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## GROWTH AND INEQUALITY IN AGRICULTURE\*

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An outstanding phenomenon of Indian agriculture during the last quarter of a century is of growth; crop production during this period has increased at an average annual rate of 2.7 per cent (19, p.2).‡ This is in marked contrast with decades of near stagnation preceding the World War II(32). The phenomenon of growth during the recent period is more pervasive, production of all important crops has increased.

While it is accepted that between the 'fifties and the 'sixties the pace of growth has slowed down, the fact to be emphasized is that the growth is now a continuing phenomenon. In the initial years, though the increase in crop production was the combined result of increase in area, changing cropping pattern and increase in yield per hectare, the contribution of the first two factors was substantial. In the recent decade the contribution of increased yield is predominant (Table I). Recent analysis suggests that even after taking out the location effect, *i.e.*, the effect of increase in shares of regions

TABLE I—COMPONENTS OF GROWTH OF CROP PRODUCTION  
(1949-50—1951-52 TO 1969-70—1971-72)

Components	Compound growth rates@		
	1949-50—1951-52	1959-60—1961-62	1949-50—1951-52
	to 1959-60—1961-62	to 1969-70—1971-72	to 1969-70—1971-72
Net sown area .. .. .	1.07	0.40	0.75
Gross cropped area .. .. .	1.94	0.63	1.28
Cropping intensity .. .. .	0.43	0.25	0.34
Cropping pattern .. .. .	0.06	0.35	0.20
Productivity per hectare of net sown area ..	2.02	2.05	2.05
Yield per hectare of gross cropped area ..	1.56	1.50	1.55
Crop production .. .. .	3.54	2.52	3.01

@ Compounded annually.

The table is based on index numbers of above items published in *Agricultural Situation in India*, Vol. 30, No. 11, February, 1976, p. 793.

[Compare the results of this table with those of Dharm Narain, (17)].

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‡ Figures in brackets denote references cited at the end of the paper.

1. Professor M. L. Dantwala in his "From Stagnation to Growth" (11) clearly brings out the new element of dynamism which is a common feature of agriculture in the recent past in many developing countries and is attributable, according to him, to improvement in technology rather than to other commonly believed factors like institutional changes or incentive prices.

with higher yields, the net increase in yield is observable<sup>2</sup> (17, p.11). A sustained increase in yields of crops for more than two decades, with increasing contribution to overall crop production, reflects active operation of forces of growth in Indian agriculture during the planning period.

Sustained increase of productive assets in agriculture is yet another indicator of agriculture being on the move. Physical durable assets in agriculture (excluding land) increased by 45 per cent between 1951-1971<sup>3</sup> or at a compound rate of 1.88 per cent per year. These assets include irrigation, bullocks, implements and machinery and houses.<sup>4</sup> The increased use of purchased inputs and introduction of new technology embodied in the new high-yielding varieties (HYVs) of important cereals and cotton are equally important indicators of upward movement of Indian agriculture in the past two and a half decades (Table II).

TABLE II—CAPITAL AND INPUTS

(Base : Capital 1950-51 = 100  
Fertilizers 1960-61 = 100  
Area under HYV 1968-69 = 100)

Capital/ Inputs	1956	1961 <sup>1</sup>	1966	1971 <sup>3</sup>
Capital (including land and houses) ..	122	127 (2.42)	132	138 (1.62)
Capital (excluding land) .. ..	111	122 (2.01)	130	145 (1.88)
Capital (excluding land and houses)* ..	112	124 (2.17)	133	156 (2.25)
Fertilizer consumption (N + P <sub>2</sub> O <sub>5</sub> + K <sub>2</sub> O)	—	—	248 (20.30) <sup>2</sup>	741 (22.30) <sup>4</sup>
Area under High-Yielding Varieties (HYV)	—	—	— (9297) <sup>5</sup>	166 (15390) <sup>5</sup>

\* Includes irrigation, bullocks (not all livestock), implements and machinery.

1. Figures in brackets in the column denote compound growth rates over 1951.

2. The figure in the bracket denotes compound growth rate over 1961.

3. Figures in brackets in the column denote compound growth rates over 1951.

4. The figure in the bracket denotes compound growth rate over 1961.

5. Figures in brackets in HYV row denote area under HYV in thousand hectares for the year 1968-69 and in 1971-72 respectively.

Source : Table is constructed on the basis of data drawn from the Population Censuses, Livestock Censuses and the Agricultural Statistics of India with the help of prices taken from Tara Shukla (38).

2. According to Dharm Narain, compound growth rates of different components of productivity are as under (17, p. 11).

	1952-53 to 1960-61	1961-62 to 1972-73
<i>Cropping Pattern Effect</i>		
Pure .. ..	0.48	0.38
Interaction .. ..	-0.04	0.23
<i>Location Effect</i>		
Pure .. ..	0.10	0.08
Interaction .. ..	0.44	0.16
Pure Yield Effect .. ..	0.54	1.39
Overall Productivity of Land .. ..	1.58	2.07

3. For methodology for building up the index of physical durable capital, see Tara Shukla (38).

4. Reserve Bank of India Studies (29 and 30) show an increase in the value of assets by 37 per cent between 1961 and 1971 if current values are deflated by the general price index. The assets include land, houses, implements, machinery, all animals, liquid and semi-liquid assets but exclude irrigation. This is a definitely much higher rate of growth, but may be partly due to inadequate deflation of price rise of assets like land.

While growth is an undeniable phenomenon, a relevant question asked in the context of growth is : who gained from the growth of agriculture, its sharper version being : have the poor become poorer and the rich richer ? This vital question is examined in a particular context of a fairly widespread phenomenon of poverty and almost equally important phenomenon of open or disguised unemployment.

Much effort has been spent recently for the measurement of poverty as well as unemployment. Widespread existence of any of the two or both will be anathema to all policy-makers. And if it can be shown that the growth in agriculture is accompanied by increase in any of the two or both, the adverse effects of growth looked from development or welfare angle can be easily established. Since no unanimous view emerges regarding the changes in both the phenomena, in this paper we concentrate largely on the distribution of assets and incomes in the rural areas, its relation to growth and finally an explanation for the observed facts. A brief reference to the widespread existence of the two phenomena is made at the outset. This provides the background for implications of changes in inequality. Widening income or wealth inequality has implications of changes and has a disturbing connotation in the context of a fairly large extent of absolute level of poverty.

