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Author(s): Dipak Mazumdar

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## Size of Farm and Productivity: A Problem of Indian Peasant Agriculture

By DIPAK MAZUMDAR

One of the most interesting findings of the recent Farm Management Surveys in India has been that input per acre increases as the size of farms (measured in acres per holding) decreases. Associated with this increase in input there is an increase in output per acre, but a decrease in output per unit of input. This shows that although there is diminishing returns to input applied to an acre of land, the marginal returns continue to be positive over the range of observation. In this article, after analysing a little more closely the nature of the variations of input per acre (in Section I), an explanation is offered, based on simple assumptions about an agricultural system making use of family labour. Some implications of the analysis for policy are noted in the last section.

### I

Let us take as an example the study for two districts in Uttar Pradesh (U.P.) for 1955-56.<sup>1</sup> The variations in cost of inputs by size of farm are shown in the table:

COST OF INPUT FACTORS  
(Rupees per acre)

	Size of farm (acres)					
	Below 5	5-10	10-15	15-20	20 and above	All farms
Bullock labour ..	126.0	88.3	74.9	70.6	56.4	76.8
Human labour ..	64.1	55.7	53.4	48.4	39.4	50.2
Seed .. ..	17.8	16.4	15.5	15.5	14.2	15.6
Fertilizer and manures	7.1	9.8	6.7	6.9	6.2	7.5
Upkeep of implements	15.4	12.7	9.4	8.5	7.3	10.1
Rent and cess ..	9.0	9.0	10.1	9.9	8.7	9.3
Irrigation charges ..	10.0	8.7	8.8	7.6	7.5	8.3
Interest on owned capital .. ..	9.4	8.4	6.4	5.7	5.4	6.9
Total Cost .. ..	258.8	209.0	185.2	173.1	145.1	184.7
Total Cost (less bullock labour) ..	132.8	120.7	110.3	102.5	88.7	107.9

Source: *Farm Management Survey, U.P., 1955-56*, Table 3.11.

<sup>1</sup> The Farm Management Surveys were intensive surveys conducted between 1954 and 1957 in six regions of India, samples of farms being selected in two districts of each region. The Reports have been published by the Ministry of Agriculture (Government of India) for each of the three years separately for each region. A check made for two years (1955-56 and 1956-57) in the six regions covered revealed that the result under investigation—that input per acre as well as output per acre increased as the size of the farm decreased—was quite pronounced in all cases except West Bengal in 1956-57 and Bombay in both years. In Bombay,

The most important point about the calculation of the value of inputs is that it includes, apart from actual payments made in cash and kind by the farm, imputed values at market prices of own-factors used on the farm. We have to investigate whether the method of calculating imputed values is responsible for the result we are examining. The method of valuing at market prices is, to say the least, controversial where there is underemployment.

### *Bullock labour*

The first input factor in the Table is bullock labour. This is the most important input in terms of cost, and it shows a striking increase per acre as the size of farm decreases. How was bullock labour valued as an input? According to the notes in Appendix B of the U.P. Report: "The cost of an animal labour day has been found by dividing their net maintenance cost by the number of the work days in the farm and in exchange." Thus the cost of bullock labour per acre does not reflect the actual amount of input, but is, in fact, related inversely to the degree of utilization of the bullocks available on the farm. Data of the actual input of bullock *labour days* per acre on farms of various size-groups are available elsewhere in the Report (Table 2.34, p. 26) and show very little variation between the size-groups: Further, at the usual daily rate of hiring a bullock it appears that if the required bullock labour days were supplied by hired bullocks, the cost per acre of this input would be something like a tenth of the calculated cost per acre for the smallest size group of farms (where under-utilization of bullock labour is greatest). This extremely "uneconomic" preference by the cultivator for the use of owned rather than hired bullock labour is difficult to explain. The evidence of field workers I have seen does not give a definite answer. For instance, Mrs. Epstein in her *Economic Development and Social Change in South India* gives two reasons: "Firstly, since the demand is concentrated into certain periods in the year, they are difficult to hire just when needed; secondly, ownership of draught animals and ploughs affects prestige. No farmer is regarded as fully established unless he owns a pair of draught animals and a plough."<sup>1</sup> The first of these explanations is hard to accept in the face of the data produced in the U.P. Farm Management Survey. There is no evidence of such strong seasonal fluctuation in the employment of bullock labour as would produce full employment of available bullock labour in any period or periods. This is at any rate the case when the days of employment of bullock labour are recorded by calendar months, as in the U.P. Survey. The average period of employment of a pair of bullocks was about seven months in a year (counting

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however, the proposition held for farms under 10 acres compared with larger farms. Similar results have also been found by private investigators; for example, John W. Mellor, of Cornell University, in a field survey in the Agra District of the U.P. (Research Bulletin 1, The Balvant Vidyapith, Bichpuri, Agra).

