Agrarian Reforms and Employment in Densely Populated Agrarian Economies: a Dissenting View

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THE SPREAD of the new seed-fertiliser technology in recent years, often referred to as the Green Revolution, is bound to arouse renewed interest in land reform as an instrument for agricultural development and employment promotion. The current literature on the subject is brimming with discussions of the benefits of land redistribution, small farming and a " unimodal " strategy which seeks to encourage a sequence of " innovations that can be used efficiently by small-scale farmers ".[2] Apart from considerations of social justice, the small farms policy is justified by two economic arguments—first that small farms operated almost wholly by family labour absorb more labour per unit of land, and second that available evidence suggests that they also yield a higher output per acre than large farms. The success of land reforms since the Second World War in a few countries like Japan inspires additional confidence in such a policy. This article is written with the limited purpose of showing the possibility of a conflict, in densely populated agrarian economies, between the long-term objectives of an over-all employment strategy on the one hand, and on the other the limited though immediate benefits derived from redistributing land so as to constitute small farms.

An attempt is made in the first section to take into consideration the effects of alternative agrarian policies on the key variables which enter

[1] International Labour Office.

[2] See for example B. F. Johnston and John Cownie: " The seed-fertilizer revolution and labour force absorption ", in *American Economic Review* (Menasha (Wisconsin)), Sep. 1969; B. F. Johnston: " Criteria for the design of agricultural development strategies ", in *Food Research Institute Studies in Agricultural Economics, Trade and Development* (Stanford University), Vol. XI, No. 1, 1972; Zubeida M. Ahmad and Marvin J. Sternberg: " Agrarian reform and employment, with special reference to Asia ", in *International Labour Review*, Feb. 1969; Michel Cépède: " The Green Revolution and employment ", ibid., Jan. 1972; and ILO: *Agrarian reform and employment* (Geneva, 1971).

into the process of employment generation. Empirical evidence on issues of policy significance is presented in the next section. The unique features of the agrarian economy of Japan are highlighted in the third section to suggest the limited relevance of the Japanese model to other, less developed countries. Attention is then drawn to the limitations of land redistribution policies in agrarian economies with unfavourable land-labour ratios. Experience in the Indian state of Punjab is described to illustrate how rapid growth of agricultural employment was obtained in a modernising region in spite of an unbalanced distribution of land and a substantial measure of mechanisation. The article concludes by advocating a cautious agrarian policy and region-specific empirical research on the relation between changes in farm size and land tenure and certain key variables.

The analytical framework

A few observations on the key elements in long-term over-all employment strategy may provide, even at the cost of repeating platitudes, a useful background for the discussion that follows. First, employment is a means of distributing income as well as producing output. In exceptional circumstances where the productive utilisation of available labour is not feasible, there may be some justification for employment policies that merely achieve a transfer of income. Such policies should, however, be confined to small sectors of the economy in order not to cut significantly into the resources needed for absorption of the growing labour force. Secondly, the majority of the workers employed should be sufficiently productive, in the sense that they add more to production than to consumption. Thirdly, agriculture produces food, which is the biggest item of the wage earners' expenditure in less developed countries. Total food output must rise to balance the increased demand following growth of population and income, but it is even more important that there should be a relative rise in marketed output to support the relative shifts in the labour force from agriculture to other occupations. Such shifts form an indispensable part of an employment strategy, as is demonstrated by economic logic and economic history; they acquire even greater significance in countries where agriculture is an overcrowded occupation. For the purpose of employment policy, therefore, the part of food output that is released for sale to the non-farm population plays a more important role than that consumed on the farm. Fourthly, in the existing state of knowledge, the new seed-fertiliser technology can be applied only under favourable agronomic conditions. To prevent a relative deterioration of conditions in the less favoured regions, massive state investment in research and infrastructure will be needed, and part of this investment must be financed by surpluses from the regions where

rapid gains have been made from the new technology, unless the non-agricultural sector can be further squeezed without any adverse reactions on its own growth. Finally, agriculture being the major industry in less developed countries, any change in the volume and type of inputs it uses and the rate and composition of outputs it produces will have sizeable backward and forward linkage effects on employment, which may be as important as labour absorption in agriculture itself.

The effects of alternative agrarian policies on the key variables that enter into the process of employment generation may be illustrated with the help of figure 1. To conceptualise the issue, two possibilities are considered: one is the creation of subsistence holdings and the other is to reorganise land into commercial holdings. The distinction is not the same as that obtaining in the usual controversy over large versus small farms, which remains vague anyway in the absence of a quantifiable norm with reference to which the two may be distinguished. Commercial holdings are no doubt bigger than subsistence holdings, but basically the distinction is not one of size. A subsistence holding for the purposes of this article is one that is cultivated largely with family labour on the output-maximising principle and that produces, given the technology and available inputs, just enough for family subsistence in accordance with an accepted norm. The label does not presuppose static technology; what it does assume is that to provide for growing population on the farm, productivity and consumption will change in a compensating fashion, leaving no net surplus for reinvestment. By contrast, a commercial holding, in the sense in which the expression is used here, uses hired labour in addition to family labour and is operated on the principle of minimising costs and maximising profits by equalising the value of marginal products to the prices of inputs. It is, however, different from a capitalist farm in so far as its surpluses cannot be used for acquiring more land, market transactions in land being banned (see assumption 8 below); the commercial holding is therefore operated on the principle of economic efficiency subject to this constraint.

The basic assumptions underlying this model are as follows: (1) all arable land is under cultivation and is of homogeneous quality; (2) all land is distributed among a number of identical production units; (3) it is operated by owner-peasants who take all farming decisions in a market framework [1]; (4) the market is perfectly competitive, so that each farm is a price taker and the prices of all inputs reflect the values of alternatives foregone [1]; (5) output is a function of labour, capital and technology; (6) most capital inputs are divisible, but some are indivisible so that their cost per unit of output declines with an increase in the quantity produced; (7) the wage rate is fixed at a norm which corresponds to the

[1] Assumptions (3) and (4) will be relaxed at appropriate stages to take account of price distortions and state intervention.

institutionally determined level of living; (8) all transactions in land take place through the government.

The OX axis in figure 1 measures the number of workers employed in agriculture. OY measures agricultural output in standard units, say wheat-tons. OX' in the lower quadrant to the left of OY shows workers employed outside agriculture; OY' measures non-agricultural output.