The paper argues that growth has been, by and large, accompanied by widening inequality observed mainly in regard to assets while inequality in the distribution of land holding has declined, still the relation between holding of land, assets and income is observed. The explanation in regard to growth of agriculture being accompanied by increased inequality of wealth, is provided in terms of production relations which determine factor shares. It is argued that mainly Indian agriculture still displays a no-change tendency, the growth is the result of a sharp increase in the production of a limited number of crops on limited area. For large part, production relations would be one of low substitution among inputs or factors of production. With the increase in labour supply, incomes, savings, investment and hence asset holdings will tend to be more unequally distributed.

## I

We are now familiar with the study of Dandekar and Rath(9). They observed that during the 'sixties the phenomenon of poverty was fairly widespread, with 31 per cent of the rural and 47 per cent of the urban population being below the poverty line (9, pp. 9 and 11). They also observed that over the period the extent of poverty did not decline in the rural areas (9, p.32). This finding is disturbing. Their study was followed by studies of other scholars. Pranab Bardhan, who examined the same problem found that in the rural areas the percentage of those below the poverty line increased between 1960-61 and 1968-69 rather sharply from 38 to 54 (4, p. 267). Minhas disputes this

finding (22, p. 257). Deepak Lal finds for a recent year 1971 a decline in poverty for five out of six States for which he could get data (13, pp. 4-47).

Uncertainty of trends in poverty arises from the quality of data. The data regarding the physical intake of food by families on the basis of which the extent of poverty is measured are available for 1961; for subsequent years similar data are not available. Inferences regarding trends in poverty for the latter years are drawn from the data regarding expenditure. Since prices of the type of commodities consumed by different income groups change over time at different rates and it is difficult to get a suitable deflator for expenditure incurred by different income groups, a common deflator is used in most cases. Hence the index number problem continues to haunt the efforts to measure the precise trend in the extent of poverty. Besides, the National Sample Survey (NSS) data on expenditure are alleged to underestimate consumption for recent period compared to other official sources (9, pp. 23-26). Adjustment for under-estimation is another source of differences in estimates of poverty at all-India level<sup>5</sup> (41, p. 240). There are more than one sources of data that may be used to draw inferences regarding poverty. But they give widely varying estimates. For instance, for Kerala while Dandekar and Rath indicate the extent of poverty to be 91 per cent in the rural areas, an alternative estimate suggests the extent of poverty in Kerala to be 48 per cent (7, Ch. IV, p. 5). The alternative estimate is worked out on the basis of food balance sheet data by the Centre for Development Studies. The Centre also undertook diet survey for 1973 for Trivandrum region according to which the extent of poverty worked out to 66 per cent (7, Ch. IV, p. 9). Yet another source of consumption data for the year 1971 for Kerala suggests the extent of poverty in the rural and urban areas together for adult males and females to be 68 and 54 per cent respectively.<sup>6</sup> This study draws data from Food Habit Survey of Protein Foods Association. A comparison of the extent of poverty in Kerala based on the data drawn from different sources indicates serious limitations of data on consumption expenditure to provide a reliable base for measuring a highly sensitive phenomenon of absolute level of poverty. Lack of agreement among scholars regarding the trend in absolute level of poverty does not mask the phenomenon of poverty being fairly widespread. Persistence of a widespread phenomenon like poverty despite growth, in itself may be regarded as a sign of ill-health of economy.

Poverty and unemployment are regarded by some<sup>u</sup> almost ~~as~~ synonymous. The measure of economic ill-health may be obtained therefore also from the situation regarding unemployment. In regard to unemployment besides

5. Vaidyanathan's results (41, p. 240) demonstrate that the trend in the extent of poverty depends also on the year and according to whether the NSS or official data are used.

6. A project 'Nutrition Gap: Its Measurement' is underway. It examines the nutritional level for individuals in the rural and urban areas according to income, sex, age and nature of activity (whether heavy, medium or light, data are drawn from Food Habit Survey by Protein Foods Association).

data, an additional difficulty is faced concerning concepts. Especially it is difficult to decide for rural areas who is in the work force. For instance, according to the latest, the 27th Round of the NSS 16.4 per cent of total females worked in the rural areas as helpers on own family farms (26, p. 11). They are by definition included in the labour force. Females in the labour force to total females constitute a little over 37 per cent. The female helpers would then constitute about 45 per cent of female workers in the rural areas. Should all these female helpers be regarded as workers? Since in the rural areas, self-employment predominates and human labour is mobilized for work according to the pace and rhythm of the agricultural activity, a good deal of substitution between domestic work and work on farm obtains. All helpers do not necessarily intend to be 'workers' as the term would be understood in the urban context and especially in the context of the organized sector. Under these circumstances, the figure relating to persons who offer themselves for work yet do not get it for the *entire* 'reference period' (which is one week) may be accepted as the least objectionable. The average number of totally unemployed persons in a week in the rural areas has remained undiminished at 7 million for nearly eleven years (1961-62 to 1973-74) though during the same period in the urban areas the number of unemployed workers increased three-fold (25, p. iii).

## II

Unequal distribution of gains of growth of agriculture can be inferred through changes in the distribution of incomes and assets. Unequal distribution of gains of growth in rural incomes in the recent past is a wider experience, many of the developing nations of Asia show this tendency. The data of income distribution among rural households at two points of time are available for five Asian countries. They include Philippines, Korea, Thailand, Sri Lanka and India. With the exception of Sri Lanka, all of them indicate an increase in income inequality. This is suggested by the increased value of the Gini coefficient, a measure commonly used for measurement of inequality (20).

Regarding India, the data are available for both income and assets distribution. The National Council of Applied Economic Research (NCAER) collected personal income data through field investigations at two points of time. The Lorenz coefficient of concentration for household income in the rural areas increased from 0.41 to 0.46 between 1962 and 1967-68. The increased concentration of incomes was accompanied by a decline in the share of the bottom 70 per cent and an increase in the share of the top 30 per cent. The share of the bottom 10 per cent declined rather sharply. Increased inequality observed in regard to income distribution is also found in regard to distribution of personal assets among rural families. In two years 1961 and 1971, the Reserve Bank of India collected data regarding personal assets, debts and investment (29 and 30). The assets for rural

households include land, cattle, implements, durable household assets and liquid assets. The Gini concentration coefficient for distribution of assets among cultivating families in the rural areas increased between 1961 and 1971 from 0.59 to 0.62, for the non-cultivating rural families it increased only marginally from 0.706 to 0.711.<sup>7</sup>

Land distribution data tell a different story. The 17th and 26th Rounds of the NSS relate to the years 1961 and 1971. For the country as a whole, the value of Gini coefficient of concentration of ownership of land (including zero holders) declined marginally from 0.72 to 0.71 during the past ten years. Earlier for the years 1953-54 (8th Round) and 1959-60 (16th Round) the value of Gini coefficient was 0.78 and 0.73 respectively. There seems to be a steady decline in the concentration of ownership of land mainly during the 'fifties. However, two facts are significant. Firstly, despite the Ceiling Laws, the concentration of ownership of land has not changed much in the recent period. Secondly, despite a marginal decline in the concentration of land ownership, the concentration of assets holding has tended to increase.

