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PART 1

TOWARD A THEORY OF OPTIMUM  
LAND REFORM FOR A DUALISTIC AGRICULTURE <sup>1</sup>

BY

RAJ KRISHNA  
*Planning Commission, New Delhi*

1. INTRODUCTION

Although the hard core of land reform—the redistribution of a given area of already cultivated land—is essentially a political problem, its major economic benefits and costs are measurable quantities. Therefore, it should be possible, in principle, to determine an optimum distribution of land—optimum in the sense that it maximizes a reasonable social objective function with given relationships linking the distribution with benefits and costs. This paper explores this possibility at a theoretical level. The analysis indicates how the benefits and costs of reform may be computed and an optimum distribution of holdings determined. The hope is that some of the uncertainty and confusion about the economic effects of land reform, and the ‘right’ dose of reform, may be reduced.

2. ASSUMPTIONS

In order to concentrate on the core problem of distributing a given area, we shall abstract, in the beginning, from the alternative of expanding the cultivated area by settlement or reclamation. We shall also abstract from tenancy reform which merely improves the position of tenants in respect of rent, security, labour obligations, etc., without conferring on them the ownership of the lands they cultivate. But if the optimum distribution of ownership is determined, the required transfer of the ownership of leased land to occupying tenants, and the transfer of self-cultivated surplus land to the landless, can be easily derived.

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1. In this paper I have used some of the unpublished material I had prepared on land reform as a World Bank staff member in January 1974.

Since our focus is on optimizing the distribution of land, we specify that land is distributed by administrative fiat only; private transfer of land is not possible. Thus the area available to every farmer at any given time is decreed by the government; but farmers (as self-cultivating operators) optimize the quantities of the nonland inputs they apply.

There are two nonland inputs: labour and the services of (fixed plus working) capital. But in the simple case initially discussed, labour is the only nonland input. In these cases we also visualize that there are only two farms, a small one with area  $L_1$  and a large one with area  $L_2$ . The government fixes the ratio  $x$  of the total land supply ( $L = L_1 + L_2$ ) which the small farm has ( $L_1 = xL$ ;  $L_2 = (1-x)L$ ). In Section 7 these assumptions will be relaxed: we shall have two nonland inputs and  $n$  farms.

The special poignancy of the reform problem arises from the fact that, in developing countries, agriculture is dualistic. Dualism creates the possibility that the transfer of more land to small farms not only improves the distribution of wealth and income but also increases output and employment. In a non-dualistic agriculture, such transfer would have positive distributive effects but insignificant or perverse output and employment effects.

Dualism can be defined, for analytical purposes, as the presence of one or both of two phenomena: (1) the representative small and large farms operate on different production functions; (2) the representative small and large farms confront different factor prices (or different quantitative factor supply constraints). In the most general case, both production functions and the factor prices differ. In partially dualistic situations (1) factor prices may be different and production functions identical; or (2) production functions may be different but factor prices identical. We can refer to these situations as partial dualism of type 1 and partial dualism of type 2 respectively.

In our treatment of these different situations we reverse the usual procedure. An optimum distribution of land is first derived with specific forms of the relevant functions; the possibility of deriving a similar distribution with general functions is demonstrated later.

When labour ( $M$ ) is the only paid variable input, the farmers would try to maximize the return to the fixed land area they have. This means that they would determine the quantity of labour so as to equalize wages with its VMP.

Thus the private maximand is the net return to land. But what should be the government's maximand? Insofar as productivity alone is concerned, the government would also like to fix  $x$  (the land distribution parameter) so that the return to the total land area is maximized. If a shift of land from the large to the small farm increases total output, the extra produce will be a clear social gain from land reform.

In addition, if land reform increases labour absorption the government may be expected to attach, in its objective function, a separate positive weight to the extra employment.

These social benefits of reform will be counterbalanced by at least three social costs: (1) the administrative and compensation cost of the process of redistribution itself; (2) a possible decrease in the aggregate marketed surplus; and (3) a possible decrease in the aggregate saving of the farm sector.

Before we formalize these ingredients of a social objective function it may be useful to review some empirical evidence supporting the assumptions made above, *viz.*, that a transfer of land from large to small farms will increase output and employment, and decrease the marketing surplus and savings.

### 3. FARM SIZE, PRODUCTIVITY AND EMPLOYMENT

An international cross-section study of the Food and Agriculture Organisation in 1961 showed that the rank correlation between the average holding size and output per hectare was negative and significantly high ( $-0.96$ ). [The study covered 13 countries including six Latin American countries, four Asian countries, two Middle Eastern countries and one European country (Yugoslavia).]\* The same study showed that output per hectare and the Gini index of land concentration also had a negative and significantly high rank correlation ( $-0.80$ ). In other words, a reduction in the average size of holdings, or a reduction in the concentration of land, is associated with an increase in output per hectare.

Output per worker, on the other hand, probably falls as the farm size is reduced because the coefficient of rank correlation between the two was positive but extremely low ( $0.14$ ).\*\*

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\* We use international cross-section data only to get some notions about the direction and strength of various relationships. The natural, technical and institutional conditions which influence productivity differ widely across countries. Statistical concepts, coverage and reference years differ too. Therefore the observations cannot be said to belong to the same universe. But on the other hand if in spite of widely different conditions in various countries some cross-section relationships are found to hold internationally as well as nationally, we can legitimately presume that they may have a strong theoretical basis.

\*\* Dayal and Elliott (1966), p. 99,

Correlation exercises with more recent data (Table 1) for a larger number of countries confirm these findings. Farm GDP per hectare and the average holding size have again been found to be negatively correlated ( $r = -0.50$ ). And farm GDP per hectare and the Gini index of land concentration for 17 countries have been found to be negatively and significantly correlated ( $r = -0.73$ ).

But per capita farm GDP and the size of holding are positively correlated ( $r = 0.73$ ).

Similar findings of cross-section studies for many *individual* countries can also be cited. As regards output per unit of area, for example, in Ceylon in 1966-67, the yield of paddy averaged 36 to 37 bushels per acre on small farms (0.1 acre) and 33 to 34 bushels on larger farms (CBC, 1969).