<sup>1</sup> T. S. Epstein, *Economic Development and Social Change in South India*, 1962, p. 48.

part of a day as a full day). Of course, intensity of employment of bullocks increases with the size of farm. But for farms of up to 10 acres—accounting for just under 40 per cent. of the total area—the intensity of employment of a pair of bullocks is well below the average for all farms. Further, as the size of the farm increases, so does the number of bullocks; farms above 10 acres usually have more than one pair of bullocks. Even if the intensity of employment per pair of bullocks may be higher on the larger farms, the total volume of unemployment of bullock labour would still be substantial.

The conclusion strongly suggested by the evidence, without being conclusive, is that a bullock is not treated as a productive factor by the farmer, but is acquired by him as an asset, possibly partly for security and partly for prestige. If this is correct, it would be wrong to include the cost of bullock labour in the total input in the way it has been done in the U.P. Survey.<sup>1</sup> As has already been mentioned, in terms of labour days the input of bullock labour per acre is rather similar for farms in various size-groups.

#### *Human labour and other factors*

Human labour is the next most important factor. In the Table this input has been valued at the prevailing market wage, both for family labour and hired labour. If it is held that the notional rate for family labour is different from the market rate for hired labour, the cost of labour inputs would have to be changed, because the proportion contributed by family labour is higher on the smaller farms. But leaving aside questions of valuation, it follows from the Table that the input, in physical units, of human labour per acre increases significantly as the size of farms becomes smaller. Labour input on farms of less than 5 acres is some 60 per cent. higher than on farms of more than 20 acres.

The input of capital can be calculated from the Table by adding together the expenditure on seed, fertilizer and manures, upkeep of implements and interest on owned capital. A part of the expenditure under these heads is family labour valued at the market rate of wages, and to that extent may be open to argument. But this is a small part of the expenditure, affecting mainly the category "upkeep of implements". Thus we can use the total expenditure on capital services as a reasonable index of capital input per acre in farms of various sizes. This is seen to increase as the size of the farm decreases, much as does the index of labour input.

On the basis of these two indices—of labour input and of capital input—we arrive at the following index of the ratio of capital input to labour input by farm size:

Under 5 acres	5-10	10-15	15-20	20 and above
103	96	92	96	100

The conclusion is that the ratio of capital to labour input per acre

<sup>1</sup> U.P. Survey, p. 25.

does not vary much among farms of different sizes. In part this is only to be expected. If more labour is put in per acre with a view to getting more output per acre, this presumably entails use of more seed and manure as well. What is somewhat unexpected is that input of capital per acre does not increase relatively to labour on farms of larger size. We shall return to this point. For the present, however, the fact that the ratio of input of labour to capital is constant enables us to proceed to analyse the factors affecting the variation in input and output per acre in terms of the two factors, land and labour alone.

It will be remembered that we began by noting that, with the valuations given by the U.P. Survey, the value of input per acre increased as the size of the farm decreased and the value of output also increased, though not proportionately: so that the marginal product of a unit of input, although positive, could be said to be diminishing. Does this conclusion hold good when we think in terms of one variable input only—viz. labour measured in physical units—applied to an acre of land? We can get a rough estimate of value added<sup>1</sup> per acre on different size-groups of farm by subtracting from the gross value of output all other inputs as valued in the U.P. Survey, excluding human labour and bullock labour. (Bullock labour is omitted for reasons discussed above.) If this value added per acre is related to the input of labour in physical terms, we find that as the size of the farm decreases the input of labour per acre increases, the value added increases per acre of land, and decreases per unit of labour. According to our rough calculations the index of value added per acre for farms under 5 acres is 154 (with 100 for farms above 20 acres), while the index of value added per unit of labour is only 82.

