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Distribution and Production Implications of Land Reform

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Abstract

This paper discusses alternative explanations of the empirically established inverse relation between the size of farm and the output-land and labour-land ratios used in agricultural production in less developed countries. The analysis establishes the implications of the various explanations for changes in income distribution and the volume of agricultural output associated with different types of land reform programs. These implications are rather heterogeneous, and are extremely sensitive to the particular explanation of the production ratio pattern which is adopted.

Distribution and Production Implications of Land Reform*

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The common characteristic of the many diverse land reform schemes is that they all involve the re-allocation of land ownership. This re-allocation of factor ownership is, of course, accompanied by a redistribution of income and a change in the size of the producing units. These changes, in their turn, have implications for the volume of agricultural output.

A large empirical literature discusses evidence on the relationship between farm size (measured in acres) and output in less developed countries.[1] The concensus is that there exists an inverse relation between farm size and output per acre. Further, there is some evidence of an inverse relation between the labour-land ratio and farm size.[2] These empirical relationships have been widely construed as justifying land reforms which break up large holdings as likely to increase agricultural output. Thus, Dorner concludes: "The dilemma of the hard choices countries must make - between distributive justice and economic efficiency or advancement - is not a real issue."[3,4]

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*I am grateful to Robert E. Evenson and James L. McCabe who made helpful comments on an earlier draft of this paper.

[1]For a survey of some evidence see Peter Dorner and Don Kanel, "The Economic Case for Land Reform" in Peter Dorner (ed.), Land Reform in Latin America, Madison, 1971.

[2]Peter Dorner, Land Reform & Economic Development, Harmondsworth, 1972, pp. 101-103.

[3]Ibid., p.141.

[4]As well, see E. J. Long, "The Economic Basis of Land Reform in Underdeveloped Countries", Land Economics, vol. 37 (1961), p.115.

Berry has dissented from this optimistic view. Investigating a model with three groups (landless labourers, small farmers and large landowners), Berry argued that "while land redistribution may be expected to raise agricultural output in many cases, it may well worsen the distribution of income by lowering the demand for hired labour."[5] Cases where landless labourers can be hurt are characterized by a redistribution of land from landowners to small farmers.

Before the relationship between land reform, income distribution and production can be established, it is imperative that the mechanism by which farms of different sizes operate with different output-land and labour-land ratios is explicitly integrated into the analysis. While many reasons have been suggested to explain the phenomenon of differing production ratios, differences in their implications for income distribution and production within the context of land reform have not been investigated. Among the reasons given for the observed differences in these ratios, three deserve special attention. For ease of reference, they may be labelled as the measurement, market failure and large landowner inefficiency explanations.

Two basic pre-reform situations with correspondingly different land reform schemes may be distinguished. In the simplest (A) case, there are only two groups, landowners and landless labourers. Since there are no small farms, any assessment of production ratio differences between different sized units must base itself on cross-country comparisons. It is assumed that production ratio relationships observed in countries with small farms would be valid in the country under consideration if it were also to have a small farm sector. Alternatively, the country under consideration may be assumed to have a small

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[5]R. Albert Berry, "Land Reform and the Agricultural Income Distribution", Pakistan Development Review, vol. 21 (1971), p.32.

farm sector which is insignificant in size, but whose behaviour nonetheless substantiates the expected production ratio pattern. Under either interpretation, the relevant land reform scheme is one of all land to the landless labourers.

The second pre-reform situation is the Berry (B) case, with landowners, small (landowning) farmers and landless labourers. In this case, the land reform scheme under consideration is one of all land to the small farmers. A scheme which re-allocated land to both small farmers and landless labourers would be similar to case A. Thus, the A and B cases can be considered as polar situations.

Throughout the analysis, the focus is on the decision individuals make between leisure and consumption. The agricultural sector under examination is assumed to be part of an economy which is small relative to the world economy so that its relative prices are given by the international market. In particular, the relative prices of agricultural and non-agricultural goods are assumed constant, permitting the suppression of non-agricultural goods in the analysis. Initially, it is assumed that labour is immobile between the agricultural and non-agricultural sectors. This assumption is subsequently removed without qualifying the results to any significant degree.

Land Reform and the Measurement Explanation:

A measurement explanation of the difference in production ratios simply asserts that land is nonhomogeneous and that this non-homogeneity leads to the observed production ratio relationships. Under assumptions of perfect competition, all farms would operate with the same production ratios when land is measured in fertility equivalent acres. In empirical work, however, land is measured in yardstick acres and farms composed of less fertile land will have lower output-land and labour-land ratios.

Further, there is a natural tendency for farms whose land is less fertile to dominate the larger size groups. Consider a simple case with only two grades of land, type one of superior fertility and type two of inferior fertility. Suppose that the distribution of farm size functions for farms composed of the two types of land are $f_1(x)$ and $f_2(x)$ where x is farm size in yardstick acres. Let one yardstick acre of type one land be a standard fertility acre and let $k>1$ yardstick acres of type two land equal one standard fertility acre. Assume that there are equal amounts of standard fertility acres of each type and, further, that $f_1(x) = f_2(kx)$. Then, the distribution for all farms is $F(x) = [f_1(x)+f_2(x)]/2$, and farms with type two land and low production ratios tend to dominate the large size classes (Figure I).

While the assumption of non-homogeneous land provides a complete explanation for observed variations in production ratios, it is fully compatible with the usual competitive assumptions. Indeed, when land is measured in equivalent fertility acres, the non-homogeneous land model reduces to the simple competitive model. For convenience, therefore, all land is assumed to be standardized. The analysis is relevant to both the competitive case and to the non-homogeneous land case after a retranslation of results from standard to yardstick acres.