"In Central Thailand..... yields decline systematically from 306 kg. per rai on holdings of 2-6 rai to 194 kg. per rai on holdings of 140 rais or more." (Griffin, 1972, p. 38.) Even after the adoption of HYV (1970) it was found in the Philippines that small farms (less than 2 ha.) produced 2.9 tons of paddy per ha. and larger farms (more than 4 ha.) produced 2.2 tons only. (Griffin, op. cit., p. 55.)

In 6 Latin American countries (Argentina, Brazil, Chile, Columbia, Ecuador and Guatemala) output per hectare on small "sub-family" farms averaged 3 to 14 times as much as on large "multi-family" farms. But output per worker on the small farms was only 10 to 20 per cent of output on large farms (Table 2).

For India there are many well-known studies, based on Farm Management data, establishing the inverse relationship between farm size and productivity. (See Bhagavati & Chakravarty 1969 and Sen 1975 for reviews.) But for our purpose here it may suffice to cite only one study in which as many as 8 bodies of disaggregated Farm Management data were analysed, covering districts in Andhra, Orissa, Madhya Pradesh, Tamil Nadu, Punjab and U.P. (Bardhan 1973). Bardhan found that in 7 out of 8 cases the (gross) elasticity of output per acre with respect to net sown area was negative.

These findings have two important implications. First, a reduction in the size of holdings and land concentration, brought out by land reform, will not be associated with a reduction in output per hectare, after a new equilibrium is established. On the contrary, the output per hectare, and hence the total output of a given area of land, is likely to increase.

But, secondly, output per worker is likely to decrease. If output per hectare goes up and output per worker falls, it follows that

employment per hectare, and hence total employment on a given area will increase, and the income generated would be more widely shared.

Indian Farm Management data again shows that labour-days per hectare increase monotonically as farm size decreases (Table 3).

#### 4. SIZE AND THE MARKETED SURPLUS

Marketed surplus is one of the magnitudes which should be expected to react negatively to a diminution in land concentration. For the ratio of the marketed surplus to production falls as farm-size decreases—obviously because small farm households have to consume a larger proportion of their output.

Data from India show, for example that small farms (2.5 acres or less) sell only 24.5 per cent of their output whereas large farms (50 acres or more) sell 65.4 per cent (Patnaik, 1972). If output remains the same but, hypothetically, farms above a certain size are eliminated and their land transferred to the small farm class, the surplus-output ratio will definitely decline.

Of course, the surplus-output ratios of different farm size groups and their shares of total output and sales differ widely across countries and regions. Sixty-one per cent of the small maize farmers in Puebla, Mexico, for example, sold no maize at all; and another 16 per cent sold 25 per cent or less of their output. In Chile, on the other hand, a typical crop-sharer would sell as much as 43 per cent of his output. (Griffin, pp. 100, 102.)

In Mexico, only 6.6 per cent of the marketed surplus comes from the bottom 70.7 per cent of the farmers; and 55.4 per cent comes from the top 1.7 per cent of the farmers.

These differences would determine how much the surplus ratio would fall after land reform; but it is highly probable that it *will* fall.

However, this decline in the market surplus ratio need not result in a decline in the *total* surplus in the long run provided that there is a compensatory increase in total output. Since per hectare output on small farms can be higher than on large farms, a sufficient increase in output should materialize if, after reform, the conditions necessary for realizing the full production potential of small farms are created.

#### 5. SIZE AND SAVINGS

Evidence on saving rates of different classes of farm households in developing countries is hard to get. But we should expect the behaviour of the saving rate to be similar to the behaviour of the

marketed surplus. At the lowest end of the farm size scale the subsistence farmers are net dissavers. As the farm size increases, the savings rate becomes positive and increases. In a recent study in the State of Haryana, India, the saving ratio was found to be -0.24 per cent for small farmers, 8.5 per cent for medium farmers and 16.3 per cent for larger farmers (Nandal, IJAE, 1972). In another study in Orissa, India (Das Gupta and Dash, 1972), the ratio of net capital formation as a proportion of income was found to be 5.5 per cent in the smallest farm size group (0-2 acres) and 19.3 per cent on larger farms (6 acres and above). For unirrigated villages the corresponding figures were lower: 2.6 per cent on the smallest farms, and 11.2 per cent on the larger farms. In still another study for the Punjab small farmers were found to be saving only 2 per cent and large farmers as much as 41 per cent of income (Kahlon *et. al.* 1972).

It follows that a reduction in the concentration of land will reduce the average saving rate of the farm sector. But, again, as in the case of the marketed surplus, if a compensatory increase in total income can be secured by intensifying inputs per unit of land on the small farms soon after land reform, the aggregate saving can be prevented from falling.

In the short run, then, the two positive effects of reform on productivity and employment per unit of land would be the "benefit" of land reform, and the cost of administering the reform, the cost of compensation, and the decline in the marketed surplus and savings would be the "cost".

In the longer run sufficiently large increase in small farm productivity will add to the benefits.

With the observed relationships in mind, we can proceed to develop our two-farm short-run model to explain the relationships and optimize the distribution of land.

## 6. THE SHORTRUN TWO FARM MODEL

Given a Cobb-Douglas production function<sup>1</sup>

$$Q = AM^a (xL)^{1-a} \quad \dots(1)$$

where  $Q$  is output,  $M$  is employment and  $xL$  is the fixed land area, the optimum employment on any farm with the given wage  $w$  is :

$$M = xL \left( \frac{Aa}{w} \right)^{\frac{1}{1-a}} \quad \dots(2)$$

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1. The Cobb-Douglas form is justified for Bardhan (1973) found constant returns to scale prevailing even with CES specifications fitted to Farm Management data for all wheat areas

The price of output is assumed to be unity. The optimum output is :

$$Q = (xL) A \frac{1}{1-a} \left( \frac{a}{w} \right)^{\frac{a}{1-a}} \quad \dots(3)$$

Output per hectare is :

$$q = A \frac{1}{1-a} \left( \frac{a}{w} \right)^{\frac{a}{1-a}} \quad \dots(4)$$