India is a vast country and an overall picture at the national level would conceal a wide variety of experiences at State or further disaggregated level. We shall have an occasion later to refer to the diversity of experiences at the State level in regard to crop production. At this stage we examine the changes in the concentration of assets holding at the State level; they display a bewildering diversity. Out of 15 States for which the data are available for 1961, comparison is possible for 14 States, since during the decade the boundaries of Assam State have been re-drawn as the new States like Nagaland, Meghalaya and Mizoram were carved out, out of the original Assam State. Out of 14 States for which comparison is made, increased concentration of assets holding is observed in four States. Punjab, where agricultural production has grown rather rapidly, is not among these four States. The States where the concentration of assets holding has increased include Gujarat, Rajasthan, Madhya Pradesh and Orissa. They represent a wide range of crop production performance (Table III). Comparing the concentration ratio of owned land holdings for 1961 and 1971 for the States, we find that it too increased in five States, Punjab, Bihar, Tamil Nadu, Uttar Pradesh and West Bengal. There is no straight comparison between the changes in the concentration of assets holding and land ownership at the State level as the former refers to cultivators while the latter includes landless population as well. Where the landless are in large proportion, with a given pattern of land distribution, the land holding concentration (with zero holders included) may be high. The State level experiences of changes in the concentration of assets holding is a combination of changes in the concentration of land holdings and of other assets. An additional

7. Cultivators and non-cultivators taken together show a small decline in the overall concentration of assets holding. This is reflected in the change in the value of the concentration ratio of the owned land holding between 1961 and 1971.



TABLE III—CHANGE IN GINI COEFFICIENTS OF CONCENTRATION OF ASSETS (FOR CULTIVATORS) AND OWNED LAND (RURAL AREAS) BETWEEN 1961 AND 1971 IN STATES

State	Assets		Owned land <sup>1</sup>	
	1961	1971	1961	1971
Andhra Pradesh .. .. .	0.648	0.609	0.764	0.732
Bihar .. .. .	0.639	0.622	0.701	0.712
Gujarat .. .. .	0.512	0.527	0.683	0.683
Kerala .. .. .	0.661	0.635	0.756	0.702
Madhya Pradesh .. .. .	0.523	0.529	0.637	0.621
Maharashtra .. .. .	0.552	0.548	0.707	0.682
Karnataka (Mysore) .. .. .	0.602	0.593	0.663	0.663
Orissa .. .. .	0.488	0.539	0.684	0.645
Punjab } .. .. .	0.497	0.482	0.749	0.776
Haryana }		0.485		0.753
Rajasthan .. .. .	0.480	0.530	0.654	0.607
Tamil Nadu .. .. .	0.625	0.558	0.749	0.751
Uttar Pradesh .. .. .	0.546	0.536	0.621	0.631
West Bengal .. .. .	0.580	0.561	0.666	0.672
All-India .. .. .	0.587	0.619	0.720	0.710

1. For working out concentration ratio the following formula has been made :

$$C. R. = \frac{\sum_{i=2}^k P_{i-1} Q_i - \sum_{i=2}^k P_i Q_{i-1}}{10,000}$$

The above one gives a lower approximation than the alternative formula in use.

Source : Assets data drawn from the Reserve Bank of India's two studies on Debt and Investment and Assets. Land ownership data are drawn from 17th and 26th Rounds of the NSS.

indication of possible widespread tendency for increased concentration of assets holding can be obtained from a comparison of the levels of incomes and consumption expenditure. The balance between the two would indicate either saving or dis-saving depending on whether income exceeds expenditure or vice versa. The NCAER study gives the data of savings and dis-savings for different levels of income for the country as a whole. Nearly 67 per cent of the rural households in the country had an excess of expenditure over income. They belonged to the income level below Rs. 2,500 per household per year in 1971 (24, p. 79). Surat is a relatively prosperous district in Gujarat. A recent study of rural households in the district deals with savings and investment behaviour (16, p. 165). Even at the level of a relatively small and homogeneous region like a district the same behaviour is observed as is observed at the national level; upto the income level of Rs. 3,200 per year, about 32 per cent of rural households showed dis-saving, their consumption expenditure exceeding their incomes. Similar studies for Kota district of Rajasthan and Purnea district of Bihar show that 50 per cent and 45 per cent of the households had excess of expenditure over

income. These are relatively prosperous districts in the respective States<sup>8</sup> (2, p. 84 and 5, p. 103).

Punjab and Haryana are two States where the Green Revolution has made strides. From a recent study relating to the year 1969-70 we find that in Haryana State as a whole, cultivators with holdings less than 5 acres had a net dis-saving, those with holdings 5 to 10 acres in size had only marginal saving of Rs. 30. In contrast, those whose holdings sizes were 20 acres or more had savings of more than Rs. 3,900. It is interesting to note that if Haryana is divided into three zones, North, Central and South, cultivators with holdings of 5 acres or less had net dis-saving in all the three regions. In the North region holdings above 5 acres had net saving. In this region the percentage of area irrigated was 67. In the Central region where irrigation accounted for 21 per cent, holdings upto 30 acres had net dis-saving and the South zone where irrigation accounted for 55 per cent, holdings upto 20 acres had net dis-saving. While on an average in the North zone the cultivator had net saving, in the other two regions there was net dis-saving (3, pp. 19, 30-31).

Changes in the concentration of assets holding would be closely related to the savings behaviour of the families; those with high levels of incomes would have savings, which they would invest in either productive or durable consumer goods. Hence their holding of assets is likely to increase at a faster rate while others who dis-save suffer depletion of their assets. This point is brought out more forcefully by the fact that the marginal propensity to save ranges from 35 to 40 per cent of incomes in these three districts. Increases in income from low levels not only result in transition from deficit to surplus but also into large and increasing savings in the upper income brackets, leading inevitably to the strengthening of forces of increased inequality of income and wealth distribution. The Surat study reveals further that the marginal propensity to save was higher for the upper asset group than that for the lower or middle asset group, the transition from deficit to surplus income is slower than the expansion of surplus among the relatively rich (16, p. 175).