Given this production function involving labour and land with decreasing returns to labour, but with the marginal product of labour being positive in farms of the lowest size-group, it has to be explained why it is that the input of labour (and hence output) per acre is lower on the larger than on the smaller farms.

## II

We begin by making several assumptions, some of which can be supported empirically. First, we assume that the operator of the farm wants to maximize total profits from his given holding, the profits being calculated net of all cash expenses as well as of any real cost incurred by him in supplying his own labour. Second, we assume that the production function facing the farmer is the same for cultivators of all size-groups. This assumption derives empirical support from the fact reported in the U.P. Survey that the proportion of acreage devoted to the major crops remains roughly the same for all size-groups of

<sup>1</sup> The estimate of value added is rough because we accept the valuation of the U.P. Survey of other costs although they include some valuation of labour at market wages. But this controversial element is small.

holdings. We also rule out any difference in managerial ability as between holdings of different sizes. A few production functions that have been fitted to cross-section data of farms in India do, indeed, show constant returns to scale.<sup>1</sup> Our third assumption is that hired labour is in perfectly elastic supply to each individual holding at the ruling wage-rate. Much of the hired labour used by most farms of all sizes is casual labour hired on a day-to-day basis. Thus we are justified in leaving out of the discussion any element of monopsony which might occur where the labour used is of the "permanent" kind attached to particular farms. Lastly, we assume what is known from observation, namely that farms of all size-groups make use of some hired labour along with family labour, although the proportion of hired labour is smaller for small farms.

With these assumptions the point to which input per acre will be carried on large and small farms will depend on the supply price of family labour used in the two categories of farms. There is, however, no direct evidence about the supply curve of family labour. We need a theory of the supply price of family labour before we can proceed to explain the observed variation in labour input. Of course, we can simply say that the supply price of family labour is higher on the larger farms, and indeed higher than the ruling wage-rate: this will give us the result that input per acre is lower on the larger farms. But this is not very much of an "explanation"; it is rather more in the nature of a re-statement of the observed facts in different words.

In what follows we shall be concerned to show that the observed result follows from the simple hypothesis that the supply curve of family labour is of the usual kind—an upward-sloping curve relating the daily wage rate and the number of days of work supplied and the assumption that the same supply function applies to agricultural labourers and enters into the determination of the ruling wage-rate for their labour.

For hired labour the hypothesis of an upward-sloping supply curve is consistent with observation. Several surveys of wage-rates and employment of agricultural labour have revealed the general pattern that there is a close relationship between the average daily wage-rate and the number of days of work secured on the average during the year by an agricultural labourer. One of the most detailed and careful studies of agricultural wages was made for the province of U.P. for the year 1944 by an official of the provincial government.<sup>2</sup> The Report was highly interesting in its treatment of the regional variation of the wage level within the province. It was clearly possible to divide the province into six wage regions with sharply demarcated boundaries, so that a map of wage regions looked very much like a map of political

<sup>1</sup> For example, see an unpublished study of Dr. Raj Krishna at the Institute of Economic Growth, Delhi.

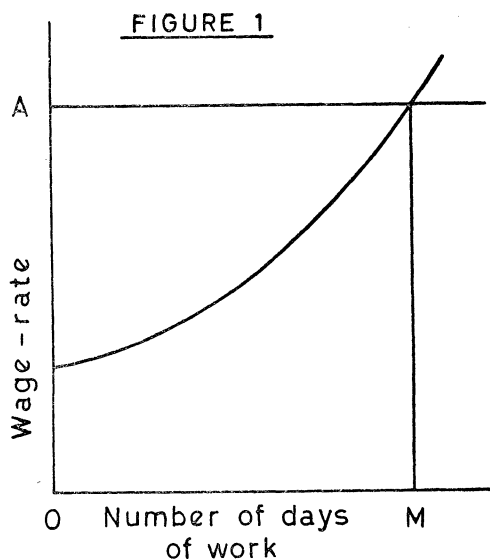
<sup>2</sup> S. C. Chaturvedi, *Rural Wages in the U.P.*, Department of Economics and Statistics, Government of U.P., 1947.

states.<sup>1</sup> Within each wage region there was a very prominent modal wage. In fact the mode was so pronounced that it was obvious that there was a general customary basis for the particular modal wage in each region. Nevertheless, the economic forces behind the customary wage were also apparent. The number of days of employment secured during the year decreased systematically as one moved to regions of lower wages.