Employment per hectare is :

$$m = \left( \frac{Aa}{w} \right)^{\frac{1}{1-a}} \quad \dots(5)$$

And productivity per work-unit is :

$$p = \frac{w}{a} \quad \dots(6)$$

Under partial dualism of type 1 (PD 1), with a small form no. 1 and a large farm no. 2,

$$(a_1 = a_2 = a; \quad A_1 = A_2 = A; \quad w_1 < w_2)$$

we can see that some of our empirical observations are immediately rationalised. Output per hectare is higher on the small farm for given equation (4) and  $w_1 < w_2$ ,

$$A \frac{1}{1-a} \left( \frac{a}{w_1} \right)^{\frac{a}{1-a}} > A \frac{1}{1-a} \left( \frac{a}{w_2} \right)^{\frac{a}{1-a}} \quad \dots(7)$$

Productivity per work-unit (equation 6) is lower on the small farm, for,

$$\frac{w_1}{a} < \frac{w_2}{a} \quad \dots(8)$$

And employment per hectare (equation 5) is higher on the small farm, for,

$$\left( \frac{Aa}{w_1} \right)^{\frac{1}{1-a}} > \left( \frac{Aa}{w_2} \right)^{\frac{1}{1-a}} \quad \dots(9)$$

Thus the existence of partial dualism is sufficient to produce theoretically the observed size-productivity-employment relationships about which there has been so much controversy. All kinds of non-theoretical hypotheses have been invented to explain phenomena which have

a simple theoretical explanation in wage dualism alone. (See Bhagwati and Chakravarty 1969 and Sen 1973, *op. cit.*)

It is easy to prove now that land reform under (PD 1) will increase output and employment. If land is divided between the two farms in the ratio  $x : (1-x)$ , total output

$$\begin{aligned}\bar{Q} &= Q_1 + Q_2 \\ &= LA \frac{1}{1-a} \left[ x \left( \frac{a}{w_1} \right)^{\frac{a}{1-a}} + (1-x) \left( \frac{a}{w_2} \right)^{\frac{a}{1-a}} \right] \dots (10)\end{aligned}$$

so that

$$\frac{d\bar{Q}}{dx} = LA \frac{1}{1-a} \left[ \left( \frac{a}{w_1} \right)^{\frac{a}{1-a}} - \left( \frac{a}{w_2} \right)^{\frac{a}{1-a}} \right] > 0 \dots (11)$$

An increase in  $x$  due to land reform will increase total output. Similarly land reform will increase total employment because :

$$\begin{aligned}\bar{M} &= M_1 + M_2 \\ &= L(Aa) \frac{1}{1-a} \left[ x \left( \frac{1}{w_1} \right)^{\frac{1}{1-a}} + (1-x) \left( \frac{1}{w_2} \right)^{\frac{1}{1-a}} \right] \dots (12)\end{aligned}$$

and

$$\frac{d\bar{M}}{dx} = L(Aa) \frac{1}{1-a} \left[ \left( \frac{1}{w_1} \right)^{\frac{1}{1-a}} - \left( \frac{1}{w_2} \right)^{\frac{1}{1-a}} \right] > 0. \dots (13)$$

Under full dualism

$$(a_1 \neq a_2, \quad A_1 \neq A_2, \quad w_1 \neq w_2),$$

it is necessary for output per hectare (equation 4) to be higher on the small farm that :

$$A_1 \frac{1}{1-a_1} \left( \frac{a_1}{w_1} \right)^{\frac{a_1}{1-a_1}} > A_2 \frac{1}{1-a_2} \left( \frac{a_2}{w_2} \right)^{\frac{a_2}{1-a_2}} \dots (14)$$

Employment per hectare (equation 3) can be higher on the small farm if :

$$\left( \frac{A_1 a_1}{w_1} \right)^{\frac{1}{1-a_1}} > \left( \frac{A_2 a_2}{w_2} \right)^{\frac{1}{1-a_2}} \dots (15)$$

And productivity per work-unit will be lower on the small farm (equation 6) if :

$$\left(\frac{w_1}{a_1}\right) < \left(\frac{w_2}{a_2}\right) \text{ or } \left(\frac{a_1}{w_1}\right) > \left(\frac{a_2}{w_2}\right). \quad \dots(16)$$

Now all these requirements (14, 15 and 16) are fulfilled if :

$$w_1 < w_2, a_1 > a_2, \text{ and } A_1 > A_2.$$

This means that under full dualism, in addition to the wage being lower, the elasticity of labour productivity and the multiplicative constant should be higher on the small farm, if familiar observations are to be rationalised. These are strong conditions.\*

Thus, under full dualism as well as partial dualism of type 1, the empirical observations about small and large farms can be theoretically derived.\*\*

It is also clear from (12) and (13) that in a non-dualist situation (identical technology and perfect market for nonland inputs) output and employment will not be affected by reform  $\frac{d\bar{Q}}{dx} = \frac{d\bar{M}}{dx} = 0$ . Therefore some dualism appears to be necessary for the productivity and employment effects of land reform to be positive.

To return to optimization, let the total administrative and compensation cost of redistribution be proportional to  $x^2$ .

$$C = cx^2. \quad \dots(17)$$

Here we are only making the reasonable assumption that the cost increases at an increasing rate as more and more land is transferred to a growing number of small farms.

It is also reasonable to assume that the cross-section marketed surplus function is of the form

$$Z = r_0 + rQ \quad (r_0 < 0, r > 0) \quad \dots(18)$$

and the cross-section saving function is of the form

$$S = h_0 + hY \quad (h_0 < 0, h > 0) \quad \dots(19)$$

\* In the case ( $w_1 < w_2, a_1 < a_2$ ) the sufficient condition for (14), (15) and (16) to hold together is that :

$$(A_1)^{\frac{1}{1-a_1}} > (A_2)^{\frac{1}{1-a_2}} \text{ and } (a_1/w_1)^{\frac{a_1}{1-a_1}} > (a_2/w_2)^{\frac{a_2}{1-a_2}}.$$

\*\* The case of partial dualism of type 2 ( $w_1 = w_2 = w; a_1 \neq a_2$ ) is not discussed because it is rather, unrealistic.