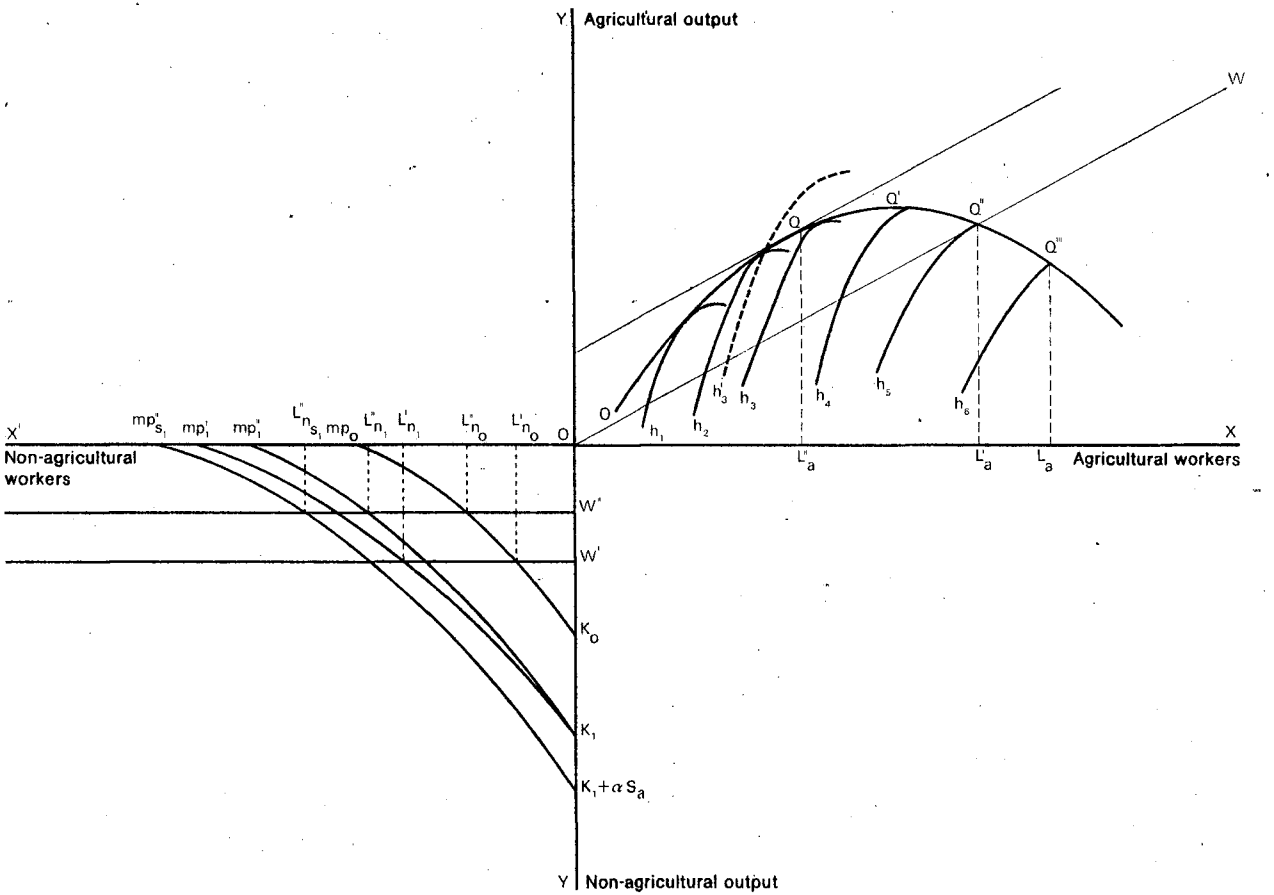
As we move to the right of OX, there is a successive fall in the land/labour ratio (with a fixed area of arable land and the number of workers in agriculture given as L_a in the initial period) and in the size of holdings. The labour input on holdings of a particular size can vary within a certain range. The degree of mechanisation falls with a decline in the size of the holdings, with the obvious implication of an inverse movement in the labour input. The h curves show the total net product (i.e. net of depreciation and interest on fixed capital and cost of variable inputs other than labour, assuming an optimal mix of these for each holding size) corresponding to the economically relevant range of labour inputs. Each curve terminates at the point of zero slope where it has the maximum attainable net product. As we move successively to the right from holding size h_1 to h_2, h_3, etc., there is a decline in the size of holdings, a fall in mechanisation and an increase in employment (for a given volume of output).[1] Since agricultural operations require close supervision, there are diseconomies of scale as the holding size moves above a certain level.[2] The diagram therefore shows an upward shift in total net product curves with a decrease in the size of holdings until the maximum product hits the ceiling Q' in the diagram. Beyond Q' the total net product declines because the size of holdings becomes too small and their occupiers' access to knowledge and resources consequently too limited to take advantage of the modern technology.

Assuming continuous variation in the size of holdings, we arrive at the total product curve $O\ Q\ Q'\ Q''\ Q'''$, which is an envelope to the total product curves corresponding to holdings of different sizes. To the left of Q' the envelope is tangential to the h curves at points where the total product falls short of their respective maximum product points. This implies that a given total product may be obtained more economically not by a holding of a size for which this is the maximum but by a bigger one, and by operating it at less than its maximum product position. This yields net savings in labour costs. They amount to real savings even in a situation of rural unemployment because at very low levels of living

[1] It may be recalled here that since the total amount of land is given and divided into identical production units, a given curve relating to changes in output could be taken as relating to holdings of a particular size or the agricultural sector as a whole, the only difference being in the scale of measurement. Thus if the maximum product on one h curve is 25 per cent higher than that on the other, output per acre is also 25 per cent higher on the former.

[2] See W. F. Owen: "The double development squeeze on agriculture", in *American Economic Review*, Mar. 1966.

FIGURE 1. LABOUR FORCE AND OUTPUT IN THE AGRICULTURAL AND NON-AGRICULTURAL SECTORS



the link between labour input and food consumption is very close, so that any reduction in labour input would reduce consumption on the farm, increase the size of the marketed surplus relative to the output and to that extent give better leverage to employment policy. Beyond Q' the envelope is extended to join the h curves at the maximum product points, the negatively sloping portion being inconsistent with the assumption of economic rationality. The envelope itself has a negative slope beyond Q' because of a fall in the maximum product as the size of holdings declines. OW represents the total wage curve with a constant slope measuring the wage rate corresponding to the accepted norm of the level of living. The intersection of OW and the envelope curve at Q'' determines the size of subsistence holdings. The point Q on the envelope where its slope equals that of the OW curve determines the size of the commercial holding that yields the maximum potential surplus. If current employment at the accepted wage is the only argument of the welfare function, Q'' represents the optimal position and the holding size corresponding to it should form the basis of land policy. It may be noted, however, that even this extreme course leaves a part of the agricultural labour force (L_a-L'_a) to be provided for elsewhere. If maximising growth is the objective, the size of holding corresponding to the point Q would provide the basis for the optimal policy, even though it lowers direct employment in agriculture by the amount L'_a-L''_a. The diagram points the well-known trade-off between the objectives of employment and growth.

The trade-off may not be as sharp as it appears at first sight if account is taken of the effects of alternative land policies on the economy as a whole. First, within agriculture, the commercial farmer can afford to be more innovative and take production and market risks. He may invest a part of his surplus in agriculture, causing an upward shift in the total product curve (as shown by the dotted line in the diagram). Provided that any technical change is neutral in its economic effects and that the relative prices of inputs are constant, a commercial farm of this sort will at first absorb more labour. With better entrepreneurial talent, the farmer may diversify his production to insure against a possible fall in food grain prices and develop labour-absorbing activities like poultry farming or the growing and processing of fruit and vegetables.

Secondly, the more important effects are reflected in the repercussions on the non-agricultural sector, as shown in the lower left-hand quadrant. The curve marked K_0mp_0 shows how marginal productivity varies with the initial stock of capital. The wage outside agriculture is the equivalent in non-agricultural goods of the institutionally determined wage (say, measured in wheat-tons) in agriculture. The wage curves W'' and W' correspond respectively to the alternative land policies based on the positions Q and Q'' respectively, the former being lower because a commercial holding is expected to yield a larger marketed

surplus than a subsistence holding.[1] The equilibrium level of non-agricultural employment consistent with the policy of commercial holdings exceeds that based on subsistence holdings (on account of the terms-of-trade effect) by $L''n_0$-$L'n_0$ in the initial period. The reinvestment out of the surplus in the non-agricultural sector in that period shifts the marginal productivity curve outward to the left, $K_1mp''_1$. The *mp* curve in period one may be somewhat flatter if account is taken of the supposedly higher labour content of goods consumed under a land policy based on the principle of subsistence holdings. On the other hand, a further outward shift in the *mp* curve becomes possible under the alternative land policy since a part of the surplus of the commercial holdings αs_a is ploughed back into much-needed investment in infrastructure as well as in processing, trade, transport and storage, all of which have both high profit-yielding and high employment-generating potential. The additional non-agricultural employment $L''ns_1$-$L'n_1$ thus generated, plus the increment in agricultural employment noted above, would cover a substantial part of the initial loss of agricultural employment at the end of the first period and, as the process continues, ultimately overtake it. The critical issue then is: Are there any special schemes that can provide a cushion against unemployment in the short term? The answer, on the basis of *a priori* reasoning and well-informed judgement, is an unequivocal " yes ". The poor countries are poor because they are deficient in productivity-raising assets—soil conservation, afforestation, irrigation, power, roads, schools, etc. Large amounts of labour can be readily absorbed in creating these assets. This approach is not new. There are traces of it in the classical theory of accumulation, and it was developed at some length in the notable contributions of Nurkse [2] and Lewis [3] to development economics in the early 1950s. However, it has not found a prominent place in the plans of less developed economies so far, except in a few isolated cases, for a number of significant reasons: its implementation is subject to three serious constraints to which the attention given in the material published on the subject is far from adequate. First, the mobilisation of surplus labour in agriculture for asset formation schemes must be accompanied by an almost proportionate increase in the supply of wage goods, particularly food. There would be a significant net increase in the demand for food as a result of the transfer of workers from agriculture. (The assumption that the withdrawal of surplus labour from agriculture would be accompanied by the release of surplus food, except for marginal leakages, is weak.) Action to raise agricultural production, in particular the marketed surplus, is

[1] On the assumption that income elasticity of demand for food outside the farm is lower than that on the farm.