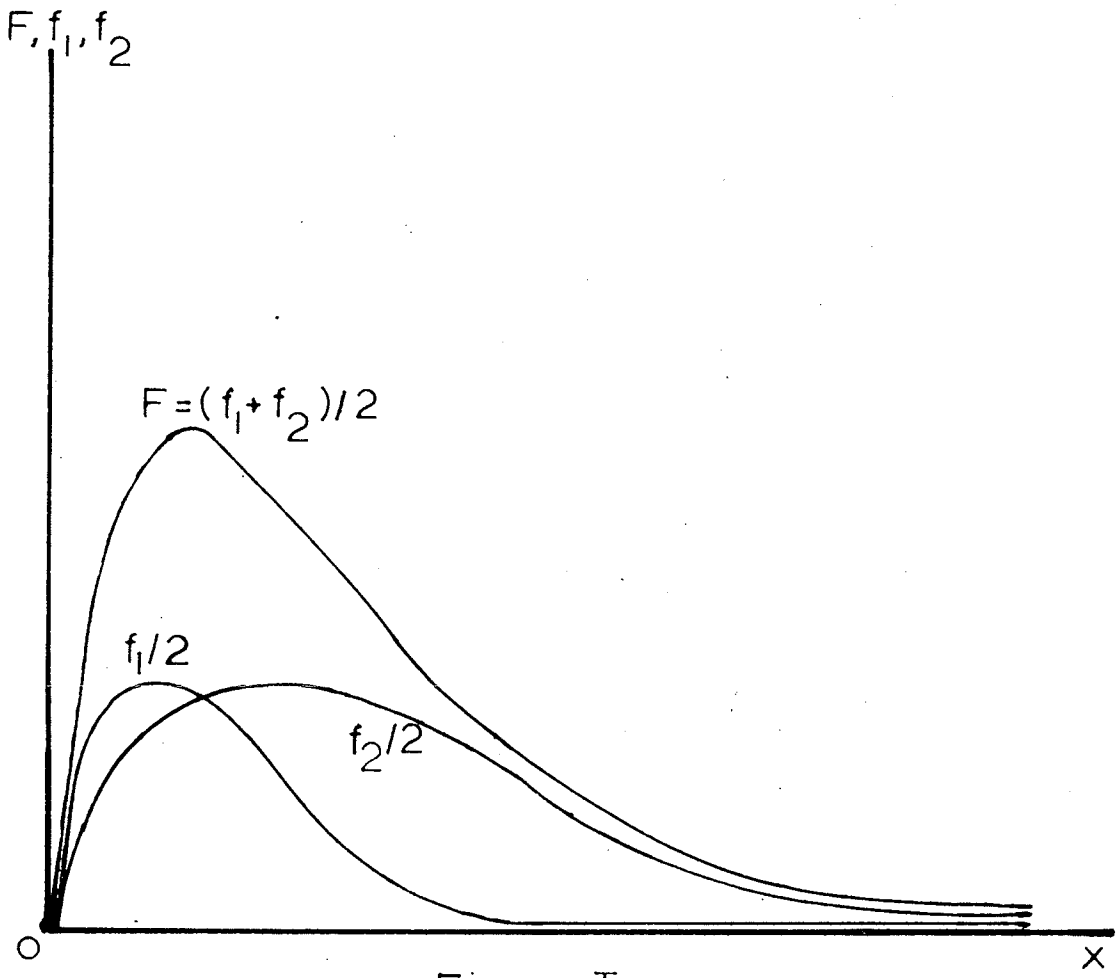

Figure I

In Figure IIa, the pre-reform equilibrium of the agricultural sector is illustrated under case A assumptions. Output as a function of labour input, given the amount of land, is given by the curve AB. Labour input is measured from right to left starting at the origin B. The production function AB can then be interpreted as a production possibility frontier between agricultural output and leisure with respect to the origin O. OB is the total amount of time available to the landless labourer community. A set of this group's community indifference curves is plotted with origin O. The wage is assumed equal to the marginal product of labour given by the slope of the line E_oD equal to the slope of the line CB. Equilibrium will be characterized by two points such as E_o and E_1, with demand for labour equal to supply of labour.

Now consider a land refrom which transfers all land to the landless labourers. Assume that neither leisure nor agricultural goods are inferior. At a (shadow) wage given by the slope of the old wage line E_oD, the landless labourer community will reach the highest level of utility somewhere along E_oJ, say at E_2. This position is not, however, a final equilibirium since the production of leisure and the agricultural good (given by point E_o) is not equal to the demand for leisure and the agricultural good (given by point E_2). Final equilibrium is attained at some point along the arc E_oK, say at E_3.

At E_3, the total output of the agricultural good has fallen. Thus, the measurement explanation under case A assumptions leads to an unambiguous decline in agricultural output following land reform. This result is associated with the role which leisure, as a normal good, plays in the determination of the level of labour input. Consumption (and welfare) of the landless labourer community has, of course, increased.

Equilibrium under case B assumptions is illustrated for the small farmer and landowner sectors in Figures IIIa and b respectively. In Figure