In regressions fitted with disaggregated data for 19 villages marketed surplus functions were found to have the linear form (18) with a negative intercept (Krishna 1965). And in a recent paper an all-India rural saving function for the period of 1951-52/1973-74 also had the form (19) with a high coefficient of correlation (Krishna and Raychaudhuri, 1977).

In equation (19),  $Y$  is output, *minus* wages which, in the present case, is simply the return to land<sup>1</sup>

$$Y_i = Q_i - w_i M_i = (1 - a_i) Q_i \quad (i=1, 2) \quad \dots(20)$$

The total marketed surplus of the two forms will be

$$Z_1 + Z_2 = 2r_0 + r(Q_1 + Q_2), \quad \dots(21)$$

and the total saving will be

$$\begin{aligned} S_1 + S_2 &= 2h_0 + h(Y_1 + Y_2) \\ &= 2h_0 + h[(1 - a_1) Q_1 + (1 - a_2) Q_2]. \quad \dots(22) \end{aligned}$$

From (18) and (19) we can easily compute the average sale *ratios* ( $r_1$  and  $r_2$ ) and saving *ratios* ( $h_1$  and  $h_2$ ) of the two forms. For simplicity we assume these ratios as given in the 2-farm case.

Now the government would like to fix  $x$  so as to maximize the total return to land *minus* the cost of reform  $C$  and any reduction in marketed surplus and saving valued at the output price. Thus the social maximand is

$$\begin{aligned} U &= (1 - a_1)Q_1 + (1 - a_2)Q_2 - cx^2 - \\ & [Z_0 - r_1Q_1 - r_2Q_2] - [S_0 - h_1Y_1 - h_2Y_2]. \quad \dots(23) \end{aligned}$$

This particular maximand has some important characteristics. First, the first two terms are consistent with the maximisation of the private gain of the two farmers. They maximise the return to the fixed land allotments by optimizing their labour inputs at the given wage rates. The government also maximises the return to land, subject to some deductions, by optimizing the allocation of land between the two farms.

Second, the equity effect of reform does not enter the objective function in the case under consideration. For suppose we define the equity index  $e$  as the ratio of gross income per worker on the small farm to gross income per worker on the large farm, then  $e$  is simply the ratio of average labour productivity on the two farms (under full dualism):

$$e = \frac{w_1 a_2}{w_1 a_1} \quad \dots(24)$$

<sup>1</sup> Here we are implicitly making the classical assumption that saving is related to non-wage income only.

This is evidently independent of the distribution of land. Therefore land reform would not alter the degree of inequality already implicit in dualism. This result would, of course, change if differential taxation and differential dependency ratios, which do not enter the above model, are taken into account.

Although the distributive benefit of reform is not reflected in any change in  $e$ , it does accrue in the form of additional employment. The government can therefore measure it by valuing the additional employment at the lower real wage of the small farm sector, and adding this welfare value  $w_1 (M_1 + M_2 - M_0)$  in the objective function. The maximand (23) thus becomes

$$U = (1 - a_1) Q_1 + (1 - a_2) Q_2 + w_1 (M_1 + M_2 - M_0) - cx^2 - [Z_0 - r_1 Q_1 - r_2 Q_2] - [S_0 - h_1 Y_1 - h_2 Y_2] \quad (25)$$

Third, though we have valued the loss of marketed surplus and saving at the going output price (assumed to be unit) it could be valued differently. The marketed surplus shortfall, for instance, could be valued at the landed cost of importing it, and the saving shortfall could be valued at the NPV equivalent of a rupee transferred from saving to consumption as suggested in the benefit-cost literature.

Our modified objective function (25) reduces to a function of  $x$  alone because  $Q_1$ ,  $Q_2$ ,  $M_1$  and  $M_2$  can be seen in (10) and (12) as functions of  $x$ ,  $M_0$ ,  $Z_0$  and  $S_0$  are given pre-reform values of employment, marketed surplus and saving, and since  $Y_1 = (1 - a_1) Q_1$  and  $Y_2 = (1 - a_2) Q_2$ , these can also be written as functions of  $x$ . Thus

$$U = [(1 - a_1) (1 + h_1) + r_1] x b_1 + [(1 - a_2) (1 + h_2) + r_2] (1 - x) b_2 + w_1 [k_1 x + k_2 (1 - x)] - cx^2 - Z_0 - S_0 - w_1 m_0, \dots (26)$$

where

$$b_1 = LA_1 \frac{1}{1 - a_1} \left( \frac{a_1}{w_1} \right)^{\frac{a_1}{1 - a_1}}, \quad b_2 = LA_2 \frac{1}{1 - a_2} \left( \frac{a_2}{w_2} \right)^{\frac{a_2}{1 - a_2}},$$

$$k_1 = L \left( \frac{a_1 A_1}{w_1} \right)^{\frac{1}{1 - a_1}}, \quad \text{and} \quad k_2 = L \left( \frac{a_2 A_2}{w_2} \right)^{\frac{1}{1 - a_2}}.$$

This attains its maximum when

$$x^* = \left[ [b_1 [(1 - a_1) (1 + h_1) + r_1] - b_2 [(1 - a_2) (1 + h_2) + r_2] + w_1 (k_1 - k_2)] / 2c \right] \quad \dots (27)$$

If, for instance,  $a_1 = \frac{2}{3}$ ,  $a_2 = \frac{1}{2}$ ,  $A_1 = A_2 = 1$ ,  $w_1 = 1$ ,  $w_2 = 1$ ,  $h_1 = .05$ ,  $h_2 = .20$ ,  $r_1 = .20$ ,  $r_2 = .50$ ,  $c = 1$  and  $L = 1$ ,  $x^*$  will be 0.92. Given these

parameter values an optimum land reform will increase the share of the small farm in the total area to 92 per cent.

These are merely illustrative numbers, with strong assumptions, intended only to show that an optimum land transfer can be computed.

