GROWTH IN AGRICULTURAL OUTPUT, PRODUCTIVITY LEVEL AND ASSET INEQUALITIES-A Regional Analysis

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Preface

The study on 'Growth in Agricultural Output, Productivity Level and Inequality in Assets' suffers from several shortcomings. In the first place, in view of the time constraint, not a very extensive survey of the existing literature was possible. Regions, as identified by NSS (26th round) and All-India Debt and Investment Survey (RBI), have been taken into account. But Gujarat and J & K have been treated as two homogeneous regions and their sub-regions (because of tehsils) have been ignored; and few other regions of union territories etc. have also been left out. So, in all, only 51 regions have been analysed. Growth rates are mere indices of agricultural production with base year prices as weights. Then, for inequality also, Gini coefficient has been used. To what extent it is an appropriate measure, it is questionable. There is also an element of approximation here because the Lorenz curves were

graphed and no precise mathematical formula was used. Growth and productivity respectively are made a function of inequality in productive assets, in total assets and in operated land and a correlation matrix is constructed. Also, cause and effect relations are identified. So, time series growth has been correlated with cross-sectional inequality. A second exercise is in terms of cross-sectional comparison between productivity and inequality. And thirdly, growth and productivity respectively are correlated with percentage of operated land less than 5 acres. The choice of 5 acres is also fairly arbitrary. The hypothesis that is being tested is in terms of inequality in assets and not the standard income disparities.

CHAPTER I

GROWTH RATE IN 51 AGRICULTURAL REGIONS

The 'green revolution' is said to herald the transformation of Indian agriculture from a 'traditional' to a 'modern' state. During this transformation, certain strategies for growth[1] can be identified; for instance the identification of strategic variables (technology and institutions) and supportive variables (policy-packages and organisational structures) in the process of growth. The other approach is to identify various sources of growth

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1. V.S. Vyas, (Indian Society of Agricultural Economics, Bombay,) January-March, 1975. - IJAE.

without categorising them as basic or supportive. Alternatively, the process of agricultural development during last 2-3 decades can be assessed and from it the factors which are relevant for growth can be inferred. To start with, it is the last approach which is being used.

Adequacy of a rate of growth of agricultural output is a relative matter, related to the income-employment goals we set ourselves to achieve. Ignoring this, some believe that the new agricultural technology constitutes a 'cornucopia'[2] for the developing world, and that victory is in sight in the 'war on hunger'.

Even if not a cornucopia, the following hypothesis at least gets disproved. For decades, using cultural variables[3] to disguise their ideologies, apologists for imperialism have been describing the Indian peasantry by reference to such characteristics as inaptitude, passivity, lethargy, religiosity, traditionalism, lack of protestant ethic etc. In a few short years, however, the peasants of India have transcended their 'cultural milieu' to make a major breakthrough in productivity.

To analyse the growth in agricultural production, 51 agricultural regions have been considered. These corres-

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2. Wharton, Foreign Affairs, April 1969.

3. Imperialism & Revolution in South Asia, edited by Katheleen Gough & Hari P. Sharma, (Monthly Review Press, New York & London).

pond to the regions of the NSS (26th round) and of the 'All India Debt and Investment Survey' (RBI). The rural area of the country was divided into 66 agricultural regions (in this study, only 51 considered because in Gujarat and J & K, the sub-regions were excluded and so were the regions of the union territories and some of the north-eastern zones) by grouping within each State districts/tehsils having similar crop pattern and population density.

Regional analysis was undertaken because regions, though a neglected dimension,[4] are yet a necessary one of the theory and practice of economic development. Instead, Statewise study was not conducted, because the initial step under regional planning is the delimitation of areas which may be considered by reason of the nature of their resources to be economic units, irrespective of whether they are subject to one or more political authorities. Besides, the states constitute highly heterogeneous economic regions.

Next, it is the output which is being compared. Here it should be pointed out that output and incomes in the agricultural sector need not of course always rise together since the effect of sharp increases in output (particularly when they are sporadic as due to exceptionally good monsoons)

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4. Dr. Kedarnath Prasad, The Economics of a Backward Region in a Backward Economy, (Scientific Book Agency, Calcutta-1).

could well be to lower the prices of agricultural products more than proportionately; this is in fact an important factor governing agricultural incomes in some regions characterised by serious year to year variations in climatic conditions and water supply.[5] Apart from this, the other reason for measuring the contribution of green revolution in terms of its contribution to output is because it is not in terms of contribution to increase in productivity per cropped acre alone. Besides, yield per acre is a crude return only to a single input, land.[6]

Then, for comparison purposes, there are different methods. For instance, C.H. Hanumantha Rao compares output between successive peaks and this gives an idea of output growth adjusted for weather. In this study, index number of agricultural production has been used, under the prevailing cropping pattern composite of changes in cropping pattern and changes in productivity and acreage. The simple Laspeyres' formula used was:

$$\frac{\sum_{j=1}^{19} \sum_{i=1}^{r(1)} O_{ij}^{(1)}_{n} P_o}{\sum_{j=1}^{19} \sum_{i=1}^{r(1)} O_{ij}^{(1)}_{o} P_o} \times 100$$

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5. K.N. Raj, Economic and Political Weekly, Annual number, February 1976, (Sameeksha Trust Publication).