We get an insight into the process of investment at various levels from the Surat and the Punjab studies: the two experiences differed. In the relatively prosperous district of Surat we find an observation by M. B. Desai to the effect that the big holders preferred to unload their assets in the form of

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8. The proportion of households with dis-saving is calculated by taking the proportion of households in the land holding size classes, or income classes that have excess of expenditure over income. All households in these size classes are not deficit families. Purnea report gives for each size class the number of households that have income deficits. They belong to all income groups though their proportion to the total families in the lower income groups is higher. The proportion of all deficit households is 28 per cent, those in deficit income earners group will be less. However the general point that savings of upper income group will be larger is valid.

land while at the same time they rapidly added assets in the form of tractors, electric motors, pumps, houses, sprayers, etc. (15). In the author's own words the experience is described as under :

“Most of the transactions are among the higher tiers of farmers.” . . . “What is, however, inexplicable is the increasing sale of land by big farmers. Thus the extent of land shedding by bigger farmers has been larger . . .” (15, Vol. 1, p. 194). Further, “The changes in the inventory of traditional implements by farmers show replacements and renewals at all levels.” . . . “The inventories of improved implements would fall in a different category (and) the substantial among the cultivators acquire improved implements” (p. 227). “The statistics relating to the value of implements at two points of time show that except for the small farmers, there had been general improvement on the score” (p. 243). “There appears to be net addition to machinery and equipment” (p. 243). “The investments have a spread over all farms. The spread, however, would appear as unequal as between small and big farms” (p. 253). Regarding draught cattle, he observes : “The number of owned draught cattle did not significantly increase in the case of small cultivators . . . The cultivators in the upper deciles improved their position. In regard to dairy animals also the improvement has been with reference to bigger farmers. Small farmer more or less retained his position” (p. 287).

The Punjab experience regarding land sale and purchase and accumulation of assets differs in this regard. There are two studies, one for land sales and purchases by A. S. Kahlon and his colleagues (21, p. 53) and the other for tractors and tubewells by Kusum Chopra (8). Read together, they suggest that farmers in the middle range of size of land holding have expanded their holdings and added rapidly to assets like tractors and tubewells. The middle size holdings range upto 15 to 30 acres in Kahlon's study (21, p. 53) and upto 60 acres in Kusum Chopra's study (8, p. 118). In a rapidly expanding economy very big holdings readjust downward perhaps under extreme policy pressure from the State.

It may be argued that the distribution of land ownership influences the distribution of income and other assets. Production and hence income and savings may be directly related to the size of land holding. For building up assets, besides savings, borrowings are important. Sufficient empirical evidence is available to suggest that borrowings from co-operatives, a major institutional agency in the rural areas, are closely related to land holdings, bigger farmers are able to borrow more than proportionately from co-operatives<sup>9</sup> (19, pp. 139-140). One has to make bold assumptions to perceive the

9. Hanumantha Rao (19) has reproduced a table prepared by the All-India Rural Credit Review Committee which shows that co-operative loans per acre are higher for higher asset value groups. Inter-State comparison shows high correlation between concentration of assets and co-operative credit. The recent position is however different. The small farmers seem to have improved their share. For details see M. L. Dantwala (10), this issue of the *Journal*, pp. 48-49.

underlying inter-relations in the moving picture of wealth and income distribution over time. However, an inter-State comparison suggests positive association between concentration of assets distribution and land distribution. Over time—1961 to 1971—this relationship has weakened (rank correlation declining from 0.54 to 0.44). Nevertheless, it is important to note that the relative positions of States regarding both land and assets concentration has not changed (rank correlations between 1961 and 1971 positions for them being 0.989 and 0.999 respectively). Vaidyanathan who studied the distribution of consumption found it to be closely related to distribution of land holding (41, p. 553). The Centre for Development Studies too found a similar relationship between the two (7, Ch. II, p. 16). A cross-section of villagers surveyed by the Agro-Economic Research Centres in western India suggests a close correlation among income, assets and land distribution.<sup>10</sup>

Since inequality in the distribution of land is expected to be related to the inequalities of wealth and income distribution if we examine the factors associated with concentration of land holdings we can also infer about their influence on income and assets distribution. We undertook such an exercise at different levels. With 1961 data drawn from the NSS Report of 17th Round, we examined from the cross-section of States the relation of concentration of owned land holdings with relevant important economic variables. The one that proved to have dominant influence on concentration of owned land holdings (in a regression of the latter on the former along with other variables) was the average value of land per acre. In other words, where land was more valuable there was a tendency for land to be concentrated among the relatively substantial farmers. We then extended the exercise and examined the relation between the concentration of land holdings and a few relevant variables from the cross-section of districts of Gujarat. The data for land holdings were drawn from the Agricultural Census, 1971, they relate to operational holdings as reported in village records (Table IV). The district level analysis indicates an inverse relation between concentration of operational holdings and the average size of holding. The inverse relationship of average size of holding with the concentration of land holdings observed at the district level would imply a positive relation between the value per hectare and concentration of land ownership. It is found that in most instances where land is on the whole more fertile and hence the average value of land per acre is higher, the average size of holding is smaller. These areas also happen to be more densely populated. Further in the study relating to the cross-section of States mentioned above, the value of land per hectare and the value of crop production per hectare were positively correlated and the size of holding and production per hectare are known to be inversely related both cross-sectionally among farmers, and inter-regionally among States. What

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10. Swarnalatha Vepa who works on 'Rural Income Distribution' for her Ph.D. study kindly worked out these results, specially for me. I owe her my gratitude. Similarly, the Bureau of Economics and Statistics, Gujarat, gratefully worked out the concentration ratios for Gujarat districts. S. D. Sawant quickly cranked out regression results. I owe them all personal gratitude.