[2] Ragnar Nurkse: *Problems of capital formation in underdeveloped countries* (Oxford, Blackwell, 1953).

[3] W. Arthur Lewis: " Economic development with unlimited supplies of labour ", in *The Manchester School of Economic and Social Studies*, May 1954.

therefore needed to balance the growing food demand that would follow the implementation of labour utilisation schemes on a sizeable scale. Secondly, while some schemes can be carried out by labour working with simple hand-made equipment, others may require complementary resources in terms of cement, steel and more complex equipment which must be procured from domestic industry, if possible, and if necessary through imports. Thirdly, these schemes make heavy demands on administrative and organisational skills that are in short supply.

It may be easily seen that an agricultural policy based on commercial farming could help overcome these constraints, while the one based on subsistence farming would make it difficult to do so except in the long run. Subsistence farms release a marketable surplus to the extent that they must also buy some non-farm products. That the marketed surplus so obtained would be a bare fraction of what would be available from commercial farms is too obvious to need emphasis. Commercial farms can also be tapped for a net transfer of funds to the non-farm sector, but even if such transfers are not politically feasible for financing labour utilisation schemes, the enlarged supplies of food that commercial farms unload on the market widen the scope for deficit financing.

Commercial farms are in a better position to diversify production and, given appropriate price and fiscal incentives, produce for export, thus relaxing the foreign exchange bottle-necks, if any, hindering the implementation of the schemes in question.

Finally, we come to the critical resource of administrative and organisational skill. Some of it is available and can be readily mobilised for asset formation schemes with a high labour content. The commercial farms can by and large manage on their own. On the other hand, in so far as they depend upon organisational help from the State in various forms such as extension services, supervised credit and marketing organisation, the subsistence farms will compete with the asset formation schemes.

It may be noted that in the course of this discussion of the execution of asset formation schemes for the short-run utilisation of surplus labour, the assumption of a competitive market has been replaced by one under which the State plays an active role. It may therefore be proper to bring out the implications of this change of assumption for the progress of agriculture. State-sponsored research is necessary for the ecological adaptation of the new technology in agriculture, but if Japanese experience is any guide the process is speeded up if there is interaction between experienced farmers and the agricultural experiment stations. Bruce Johnston points out that in Japan many " important technical innovations came from the farmers themselves ".[1] Apart from their initiative in

[1] Bruce F. Johnston: " The Japanese ' model ' of agricultural development: its relevance to developing nations ", in K. Ohkawa, B. F. Johnston and H. Kaneda (eds.): *Agriculture and economic growth : Japan's experience* (Princeton University Press and University of Tokyo Press, 1970).

adaptive research and capacity for experiments on the farm, commercial farmers can sustain progress by reinvesting out of their own surpluses and assuming production and market risks involved in innovations. As against this, it may be pointed out that even uneconomic subsistence farms can be made economically efficient given an institutional framework in which research institutions are organised to work down to the farm level, extension services are organised to disseminate the necessary knowledge, co-operatives are run to supply credit for the purchase of inputs and provide all supporting services such as storage, marketing and processing, and special organisations are set up at a suitable stage of development to mobilise funds for investment and expansion. All this is possible provided the State directs the necessary funds and administrative skills to these tasks; but it will take time, which itself involves costs. To avoid imbalances in the economy, the longer the time required to quicken the rate of agricultural progress, the slower must be the pace of the development schemes having a high labour content and hence creating a high demand for wage goods.

The more vital issue, however, is what would be gained by all the investment by the State in transforming, over a considerable time, a possibly large number of uneconomic farms into viable subsistence units and ultimately into commercial farms. The ultimate physical output would perhaps be not much different from that obtained under commercial farming; the transfer of goods and resources to the non-farm sector would remain smaller for quite some time. What would be gained in the process is the transfer of income from the rich to a fraction of the poor farmers, a large number of workers in overcrowded agrarian economies being still left without even work on the land, as indicated earlier. The income transfers would, however, be achieved at the expense of scarce financial and personnel resources of the State. Under the alternative policy of commercial farming, the same resources could be deployed on large-scale public works programmes. They would provide work at reasonable wages to the marginal farmers and landless workers, and in the process generate the much-needed infrastructure which would raise the productivity of workers in agriculture and industry, create larger surpluses and provide the basis for still further expansion of employment. Rising income would also diversify the demand pattern and open up new avenues of employment.

Considerations of sustained growth of employment over time as well as its regional diffusion thus seem to determine the choice in favour of commercial farming. The supplementary works projects that become more feasible with such an agrarian policy will also take care of the unemployed in the short run; the extent of coverage will, of course, depend on their magnitude.

It may be added that the basic model as well as the discussion of supplementary works projects outlined above are at best suggestive. To

make a final recommendation on policy it is necessary to estimate the key parameters such as productivity, input combinations, net resource transfers and backward and forward linkage effects in relation to farm size from the data in region-specific situations. In the next section, illustrative bits of empirical evidence are put forward in an endeavour rather to provoke more research than to provide a final answer to an issue of policy significance, though the temptation to make provisional judgement on their basis may be difficult to resist.

Empirical evidence: correlation between farm size and other variables

Productivity and marketed surplus

The first element in our analytical framework is the total product, or output per acre if the total cultivated area is given. On this question Bachman and Christensen observe:

> Much available evidence indicates that small farms in the Near East and Far East have higher gross output per acre than do large farms. This usually also means larger returns per acre over non-farm cash costs, since cash costs per acre for capital items tend to remain relatively constant with increases in size of farm.[1]

This observation was borne out by farm management studies in India [2] and elsewhere [3] in the 1950s. These results, however, relate to the period preceding the Green Revolution. The big farmers with more knowledge and resources have a relative advantage as regards the adoption of new technology, and recent evidence suggests a change in the above-mentioned situation. An intensive examination of data for individual farms in the Ferozepur district of the Punjab state of India and in the Thanjavur district of Tamil Nadu (formerly Madras) leads Harrison to conclude that " output elasticities are not different for large and small farms ".[4] He observes at the same time that these districts are atypical of the rest of India. Thanjavur is a district selected for intensive agricultural development by the State, and Ferozepur borders on Ludhiana, the most successful of all such districts. Since the intensive agricultural development programme had been going on for quite a few years, even small farms were as well equipped for the modern technology as the

[1] K. L. Bachman and R. P. Christensen: " The economics of farm size ", in H. M. Southworth and Bruce F. Johnston (eds.): *Agricultural development and economic growth* (Ithaca (New York), Cornell University Press, 1967), p. 245.

[2] Government of India, Ministry of Food and Agriculture: *Studies in the economics of farm management* (New Delhi, 1957-62).

[3] FAO: *Report on the 1960 World Census of Agriculture*, Vol. 1, Parts A and B (Rome, 1966 and 1967).