We can easily verify from (19) that the optimum land transfer to the small farm will be larger—

(i) the higher its saving ratio and the lower the saving ratio of the large farm

$$\left( \frac{\partial x^*}{\partial h_1} > 0, \frac{\partial x^*}{\partial h_2} < 0 \right),$$

(ii) the higher its sale ratio and the lower sale ratio of the large farm

$$\left( \frac{\partial x^*}{\partial r_1} > 0, \frac{\partial x^*}{\partial r_2} < 0 \right),$$

(iii) the lower its wage rate  $\left( \frac{\partial x^*}{\partial w_1} < 0 \right)$  (provided that  $k_1 < k_2$ );

and

(iv) the lower the direct cost of land transfer

$$\left( \frac{\partial x^*}{\partial c} < 0 \right).$$

These are obviously reasonable propositions about the direction in which the optimum land transfer should be adjusted with variations in the wage rate, savings and sales parameters, and the cost of land transfer.

Let us now see whether our results are modified when we have two nonland inputs (labour and capital) instead of one,  $n$  farms instead of two; and general instead of specific functions.

## 7. THE GENERAL CASE

Consider the case in which there are two variable nonland inputs, labour ( $M$ ) and capital ( $K$ ),  $n$  farms facing different wages ( $w_i$ ) and rents ( $v_i$ ) and operating on different production functions

$$Q_i = f(x_i L, K_i, M_i) \quad (i=1, \dots, n) \quad \dots (28)$$

where  $x_i$  is the fixed proportion of the total land area  $L$  allotted by the government to farm  $i$ , and  $K_i$  and  $M_i$  are its capital and labour

inputs respectively. As usual, let production functions be homogeneous of degree one with positive but declining marginal products of individual inputs ( $f_{kk} > 0$ ,  $f_{kk} < 0$ ). Then it is clear that, output price being unity for all farms, the optimal labour and capital input levels of all farms can be determined by the  $2n$  equations

$$f_{ki} = v_i \quad (i=1, \dots, n) \quad \dots(29)$$

$$f_{mi} = w_i \quad (i=1, \dots, n) \quad \dots(30)$$

Substituting the optimal  $K_i$  and  $M_i$  in the production functions we can determine  $Q_i$  in terms of  $x_i$ ,  $w_i$ ,  $v_i$  and the coefficients of the production functions only.

Then the general analogue of the government's maximand (25) will be

$$U = \sum_{i=1}^n (Q_i - w_i M_i - v_i K_i) + w_{min} \left[ \left( \sum_i^n M_i \right) - M_0 \right] \\ - C(x_1, x_2, \dots, x_n) - \left[ Z_0 - \sum_{i=1}^n r_i Q_i \right] - \left[ S_0 - \sum_{i=1}^n h_i (Q_i - w_i M_i - r_i K_i) \right] \quad \dots(31)$$

Since  $Q_i$ ,  $M_i$  and  $K_i$  can all be expressed as functions of  $x_i$  ( $\sum_i x_i = 1$ ), we can get optimal values of  $x_i$  by equating all the first order partial derivatives of  $U$  with respect to  $x_i$  to zero.

The optimal distribution of the total area between  $n$  farms can thus be determined.

#### 8. CONCLUDING REMARKS

The approach outlined above shows that all the major positive and negative effects of land reform can be brought together in a measurable form capable of optimization. And at least the technical discussion of reform can be transformed from an either/or to a how-much debate.

In order to operationalise and dynamise the approach the 3-factor case needs to be pursued in further research with real econometrically estimated parameters, and the multiplicative constants in production functions shifting with technical progress.

TABLE I

Productivity, Employment and the Distribution of Land,  
Different Countries, 1960s

Country	Data year <sup>2</sup>	Farm GDP per Hectare <sup>3</sup> (US \$)	Farm GDP per Worker <sup>3</sup> (US \$)	Employment per Hectare	Average Holding Size <sup>4</sup> (Hectare)	Gini's Index of Land Concentration <sup>14</sup>
1	2	3	4	5	6	7
<i>Europe</i>						
Greece	1961	424	848	0.50	3.18	.597 <sup>15</sup>
Spain	1962	90	980	0.09	14.85	.832
<i>Central America</i>						
Costa Rica	1963	83	951	0.09	40.74	
Dominican Rep.	1971	129	463	0.28	8.64	
El Salvador	1961	186	489	0.38	6.95	
Guatemala	1964	144	492	0.29	8.17	
Mexico	1960	22	569	0.04	123.9	
Nicaragua	1963	55	580	0.09	37.34	
<i>South America</i>						
Argentina	1970	18	1903	0.01	270.1	.873
Brazil	1960	14	285	0.05	79.25 <sup>5</sup>	.845
Chile	1965	18	692	0.03	118.5	
Colombia	1960	67	663	0.10	22.60	.865
Paraguay	1961	11	479	0.02	108.7	
Peru	1961	50	477	0.10	20.37	.947
Uruguay	1966	14	1333	0.01	208.8 <sup>6</sup>	.833
Venezuela	1961	31	925	0.03	81.24	.936 <sup>10</sup>
<i>Asia</i>						
India	1960	172	141	1.22	6.52	.607
Indonesia	1963	323	149	2.17	1.05 <sup>7</sup>	
Iran	1960	187	581	0.32	6.05	.624
Korea, Rep. of	1970	1085	377	2.88	0.85 <sup>8</sup>	
Japan	1960	1720	1188	1.45	1.18 <sup>7</sup>	.473 <sup>17</sup>
Nepal	1961-62	352	138	2.54	1.23	
Pakistan <sup>1</sup>	1960	240	249	0.96	2.35	.607
Philippines	1960	230	200	1.25	3.59	.580 <sup>18</sup>
Sri Lanka	1962	376	337	1.12	1.61	
Taiwan	1960-61	841	410	2.05	1.27	.474
Thailand	1963	166	137	1.21	3.47	
Turkey	1963	155	243	0.64	5.03	.611 <sup>16</sup>
Vietnam, Rep. of	1960	355	127	2.79	1.33 <sup>7</sup>	

Table 1 contd.