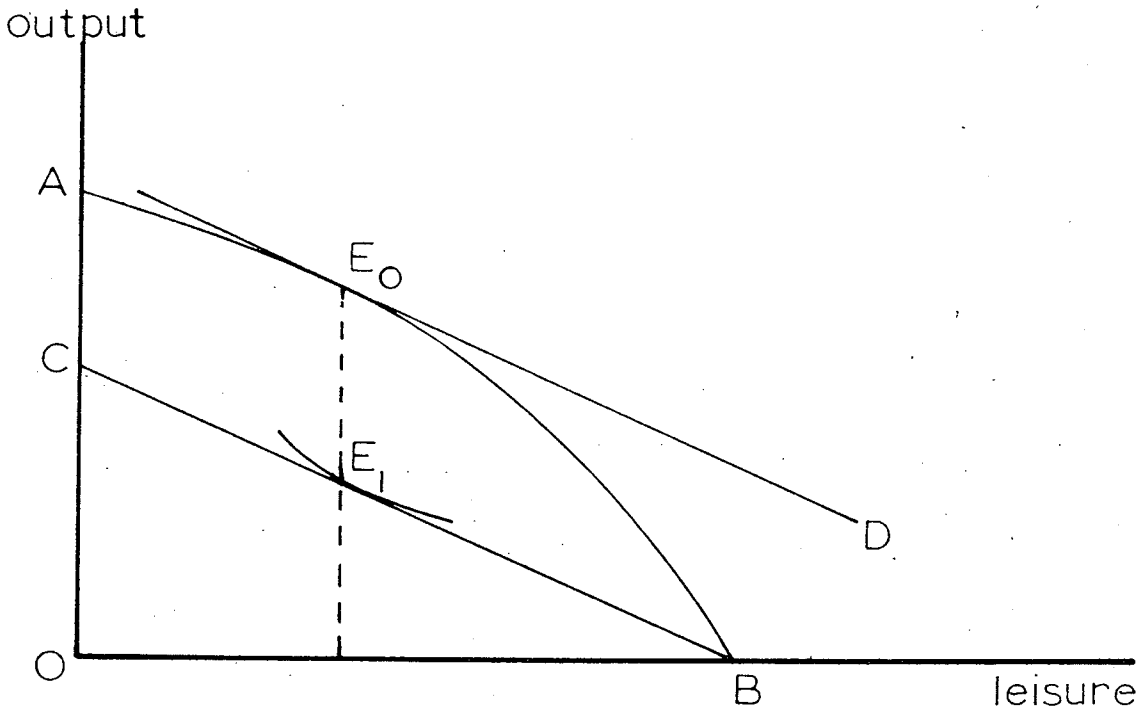

Figure IIa

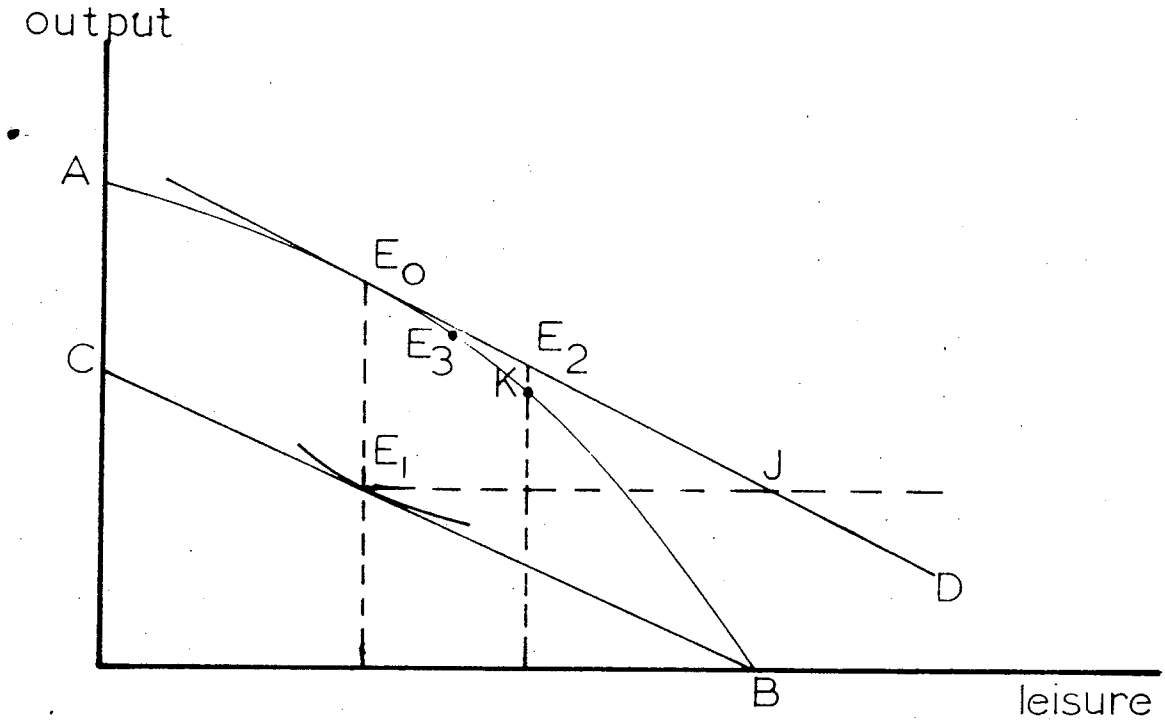

Figure IIb

IIIa, the small farmer group's indifference map is drawn with origin O, curve AB is a production possibility frontier given the amount of land held by small farmers and total time available to small farmers is OB. With the equilibrium wage given by the slope of E_oD (equal to the slopes of e_od and cf in Figure IIIb), small farmers wish to work FG (equal to fb in Figure IIIb) hours on the landowners' land.

In Figure IIIb, the landless labourer group is assumed to have an indifference map with origin o, ab is a production possibility frontier given the amount of land owned by landowners, and total time available to landless labourers is of. Equilibrium is given by a pair of points e_o and e_1 with demand for labour on the part of landowners equal to the supply of labour from small farmers and landless labourers.

Now consider a land reform scheme which transfers all land to the small farmers. The consequent shift out in the production possibility frontier facing the small farmers leads to a decline in the amount of work they are willing to perform at any wage. This result is illustrated in Figure IVa, and is dependent on the assumption of the non-inferiority of leisure.

A supply of labour function can be defined as the sum of the work done by landless labourers and that done by small farmers (given the amount of land they own) at any wage rate. A demand for labour function can be defined as the sum of the amount of labour used on the land originally belonging to small farmers and on that originally belonging to landowners. In the case under consideration, the fall in labour supplied by the small farmers shifts the supply of labour function up. The demand for labour schedule, determined by the marginal product of labour (given the total amount of land) remains constant. As a result, the wage rises, output falls and both small farmers and landless labourers are better off (Figure IVb).