[4] James Q. Harrison: *Agricultural modernisation and income distribution*, unpublished Ph.D. thesis, Princeton University, 1972.

large, a situation confined to selected districts so far. They have had the full benefits of extension services, a much greater proportion of irrigated area than the national average and a near saturation with supplies of modern inputs. Small farms may not show equally good results in the districts not supplied with similar facilities.

A recent study in Haryana (part of the Punjab before 1966) shows a rise in the farm business income (value of total output minus paid-out costs) per acre with farm size until the operational area reaches 12 acres. An interesting finding of this study is that, except in the north, the income of agricultural (landless) labour households was higher than that of cultivators with holdings of 5 acres or less.[1] The Ceylon-Minipe survey, 1969-70, shows that average yield for the improved variety of rice was 59.2 bushels per acre for tractor-users (expected to have larger farms than non-users) as against 45.3 bushels for the buffalo-users.[2] The tractor-using farms would therefore appear to be more efficient than the buffalo-using ones, unless costs per acre on the former are more than 30 per cent higher than those on the latter.

The stock argument in favour of subsistence farms is that they can achieve higher productivity (per acre) by intensive application of family labour. In the absence of alternative income opportunities, family labour appears as a fixed cost. The implicit assumption that the additional input of labour time is cost-free is, however, questionable: it involves additional consumption of energy, to make up for which, at the bare subsistence level, there must be an adequate increase in food intake to prevent depreciation of the stock of human capital. The farm family may increase labour input until its contribution to output equals the additional food intake necessary to maintain the energy equilibrium of its workers; however, a rise in output per family member may induce consumption above that level, and therefore a fall in the marketed surplus per acre.

That the marketed surplus is higher in relation to output per acre on large farms than on small should be obvious if it is recalled that labour per acre (which mainly accounts for food consumption on the farm) is lower on the former and income elasticity of demand for food is high but less than unity. If large and small farms show equal output per acre, the former have an edge over the latter to the extent that they yield a larger marketed surplus per acre.

Potential surplus and investment

In countries like India where taxation in the urban sector is already at a very high level and the investable funds generated by the non-

[1] G. S. Bhalla: *Changing structure of agriculture in Haryana (1969-1970)* (Government of Haryana, 1972).

[2] *Ceylon-Minipe survey, 1969-70,* quoted in M. Yudelman, G. Butler and R. Banerji: *Technological change in agriculture and employment in developing countries* (Paris, OECD, 1971).

agricultural sector are barely sufficient to finance its own expansion, agriculture in areas of rapid growth must yield surpluses for infrastructure investments and for the much-needed diffusion of modern technology to other areas. The relative advantage of commercial farms with respect to potential surpluses is obvious: the available evidence indicates that the new investment opportunities thrown up by modern technology have contributed to an unprecedented spurt in savings, and average rates ranging from 20 to 40 per cent are not uncommon on big farms.[1] The problem is one of sustaining high rates of saving after the initial phase of unexpectedly high rates of return on agricultural investment is over, and channelling adequate funds into public investment in infrastructure through appropriate fiscal and price policies.

Two features of Japan's farm economy are of particular interest in the present context. First, it is a high-saving society, but the rates of saving vary directly with the size of farm. Analysing the data on savings of farm households, Noda finds that " there are clear differences in propensity to save by farm size groups when we pool both time series and cross-section data ".[2] The second notable feature for our purposes is that in the case of tenant farmers " disposable income increased by 43 per cent largely because the land reform granted them the amount of former landowners' rental income, and all the increased income was spent on consumption ".[3]

Mechanisation

The most controversial issue relates to the degree of mechanisation that is associated with commercial farming. The use of mechanical equipment displaces labour for a given activity. Whether it has net labour-displacement effects depends on its repercussions on the entire pattern of farming and allied activities. Some forms of mechanisation, such as power irrigation, increase both output and labour input per acre. Two studies quoted in the OECD report, one relating to Thailand and the other to Pakistan, indicate that " selective mechanisation in conjunction with land-augmenting innovations will increase both output per man and labour utilisation ".[4] In the Pakistani part of the Punjab, for example, the success of wheat-cotton rotation requires that the harvesting and threshing of the wheat and the sowing of cotton should be completed within 45 days. The substitution of a threshing machine

[1] A. S. Kahlon: " New farm technology: its implications for agricultural economics ", in *Indian Journal of Agricultural Economics* (Bombay), Oct.-Dec. 1970.

[2] T. Noda: " Savings of farm households ", in Ohkawa, Johnston and Kaneda, op. cit., p. 372.

[3] S. Kawano: " Effects of land reform on consumption and investment of farmers ", ibid., p. 385.

[4] Yudelman, Butler and Banerji, op. cit.

for labour would reduce the time actually spent on those critical operations from 120 days to 50 days, and would at the same time increase the over-all labour input to make double-cropping feasible. With complete mechanisation—a tractor, wheat drill, cotton planter and "pull combine" —the time spent on the critical operations would be reduced to 25 days, and there would be a simultaneous reduction in over-all labour requirements. Data from other surveys mentioned in the same report also show that extreme mechanisation resulted in a substantial reduction in the labour requirements, within the range of 12-27 per cent in terms of man-days per hectare.

At an aggregate level, experience in the Indian state of Punjab, described in a later section, shows that in areas of rapid agricultural growth the number of workers employed in agriculture has far outpaced the natural increase of the labour force in spite of a fairly high rate of mechanisation. There is no doubt a tendency towards increasing mechanisation on the big farms. In so far as it is encouraged by over-valuation of foreign exchange and underpricing of capital, it can be corrected by an appropriate price policy; excise duties and even physical controls can also be imposed, if necessary, to contain mechanisation within economically desirable limits.

Backward and forward linkages

So far, we have compared the direct productivity and employment effects of commercial and subsistence farming. It is also important to consider the indirect employment effects (the backward and forward linkage effects) of farming under the two systems.

Agriculture requires inputs, and their production generates employment. Similarly, agricultural output leads to additional activity and employment in processing, trade, transport and finance. Technological progress may be more rapid under commercial farming that generates demand for more inputs from outside the farm. On the basis of an elaborate exercise, Johnston and Kilby show that the labour content of the sophisticated equipment used by big farms is much smaller than that of the simple implements operated by small farmers.[1] The magnitudes involved are, however, trivial by comparison with the massive employment potential of the investment in social and physical infrastructure which gives a high return with the spread of modern technology and has to be financed in most countries by a net outflow of resources from agriculture. The new seed has given a fillip to the "farm-to-market roads" programme, an outstanding example of which is the Friendship Highway from Bangkok to Korat which helped Thailand, traditionally

[1] P. Kilby and B. F. Johnston: *The choice of agricultural strategy and the development of manufacturing*, Paper submitted to the Conference on Strategies for Agricultural Development in the 1970s, Stanford University, 13-16 December 1971 (mimeographed).

a one-crop (rice) exporter, to become a ranking world exporter of maize.[1] The effect of roads on the development of the rural economy, even before the new seed, was revealed by the survey of the benefits of the Ramnad-Mandapan road in South India—an increase ranging from 12 per cent to 203 per cent in the output of most agricultural commodities and increases of 48 per cent in the output of milk and of 16 to 125 per cent in the output of non-agricultural products.[2]

The development of the physical infrastructure for agrarian modernisation holds even more promising prospects from the point of view of employment. Employment norms identified by the Planning Commission in 1960-61, at the time of the preparation of the Third Plan, show that investment worth Rs 10 million (about $1.3 million) can generate 10,000 jobs in road construction, 8,000 in soil conservation and forestry or 7,000 in irrigation works, as against only 1,700 in small industries.[3]

Further, Johnston and Kilby themselves refer to the relative significance of forward linkages, brought out by Simantov's study. Analysis of the national income data for Denmark, France, Greece, Japan, Sweden, the United Kingdom and the United States showed a remarkably constant relationship between farm input purchases and expenditures on the " marketing services " (processing, transport and trade), the latter being approximately three times the former at all stages of structural transformation. Also the labour absorption per unit of output of the " marketing services " exceeds that of agriculture's backward linkages, ensuring employment gains of more than triple those in the input industries.[4] Commercial farming has a decided advantage over subsistence farming in terms of the use of purchased inputs as well as the capacity to finance " marketing services ".