1	2	3	4	5	6	7
<i>Africa</i>						
Botswana	1969-70	168	142	1.18	4.75	
Kenya	1969	183	140	1.31	871.3 <sup>9</sup>	
Malagasy	1961-62	293	88	3.32	1.04	
Mali	1960	98	43	2.06	4.35 <sup>8</sup>	
Morocco	1961	144	295	0.49	4.62	
Senegal	1960	209	174	1.20	3.62	
Tanzania	1960	485	94	5.16	785.7 <sup>10</sup>	
Togo	1961-62	189	180	1.05	2.62 <sup>11</sup>	
Tunisia	1961-62	42	341	0.12	15.41 <sup>12</sup>	
U.A.R.	1960-61	681	360	1.89	1.59	.748 <sup>17</sup>
Uganda	1963-64	167	198	0.84	3.29	
Zambia	1960	68	101	0.67	11.73 <sup>13</sup>	

*Sources* : Unless otherwise footnoted below, cols. 1 and 3 are based on FAO, *Production Yearbook, 1971*, pp. 10-11, 21-23, and col. 4 on UN, *Monthly Bulletin of Statistics*, XXVI, No. 4, Apr. 1972 and XXVII, No. 11, Nov. 1973. For currency exchange rates, see *ibid.* and IMF, *International Financial Statistics*, XXVI, No. 8, Aug. 1973, GDP in agriculture shown here includes, unless otherwise indicated, agriculture, hunting, forestry, and fishing.

1. Including Bangladesh, but excluding Jammu and Kashmir.
2. Date year refers to average holding size (col 2.) only.
3. GDP data refer to 1970, except for Argentina (1969), Brazil (1969), India (1969), and Botswana (1971). Col. 3—GDP in agriculture—Area of holdings; col. 4=GDP in agriculture—Economically active population in agriculture.
4. Contents of reported holding areas vary. Data must be referred to FAO, *Production Yearbook, 1971* and footnotes.
5. Excluding subsistence holdings.
6. Excluding holdings under 1 ha. For 1966 census data, see Kenneth Ruddle and Donald Adalman (eds.), *Statistical Abstract of Latin America, 1971* (Los Angeles : Latin American Center, University of California, 197, p. 192).
7. Farm households only.
8. Cultivated area.
9. Large farm only.
10. Large-scale commercial holdings of Tanganyika only.
11. Arable land.
12. Excluding wood or forest land.
13. European holdings of more than 10.12 ha.
14. Ram Dayal and Charles Elliott, *Land Tenure, Land Concentration and Agricultural Output*, U.N.R.I.S.D /66/c/29 (Geneva 1966), Table IX. Unless otherwise indicated below, data refer to 1961 or nearest year.
15. Data refer to 1951 or nearest year. The size classification is based on agricultural land.
16. Data refer to 1951 or nearest year.
17. The size classification is based on agricultural land.

TABLE 2  
Agricultural Output Per Hectare & Per Worker  
by Farm Size, Latin America

Country	Year	Smallest Sub-family Farms	Largest Multi-family Farms	Ratio Col. 1 to Col. 2
		1	2	3

(National Monetary Unit Per Agricultural Hectare)

Argentina	1960	2492	304	8.2
Brazil	1950	1498	170	8.8
Chile	1955	334	41	8.2
Colombia	1960	1198	84	14.3
Ecuador	1954	1862	660	2.8
Guatemala	1950	63	16	3.9

(National Monetary Unit Per Worker)

Argentina	1960	40	192	.21
Brazil	1950	1197	8237	.14
Chile	1955	268	1171	.23
Colombia	1960	972	9673	.10
Guatemala	1950	74	523	.14

Source : Barraclough and Collarte (1973), Table B. 2.

TABLE 3  
Labour-Days Per Hectare\*

District	Period	Smallest Size Group	Largest Size Group
		(Person days per hectare)	
Coimbatore	1971-73	176	104
Surat	1967-69	207	169
Cuddapah	1969-70	307	128
Thanjavur	1968-70	181	163
Pali	1963-65	87	49

\*Source : Farm Management Reports.

## PART 2

### THE IMPLEMENTATION OF CEILINGS

In this short presentation I propose to focus on the important question of how the movement to implement land ceilings which has almost petered out can be restarted. We have to recall only briefly the basic case for redistributing land in a chronic labour surplus country such as India, and the pathology of the failure to implement the mass of ceiling legislation enacted in different States. These have been documented in the literature. The main task now is to emphasise the imperative need for a new non-official movement to break the vicious circle of this pathology. Sections of the official leadership who are sincerely committed to land reform can also take some measures to help this movement develop on the right lines and succeed. These measures can be thought out and suggested.

Technical studies clearly show that the distributive gains of land ceilings can be achieved without loss of production, if the transition is well-managed. For productivity per unit of land is usually higher on small farms. This remains true even with the coming of the new seed-water-fertilizer technology, provided that the input delivery system supplies modern inputs to small farmers without discrimination. Small farms also generate more employment per hectare. Thus a small farm structure can yield more employment as well as more output, and reduce rural disparities. But such a structure would reduce somewhat the rural saving rate and the marketed surplus for some time. Therefore computable analytical models are necessary to estimate the optimum farm size range which reconciles the pluses and minuses of a small farm structure. It has been shown that such models can be developed without much difficulty.

In any case the case for ceilings and a small farm structure has been politically and legally accepted by all the major parties in India. The only issue is how the stalemate of non-implementation can be overcome.

The fiasco of land redistribution is clearly reflected in some recent official figures. As on 31st July 1977, the estimated surplus area was 5.32 million acres, the area "declared surplus" was 4.04 million

acres; the area "taken over" by governments was 2.10 million acres; and the area actually distributed was only 1.29 million acres. Thus the distributed area is less than one-fourth of the estimated surplus.

But an even more disturbing fact is that the officially estimated surplus is a small fraction of the area in large ownership holdings of 20 or more acres. According to the National Sample Survey (26th Round, 1971-72) 29.81 per cent of the total owned area in rural India or 88.13 million acres was held in these large holdings. It was owned by only 3.29 per cent of rural households. (NSS Report No. 215, p. 38.) If the whole of this area is regarded as the potential surplus area (88 million acres), keeping in view the National Guidelines\* formulated by Chief Ministers in July 1972, the officially estimated surplus (5.3 million acres) would be only 6 per cent of the potential surplus.

Even if we shift the cut-off point from 20 to 30 acres, the potential surplus is still 53.54 million acres, which is more than 10 times the officially estimated surplus.