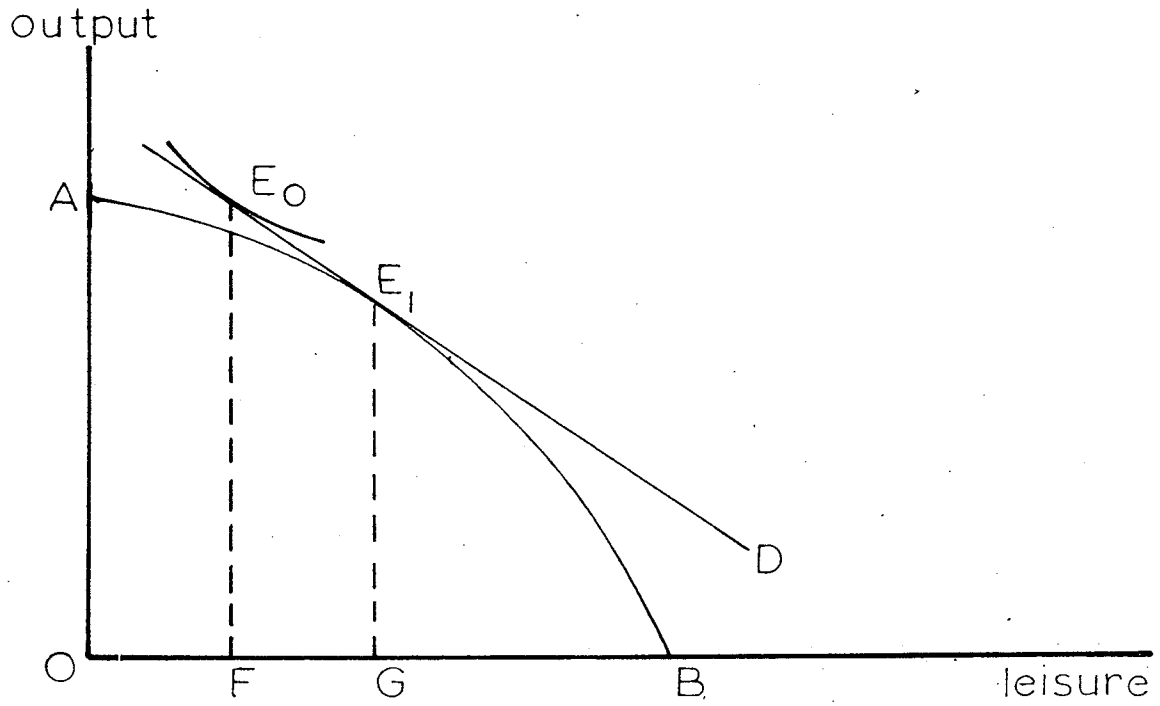

Figure IIIa

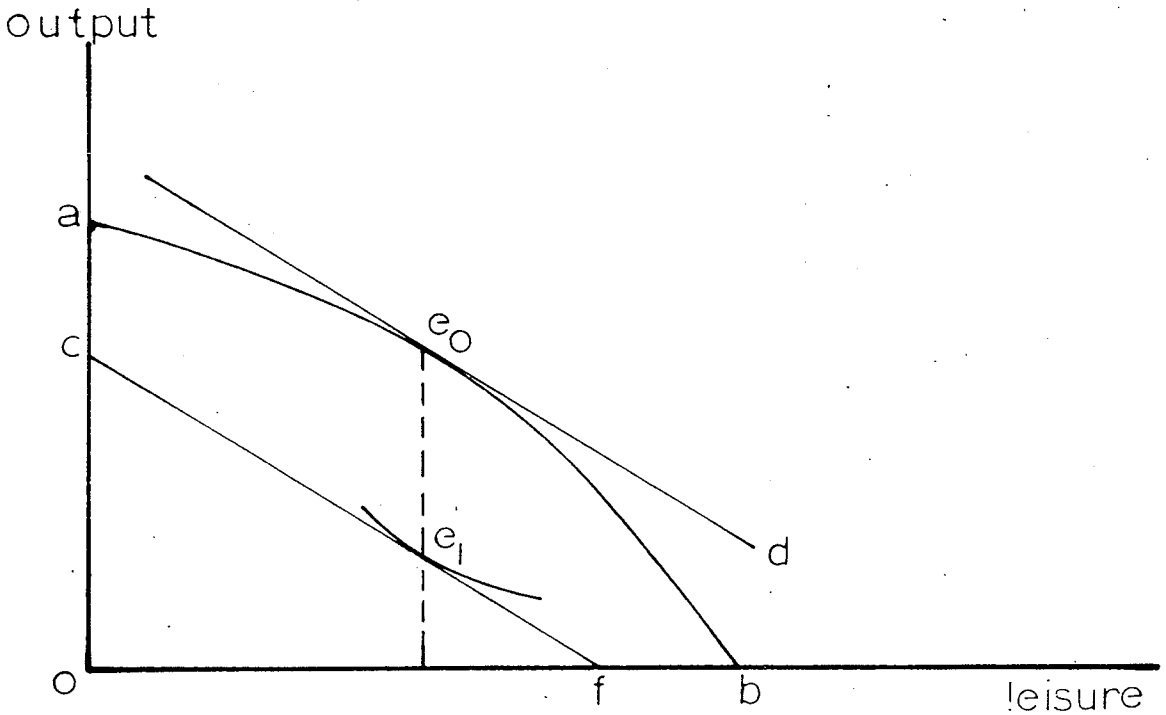

Figure IIIb

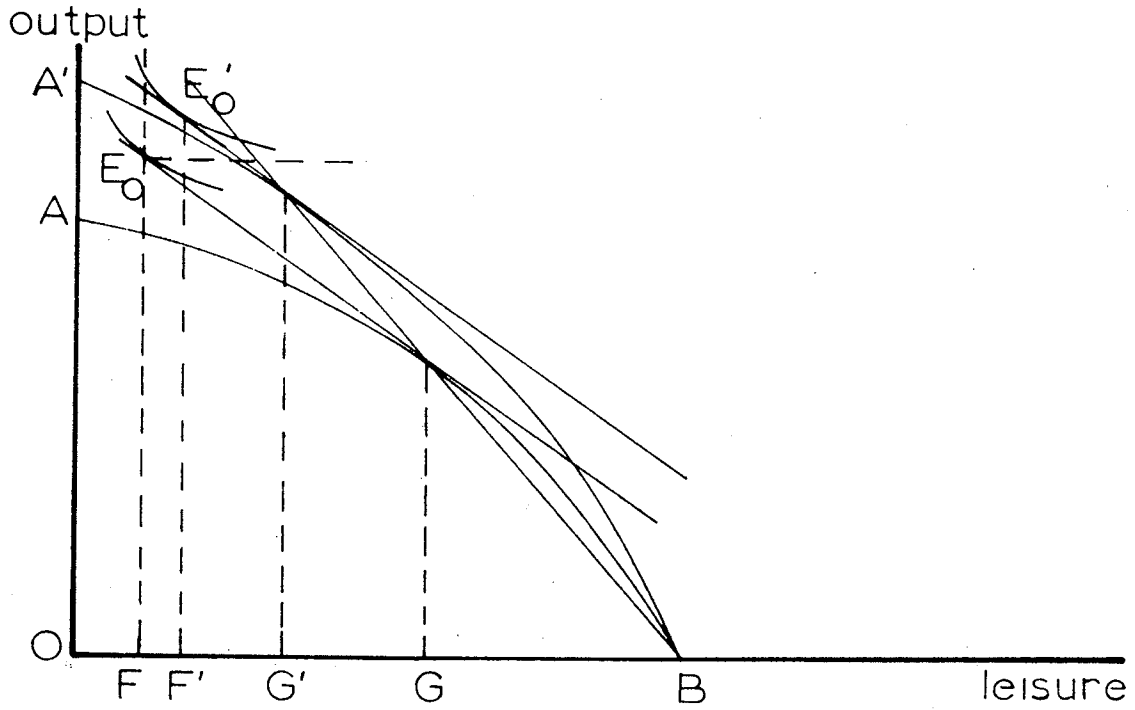

Figure IVa

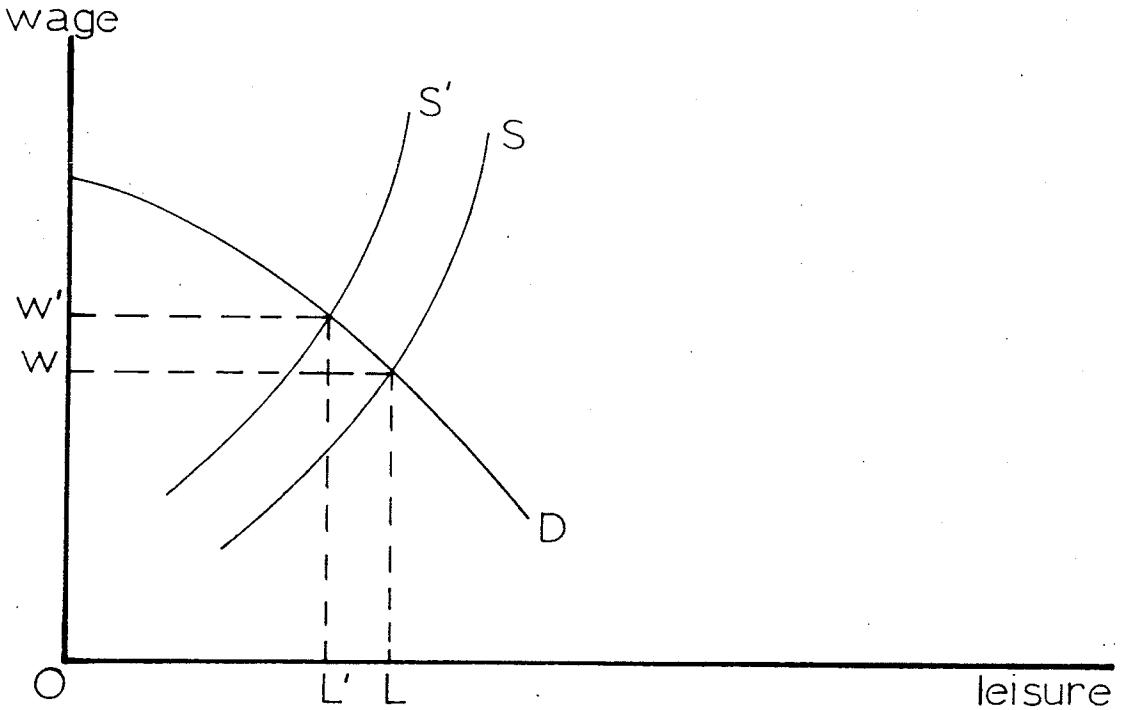

Figure IVb

Thus, under assumptions of competition and non-homogeneous land, land reform leads to output contraction in both cases A and B. The welfare of groups other than the expropriated landowners always increases. While this analysis provides an important benchmark, an assessment of the optimists' position must consider the output implications of land reform when the market failure and inefficiency explanations hold. It is on the basis of these explanations that the optimists hold their views.

Land Reform and the Market Failure Explanation:

A market failure explanation of differences in output-land and labour-land ratios concentrates on imperfections in the land and labour markets in LDC agricultural sectors. Many small farmers, given the amount of land they own, the wage rate and the rental rate on land, would like either to rent more land or to allocate part of their time to working off their farms. Opportunities for factor ratio adjustments of this nature may, however, be limited or unavailable. Small farmers are then confined to working only their own land.

These circumstances lead small farmers to operate with higher output-land and labour-land ratios than large farms. Equilibrium in the agricultural sector under market failure is illustrated in Figures Va and b. Figure Va repeats the information on the small farms contained in Figure IIIa. Under the assumption of market failure, however, equilibrium cannot occur at E_o since E_o implies that small farmers work FG hours on the farms of large landowners. Without this opportunity, equilibrium is reached somewhere along the arc HE_1, say at E_2.

Equilibrium in the landowner-landless labourer sector is illustrated in Figure Vb, which repeats the information contained in Figure IIa. The marginal product of labour in the landowner sector (given by the slope of the line $e_o d$ equal to the slope of $E_1 D$) exceeds that in the small farm sector (given by the slope of AB at E_2). On assumptions of constant returns to scale and identical production functions in the two sectors, the output-land and labour-land ratios are higher in the small farm sector.