Income distribution and employment

It is averred that inequitable income distribution under commercial farming alters the consumption basket in the direction of capital-intensive goods. (The effect could be partly mitigated by reducing the disposable income of the big farmers through a land tax and using the revenue to generate new jobs in rural works projects.) However, the available evidence does not lend much support to this argument. Analysing data on

[1] Lester Brown: *Seeds of change* (New York, Praeger, 1970).

[2] " Road development in India under the Plans ", in *Reserve Bank of India Bulletin* (Bombay), July 1970.

[3] " Road transport and economic development in India ", ibid., Nov. 1970.

[4] A. Simantov: " The dynamics of growth of agriculture ", in *Zeitschrift für Nationalökonomie* (Vienna), Vol. 27, No. 3, 1967, quoted in B. F. Johnston and P. Kilby: *Agricultural strategies, rural-urban interactions and the expansion of income opportunities* (unpublished monograph).

consumption by rural expenditure classes, Mellor and Lele find that while the share of food grains in total expenditure progressively diminishes from 55 per cent in the bottom two deciles to only about 15 per cent in the sixth, seventh and eighth deciles, 10 per cent in the ninth and about 5 per cent in the tenth, expenditure on other agricultural commodities like milk, livestock and fruit (all labour-intensive) rises from 23 per cent in the bottom two deciles to 33 per cent in the sixth, seventh and eighth deciles and remains at about the same level in the upper income groups. Further, even among the non-agricultural goods, although some expenditure goes to more sophisticated items like consumer durables that are capital-intensive, by far the largest proportion goes to housing, education, amusements and services which are labour-absorbing.[1]

Cline analyses in depth the three effects of income redistribution, viz.—(1) the lower import content of the basic consumer goods used by the poor; (2) the scope for economies of scale arising out of mass production; and (3) change in the structure of consumption towards less capital-intensive products;—but concludes that " the three demand composition effects postulated for income redistribution prove to be alike in one regard: empirical estimation suggests that while they may be in the theoretically correct direction, the effects are minor ".[2] On the basis of the Latin American cases examined, he observes that shifting demand and output from capital-intensive to labour-intensive sectors would reduce capital requirements by only 3 per cent, and that in so far as employment in less developed countries is a function of capital availability the employment effect would be negligible. He further adds that even this measured change is subject to the validity of questionable capital coefficients.

While this analysis started with the categories of commercial and subsistence farms, the evidence presented in this section slips into the usual comparisons between large and small farms, for this is the form in which available data exist. Intensive analysis of the input-output data for individual farms is needed to determine what would be the respective size of a commercial and a subsistence farm in a particular environment with given crop patterns, technology and prices of inputs. In so far as commercial farms are bound to be bigger than subsistence farms in any case, there is a need for fresh empirical verification of the relation between farm size and productivity. If net output per acre on commercial farms corresponds closely to that on subsistence holdings, commercial farms would turn out to be positively more efficient, since they contribute to a higher marketed surplus, greater potential for net transfer of funds and stronger backward and forward linkages.

[1] Cornell University, Department of Agricultural Economics: *Growth linkages of the new foodgrain technologies*, by John W. Mellor and Uma Lele, Occasional Paper No. 50 (1972).

[2] W. R. Cline: *Potential effects of income redistribution on economic growth in Latin American cases* (New York, Praeger, 1972).

The limited relevance of land reforms in Japan

Agrarian organisation in Japan

The land reforms introduced in Japan after the Second World War are frequently held up as a model for agrarian policy in less developed countries. The basic elements of these reforms were the transfer of ownership rights from landlords to tenants and equitable land distribution. It would seem that the rapid spurt in agricultural output and the increase in income of the average farmer which followed the reforms should inspire confidence in the system. The special agronomic, political and institutional conditions of the country must, however, be noted before we draw any inference from Japanese experience for planning in less developed countries. First, Japan had abundant water supplies, which were adequately harnessed, so that all of the paddy fields were under irrigation as early as the Meiji period. Secondly, the land constraint was relaxed by lengthy research and by the development of high-yielding fertiliser-responsive seed varieties and the improvement of crop practices. Thirdly, the intensive use of fertilisers began in Japan as early as 1880: by 1915 Japan was using 45 kilograms of fertiliser per hectare, just marginally below the 1960 level of 49 kilograms per hectare in the United States; the 1960 level of fertiliser consumption per hectare in Japan was as high as 272 kilograms. Fourthly, the land was operated in small and nearly equal units so that in the course of time all the farmers developed the necessary expertise in the arts of production and management. Finally—and this is what contributed most strikingly to the simultaneous development of Japanese agriculture and the structural transformation of her economy—the ownership rights were vested in big landlords who combined in themselves the best features of that function under the feudal and the capitalist systems. The key role of the big landowner in Japan's economic development is described succinctly as follows:

> The landlord clearly stood to gain the most from the exploitation of agricultural reserves of productivity. Receiving rising direct or rental incomes while paying taxes increasing in smaller proportion, this group was in a position to lay claim to most of the surplus which did not land in government coffers. The Japanese landlord of the Meiji era presents a sharp contrast to Ricardo's wastrel type. From the outset he devoted himself to improvements, promoted societies for the discussion of agricultural techniques, introduced winter drainage and helped sponsor the growth of superior rice strains. . . . There is no evidence of any sizeable diversion of the landlords' respectable surpluses to high living or speculation. A large share of these surpluses as well as of the land tax proceeds was invested outside of the primary sector.[1]

[1] G. Ranis: " The financing of Japanese economic development ", in Ohkawa, Johnston and Kaneda, op. cit., pp. 45-46.

By the time of the reforms carried out after the Second World War, Japan had already acquired the full complement of research and extension services as well as the physical infrastructure and the requisite supply of key inputs like fertilisers. In fact, with universal education and long experience of technological change, almost every farmer was not only a farm operator but also an entrepreneur and an innovator. Above all, the limited variation in the size of operational units meant that the transfer of ownership rights did not cause any perceptible alteration in the unit of management.

Agriculture in other densely populated countries of Asia

The situation in other densely populated countries of Asia is one of contrast in several respects. A few facts from India serve to illustrate this contrast. After two decades of planning and investment in agriculture, less than a quarter of the cultivated land is served by irrigation from any source. About three-fourths of all villages were more than 2.5 km away from an all-weather road in 1959, and though the latest data are not available the fact that road mileage has since increased by only one-third implies that a large number of villages still have only difficult access to any but the most elementary form of transport. Dwarf wheat has been successfully introduced, but considerable investment in adaptive research and extension services, infrastructure and the production and supply of key inputs like fertilisers is needed to ensure wide diffusion of the new technology in agriculture. Even on progressive farms in India the application of fertilisers is less than one-tenth of that in Japan. Further, between 1919 and 1954, while the current inputs in Japanese agriculture were rising at the rate of 2.43 per cent per annum [1], the area of arable land did not increase at all. These figures bring out the progressively diminishing role of land itself as an input in agricultural production in Japan, so that in planning for land redistribution in other densely populated countries it would be positively misleading to refer to the average size of land holdings in Japan without taking due account of differences in levels of technological development.

Moreover in most countries in Asia, unlike Japan, the distribution of land in terms of the size of operational units is rather unbalanced: in India over one-fifth of the rural households in 1960-61 had no land and little experience of farm management, and another two-fifths had some land but less than 2.5 acres each, while at the other extreme 2.09 per cent of the operational holdings amounted to 30 acres or more and between them accounted for 23 per cent of the cultivated land.[2] This

[1] K. Ohkawa: " Phases of agricultural development and economic growth ", ibid., p. 18.