There is obviously a yawning gulf between survey data and recorded data on surplus land because of the legal definitions of surplus land in different States, the transfers made to evade ceilings and/or the failure to record or verify true surpluses.

The traditional response to this situation is to request the States once again to correct land records, eliminate legal loopholes and complete the acquisition and transfer of surplus land by a new deadline. This exercise was completed once again in November this year. But it is likely to prove as sterile as similar exercises in the past.

In order to make the ceiling movement effective we must begin by realising that legal and administrative processes will not proceed more rapidly unless the beneficiaries are organised.

It is necessary to recall that in all cases of successful land reform in the world, in Japan, Taiwan, Mexico, Venezuela and parts of Brazil and Bolivia, fully empowered village level committees or political movements of the beneficiaries played a critical role in pushing and/or implementing land reform.

In Japan, village level land committees, prefectural land committees and central land committees were appointed to supervise the transfer of land rights. And it is significant that at each level the

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\*The Guidelines laid down a ceiling of 10 to 18 acres for land with assured irrigation for 2 crops, 27 acres for land with irrigation for one crop and 54 acres for dry land.

number of tenant farmers and neutral persons or university professors was larger than the number of landlords.

Composition of Japanese Land Committees

Committee	Landlords	Representatives of			Total
		Tenants	Cultivating Owners	Others	
Local	3	5	2	—	10
Prefecture	6	10	4	4*	25
Central	8	8	—	2(a) + 5(b)	23

\* Neutral persons

(a) Peasant union representatives

(b) University professors

Source : Voelkner, 1970, pp. 39-40.

As the Table above shows tenants, the main beneficiaries of reform, small cultivating owners and neutral persons dominated all the committees. The central committees even included five university professors. The village committee members were elected separately by each class represented. This committee had real power to execute land reform: to determine the area, not more than one hectare, which a landlord could retain and the areas to be given to tenants. And it arbitrated all disputes. Financial transactions and the provision of police protection were the responsibility of prefectural agencies.

In Taiwan, too, a small organization was in charge of land transfer (see Koo 1970). It is not surprising, therefore, that an equitable small farm structure was created in these countries.

"In Mexico, the base of implementation of reform has continued to fluctuate with the strength of the peasant movement... Working closely with peasant organisations during his six-year term, Cardenas redistributed 15 million hectares, far more than any administration before or since... Direct action by peasant groups in Northern Mexico led to another spurt of reform activity in the late 1950s... Mexican peasants have had to rely on their own initiative and resources to pressure first for the promulgation of reform legislation and then, over a 50-year period, for enactment of laws." (Brown, 1971, p. 196.)

In Venezuela, the Federacion de Campesinos de Venezuela was responsible for pushing an agrarian reform programme providing more than 5 million acres to over 1,00,000 peasant families. When the influence of the FDC declined, agrarian reform slowed down. The Peasant Leagues in Northeast Brazil and the Sindicatos in Bolivia.

also played a key role in generating and sustaining pressures for reform.

Where, as in India and Pakistan, for example, the main implementing agency contemplated by reformers, was the official State apparatus, important sections of which have a strong community of interests with the landed aristocracy, and no organised pressure came up from the beneficiaries, a large mass of legislation produced no significant redistribution.

These facts and similar data from other countries strongly suggest that differences in the rate at which land is actually distributed, over time, and across countries and regions, are directly proportional to the intensity of peasant organisation—either under administrative or political auspices.

Land cannot merely be meant to be supplied to the poor by a few well-meaning men at the top; but it should also be demanded from the bottom by the poor themselves. The unionization of the rural poor is as critical for improving their income or wealth position as urban unionization has been for improving the position of the industrial working class.

Orthodox Leninist theory laid special emphasis on the organisation of the industrial proletariat. But in peasant societies this is clearly not enough, for the proportion of workers in large-scale modern enterprises is negligible. Therefore the major task in such societies is to organise the small-scale or self-employed urban workers and the mass of the small peasant and landless workers in the rural areas. In the Communist tradition Mao changed the orthodoxy to focus on the organisation of these classes. But in the democratic tradition it is even more important to organise them in spite of the fact that the mode of production to which these classes are tied makes it extremely difficult and prohibitively expensive to organise them.

One major solution of the problem of the high cost of organising dispersed workers lies in the creation of a public fund for the organisation of the rural and the urban poor. This fund must receive a large State contribution in addition to voluntary contributions. But the fund should not be administered by the State. It should rather be managed by an independent quasi-judicial body which hands out the organisational subsidy impartially to all political parties and social work organisations engaged in establishing and operating the unions of the poor in proportion to the membership of each union—ascertained through a secret ballot of union members.

The unions of landless farm workers, mini-farmers and tenants would demand the immediate implementation of land reforms, and tenancy laws by committees on which they as beneficiaries, have adequate representation.

It is necessary to say here that cooperatives, panchayats and other multi-class organisations can never play the redistributive role of the single-class unions contemplated by us. For Indian experience over the last 30 years clearly shows that multi-class organisations are invariably dominated by the propertied classes who misappropriate for themselves a lion's share of the organisations' resources. The rhetoric of class-cooperation or constructive/developmental activity merely camouflages the reality of conflict and the steady draining of most of the new income and wealth toward those who are already rich. Only class-conscious single-class organisations can secure fair shares for the propertyless from the local oligarchies and the State.

Between 1951 and 1971 trade union membership in India multiplied more than two-and-a-half times. Almost all factory workers, about 5 million, had been unionised. The membership of employers' unions also grew from 5,000 to 36,000. But we have to remember that factory workers form a very small proportion (about 3 per cent) of the total working force in India. Thus unionisation is still confined to an insignificant segment of the working class. Almost the entire working force in non-factory urban activity (about 28 million in 1971) remains unprotected. Political parties and social workers have sporadically tried to form a few organisations of sections of the urban informal work force such as handicraftsmen, porters, rickshaw pullers, domestic servants, construction workers, etc. But because of the inherent difficulties and high cost of organising scattered, underemployed or self-employed workers, it has not been possible to form viable and stable organisations of the vast nonfactory work force.