Thus it is very reasonable to explain the determination of the prevailing wage level of a region with a simple supply-and-demand model—the wage being determined at a point on the upward-sloping supply curve corresponding to the number of days of work supplied by an average agricultural worker to the area in which he works. As has been stated above, hired labour is in perfectly elastic supply at the prevailing wage to each farm. For the present we rule out any difference in the efficiency of a day's work of labour at different daily wages, so that the daily wage is itself the marginal cost of an efficiency unit of labour at each point on the supply curve. (We return to this point again in the following section.)

If we now assume that the supply function for hired labour is the same for the family labour available to an individual farmer, it follows that the supply price (i.e. the marginal cost of a day's input) of family labour is, up to a certain point of utilization of family labour, below the marginal cost of employing hired labour (i.e. the ruling wage). This is so because a hired worker supplies his labour to the entire area in which he operates, whereas family labour is supplied to the individual farmer alone. The ruling wage for hired labour is given by the number of days of work supplied on the average by such a worker in the year to the area as a whole. Hence, with the same individual supply function, the supply price of family labour is below this wage as long as the number of labour-days supplied by such labour is less than this average. For the individual farm, therefore, the supply curves of the two types of labour are as shown in Fig. 1. Hired labour is in perfectly elastic supply at the wage  $OA$ . If the number of days of work supplied by a hired worker to the area (which determines the wage  $OA$ ) is  $OM$ , the supply price of family labour to the individual farmer is below the wage as long as supply of work by a family worker is less than  $OM$ , and exceeds the wage beyond this point of utilization. Family labour is therefore employed by a farmer up to the point where its supply price is equal to the wage level of hired labour, and further requirements for labour are met by employing hired labour. Now given this situation (and assuming the same production function for all farms) it would appear that the labour input per acre will be larger on smaller farms only if they do not employ any hired labour at all. If some hired labour is employed by all the farms, the marginal supply price of labour will be the uniform wage rate for all farms, and input of labour will be carried to the same point. And,

<sup>1</sup> *Ibid.*, Plate 4 facing p. 37.



as has been noted above, hired labour is in fact employed by small farms as well as large farms, though to a smaller extent. Thus the fact of variations in labour input per acre remains to be explained.

The simple combination, implied above, of the supply curves of the two types of labour, hired and family, for a period like a year is, however, appropriate only if the input of labour in the production process is regular and unchanging throughout the year. This procedure is obviously inappropriate in agriculture where, unlike in industry, labour input varies markedly. Furthermore, some labour inputs in one part of the year are linked with (or entail) others at other parts of the year. A given marginal increment of output results from linked marginal increments of labour input at different dates. The appropriate marginal labour cost is the sum of the supply prices of those increments of labour inputs. Thus we have to determine the supply prices of the marginal input of labour separately for the different periods of the production year in order to calculate the (total) marginal cost of labour.

The discussion can be simplified by dividing the production year into two periods, a busy season and a slack season. Our hypothesis about the supply curve of labour—relating the daily wage to the number of days of work supplied—can be modified to refer not to the whole year but to each of the two seasons separately. For hired labour there is empirical support for this modified hypothesis. It is well known that agricultural wages in slack seasons, when the number of days of employment secured by a hired worker is smaller, are generally lower. As before we assume that the same supply function holds both for family labour and for hired labour. Thus the supply



curve of family labour can be related to the wage level in the same way as before, but now separately for each of the two seasons, as in Fig. 2.