Since the representation of the landowner sector under the market failure and measurement explanations is identical, case A land reform has the same outcome under both sets of assumptions. Case B land reform, however, is considerably more complicated. Assume, as in Figure IVb, that the supply of

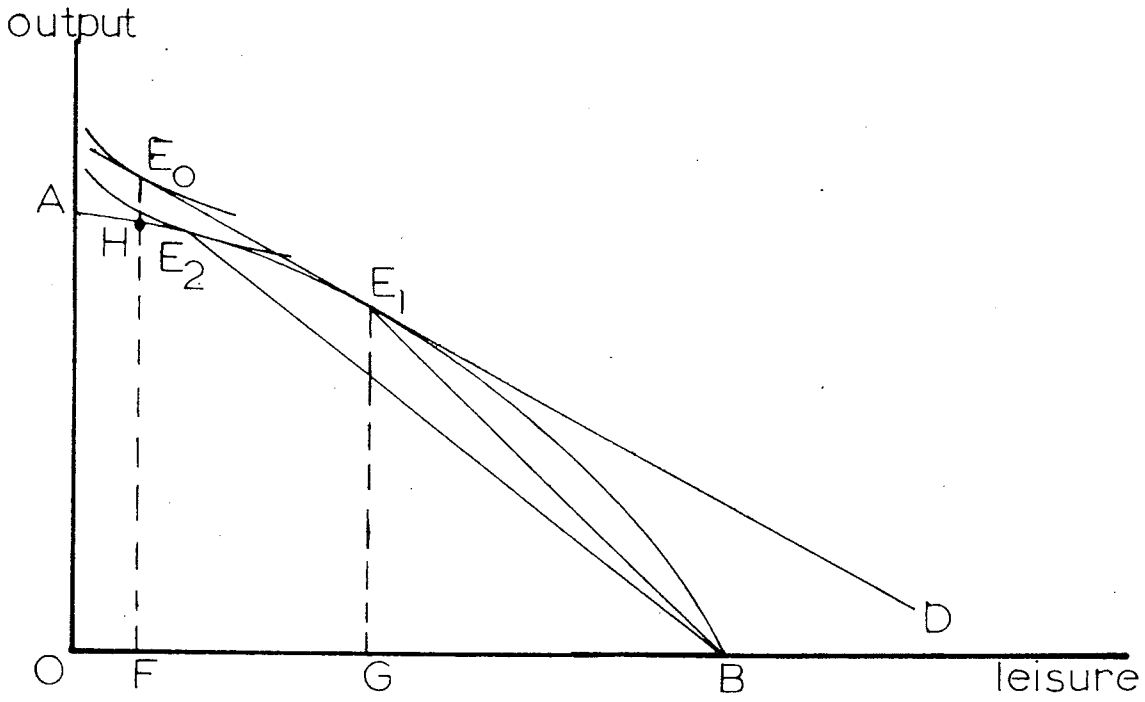

Figure Va

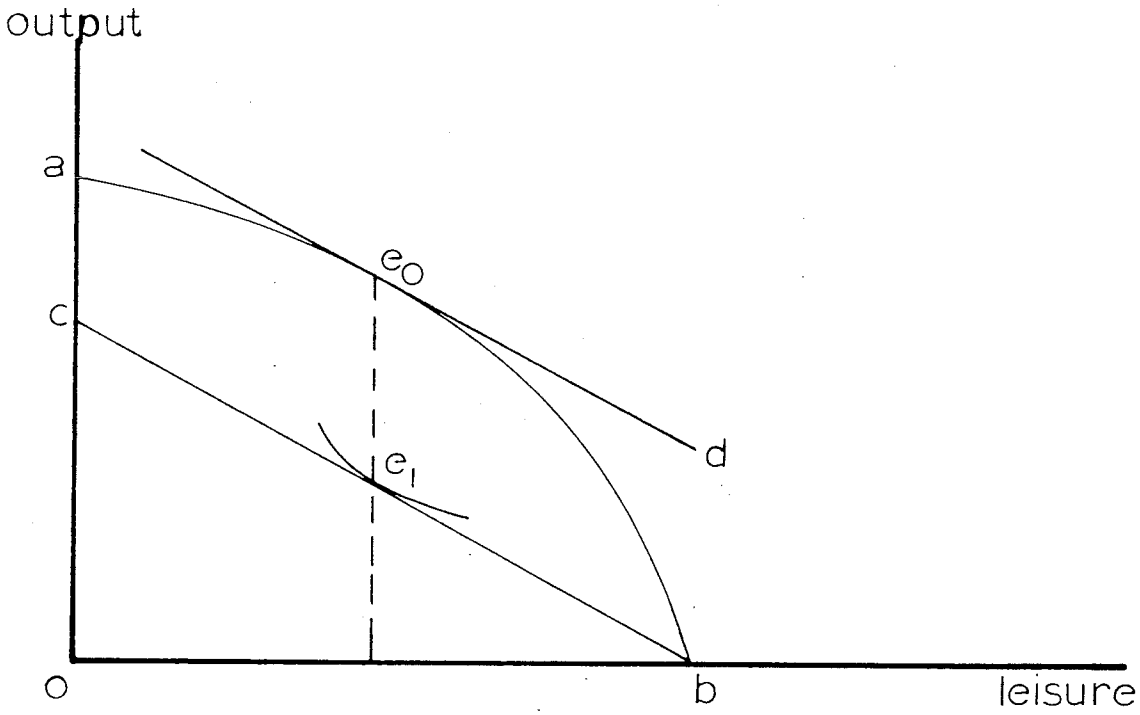

Figure Vb

and demand for labour curves are, respectively, monotonically increasing and decreasing.