TABLE IV.—ZERO-ORDER CORRELATION COEFFICIENTS (r) BETWEEN CONCENTRATION OF OWNED LAND HOLDINGS AND OTHER IMPORTANT VARIABLES

Variables	Value of r	Variables	Value of r
Inter-State (India)			
Average value of yield per acre	.. .. .	Coefficient of variation for household ownership holdings	0.715***
Average value of land per acre	.. .. .	Coefficient of skewness for household ownership holdings	.. 0.469
Crop production per 100 Rs. worth of land 1960-61	.. .. .	Kurtosis for household ownership holdings	.. .. 0.420
Production per rural worker	.. .. .	Per cent of households owning lower 10 % of the area	.. 0.828***
Compound growth rate of crop production (1952-53—1964-65)	0.522*	Per cent of area owned by upper 10% of the households	.. 0.849***
Extent of irrigation, 1960-61	.. .. .	Concentration ratio for operational holdings	.. .. 0.570*
Extent of area under HYV (1969-70)	.. .. .	Coefficient of variation for operational holdings	.. .. 0.558*
Consumption of nitrogen (N) fertilizer per hectare, 1961-62	0.766***	Percentage of holdings operated lower 10% of the area	.. 0.568*
Consumption of combined fertilizers per hectare, 1970-71	0.688***	Percentage of area operated by upper 10% of the operational holdings	.. .. 0.534*
Extent of cash crops, 1960-61	.. .. .	Percentage of leased-in land to operational land	.. .. 0.379
Population density per sq. mile, 1961	.. .. .	Percentage of households owning no land to total number of households	.. .. 0.218
Percentage of rural population, 1961	.. .. .	Extent of urban ownership (NSS Report relating to 17th Round)	.. .. 0.281
Average size of household ownership holdings (excluding zero holders)	.. .. .	Intermediary tenure	.. .. -0.526*
Concentration ratio for household ownership holdings	.. .. .	Concentration ratio of value of owned land	.. .. 0.620**
Standard deviation for household ownership holdings	.. .. .		
Inter-Districts (Gujarat)			
Value of crop production, 1971 (Rs. per hectare)	.. .. .	Population density per sq. kilometres, 1971 (No.)	.. .. 0.651***
Percentage of literate population, 1971	.. .. .	Percentage of tribal population, 1971	.. .. 0.314
Percentage of rural population, 1971	.. .. .	Percentage of irrigated area to cropped area, 1971	.. .. 0.052
Average size of operational holdings, 1971	.. .. .		

\* Significant at 10 per cent level.

\*\* Significant at 5 per cent level.

\*\*\* Significant at 1 per cent level.

emerges from these exercises points clearly to the tendency for concentration in land ownership to increase with a rise in the value of land or its proxy like land productivity. The market forces encourage this tendency, if they are allowed to operate unhindered.

The conclusion reached by an earlier study (not published) on the subject may be reproduced here with benefit. It refers to the net effect of land reforms and other forces. "Sweeping land reforms had welcome effect on the structure of ownership holdings of land, especially more farmers came to own land. This was mainly a qualitative difference (tenants becoming owners in some States). The rising pressure of population had the positive effect. But the latter was submerged by the former." It explains that by intervention in the market, undesirable trend can be halted or reversed. But it is also important to note, as is observed earlier, while the concentration in the land holdings declined that in assets (including land) seems to have increased between 1961 and 1971.

### III\*

#### *Pace and Pattern of Growth*

The phenomenon of growth accompanied by widening inequalities of incomes and assets and also the relation of inequality of land holding to land value can be explained in terms of the nature of agricultural growth. It can be shown that while growth occurred the cropping pattern remained almost unchanged; so also the rapid increase in yields had a limited coverage both in terms of crops and regions. The past trends in production have been examined in connection with an exercise undertaken to project the level of crop production for the year 2000 A. D. (35). In this connection, the past trends in the cropping pattern and yield per acre between 1954-55 and 1971-72 were studied at the States' level. Regressions were run based on single equations for which various forms were employed. The exercise involved running about 361 regressions for cropping pattern on irrigated and unirrigated area and about 208 regressions for examining the trends in crop yields. Out of 230 regressions run for shares of crops on unirrigated area, for 97 no trend was observed. On irrigated land too out of 131 regressions, for 60 no trend was observed. 15 regressions were run for the proportion of paddy area to the total irrigated area. They showed that as many States had unchanged as those experiencing either upward or downward trend. Green Revolution is identified as wheat revolution. Its share tended to increase mainly on irrigated area, on unirrigated land the share of wheat was either unchanged or declined in ten out of 14 States and improved in four States. The conclusion reached was as under : . . . "in so far as alloca-

\* The approach developed in this section is based on an earlier work by the author on "Poverty within Agriculture," a series of three lectures delivered at the Karnataka University, Dharwar in March, 1975.

tion of area to alternative crops is concerned, it has shown a tendency of no or low or limited change or predominance of an element of stickiness or constancy in cropping pattern" (32).

A similar picture obtains regarding the trends in crop yields. Out of 208 regressions, in 109 cases no trend was observed, only in 94 cases the trend was significant and positive. What is more important is that "lack of vigorous dynamism is suggested by the fact that important crops fail to show upward trends in States where they occupy large areas." Wheat showed positive trends in a maximum number of States, ten out of 12 States for which regressions were run. There was no crop which showed significant upward trend in all States and there was no State, not even Punjab in which all crops showed positive trend. It is also true that there was no crop, yields of which displayed sluggishness in all States. Taking an overall view of the States, the following observation would emerge. Punjab demonstrated the most favourable situation where with the exception of one (*viz.*, gram) all other crops indicated positive trends in yields. At the other end, Rajasthan and Maharashtra had no positive trends but for one or two crops and these crops were less important in terms of area they occupied in these States. Orissa showed positive trend in only one crop, *viz.*, rice which happens to be the major crop in the State. In between, Gujarat, Andhra Pradesh, Uttar Pradesh, Tamil Nadu and West Bengal showed positive trends for crops some of which were important and some were unimportant.

### *Production Relations*

The nature of growth is better understood by the production relations. We contend that during the post-war period factor proportions have not changed in a marked way, apart from a few minor exceptions. This is only to be expected from the fact that the growth of crop production had limited coverage. Limited changes in factor proportions <sup>are</sup> an important result, we therefore comment on ~~it~~ <sup>them</sup> in detail.

Let us define our terms first. We define capital in this context to include only productive items such as irrigation from all sources, bullocks and implements and machinery. Since houses are on the border line, they are included in one version and excluded from the other. The data regarding bullocks and implements and machinery are drawn from the quinquennial censuses of livestock. The data regarding irrigation are drawn from the Agricultural Statistics in India from which the data regarding land are also drawn. Land relates to cultivated area which includes net sown areas plus fallows. The problem regarding measurement of agricultural labour is intractable owing to changes in the definition of workers from Census to Census. We, therefore, employ two alternative measures, *viz.*, rural population and male workers employed in agriculture.

We have expressed our factors of production in terms of index numbers with base 1951=100 for India as a whole and 1961=100 for different States. For the States the changes are observed for ten years, 1961-1971 (Tables V to VIII). Aggregation of different forms of capital has been arrived at by using prices borrowed from the earlier study of Tara Shukla.