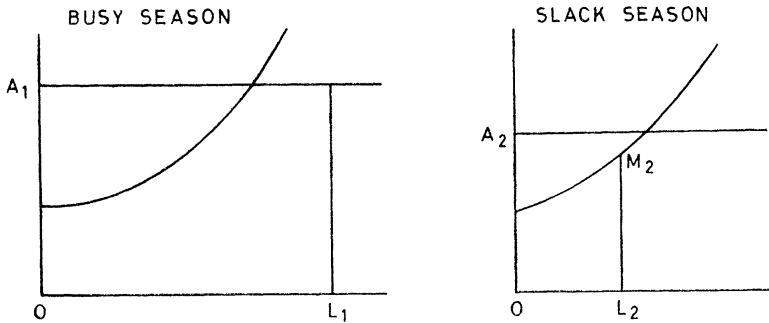


FIGURE 2

For a given volume of output on a farm of a certain size,  $OL_1$  labour is required in the busy season to combine with  $OL_2$  labour in the slack season. (The requirement of labour as shown in the diagram should take account of the number of family workers per acre, which would not be the same for all farms of a given size; hence it is expressed as a quantity per unit of family worker available to the farm in question.) In the present example the marginal input of labour in the slack season is supplied by family labour; but in the busy season the supply price for the required volume of effort by family workers would exceed the prevailing wage-rate, so that the marginal input of labour is supplied by a hired worker. The marginal cost of labour for the given volume of output is the sum of  $L_2M_2$  and  $OA_1$ , the prevailing wage-rate in the busy season.

On a larger farm there are fewer family workers per acre of land.<sup>1</sup> Hence for the same volume of output (and input of labour), the quantity of labour required per family worker is larger in both seasons. This does not affect the marginal cost of the required input of labour in the busy season, since again it is the wage-rate,  $OA_1$ . The marginal cost of the required labour input in the slack season, however, is higher, and may be as high as the possible maximum, namely  $OA_2$ , the prevailing wage-rate for this season. Accordingly, the composite marginal cost of labour for the same volume of labour input per acre is higher for the larger farm. Thus the supply price of labour for any level of output is lower on the smaller farms, and, given the same production function, input of labour and output per acre is higher than on the larger farms.

The preceding analysis has tried to explain, with a minimum of assumptions, the survey finding about variations of input per acre.

<sup>1</sup> According to the U.P. Survey the number of acres in a farm per family worker increases continuously from 1.5 for farms under 5 acres to 10.0 for farms above 25 acres.

Other influences on the supply function for family labour, which cannot be established empirically but which appear reasonable, can be accommodated in the analysis. Thus, for instance, one can presume that there is an income effect on the supply function, so that the supply price of family labour is lower on smaller farms for any given number of work days supplied. Again, it is arguable that the supply curve for self-employed family labour is below that for hired labour. Both these influences reinforce the conclusion that the marginal supply price of labour is lower for smaller farms.

Reference should be made to a special case. It has sometimes been suggested in the literature that the notional supply price of family labour is zero because its opportunity cost is zero. (This argument rejects the idea of a real disutility cost of labour.) On the further assumption that small farms do not employ any hired labour at all, it has been argued that large farms, employing hired labour, maximise net cash profits, while small farms maximise output per acre; and that it is this difference which leads to the higher output per acre on small farms.<sup>1</sup> This result can be obtained within the framework of the present analysis, with *both* small and large farms using some hired labour and assuming a zero supply price of family labour. In this case, however, the reason why hired labour is employed is not the same as in the general case. Hired labour is used in some periods when family labour is fully employed in the physical sense; and as this is likely to occur more frequently on large farms, the proportion of hired labour used in the composite marginal input of labour will be larger for larger farms. In this case the supply of family labour comes up against the physical constraint of full employment in some periods. It should be distinguished from the general case in which there is full employment of family labour in some periods in an economic sense only, i.e. no further supply of family labour is forthcoming at a supply price equal to the ruling wage in the relevant period. In principle, it would be possible to choose between these two alternative explanations by checking whether there is full employment of family labour in the physical sense in the periods in which hired labour is employed.

### III

In the preceding analysis it has been assumed implicitly that members of farm families do not enter the market for hired labour; otherwise it would seem that the supply price of family labour to the family farm would be the opportunity cost of employment at the ruling wage. There may indeed be social influences sufficiently strong to ensure the implied segregation. But there are at least two "economic"

<sup>1</sup> This argument is implicit in P. T. Bauer, "The Economics of Planting Density in Rubber Growing", *Economica*, vol. XIII (1946), in connection with differences in yields on smallholdings and estates. It is also mentioned by A. K. Sen in the context of the present problem in *Economic Weekly*, Bombay, Annual Number, 1962.

reasons why a gap should persist between the supply price of family labour and the wage level.