Now consider the post-reform wage. At a wage less than or equal to the wage given by the slope of the production possibility frontier at E_2, small farmers will do less work than prior to the reform since they now own more land (see Figure IVa). Since this wage is less than that received by landless labourers in the pre-reform situation, landless labourers also supply less labour. Yet, since both the land formerly held by landowners and that originally held by small farmers is worked more intensively, the demand for labour is higher at this wage than in the pre-reform situation. Therefore, at a wage lower than that associated with point E_2, demand for labour exceeds the supply of labour and equilibrium is not possible.

At a wage between that implied by E_2 and the pre-reform wage given at E_1, the supply of labour by landless labourers continues to fall short of its pre-reform level. Small farmers, however, may wish to work more than previously. Two offsetting factors influence the small farmers. The implicit wage is now more favourable than that which they were receiving at E_2, but the additional income derived from their new lands acts to discourage additional work. Similarly, the demand for labour may increase or decrease. The lands which were always owned by the small farmers are now worked less intensively while the newly acquired lands are worked more intensively. Consequently, it is possible to have an equilibrium in which post-reform wages are lower than at E_1 (but higher than at E_2), landless labourers are worse off (the Berry case) and either more or less output is produced relative to the pre-reform situation.

For wages exceeding the pre-reform wage, landless labourers wish to supply more labour than previously. Small farmers may or may not wish to work more; their decision is based on the same considerations discussed above.

Less labour is demanded since both the newly acquired and the original small farmer lands are worked less intensively. Consequently, it is possible for the post-reform equilibrium to be characterized by higher wages and an improvement in landless labourer welfare. Less output is produced.

Under the market failure hypothesis, it is impossible for equilibrium to be characterized by both an increase in output and an increase in the welfare of landless labourers. The market failure hypothesis leads to a rejection of the optimists' position under both case A and B land reforms.

Land Reform and and the Inefficiency Explanation:

An inefficiency explanation asserts that large, often absentee, landowners fail to operate in a rent maximising fashion. The equilibrium of the small farm sector under the inefficiency hypothesis is identical with its position as illustrated in Figure IIIa. Figure VI reproduces Figure IIIb with the important additional assumption of landlord inefficiency.

Consider an equilibrium wage given by the slope of e_od equal to the slopes of gb and cf (and to that of E_oD in Figure IIIa). Under the usual competitive assumptions, with small farmers working fb (equal to FG in Figure IIIa) hours on landowners' land, landless labourers must be in equilibrium at point e_1 if e_od is to define the equilibrium wage. Otherwise, the demand for labour (given by the marginal product of labour) would not equal the supply of labour from small farmers and landless labourers. Under an inefficiency hypothesis, no such restriction can be placed on the equilibrium position since the demand for labour is no longer given by the marginal product of labour.

Certain a priori restrictions can, however, be placed on the equilibrium position. Given the equilibrium wage, landless labourers must be in equilibrium somewhere along cf. Total wage payments for any amount of labour along bo, say bl, are given by the height of the line gb corresponding to that amount of labour (e_3l in the case of bl). Now, if landowners do not run their farms at a loss, the total amount of output produced must at least cover the wage bill (i.e., production must be along the segment he_3 in the case of bl).

These considerations restrict the production point (combination of labour input and output) to the area $agijhe_o$ in Figure VI. (The area jib is excluded since at least fb of labour must be hired if e_od is to define an equilibrium wage from the point of view of small farmers.) The area $agijhe_o$ can be subdivided into three zones (α, β and γ) defined by the relationship of the production ratios which prevail in each zone to the production ratios

