	1·96	0·57	0·1198	271·45	2·51	0·61	0·1099	233·24	3·95	0·65	0·1001
g_c=3.75%, g_a=4.2%		0·108	326·77	1·44	0·52	0·1321	314·81	1·61	0·54	0·1272	298·86	1·88	0·57	0·1198
g_c=g_a=g=3.6%		0·090	309·97	1·68	0·55	0·1247	292·16	2·01	0·58	0·1173	266·51	2·65	0·61	0·1099
II. $e = 2$														
g_c=0.65%, g_a=1.35%		0·006	193·52	4·00	0·65	0·1001	135·93	8·10	0·69	0·0903	56·91	46·19	0·72	0·0829
g_c=g_a=1.75%		0·015	203·61	3·61	0·64	0·1026	148·40	6·79	0·68	0·0927	69·42	31·04	0·71	0·0853
g_c=2.4%, g_a=2.9%		0·037	229·56	2·84	0·62	0·1075	181·67	4·53	0·66	0·0976	109·06	12·58	0·70	0·0878
g_c=g_a=3.1%		0·042	235·60	2·69	0·61	0·1099	189·72	4·16	0·65	0·1001	119·75	10·43	0·69	0·0903
g_c=3.75%, g_a=4.2%		0·066	266·16	2·11	0·58	0·1173	230·23	2·82	0·62	0·1075	176·85	4·78	0·66	0·0976
g_c=g_a=g=3.6%		0·052	248·19	2·43	0·60	0·1124	206·26	3·52	0·64	0·1026	142·59	7·36	0·68	0·0927

Notes :

[1] i = consumption rate of interest.
b = base consumption level at which consumption accruals are socially equally valuable at par.
S = premium on savings.
k = ratio of shadow to market industrial wage rate.
ρ = accounting rate of interest.
e = elasticity of social marginal utility of consumption.
T = the date at which savings and consumption are socially equally valuable.
g_c = growth rate of rural per capita consumption.
g_a = growth rate of urban per capita consumption.

[2] The value of b has been derived from equation (19), for alternative values of e, T and g_e/g_a, with the following values of the other variables

$\sum \pi_j(c-a_j) = 760$ (see Table II)

$\frac{n \cdot b^e}{1-e}\sum \pi_j(c^{*1-e}-a_j^{*1-e}) = \cdot 00508b^2$ (when $e=2$) and 00001515 (when $e=3$) (see Table II)

$\sum \pi_j m_j = 1126$ (see Table II)

$r = 0.014$ (see Section 2.5)

$w = 0.246$ (see Section 2.5)

$w_f = 2614$

The values of i for different g_e/g_a and values of e are from Table IV.

[3] The value of s is derived from equation (12)

$$(\pi_j(c-a_j))/n.b^e\sum \pi_j(c^{*1-e}-a_j^{*1-e})$$

$= 149606/b^a$ (when $e=2$)

and $= 50165017/b^a$ (when $e=3$)

[4] The value of k is derived from equation (15):

$$k = \left(\sum \pi_j m_j + \sum \pi_j(c-a_j) - \frac{n \cdot b^e}{1-e}\sum \pi_j(\overset{*}{c}{}^{1-e}-\overset{*}{a}{}_j^{*1-e})\right)/w_f$$

$= (1886-.00508b^2)/2614$ (when $e=2$)

and $= (1886-.00001515b^3)/2614$ (when $e=3$)

[5] The value of ρ is derived from equation (14) :

$$\rho = r+(1-k)w = (0 \cdot 26-0 \cdot 246k)$$

we wish to value consumption accruals at the proverty line socially at par, because a large part of the population will fall below this base level of consumption, and it would make sense to increase consumption uptill this level if the current premium on savings was small and expected to disappear in the very near future. If this appears implausible, we will have to grasp the nettle of making an independent estimate of e and T, and thereby determining the level of b, which will obviously be *less* than the poverty level, the further away is T, as can be seen from Table V. These judgements about the value of e and T are discussed in the next section.

III. Judgements

3.1 *Estimating (e)*

The elasticity of social marginal utility, e, is essentially a normative parameter. What would be a reasonable value of e for India?

Various attempts have been made to estimate e empirically. There is the method due to Frisch and Fisher, recently revived by Fellner [1967], by which if total private utility is composed of two separable additive terms, food and non-food utilities, then $e = e_y/e_p$, where e, is the income elasticity and e, the price elasticity of the demand for food (after eliminating the income effect). In an ealier study, using the relevant elasticities derivable from NSS data, I had estimated the value of e for India of 2.3. Fellner's estimates for the USA fell between 1 and 2.5. Brown and Deaton [1972] have surveyed the large number of studies based on linear expenditure demand systems which have estimated e for a number of countries. They conclude that an average value of $e = 2$ is consistent both with most such studies and with the results from fitting other models. They, however, note that there are considerable variations (some very large) in the estimates.

Attempts have also been made to derive cardinal utility functions using the von Neumann-Morgenstern framework to analyse individual attitudes towards risk. Some of these studies have yielded values of e of about 16, involving a high degree of risk aversion. This "uncertainty approach", as Stern [1977] emphasizes, "does not seem to be a hopeful route" towards estimating e.