[2] V. M. Dandekar and Nilakantha Rath: *Poverty in India* (Bombay, Indian School of Political Economy, 1971), p. 68.

implies unequal distribution not only of material resources other than land but also of those basic inputs, management skill and technical knowledge, which take time to build up.

Limitations on land redistribution in overpopulated countries

The existing inequalities in land distribution coupled with the success of small farming in Japan seem to support the case for the reorganisation of agriculture into small farms in densely populated countries. Thus Ahmad and Sternberg observe that " in view of the reforms in Japan..., which are conceded to be successful, the establishment of holdings of 2 or 3 hectares (an economically viable unit at the stage of development... at that time) might be possible throughout Asia through land redistribution, even if agricultural wage earners are taken into account, on the basis of three workers per farm household ".[1] In a later article Sternberg asserts even more strongly the case for uniform land distribution in Asia, stating that " it is possible to achieve relatively high levels of remuneration for the agricultural workforce with exceedingly low but relatively uniform land/labour ratios ".[2] These writers ignore the fact that physical conditions in Japan were exceptionally favourable to agriculture since, as pointed out above, all the paddy land was under irrigation, land distribution by size of operational units was fairly equal, the institutional framework permitted the growth of agriculture for decades as a joint venture of the small farming units and the big landowners with the investment and entrepreneurial functions being performed by the latter, and the ownership rights were transferred to farmers at a fairly late stage when technical progress had attained a high level and they had acquired the necessary expertise and resources to manage the farms on their own.

In most other Asian countries, however, land distribution is highly unbalanced and is accompanied by almost similar inequalities in the ownership of complementary assets. Equal distribution of land will disorganise agriculture and lead to a fall in output unless measures are simultaneously taken to redistribute complementary resources.

Some inputs like tube-wells and heavy farm equipment are indivisible; they could be made widely available by hiring them out, though of course there would have to be a charge. Others, like technical knowledge and managerial efficiency, which gain in importance with agrarian modernisation, are simply not transferable. To get around this difficulty, an entirely new system may be necessary, possibly one of co-operative

[1] Ahmad and Sternberg, op. cit., p. 175.

[2] Marvin J. Sternberg: " Agrarian reform and employment: potential and problems ", in *International Labour Review*, May 1971, p. 465.

joint farming or collectivisation. Persons responsible for management under the new system must, however, aim at economic efficiency, making optimal use of resources, including labour; and such an approach might convert the existence of surplus labour (underemployment) into open unemployment. It is evident that the principle of perfect equity in terms of land holding cannot work unless it is carried to its logical conclusion, with all that it implies in terms of economic costs and political change.

Assuming that agriculture is reorganised within the institutional framework of private property, the differences in the ownership of assets other than land and the need for their economic utilisation have to be taken into consideration: some variation in the size of holdings may then be necessary to satisfy the criterion of economic efficiency. It remains true nevertheless that some holdings are too big for efficient management within the limits of economic mechanisation. A ceiling on the size of land holdings is therefore justified on grounds of economic efficiency, apart from considerations of social justice: the area that is surplus after the imposition of ceilings must be redistributed to small holders. The central issue is how to maximise the gains from land redistribution: in overpopulated countries an equal distribution of available surpluses among the landless and the very small farmers would only result in an enormous increase in the number of irredeemably uneconomic holdings.

Over-all economic cost of subsistence or commercial farming

A choice must therefore be made between the only two economically justifiable alternatives: redistribute the available land surplus so as to bring the largest number of non-viable holdings up to a viable size, or raise as many farms as possible to the size of commercial holdings. Farmers who are only marginally below the commercial level will in all probability manage the extra land and attain economic efficiency out of their own resources. The non-viable farms, on the other hand, will require state aid in various forms such as extension services, supervised credit, special arrangements for the supply of services of indivisible farm equipment such as tube-wells, and even subsidies to key inputs for some time in order that they may become viable, and the help of special institutions that provide for the vertical integration of ancillary services like transport and marketing for an even longer time in order to attain a reasonable level of economic efficiency. The transfer of surplus land to uneconomic but potentially viable (and in the long run profitable) farms, instead of to those that are just below the limit of economic efficiency, thus amounts to a process of income transfer with heavy costs to the State.

It follows that the policy of making profitable the maximum number of potentially viable farms does not square well with the efficiency criterion. In overcrowded agrarian economies it does not even serve the objective of equity: an elaborate exercise for India carried out by Dandekar shows that even if the size of a viable holding is fixed at 2.5 acres [1] and the ceilings reduced to limits as low as 7.5 acres in Assam, 10 acres in Tamil Nadu and West Bengal and 15 acres in Uttar Pradesh, the surplus obtained from the imposition of ceilings would be barely sufficient to raise all holdings of 0.5 acres or more but less than 2.5 acres to the viable size [2]; the lot of the poor farmers on non-viable farms would be improved, but at the cost of the still poorer landless labourers and the marginal farmers who obtained some paid work when the land belonged to the big farmers but who would be almost completely displaced by family labour when the land is transferred to potentially viable farms.

It may be suggested that the marginal farmers and landless labourers could be taken care of by supplementary work programmes of the type mentioned earlier. The feasibility of this solution is, however, considerably restricted by an agrarian policy based on subsistence farming, especially where the numbers involved are proportionately large [3] and the elasticity of state resources is comparatively limited. Redistribution of land on a sizeable scale from farms that are big to those that are only just viable would reduce the taxable surplus in agriculture. The reduction in the marketed surplus would also restrict the scope for deficit financing. At the same time, a variety of schemes that must accompany land redistribution to convert small farms into viable and ultimately profitable units would be a drain on the state revenues and personnel resources. It is therefore doubtful whether the State would be left with enough resources to undertake public works projects on a scale commensurate with the size of the agricultural workforce not covered by redistributive land reforms.

It thus appears that in regions where average land availability is itself low, land redistribution cannot play a very substantial role in an anti-poverty policy. Is it not sensible, then, to use the surplus land to bring up to the commercial level as many as possible of the farms that are below that level? Such a course would secure the maximum efficiency on the farms in terms both of current output and of reinvestable surplus; it would provide for more and better-paid work for the landless; and

[1] Johnston and Kilby (in *Agricultural strategies . . .*, op. cit.) observe: " Even a pair of bullocks and family labour are likely to be seriously underutilised in India on farm units below, say, two or three irrigated acres or five or six unirrigated acres, and . . . hiring out labour may be more rewarding than operating such an uneconomic holding."

[2] Dandekar and Rath, op. cit., p. 85.

[3] About 36 per cent of rural households in India are landless or live on farms of less than 0.5 acre.

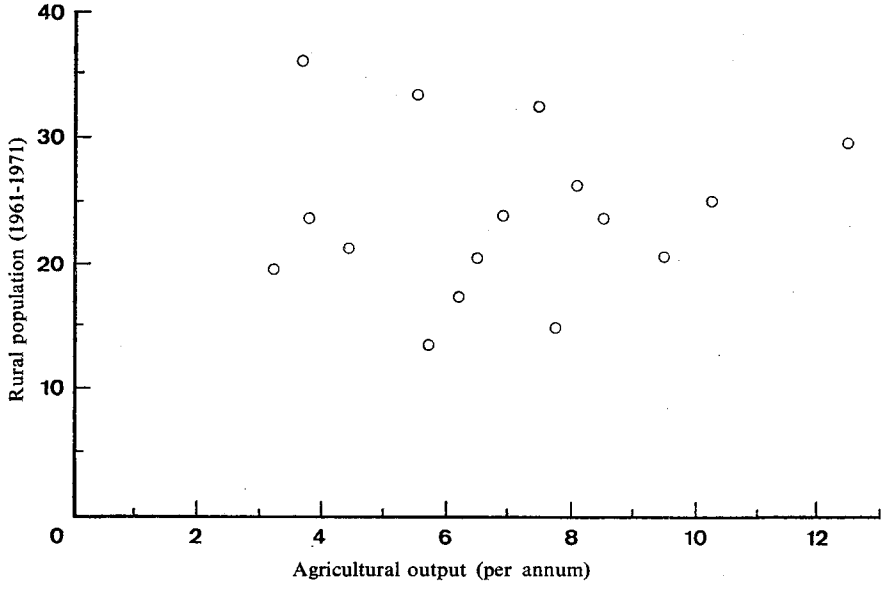
though on balance it would reduce over-all employment in agriculture it would simultaneously generate new job opportunities on a sizeable scale through strong backward and forward linkages. Of course, it would have to be accompanied by appropriate price and fiscal policies which would not only contain mechanisation within economically desirable limits but also mop up resources for developing other productivity-raising programmes with a high labour component. The availability of transferable funds also gives greater manoeuvrability for the regional dispersal of the basic facilities needed for the diffusion of new technology.