TABLE V—LAND, LABOUR, CAPITAL AND CROP PRODUCTION, ALL-INDIA : 1951—1971

*(Index Numbers with Base : 1951 = 100)*

Factors/ Output	1956	1961	1966	1971
Land (cultivated area) .. .. .	129	130	134	135
Capital				
Excluding land .. .. .	111	122	130	145
Excluding land and houses .. .. .	112	124	133	156
Labour				
Rural population	110	122	135	149
Male workers .. .. .	110	121	134	146
Crop production .. .. .	122	142	145	170

TABLE VI—FACTOR PROPORTIONS, ALL-INDIA : 1951—1971

Factor	1956	1961	1966	1971
Capital (excluding land) to Rural population .. .. .	1.01	1.00	0.96	0.97
Male workers .. .. .	1.01	1.00	0.97	0.99
Capital (excluding land and houses) to Rural population .. .. .	1.01	1.01	0.98	1.05
Male workers .. .. .	1.01	1.02	0.99	1.06
Land (cultivated area) to Rural population .. .. .	1.16	1.07	0.99	0.91
Male workers .. .. .	1.16	1.07	0.99	0.93
Capital (including land) to Crop production .. .. .	1.00	0.90	0.91	0.81
Capital (excluding land) to Crop production .. .. .	0.91	0.86	0.89	0.85
Capital (excluding land and houses) to Crop production .. .. .	0.91	0.87	0.91	0.91



TABLE VII—LAND, LABOUR AND CAPITAL, STATES: 1961—1971

(Index Numbers 1961 = 100)

State	1971		
	Land (cultivated area)	Agricultural workers	Capital (excluding land)
Andhra Pradesh .. .. .	100	117	115
Assam .. .. .	103	123	104
Bihar .. .. .	106	128	115
Gujarat .. .. .	103	126	144
Jammu & Kashmir .. .. .	104	107	117
Kerala .. .. .	108	157	119
Madhya Pradesh .. .. .	109	120	115
Maharashtra .. .. .	101	114	118
Karnataka (Mysore) .. .. .	100	115	119
Orissa .. .. .	100	119	111
Punjab* .. .. .	99	136	137
Rajasthan .. .. .	102	147	124
Tamil Nadu .. .. .	100	121	121
Uttar Pradesh .. .. .	101	115	120
West Bengal .. .. .	101	124	88

\* Includes Haryana.

TABLE VIII—FACTOR PROPORTIONS, STATES: 1971

States	Land/labour	Ratio of capital (excluding land) to	
		Labour	Land
Andhra Pradesh .. .. .	0.83	0.98	1.15
Assam .. .. .	0.84	0.84	1.00
Bihar .. .. .	0.83	0.90	1.09
Gujarat .. .. .	0.82	1.14	1.39
Jammu & Kashmir .. .. .	0.97	1.10	1.13
Kerala .. .. .	0.68	0.76	1.11
Madhya Pradesh .. .. .	0.91	0.96	1.06
Maharashtra .. .. .	0.89	1.03	1.16
Karnataka (Mysore) .. .. .	0.38	1.04	1.17
Orissa .. .. .	0.84	0.93	1.11
Punjab* .. .. .	0.73	1.00	1.38
Rajasthan .. .. .	0.70	0.84	1.21
Tamil Nadu .. .. .	0.83	1.01	1.21
Uttar Pradesh .. .. .	0.88	1.05	1.19
West Bengal .. .. .	0.81	0.71	0.88

\* Includes Haryana.

With these observations we turn to the results. We examine the results first at the all-India level. Whichever way we measure capital and labour, the ratio between the two seemed to move for four quinquennia, 1956, 1961, 1966 and 1971 in a narrow range between 0.96 and 1.06. If we consider a ratio of incremental capital to addition to labour, a little wider range is observed from 0.85 to 1.04. But if we exclude one observation, the range for changes in the index of the incremental ratio also narrows down to 0.95 to 1.04. This

is indeed a small range considering alternative definitions, index number problem involved and the period of four quinquennia for which the results are obtained. If we exclude houses from capital and confine our observations to 1951-66 period, the capital/labour ratio seems to have varied between 0.99 and 1.02. In other words, if we exclude houses, a border line case but include irrigation, a powerful land substitute (but not fertilizers), the capital/labour ratio seems to have remained more or less unchanged. As may be expected, the ratio of land to agricultural workers shows a declining trend, the decline obtaining only in the 'sixties and sharp after 1966. It may be relevant to observe that the use of fertilizers, a major land substitute, increased sharply also after 1960 and largely after 1966.

We do not want to underrate the recent progress in agricultural production through technological breakthrough. If we restrict for convenience the inputs to three factors, namely, cultivated land, male workers and capital (excluding land) and employ the weights observed in some of the farm management studies (adopted by Tara Shukla), we find that the ratio of output to inputs tends to increase. But this ratio fluctuates quite a bit for four quinquennia. If we compare 1961 with 1971, the ratio would seem to be moving only marginally upward. The output data are for three years, averaged around the quinquennia termini. Perhaps the increase in the ratio of gross output to input which includes only durable capital may be accounted for, if not wholly, largely, by the increased use of the important current inputs like fertilizers. Between 1961 and 1971 the use of fertilizers increased almost seven-fold and between 1966 and 1971 it increased nearly three times. We should note that between 1951 and 1971, capital measured in terms of irrigation, implements and machinery showed an increase of about 56 per cent out of which an increase of 24 percentage points was during the first decade. Though the absolute increase in the durable capital used for production is more during the second decade, the rate of increase is nearly the same as that observed during the first period. The annual compound rate of growth amounted to 2.17 during 1951-61 and 2.34 during 1961-71. During the same two decades male workers increased by about 46 per cent, out of which 21 percentage points increase was observed during the first decade. Even in regard to the male workers, the decennial rate of growth did not vary by a significant margin between the two decades. During both the decades 1951-61 and 1961-71 the compound rate of increase in male workers was 1.92 per cent per annum. The cultivated land during the two decades increased relatively less, by 35 per cent but the shortfall does not seem to be frightening, however the bulk of the increase in the cultivated land, namely, 30 percentage points out of 35, was during the first decade.