The final method of estimating e empirically is to deduce its implicit value from government behaviour. Atteinpts have been made to derive the value of e from inarginal tax schedules. Mera [1969] found that for the USA this yielded a value of $e = 1.5$, whilst for the U.K. Stern derived a value of $e = 1.97$ from its marginal tax schedule. There are, however, obvious probleins in assigning any "optimality" properties to derivations based on government behaviour. For government action is likely to be based on a whole host of considerations, and it would be implausible to assume the "rationality" of government's posited by these taxation models.

Thus, it seems that of the empirical estimates, those based on complete demand systems, which on average yield values of e of about 2, seem the "best". However, these are likely to be approximations to the elasticity of private marginal utility of income. Can we also assume that this will be the elasticity of social marginal utility of income? We can if we accept the full-blooded utilitarian additively separable cardinal social welfare function. However, as Sen [1973] has emphasized, such a utilitarian welfare function is not egalitarian. He argues that "the trouble with this approach is that maximizing the sum of individual utilities of supremely unconcerned with the inter-personal distribution of that sum". Stern (1977) has shown that

$$-e = \varepsilon + \eta(\varepsilon - 1) \tag{22}$$

where the value of the social marginal utility of income $(-e)$ is given by ε, the private elasticity of marginal utility, plus a term which depends directly upon η, the "index of egalitarianism". Unlike utilitarianism, which assumes $\eta = 0$, being concerned with equality, we will want to take $\eta > 0$.

Thus, accepting the estimates from consumer studies of a value of $\varepsilon = 2$, and then adding on something for η, say $\eta = 1$, we get a value of $e = 3$ [from (22)]. This is the value we recommend should be taken for e for India.

3.2 Estimating T

Little and Mirrlees have suggested that T (the date by when savings and consumption are equally valuable) should be estimated as the date by when the proportion of the labour force employed in urban industry is fairly constant. For then additional industrial investment will not result in extra employment per se, but rather to increases in the capital per worker. In such a situation the value of S (the premium on savings) can be expected to be unity as we would not then want to give any extra weight to the creation of industrial employment and hence to the future "consumption" that entails. Little and Mirrlees also suggest that this estimate of T may be obtained in practice by making projections of the labour force and determining the data by which the proportion of the labour force in manufacturing is expected to be the same as in currently more developed countries.

We do not have projections for India for the likely proportionate changes in the labour force in manufacturing. However, J.P. Ambannavar [1975] has recently projected the urban and rural labour force for India till 2011. His estimates are given in Table VI, whilst Table VII gives the percentage of the labour force in mining, manufacturing, construction, and electricity in a number of developed countries. From Table VI it appears that by 2011 (that is in about 50 years) the *urban* labour force will be about 29% of the total labour force in

TABLE VI

GROWTH OF LABOUR FORCE IN RURAL AND URBAN AREAS AND URBAN LABOUR FORCE AS PROPORTION OF TOTAL LABOUR FORCE, INDIA 1971-2011

Year	Persons	Labour Force in Thousands					'Urban' proportion of Labour Force
		Rural		Persons	Urban		
		M	F		M	F	
1971	191183	125697	65486	36211	30251	5690	·1592
1976	209697	137685	72012	42125	35376	6749	·1673
1981	231268	151747	79521	49335	41310	8025	·1758
1986	253982	166647	87335	58502	48845	9657	·1872
1991	277814	182320	95494	69187	57647	11540	·1994
1996	300469	197232	103237	82759	68795	13964	·2160
2000	322143	211417	110726	97437	80721	16621	·2322
2001	323021	211987	111034	98124	81375	16749	·2330
2006	339794	223052	116742	119248	98682	20566	·2598
2007	342475	224877	117598	123199	101910	21289	·2646
2011	354377	232925	121452	142576	117762	24814	·2869

Source: Table 3.9, p. 87, Ambannavar, ***op. cit.***

TABLE VII

PERCENTAGE OF ECONOMICALLY ACTIVE POPULATION IN MINING, MANUFACTURING, CONSTRUCTION AND ELECTRICITY (1961 or nearest)

Country	(%)
1. Canada	33·1
2. USA	35·0
3. Japan	32·4
4. France	37·1
5. West Germany	48·6
6. UK	46·6
7. Yugoslavia	22·0
8. Australia	39·1
9. USSR	42·1

Source: Table 11.2, p. 146-7, ***Pocket Book of Labour Statistics, 1973.***

India. From the 1971 Census it appears that total workers (rural and urban) in mining, manufacturing, and construction were about 13.6% of the total labour force in 1971, a figure which is close to the proportion of *urban* workers in the total labour force in India in the same year. If, therefore, we assume that in the future too the proportion of the labsur force in "modern" sector activities is likely to be close to the proportion of the urban to total labour force, then Ambannavar's projections would suggest that by 2011 we could also expect about 29% of the Indian labour force to be in these "modern" sector activities. As this proportion would not be far below that in currently developed countries, we might feel justified in taking T to be about 50 years.