The critical issue, however, is this: Is it possible to mobilise sufficient resources and organisational skills to develop programmes which in the near term can take care of workers not absorbed in agriculture? There are grounds for hoping that in the Indian context the answer is " yes ". Dandekar gives an over-all estimate of the magnitude of the anti-poverty public works programme that would be necessary. He observes that about 40 per cent of the rural people are below the poverty line and that a works programme of the order of 8,000 to 10,000 million rupees is needed to raise their level of living above it. This amount could be secured by a 15 per cent cut in the expenditure of the top 5 per cent income group of the rural population and a 7.5 per cent cut in that of the next 5 per cent. In a recent article, J. P. Lewis makes out an excellent conceptual case for claiming a central place for public works in the design of short-term anti-poverty policy. To quote him, " in most developing countries the variety of projects with high (social) benefit-cost characteristics that are still not built is enormous. . . . In countries where agricultural acceleration is now removing the food supply constraint, it is, at the same time, raising the prospective returns of public works that support agriculture." [1]

He rightly points out that most public works ventures have not been a success in the past because they were operated on an extremely small scale and suffered from technical and organisational infirmities. The approach can live up to its conceptual promise only if the programme for the 1970s is sufficiently bold in relation to the national employment needs. It is now also more feasible since with new technology and the growth of agricultural surpluses the resource constraint is substantially relaxed. Effective organisation and implementation still pose difficult problems. The point of immediate relevance, however, is as follows. There would seem to be a choice for the use of a given amount of public revenue and administrative effort. They could be used, on the one hand, to develop numerous small farms formed by the redistribution of land; however, that land could as well be transferred to other people (farmers

[1] J. P. Lewis: " The public works approach to low-end poverty problems: the new potentialities of an old answer ", in *Journal of Development Planning* (United Nations), No. 5, 1972.

FIGURE 2. PERCENTAGE INCREASE IN AGRICULTURAL OUTPUT AND RURAL POPULATION IN 16 DISTRICTS OF THE INDIAN STATE OF PUNJAB, 1961-71

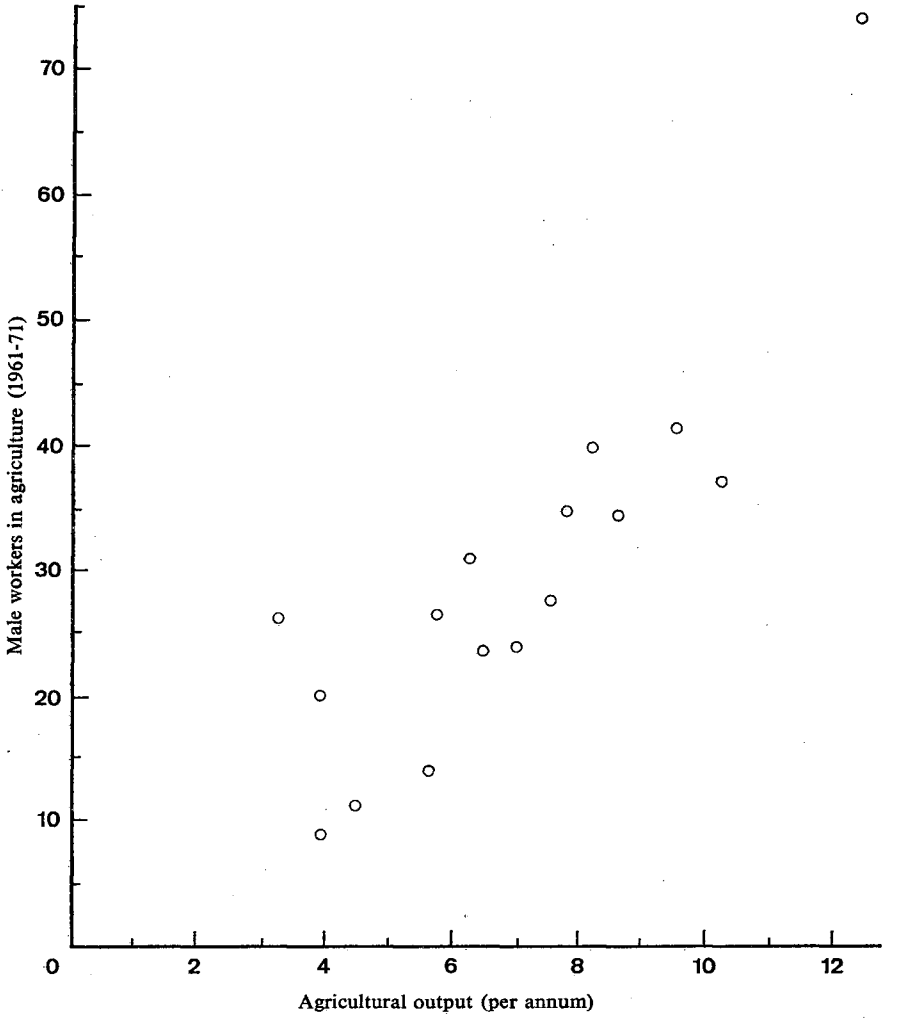


just below the commercial production level) who could operate it with equal efficiency on their own. In the latter case the above-mentioned public resources could be used for public works, which in addition to providing direct employment would create an infrastructure for new activity and further employment promotion. The latter course is obviously preferable unless the only objective is the immediate promotion of employment and welfare.

Employment and agricultural efficiency in a modernising region

The Indian state of Punjab is one of the few regions to have recorded impressive gains from the new seed-fertiliser technology in recent years. Agricultural output increased at an annual rate of 6.7 per cent between 1960-63 and 1968-71, while the net sown area increased by just over 1 per cent per annum. The distribution of land is unbalanced in Punjab, as elsewhere in the country, since about 11 per cent of the landowners with 15 acres or more operate between them over 50 per cent of the cultivated area. The big farmers have played a major role in the accelerated development of agriculture. They have also gone quite far in the use of tractors and mechanical threshers: the number of tractors in India

FIGURE 3. PERCENTAGE INCREASE IN AGRICULTURAL OUTPUT AND NUMBER OF MALE WORKERS IN AGRICULTURE IN 16 DISTRICTS OF THE INDIAN STATE OF PUNJAB, 1961-71



rose from 31,000 in 1960-61 to 91,000 in 1968-69, of which more than half are concentrated in Punjab; there is one tractor for about 600 hectares in Punjab, and this ratio is not very low by comparison with the average of one tractor per 470 hectares in the Federal Republic of Germany or 330 hectares in the Netherlands. It is striking to note, however, that employment in agriculture has increased faster than the rural population in spite of the process of mechanisation. The number

PARAMETER ESTIMATES FOR OUTPUT PER ACRE[1] IN THE INDIAN STATE OF PUNJAB, 1951-71

Year	Gross irrigated area	Male workers in agriculture	Fertilisers	Implements	R^2	Degree of freedom
			Independent variables [2]			
1951	0.2661	0.2953	—	0.2311	.7925	12
	(3.4305)	(1.2025)	—	(1.5726)		
1961	0.0464	0.4395	—	0.1816	.8716	11
	(0.9612)	(2.9234)	—	(2.1036)		
1971	0.3744	0.4123	−0.0040	0.1772	.9487	11
	(6.3655)	(2.1228)	(−0.0556)	(3.5137)		
			Marginal product in rupees			
1951	84	181	—	4.6		
1961	18	282	—	1.7		
1971	143	487	−36	0.6		
			Geometric means of the variables			
1951	0.3979	0.205	—	6.3		
1961	0.3900	0.180	—	17.0		
1971	0.5999	0.190	2.5	63.0		

[1] Gross sown area in 16 districts. [2] Figures in parentheses give the *t* values of the regression coefficients.