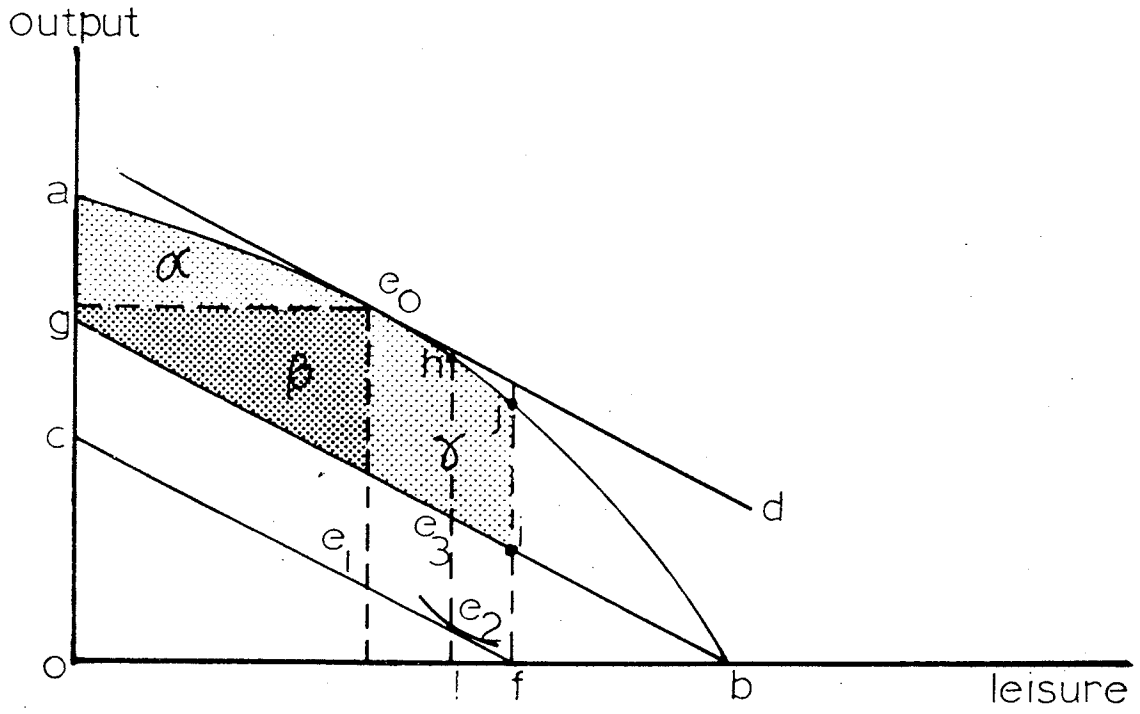

Figure VI

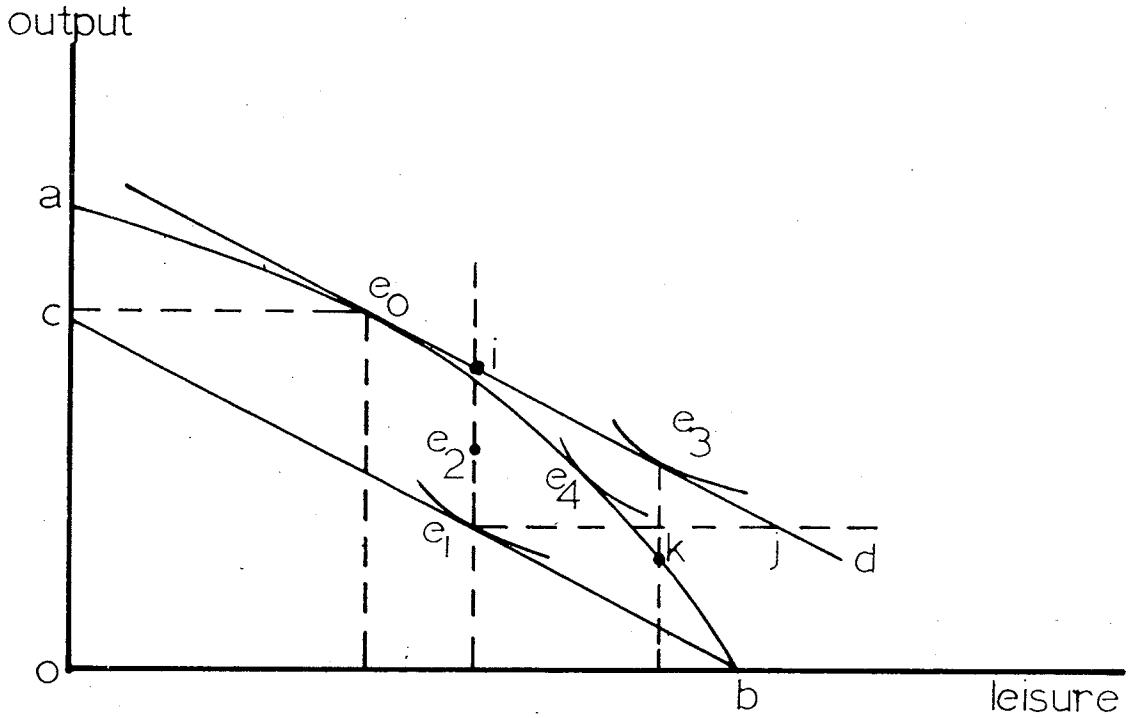

Figure VII

of the small farmers (given by the point e_o). In zone α, both the labour-land and the output-land ratios are higher on the large, inefficient farms than on the small farms. In zone β, the labour-land ratio is higher and the output-land ratio is lower, and in zone γ, both ratios are lower.

Only a production point in zone γ is consistent with the empirical production ratio pattern. Unfortunately, there are no a priori arguments suggesting that a general presumption of inefficiency leads to a production point in zone γ rather than in either of the other two zones. Thus, inefficiency only provides for the possibility that production ratios correspond to the observed pattern; it is not a sufficient condition.

Production and distribution implications of land reform can be examined in the context of an inefficiency explanation if the production point is assumed to lie in zone γ, as the empirical evidence suggests. Land reform under case A assumptions is illustrated in Figure VII which reproduces the basic structure of Figure VI for an economy without small farmers. Pre-reform equilibrium is characterized by a wage (given by the slope of the lines $e_o d$ and cb), a production point (e_2) and a point at which landless labourers are in equilibrium (e_1).

If the pre-reform wage were to persist into the post-reform situation, an analysis similar to that embodied in Figures IIa and b establishes that equilibrium would be along ij, say at e_3. e_3 does not, however, imply the equality of the demand for and supply of labour, and equilibrium will finally be reached along $e_o k$, say at e_4. At e_4, more or less output may be produced in comparison with point e_2. The optimistic outcome is, therefore, possible but not assured under the inefficiency explanation with case A assumptions.

It can similarly be shown, by analyzing the impact of land reform on the demand for and supply of labour and on the intensity of cultivation, that output may or may not increase under case B assumptions. The wage must always

rise, however, with the result that landless labourers are better off.

Conclusions:

Table I summarizes the outcomes possible in each of the six land reform models considered. The heterogeneity of results underscores the importance of an explicit integration of the different explanations of the production ratio pattern into the analysis. The optimists' view that land reform always leads to a rise in output and an improvement in the welfare of all groups other than expropriated landlords is clearly refuted. Similarly, only in the context of the market failure explanation can one observe the Berry result of an immiserization of the landless labourers.

The implications of intersectoral labour flows following on a land reform program are easily established. Assume that wages are initially equal between sectors and that an inverse relation exists between wages and the quantity of labour input demanded in the non-agricultural sector. Recall the assumption of a fixed relative price between agricultural and non-agricultural goods.

If the post-reform (actual or implicit) agricultural wage as determined in the preceding three sections exceeds the pre-reform wage, labour will flow from the non-agricultural sector to the agricultural sector. This adjustment will lower the wage in agriculture and raise the wage in the other sector until wage equality is restored. The final equilibrium wage will be intermediate between the pre-reform wage and the post-reform wage as calculated by the preceding partial equilibrium analysis. Similar results are obtained if the partial equilibrium analysis establishes that the pre-reform wage would exceed the post-reform wage. Thus, general equilibrium considerations stressing the intersectoral re-allocation of labour following on land reform do not affect the qualitative conclusions of the partial equilibrium analysis as displayed in Table I.

	Measurement	Market Failure	Inefficiency
Case A			
	output	output	output
landless labourer welfare	up / down	up / down	up / down
up			X
down	X	X	X
Case B			
	output	output	output
	up / down	up / down	up / down
up			X
down	X	X	X
up		X	X
down		X	

TABLE I

Bibliography

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