First, the hiring of agricultural labour is on a casual day-to-day basis, and there is an element of chance in the selection of workers. In the long run, for example over a year, the total number of days of employment tends, through the play of chance, to be distributed equally among all job-seekers. A job-seeker cannot, however, be certain of employment on any particular day on which he offers to work; his chances depend on the number of job-seekers relative to the number of jobs on that day. This uncertainty is not present for the family worker on the family farm. Thus the opportunity cost of working on the family farm is less than the prevailing wage-rate.

Second, while hired labour receives only its marginal product, family labour on owner-operated holdings, appropriates the rent element as well. Now if the rent the owner-operator can obtain by leasing out his land is less than its economic rent, clearly over some range he will be better off by cultivating his land rather than by leasing it out and supplying his labour in the market at the going wage-rate for hired labour. That is to say, the supply price of the family labour on an owner-operated farm will be less than the ruling wage-rate to the extent of the difference between the market rent and the economic rent. The possibility that the market rent is less than the economic rent is examined presently. But it should be noted here that if there is such a discrepancy, the supply price of family labour on tenanted farms also will be lower than the ruling wage-rate; part of the economic rent accrues to the tenant, none to the hired worker.

The effect of these two factors is that even if family workers are free to seek employment in the hired labour market, over some range the supply price of family labour on family farms will be below the market wage-rate, which overstates the opportunity cost of labour on the family farm. This opportunity cost, on the one hand, and the disutility of the requisite intensity of employment, on the other, will enter into the determination of the supply price of family labour; whichever is the greater for the volume of effort supplied, is the effective influence. In any event, however, the supply price of family labour will be below the wage-rate up to a certain point, so that the general analysis is not affected.

A further question arising from the analysis is whether, if output per acre is higher for smaller farms for the reasons given above, it will not be more profitable for owners of large holdings to lease out their land in small units than to depend on hired labour to the extent they do. There are probably many non-economic and conventional influences which exclude the alternative postulated. The preceding analysis, however, enables us to indicate at least one "economic" reason why this may not happen. We have argued that output per acre is higher on the smaller than on the larger farms because the supply price of the marginal unit of family labour is lower. When the owner-

cultivator of a larger holding leases out his holding in smaller units, two opposite influences are at work. On the one hand, the availability of a larger stock of family labour per acre on the owner's reduced holding lowers the supply price of family labour. On the other hand, while the owner-cultivator is able to appropriate the economic rent, the tenant has to forego it, thus pushing up the supply curve of family labour per acre of his now enlarged holding. The first influence raises output per acre; the second reduces it. It is possible that if the whole of the economic rent is appropriated by the landlord, the second influence will predominate, and that over-all there will be a reduction in output per acre. To put it differently, for the output per acre to rise, on balance, the owner leasing out his land may have to accept only a part of the economic rent. It is possible that a smaller part of a larger output may be less profitable to him than the whole of a smaller output.

In this general context we may refer to a set of considerations which have not been discussed so far. This is the effect of an increase in annual income on the efficiency of a day's work. The supply function used so far related the daily wage to the number of work days supplied during a period of time. With a larger volume of employment there is larger annual income per worker. We can reasonably consider an additional hypothesis that this leads to an increase in the efficiency of a day's work. The supply curve of labour can be re-drawn so as to relate the total number of efficiency units of labour to the marginal cost (i.e. the supply price) of an efficiency unit. If this is done, there is no reason for expecting an upward-sloping supply curve of labour for the entire range. At lower levels of income the feedback effect of an increase in income on the efficiency of a day's work is likely to be stronger, and, indeed, efficiency might increase proportionately more than the wage-rate. If that is so, the supply curve of labour in efficiency units will fall for small volumes of employment, and will rise only after a point when the feedback effect of income or efficiency is no longer so strong. A U-shaped supply curve results. I have argued elsewhere that in peasant agriculture it is quite possible for equilibrium in the hired-labour market to be reached within the falling part of the supply curve; and, indeed, only in such a situation can a distinct and meaningful definition be given to "disguised unemployment".<sup>1</sup> If this were the case, the supply curve of family labour would not lie below the prevailing wage-rate as is shown in Figures 1 and 2. For smaller numbers of work-days than are supplied by the average agricultural worker to the region as a whole, the supply price of family labour to the individual farm will be higher than that of hired labour. It will be lower only for relatively larger volumes of employment of family labour. The implication of this situation is that below a certain size of farm it will not pay to operate farms at all with family labour rather