Source: United Nations Economic Commission for Asia and the Far East: *Population and agricultural change in India* (mimeographed, 1972).

of male workers in agriculture increased by 27 per cent between 1961 and 1971, while the rural population grew by 24 per cent during the same period.[1]

An important aspect of the new technology is that the conditions for its success are too numerous and complex to permit equitable distribution of its benefits among different regions. Thus during the period 1961-71, the rate of agricultural growth varied widely in different districts within Punjab, from 3 per cent to 12 per cent per annum. Population growth also showed significant inter-district variations, ranging from 13 per cent to 37 per cent, mainly owing to migration. The differences in the rates of increase in the male workforce in agriculture are even more striking, the range being as wide as from 9 per cent to 75 per cent.

A glance at the two accompanying diagrams, which show the relation between the growth of agricultural output on the one side and that of the population and of the number of male workers in agriculture

[1] Indian Society of Agricultural Economics: *Problems of farm mechanisation*, Seminar Series, IX (Bombay, 1972).

respectively on the other, brings out a few points of great interest. First, several districts with relatively high rates of agricultural growth also show high demographic growth, though the relationship is not uniform. Secondly, the increase in the male workforce in agriculture is generally higher than the growth of the rural population, and shows a very close association with the growth of agricultural output. Thirdly, the higher the rate of the growth of agriculture the greater is the difference between the respective rates of increase in the agricultural workforce and in the rural population. This clearly suggests that the districts with rapid agricultural development have high rates of net immigration of agricultural workers.

An attempt may be made through a multivariate regression analysis to examine the respective contributions of labour and other key variables—irrigation, fertilisers, and implements, including agricultural machinery—at different points of time before and after the introduction of new technology. The values of the parameters obtained by fitting log-linear regressions to the cross-section data from 16 districts in the Indian state of Punjab are given in the table. They measure the elasticity of output per acre with respect to the explanatory variables.

It is interesting to note that the explained variation in productivity rises from 79 per cent in 1951 to 87 per cent in 1961, and to 95 per cent in 1971. The elasticity of output per acre with respect to labour is low and statistically insignificant in 1951. Its value rises in 1961 and 1971 and becomes significant at the 5 per cent level. The mean values of labour input per acre showed a slight increase [1] between 1961 and 1971 in spite of an almost fourfold increase in the value of implements per acre. The marginal product of labour rises from Rs 181 in 1951 to Rs 282 in 1961 and Rs 487 in 1971. The fact of consequence that emerges from this analysis is that labour is not a factor of importance in explaining inter-district variations in productivity under static conditions as in 1951. However, as agriculture becomes dynamic, and particularly when the new seed-fertiliser technology is adopted, labour becomes the factor of greatest significance.

The foregoing analysis based on the aggregated data from all farms in each district obviously suffers from the aggregation bias. For the same reasons, the substantive results cannot be taken as definitive. However, in view of the well-known fact that the big farms have played a major role in agricultural development in recent years and the earlier observation that the number of workers in agriculture has grown much faster in relation to population in the rapidly developing areas, it appears that high rates of labour absorption in the Punjab are possible within

[1] Since these figures relate to gross sown area, and since cropping intensity increased from 130 to 140 between 1961 and 1971, labour input per acre would show a marked increase in relation to net sown area.

the existing agrarian framework if mechanisation is contained within the limits reached so far. The need for an analysis at the level of the individual farms to obtain more definitive conclusions can scarcely be overemphasised.

Conclusion

Developing countries are faced with a serious employment situation which takes different forms—unemployment, underemployment and full-time work with incomes below the poverty line. The situation is deteriorating even though most of the less developed countries have succeeded in attaining the target of a rise of 4 to 5 per cent in their gross national product. The main contributory factors have been the tremendous increase in the labour force and strategy directed to the development of heavy industry and the use of capital-intensive techniques. The high-yielding varieties of seed have, however, opened up new possibilities of development and labour absorption in agriculture. The immediate relevance of an optimal strategy for employment promotion in agriculture is therefore obvious. The redistribution of land and the reorganisation of agriculture into small farms are generally deemed basic to such a strategy. These measures are particularly inspired by the experience of countries like Japan. Until the reforms introduced after the Second World War, however, agriculture in Japan was a joint venture of the small farmers and the big landowners in which the latter undertook the investment and entrepreneurial functions. The success of small farming in other countries would seem to depend, therefore, on the substitution of development agencies to carry out the functions performed by the landowners in Japan. It will not be easy for agencies to carry out such functions successfully.

It may be noted that in most of the less developed countries, unlike Japan, the ownership and distribution of land by operational units is unbalanced and obviously accompanied by unequal ownership of complementary assets, some of which are indivisible and even non-transferable. Short of collectivisation, therefore, efficient resource utilisation would require variations in the size of holdings. It is true that a certain proportion of farms are too big for efficient management within the limits of economic mechanisation. There is thus an obvious case for expropriating and redistributing all land above the limits consistent with commercial farming in the sense in which the expression is used in this article. But among whom? To redistribute it among farmers with holdings below the viable limit (including the landless) meets the equity requirement but only at the cost of creating irredeemably uneconomic farms. If the landless and the marginal farmers are ignored and the redistribution is confined to the small uneconomic farms so as to raise the maximum number to viability, neither equity nor efficiency is well served. The incomes of the

small farms would be raised at the cost of hired labour, which would be replaced by family labour on small farms. By definition, also, the viable farms would leave no surplus for reinvestment. A policy of land redistribution with a view to creating as many commercial farms as possible appears, then, as a sensible option. It would secure maximum efficiency on the farms in terms of both current output and reinvestable surplus; it would provide for the maximum absorption of landless labour; and although on balance it would reduce employment in agriculture, it would simultaneously generate new job opportunities on a sizeable scale through strong backward and forward linkages. At the same time, appropriate price and fiscal policies must be adopted to mop up resources for financing development programmes. Among such programmes, those connected with the agricultural infrastructure appear promising from the point of view of short-term employment as well as of the creation of assets that will add to the employment potential in the future.

A policy of encouraging small farms has an obvious appeal in overpopulated agrarian economies. It is based on two assumptions—first that small farms absorb relatively more labour, and secondly that they make more intensive use of land. Evidence from regions of modernising agriculture presented in this article suggests the need for fresh empirical verification of the commonly noted inverse relationship between farm size and productivity which forms the basis of the second assumption. Both of the above considerations are, however, focused on short-term anti-poverty policy. It is also necessary to consider the policy as it will affect a wider area for a longer time. It is with this end in view that an attempt has been made in this article to take into simultaneous consideration such key variables as intersectoral flows of products and resources transfers as well as the linkages between agriculture and other economic activities, in addition to output and direct employment in agriculture. Empirical evidence on these variables presented in this paper supports the case for commercial farming as the basis for redistribution of limited land surpluses in overpopulated countries, though the evidence is fragmentary and not quite comprehensive enough to provide a basis for firm generalisation. In fact, the agronomic conditions, population pressure, institutional framework and levels of technological development vary so widely from one region to another that no land reform policy can be regarded as uniquely optimal: land reform has to be pragmatic and suited to particular situations. However, to provide a rational basis for choice there is a strong case for region-specific empirical research that will quantify the parametric values of the key variables in relation to farm size and land tenure, and indicate how these variables change, at what cost and with what time lag with various forms of state aid.