At the States' level, we restrict our exercise to capital (which includes houses) and labour as represented by male workers. At the States' level the capital/labour ratio does not show the stickiness to the same degree as observed at the all-India level. However, between 1961 and 1971 out of 15 States,

for as many as eight the ratio was around unity if we permit deviation within the range of plus or minus 3 or 4 percentage points. These eight States represent a wide spectrum in terms of growth experience. We have, for instance, among these States Punjab, Andhra Pradesh and Tamil Nadu as well as Maharashtra, Madhya Pradesh and Uttar Pradesh. The experience of Gujarat differed from that of the rest; in Gujarat the capital/labour ratio showed an increase by a substantial margin, 14 percentage points. In the remaining seven States capital lagged behind the rising labour supply but barring two extreme cases of Kerala and West Bengal where the capital/labour ratio showed a sharp decline ranging from 25 to 30 percentage points, in the remaining four States the decline was between 7 and 16 percentage points. In these States fertilizer consumption has increased which would to some extent fill up the shortfall in the capital/labour ratio. But Kerala and West Bengal will still be at the bottom (19, p. 98).

Movement of capital and labour in unison over time may not provide sufficient evidence of close complementarity or low substitution among factors. The same observation may emerge even with production relations with greater factor substitution if the economy is moving along the optimum path and if relative prices do not change. The farm management studies that give data regarding the actual use of factors of production at the farm level provide some evidence regarding production function and factor relations. High correlation among factors of production in use has been observed by many scholars, G. R. Saini's study (31) is perhaps the latest. He has observed for different crops, high correlation between bullocks and labour for 1955 to 1957 in Uttar Pradesh and Punjab. Crops considered by him included irrigated and unirrigated wheat, irrigated and unirrigated cotton, gram, paddy and sugarcane. Barring sugarcane, the values of coefficient of correlation ranged from 0.74 (gram 1955-56) to 0.97 (wheat unirrigated) in Uttar Pradesh and from 0.81 (*desi* cotton) to 0.97 (wheat irrigated and unirrigated) in Punjab (31, p. 178). Similar high correlations were observed between labour and land but not between labour and land substitutes such as fertilizers and irrigation. The author did not carry out the exercise to test how many of the values of coefficients of correlation were significantly not different from unity. Close complementarity of factors of inputs for individual crops again may be considered an insufficient evidence as it would permit substitution of factors of production via product substitution. Besides, Saini's results relate to a period nearly two decades ago. A recent study for 1972, of seven villages of West Godavari district, a district claiming to have the highest number of tractors in the State, gives us measurements of substitution elasticities among four factors considered in six pairs (1). The author has combined land, implements and fertilizers into one factor. We shall call it non-energy input and for brevity refer to it as land and allied inputs. The other factors considered are bullocks, tractors and human labour. Two different regressions were run by him, the difference being that in the second regression he introduced a dummy for paddy zone. To measure elasticities of sub-

stitution by allowing them to float freely between any two factors considered in a pair, he adopted a translog function.<sup>11</sup> In regression one, measures of substitution elasticity between bullocks and land (and allied inputs) and labour and land (and allied inputs) were very much below unity, the highest being that between labour and land (and allied inputs) (0.08), other two were almost close to zero. In the regression where dummy was introduced for paddy zone the coefficient for dummy was found to be significant. In this regression too the values of the elasticity of substitution between labour and bullocks and between bullocks and land (and allied inputs) were found to be low. But between labour and land, however, substitution elasticity was observed to be above one (1.58) (1) (see Table IX). In both the regressions the elasticity of substitution of tractors with land and with labour was very high.

TABLE IX—CORRELATION

Other inputs	Correlation with labour with other inputs				
	Highest value		Lowest value		
	Crop	Correlation	Crop	Correlation	
Uttar Pradesh					
Land	.. ..	Wheat unirrigated (1955-56)	0.923	Sugarcane (Ratoon) (1955-56)	0.613
Bullock	.. ..	Wheat unirrigated (1955-56)	0.974	Sugarcane (Ratoon) (1956-57)	0.705
Fertilizer	.. ..	Sugarcane (1956-57)	0.516	Wheat irrigated (1956-57)	0.109
Irrigation	.. ..	Paddy (1955-56)	0.745	Wheat unirrigated (1955-56)	0.183
Punjab					
Land	.. ..	American cotton (1955-56)	0.928	Wheat unirrigated (1956-57)	0.723
Bullock	.. ..	Wheat irrigated (1956-57)	0.965	Local cotton (1956-57)	0.808
Fertilizer	.. ..	American cotton (1956-57)	0.652	Local cotton (1956-57)	0.030
Irrigation	.. ..	American cotton (1955-56)	0.769	Local cotton (1955-56)	0.509

Source: G. R. Saini (31), pp. 171-174.

11. Translog production function

$$\log Y = A + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + C_1 \log X_1 X_2 + C_2 \log X_2 X_3 + C_3 \log X_1 X_3.$$

This study, the latest in the string of studies, examining this intriguing problem of factor substitution, provides valuable evidence that shows substitution between labour and other factors, barring tractors, to be low. In other words, labour continues to be complementary to other factors taken together or singly. It is important to note that even when fertilizers and implements are included along with land, the elasticity of substitution between labour and the combined non-energy factor shows up to be fairly low. In an interesting exercise by Uma K. Srivastava jointly with Earl O. Heady, the two authors consider the two factors, labour on the one hand and capital and land together on the other, and they find the elasticity of substitution of labour with other factors combined together to be below one (to be exact 0.6) (39). The authors do observe that the value of substitution elasticity has increased in the recent period compared to the pre-Green Revolution period. Their results refer to the farm management data for Punjab and Uttar Pradesh. Low substitutability between labour and other factors taken together (and after Green Revolution they include high dose of fertilizers and in Punjab even the use of tractors) provides a strong evidence regarding continued complementarity among factors of production.