Another way of estimating T would be to estimate the date by which the savings rate in the economy is likely to be at the level in currently developed countries, for whom it would be plausible to assume that savings and consumption are socially equally valuable. Table VIII gives data on savings rates for a number of developed countries. Clearly if India could achieve the Japanese 1969 rate of savings of 37%, it would be fair to say that savings and consumption were equally valuable. Table IX summarizes the Draft Fifth Five Year Plan's projections of savings rates from 1973-74 to 1985-86. Simple linear extrapolation yields the year 2007 as the date by which the savings rate would be at the Japanese level. This again gives a value of T close to 50 years.

On the basis of these (admittedly crude) arguments we will take our best estimate of T to be 50 years.

TABLE VIII

SAVINGS RATES IN SOME DEVELOPED COUNTRIES

	Gross Domestic Savings As percentage of GNP	
	1950	1969
Japan	22	37
Canada	26	33
Australia	34	26
France	20	25
Italy	18	23
Sweden	19	23
USA	21	17
UK	10	19

Source: India, Pocket Book of Economic Information, Table **16.6,** p. 222.

3.3 *Best Estimates of Distributional Weights and Inter-Temporal Parameters*

Given a value of $e = 3$ and $T = 50$, we are finally left with some judgement to be made on the likely future per capita growth rate of consumption. We would suggest taking the moderate projections in the Fifth Plan Draft for the 1973-78 period as applicable to the whole perspective plan period. It being noted these figures are still substantially above the realized rates of growth of per capita consumption during 1960-1973 (see Table III).

From Table V, our best estimates of the relevant parameters then are:

ρ = accounting rate of interest = $10.75 \simeq 11\%$
k = ratio of social to market industrial wage = $0.62 \approx 0.6$
b = the base line consumption level at 1970-71 accounting prices at which consumption accruals are considered socially as valuable as the numeraire (savings expressed in foreign exchange) = $262.28 \approx 262$
s = premium on savings = 2.78
i = consumption rate of interest = $6.7 \simeq 7\%$

Using the above value of b, we can derive the composite marginal distributional weights for different income groups at 1973-74 market and social prices, by using valuation function (2). These are summarized in Table X. It should be noted that these distributional weights are valid for marginal changes in consumption, for discrete changes formula (1) will have to be used.

Finally, it should be noted that we have only estimated an all-Ipdia unskilled industrial workers shadow to market wage ratio in this paper. Elsewere the same methodology for estimating SWR's has been used to derive SWR's for the rural and urban sectors by State. In actual project evaluation it is these more sector and State specific SWR's which will be required, and hence in Table XI we summarize these more disaggregated SWR estimates we have made in Lal [1974c].

TABLE IX

PROJECTED RATES OF SAVINGS IN INDIA : *1973-74–1985-86*

Year	Domestic Savings as Percentage of Gross National Product
1973-74	12·2
1978-79	15·7
1983-84	19·0
1985-86	20·0

Source: Table *12,* p. *12, Draft Fifth Five Year Plan, Part I.*

TABLE X

MARGINAL DISTRIBUTIONAL WEIGHTS (w)

c/b	c(Rs.) 1970-71	c(Rs.) 1973-74	w
0·25	65·57	91·65 (107)	64·000
0·50	131·14	183·31 (213)	8·000
0·75	196·71	274·96 (320)	2·380
1·00	262·28	366·62 (426)	1·000
1·50	393·42	549·92 (639)	0·300
2·00	524·56	733·23 (853)	0·125
3·00	786·84	1,099·84 (1279)	0·040
5·00	1,311·40	1,833·08 (2132)	0·010
10·00	2,622·80	3,666·15 (4263)	0·001

$w = (b/c)^e$ with $e = 3$.

b = per capita annual consumption level at shadow prices.

b = base line per capita consumption level at shadow prices = Rs. *262.28* at *1970-71* prices.

Notes:

1. b at *market* prices in *1970-71* = 262.28/0·86 = Rs. *305.58*
   in *1973-74* = 366.62/0·86 = Rs. *426.30*
2. Values in brackets are for the various consumption levels at *market* prices.
3. The *1973-74* values of c have been derived by applying the rise of *39.78%* in the working class consumer price index which rose from *186* in *1970-71* to *260* in December *1973.*

TABLE XI

SUMMARY OF RATIOS OF SHADOW TO MARKET WAGE RATES FOR RURAL AND INDUSTRIAL LABOUR – BY STATES

State	Rural	Urban-Industrial
1. Andhra Pradesh	1·00	0·59
2. Assam	1·00	0·65
3. Bihar	0·64	0·48
4. Gujarat	0·92	0·57
5. Jammu and Kashmir	1·00	0·50
6. Kerala	0·88	0·57
7. Madhya Pradesh	0·95	0·61
8. Maharashtra	0·76	0·58
9. Mysore	0·91	0·62
10. Orissa	0·94	0·69
11. Punjab and Haryana	0·94	0·69
12. Rajasthan	0·91	0·59
13. Tamil Nadu	0·98	0·67
14. Uttar Pradesh	1·00	0·68
15. West Bengal	0·70	0·53

Source : Table (A) in Lal (1974c).

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