The same is true, by and large, of the even more numerous mass of rural workers, most of whom are underemployed small farmers and landless workers. There are 5 all-India peasant organisations of the trade union type: the 2 Kisan Sabhas sponsored by the Communist Party of India (CPI) and the Communist Party of India (Marxist) (CPIM); the All India Agricultural Labour Union sponsored by the CPI; the Indian National Rural Labour Federation sponsored by the Indian National Trade Union Congress (INTUC); and the All India Kisan Sabha sponsored by the Communist Party of India (Marxist-Leninist) (CPIML). There are a few local peasant organisations also such as the Lal Nishan in Maharashtra. But no list of local peasant organisations is available. The total membership of all peasant organisations is reported to be about 3 million including: All India Kisan Sabha (CPI) - 1.00 million,

All India Kisan Sabha (CPIM)-1.17 million, All India Agricultural Labour Union-0.40 million; Indian National Rural Labour Federation-0.06 million; and all other organisations-0.50 million. A high proportion of the total membership belongs to West Bengal and Bihar in the East, Andhra Pradesh, Tamil Nadu and Kerala in the South, and Punjab and Haryana in the North.\* Even if the membership figure of 3 million is believed to be correct, it covers only a negligible proportion of the rural work force (about 190 million in 1971).

The fact remains that both in the rural and urban areas, the vast mass of toiling workers remains unorganised. The organisational revolution has yet to reach the poor in India. But to carry it to them is the over-riding task if land reform or indeed any redistributive policy is to succeed. This task has to be performed by political and social workers; it cannot be carried out by the administration. They would be well-advised to redirect their energy to this task. For without it the power structure cannot be changed in favour of the poor.

On the official side, however, some new initiatives are urgently necessary in addition to the establishment of a national fund for the organisation of the rural poor.

In the present legal-administrative arrangements for implementing land ceilings in different States there is provision for some non-official committees. In Andhra and Assam such committees are "associated" with land distribution work. In Bihar there is a coordination committee. In Gujarat there are committees to help identify surplus land and persuade landlords to surrender it. In Haryana, U.P., Punjab and West Bengal there are "advisory" committees with some non-officials. In Madhya Pradesh and Orissa there are Circle Committees with limited legal powers. In Tamil Nadu some "association" of non-officials with land reform has been under consideration.

Only in Karnataka, Maharashtra and Kerala there are tribunals or committees with 3-6 non-official members and an official chairman, to determine by majority vote surplus land and its distribution.

Thus the overall situation is that the role of committees is limited and their composition is unsatisfactory except in two or three States. Learning from the Japanese experience, we must propose that in all States with ceiling laws, village (or block) committees must be established by new legislation, if necessary, within three months or so. These committees must have fixed class quotas of elected representatives so

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\* I am grateful to Shri A. N. Seth, Director of the Centre for Agrarian Research, Training & Education for the above information about peasant organisations.

that the elected representatives of landless and minifarm households have no less separate representation than those of the remaining farm households and there should be three independent, preferably academic landless persons interested in a fair and quick redistribution of land. The committees can be chaired by a revenue official. But they should be empowered to correct relevant land records, identify surplus land and draw up the redistribution plan for each village. They should take their decisions by a majority vote. While correcting land records they must collect and record the collective opinion of all the adults of a village in meetings.

The most crucial requirement is that the land awards of these committees should have the force of law and be immediately followed by the conferment of title deeds, provided only that they conform to the core provisions of the ceiling legislation. Only one appeal may be allowed to a single mobile higher-level tribunal with the stipulation that its judgment will be available within a fixed, short period of time. Central initiative will be necessary not only to induce the States to enact such a mechanism, but also to create the constitutional, legal basis for the new legal procedure in so far as it relates to the redistribution of land. Special land reform machinery—legal and administrative—will have to be created and arrangements made to dispose of all presently pending ceiling cases in a short time.

Such arrangements have worked in the past in many parts of the world and will also work here if they are set up with sincerity and determination. In fact without such special arrangements land reform can no more progress in the future than it did in the past.

Tenancy reform is not my theme today but it needs to be integrated with the redistribution of land, for, ideally it is nothing but a part of the redistribution process. Actual resident and operating tenants should be the first claimants of leased-out land above the self-cultivation limit as they were in Japan, whereas the landless workers should be the first claimants of the surplus self-cultivated land. The latter principle was clearly accepted in the 1972 Guidelines. The difficulties that have arisen due to the non-recording of true tenants can also be overcome only through the organisation of tenants from a quasi-judicial public fund, a special committee system and special legal and administrative arrangements analogous to the ones suggested for the enforcement of ceilings.

Similarly compulsory enforcement of consolidation plans endorsed by a 2/3 majority of landholders in a village must be integrated with redistribution.

Contrary to the impression in some quarters, if surplus leased-out land is transferred to real tenants and surplus self-cultivated land to landless worker households, the latter can be given at least one hectare of land in most parts of the country. If irrigation is simultaneously extended to the entire irrigable area (107 million hectares), and poultry, husbandry, forestry, fishing and cottage industry programmes are expanded to cover, and favour, all landless or small-farmer households they can rise above the poverty-line (say Rs. 4,000 per family per year) even with a one-hectare land base.

This, of course, implies that after land allotment becomes automatically entitled to the benefits of the marginal farmer and agricultural labourer scheme, rural industries schemes, and other schemes extended to cover every district.

There is indeed no other option left for us to reduce dire poverty.

For the (adjusted) number of agricultural labourers in India seems to have increased from 31.5 to 50.4 million over the decade 1961-1971, i.e., by about 1.9 million a year. The proposition of the Indian workforce engaged in agriculture and allied activities has remained undiminished around 74 per cent over more than 50 years. The average holding size continues to diminish. Fragmentation continues to increase. Industrial growth and industrial labour absorption decelerated in the late 60's and early 70's. Absolute rural poverty and unemployment have continued to rise in most parts of the country. Against this background, in addition to all the other measures that are being contemplated by the new Government we must generate maximum moral and intellectual pressure in favour of quick land reform as a critical means of increasing labour absorption and reducing poverty in the rural areas.