#### IV

##### *Explanation : Theory*

At this stage we obtain guidance from the theory. The theory we refer to is static in character. We can apply it in a dynamic setting only in a comparative static sense. We refer to Hicksian Law of factor shares. Central to this law is the elasticity of factor substitution. According to the theory, with low substitution elasticity, if supply of labour increases exogenously, as it has done in the past two decades, its relative as well as absolute share in the (real) product may tend to decline. This theoretical proposition pertains primarily to factor shares. It can be extended to draw inference regarding broad trends in personal income distribution. As wages and wage income decline, those who derive income largely from labour may experience a decline in their personal incomes. That this process is less likely to continue unhindered is illustrated by Tara Shukla in her now widely known study 'Capital Formation in Indian Agriculture.' To follow her argument, the lowering of wages may make investment more attractive, other things remaining the same, and if incomes of those who own or use non-human factors—land, irrigation and other capital—go up, the investment capacity of owners or users of these productive assets will also go up. It would then follow that the investment in physical capital may spurt up following an increase in the labour supply. The incentive to invest would weaken as soon as the capital catches up with the increased supply of labour. If nothing happens in the meanwhile the process will soon come to an end. Fresh increase in the supply of labour will start the process again. We can visualise the process to be continuous if labour supply continuously increases,

It is not suggested that the process is automatic, far from it. In agriculture where we have considered three factors, land, labour and capital and since expansion of supply of land becomes increasingly difficult, substitution between labour and combination of land and physical capital has to keep pace with rising supply of labour. Gradually the nature and the form of land substituting (or land augmenting) capital may have to change to facilitate continuance of land substitution by capital. To the known form of irrigation, fertilizers are added. For accelerating the process of land substitution fertilizers had to come in, in a big way. This was helped by ushering in of the Green Revolution which is also alternatively known as seed-fertilizer revolution. The revolution was not planned. But what happened fortuitously proved beneficial to the economy.

With the introduction of a technological change, however, the theory loses its neatness. The gains of technological change will be shared by different factors on the basis of their relative bargaining strength. Labour, the supply of which increases exogenously will be in a relatively weak bargaining position. This will apply *a fortiori* if new technology is embodied in non-labour inputs like seed and fertilizer; those who have an access to these resources and irrigation that facilitates the application of new technology, will be in a commanding position. Empirically, Hanumantha Rao has shown that the relative share of labour has tended to decline in Ferozepur district of Punjab where Green Revolution made a headway much ahead of other States (19, p. 128-129).

A brief reference to the economic theory provides an explanation for widening inequality of incomes and assets which we observed earlier. The explanation lies in low elasticity of substitution between labour on the one hand and capital and land together with modern inputs on the other. The theory also provides explanation for the possible decline in the inequality of owned holdings. We do not have exact measure of substitution elasticity between land and land augmenting capital like irrigation and fertilizers. It can be presumed to be high, above unity. If it is above unity, the absolute share of land in the product will tend to decline when the use of land augmenting capital increases. Land then becomes less attractive vis-a-vis land augmenting capital. Hence the behaviour of relatively large landowners, that they shed part of their land holding as is observed earlier (illustrated by M. B. Desai for Surat and by A. S. Kahlon and his colleagues for Punjab) can be explained with the help of economic theory. The State policy regarding ceiling and tenancy laws provides an additional force working in the same direction. However, the importance of land for obtaining credit will work in the opposite direction. Distribution of land holdings in any one year will be the combined result of these forces, land substitution, credit link and State policy. It is important to recall in this connection our earlier observation that inter-State variations regarding land ownership in 1961 were correlated to those in per hectare land value and not to productivity of land in

a regression exercise. It will find support from the theory. The other part of the observed behaviour of middle size farmers and large farmers regarding investment in tubewells and tractors is also now understandable, to them tractors are land substitutes to the extent they permit expansion of area under crops by expanding double cropping. The theory thus provides an explanation and tells us that increased inequality in income and wealth distribution is to be expected. This need not be accepted as inevitable. Just as the theory provides an explanation for the observed behaviour it also provides a policy clue.

## V

### *Strategy for Improved Income Distribution*

The role of land substituting capital is crucial when labour supply increase persists. Hence irrigation will be in great demand even in areas with moderate to heavy rains where trans-evaporation speeds up outside monsoon months. To take a second crop, a third crop or a long duration crop even light irrigation is necessary. Investment in irrigation has to be speeded up not only to catch up with but also to surpass the increase in labour supply, so that the balance of gains from growth may tilt in favour of labour.<sup>12</sup> Labour may experience a situation of excess demand leading to rise in wages and with technological change wage rise may be more than matched by a rise in productivity.

An accent on irrigation may have two consequences. An unrestricted expansion of wells will impinge on the limited supply of underground water, and the water level may recede which may lead to drying up of shallow wells or may render the working of pumps uneconomical. A plea is, therefore, made for social control of underground water. A plea for planning and social control of surface and subterranean water can be made on an additional ground. As an access to irrigation water influences personal income distribution via reallocation of factor shares, an access to irrigation made available with priority to small farmers may halt or even reverse the trend now observed regarding accentuation of income and assets inequality.

Another problem that is expected to arise as a sequel to an accent on irrigation is regarding regional dispersal of gains of growth. Only half of the irrigation potential of the country has been tapped so far. There is a long way to go. However, the irrigation potential of States varies widely. The States in western India have a low potential. Hence, when full potential of irrigation is realised the disparity of growth potential of different

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12. This may happen if irrigation has land augmenting effect and land and labour are complementary and the increase in the supply of labour is less than that of land and irrigation taken together.

States will be accentuated. An advancement in the technique of dry land farming may provide only a partial corrective.

Uneven regional potentialities of growth of agriculture in the rural area are to be combated partly on a research plane, and partly by encouraging migration of labour. Migration may be vertical, *i.e.*, out of agriculture into other sectors or horizontal, *i.e.*, over space. Rural-rural migration is a phenomenon about which very little is known. Within Gujarat for instance, we have a small taluka of Matar in Kaira district where over three-fourth of the cropped area was under irrigation in 1975. This taluka attracts labour of Bhils on large-scale from the Panch Mahals district. The seasonal migration of Bhils spreads over areas from North Gujarat to Narmada and even beyond. Much less is known about the potentialities of rural migration among States. Rural-rural migration provides an interesting and a challenging area for research. Labour migration may help blunt the edge of the problem of income inequalities, to the extent that regional variations in returns to labour are narrowed. But the significant part of the task will still remain.

Balancing a complex process of growth with equity requires a much bigger effort, it requires a total strategy. Such a strategy may consist of core actions and remedial measures. Providing employment to unemployed persons, security of tenure on leased land, or ownership of leased land to tenants, or imposing a ceiling on size of holding are important remedial measures.

The core should combine growth promoting character with plasticity to permit directing of gains of growth in desired direction. Irrigation is such a measure and hence the accent on it. A few more may be conceived and among them that can be readily named is education or creation of skill so that labour combines in itself an embodied capital and capacity to absorb new technologies. But it is realised that only a few measures of the type can be conceived. The strategy will have to be therefore multi-modal consisting of both core and as many remedial measures that are demanded by the situation.

Our analysis has shown broadly the nature of the problem of growth accompanied by inequality and provided an explanation as well as the general content of the policy to redirect the process to the desired goal of growth with equity.

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