<sup>1</sup> See my article "The Marginal Productivity Theory of Wages and Disguised Unemployment", *Review of Economic Studies*, vol. 26 (1959).

than hired labour. Thus we would not get the observed result that there is a consistent increase in output per acre with a decrease in the size of farms. If, however, all or part of the economic rent accrues to family labour, the supply curve of family labour is pushed down and the supply price of such labour may be below that of hired labour even for small volumes of employment per period. Thus it seems that we may not be able to explain the observed output phenomena solely on the basis of the supply-of-effort function as suggested in Section II. If allowance is to be made for the postulated effect of income on efficiency, part of the explanation has to be that an element of economic rent accrues to family labour.

#### IV

We now turn to some implications of the observations we set out to explain, and of the hypothesis suggested to explain them.

It is apparent from the observations that the marginal product of labour-input is positive. If the analysis is correct, it can be said that the marginal product of labour in the smallest size-group of farms is positive but less than the prevailing wage-rate. On the assumption that there is a perfectly elastic supply of hired labour to individual farms at the prevailing wage-rate, the marginal supply price of labour as a whole cannot exceed this wage-rate, and the marginal product of labour equals this rate on the largest size-group of farms. For smaller size-groups the input of labour per acre is higher because the marginal supply-price of a composite labour unit is lower than the wage-rate, and the marginal product of labour equated to the former is also lower than the wage-rate.

We have seen that output per acre is maximised on the smallest size of farm, as is also, according to our hypothesis, the surplus above notional marginal cost per acre. It is quite likely that taking all capital investment (including land) into account, the rate of "surplus" per unit of capital is also maximised on farms in the smallest size-group. In the context of an economy in which land area is not expanding significantly, and the rate of development depends significantly on the expansion of agricultural output, output per acre is a reasonable criterion to adopt as an index of efficiency.

The observed result is largely due to the absence in Indian agriculture of any indivisible productive factor which would lead to decreasing overhead cost (per acre) with increasing size of farm. Bullock labour might seem to be the only such indivisible factor among the inputs recorded in the Survey; but we had reasonable grounds for suggesting that this is not in fact to be regarded mainly as a productive factor. Another possible source of increasing returns with larger size of holding might be finance, if the marginal productivity of capital invested in agriculture were high and the capital market not perfect. Larger firms with higher total incomes might be expected to have a larger supply

of own capital and to use it relatively more commercially as a productive factor. But in fact one of the most remarkable results suggested by the Survey is that the input of capital services per acre actually declines with the size of farms and, as we noted, in the same proportion as the input of labour per acre. This result, which is surprising to say the least, needs to be looked at more closely. It is, of course, possible that this surprising result, while valid under the present system of agriculture, may not hold if a more "dynamic" system were adopted. However, any enquiry into this possibility will have to examine information of a different type from that which we have been considering, and is outside the scope of this study.

A further point may be noted. On the basis of the analysis it can be expected that a compulsory reduction of rents will lead to an increase in output per acre on tenant-cultivated holdings. But it can also be expected that owners will farm larger holdings because leasing-out will be less profitable. This will have an adverse effect on output per acre. This dilemma is not present, of course, where land reform takes the form of redistribution of land rather than of rent reduction.

We have, however, yet to mention the most serious dilemma concerning Indian agriculture if the observed results and our analysis are correct. The fact is that although productivity per acre is highest on the smallest holdings, they are not viable units in terms of the total income accruing to the family. The family budgets collected for families of such holdings show substantial deficits. According to calculations made by Professor Khusro in terms of the data of the Survey, the minimum size of holding to achieve a minimum income goal for tenant-cultivators is 10–15 acres.<sup>1</sup> But in this size-group productivity per acre is about 25 per cent. below the maximum obtained on smaller holdings.<sup>2</sup>

*London School of Economics.*

<sup>1</sup> A. M. Khusro, *An Analysis of Agricultural Land in India*, Delhi Institute of Economic Growth (mimeographed).

<sup>2</sup> The data are lacking to decide whether the problem is less serious for owner-cultivators who do not pay rent.