6. A.M. Khusro, (Indian Society of Agricultural Economics, July-December, 1964. IJAE.)

O - base years

n - current year

i - districts--output of each crop cummed over districts for a region

j - crops--value of output summed for all 19 crops

P - $\frac{\text{Value of output}}{\text{physical output}}$

Both numerator and denominator averaged over 1962-63, 63-64 and 64-65.

The 19 crops considered were: rice, wheat, jowar, bajra, maize, ragi, barley, gram, tur, ground nut, rape-seed and mustard, sesamum, linseed, castor seed, sugarcane, cotton, jute, mesta and tobacco.

A comparison of economic variables relating to a single year with those of another year may lead to highly misleading results, if either of the years happens to be abnormal for whatever reasons. In order to take care of this, the data used has been averaged over 3 consecutive years instead of using data relating to a single year. Output of each of the crops has been averaged over 1962-63, 63-64 and 64-65 (base years) and over 1970-71, 71-72 and 72-73 (current years).

The results of the indices of growth of agricultural production were as follows:-[7]

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7. Refer to the map (7-A) attached.

The highest growth index was in southern Punjab (463.18), followed by Assam Hills (306.03). Next highest growth region can be obtained by considering all the regions within 140-190 together - western Haryana (185.09), Himalayan U.P. (172.70), eastern Haryana (162.28), western plains (West Bengal) (163.95), J & K (157.13), western Rajasthan (153.62), and north-eastern Rajasthan (158.15), northern Punjab (143.03), south-eastern Rajasthan (148.32), western U.P. (140.00). Apart from the western plains of West Bengal, this entire region (140-190) covers the north-western belt of India.

Between growth indices of 100 and 140 lie 26 regions of the total 51 regions. These regions cover the southern and north-central parts of India. Of course, the regions which showed deceleration in growth are 13 in number (south-central and parts of south). Their indices of growth were between 50-100 and they were: Inland central (Maharashtra) 57.66, Inland northern (Maharashtra) 67.16, Eastern (Maharashtra) 68.05, Inland northern(A.P.) 75.49, and Inland western (Maharashtra) 74.58, coastal A.P. 80.11, Inland eastern (Maharashtra) 80.73, southern Bihar 91.10, coastal and ghats of Karnataka 94.09, coastal Maharashtra 96.54, Central Orissa 97.17, southern Orissa 98.34, and northern Orissa 98.01. Actually, certain districts in the south should

have emerged as high growth districts but this being a region-wise study, their growth rates have been pulled down by the neighbouring low-growth areas.*

In this analysis, the levels of agricultural production in 1962-63, 63-64 and 64-65 have not been considered. Because the interest was in the growth of output as such, for each region and not in knowing the levels of each region, from where it began vis-a-vis its growth.

For the growth indices, only 2 points of time are required. So, the yearly fluctuations in agricultural output have been ignored. The importance of these fluctuations has been highlighted by Dr. K.N. Raj.[8] Since violent fluctuations in output are accompanied generally by similar fluctuations in the prices and such price fluctuations are not conducive to farmers taking the measures necessary for increasing their output; the phenomenon of agricultural fluctuations cannot be separated from that of agricultural growth and need to be tackled along side the measures taken for promoting the latter.

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* A.M. (of indices of growth) of 51 regions = 127.92431
S.D. = 60.559854
C.V. = .47

8. K.N. Raj, Economic and Political Weekly, Annual number, February 1976.

T.N. Srinivasan drew the conclusion that just because of green revolution, the 'exaggerated notions regarding achievements and overly optimistic assessment of the future possibilities can be harmful'.

According to K.N. Raj, the so-called green revolution has failed to raise the overall rate of growth of agricultural output above the level achieved in the 15 years prior to 1965. The output of even the few crops which had recorded sharp spurts towards the late sixties is not growing so rapidly any more. Whether there has been in consequence a deceleration in the overall rate of growth is not certain yet, but that it remains low is beyond doubt. It is important however to recognise that there are serious constraints on the rate of growth of agricultural output in India on account of limited availability of readily cultivable land and either shortage or sharp variability in the supplies of water. These can be overcome in a variety of ways, but not overnight. In this study, however, there is abstraction from such overall growth rates for the country as a whole and instead region-wise performance has been considered.

Nevertheless, this section can be concluded with a quotation 'Growth for the sake of growth is the ideology of the cancer cell'.[9]

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9. The Retreat from Riches, Affluence and Its Enemies, Peter Passel and Leonard Ross, (The Viking Press, New York).

CHAPTER II

INEQUALITY MEASURE--GINI COEFFICIENT

This is a purely theoretical section based on Amartya Sen's book, 'On Economic Inequality'. And its sole purpose is to act as a prelude to the forthcoming sections, where, with the use of this inequality measure, certain hypotheses have been tested on the basis of empirical data.

"The idea of inequality is both very simple and very complex. At one level it is the simplest of all ideas and has moved people with an immediate appeal hardly matched by any other concept. At another level, however, it is an exceedingly complex notion which makes statements of inequality highly problematic." -- Sen.

Inequality as an 'objective' notion implies some statistical measure of relative variation of income, but it must be related to ethical evaluation or the normative concern as well. Besides, finding a measure of inequality that involves a complete ordering (i.e., all alternatives are rankable vis-a-vis each other) may produce artificial problems, because a measure can hardly be more precise than the concept it represents.

There are several measures of inequality for instance, the range, the relative mean deviation, the variance, the coefficient of variation etc. A measure that has been very widely used to represent the extent of inequality is the Gini coefficient. One way of viewing it is in terms of the Lorenz curve, due, not surprisingly, to Lorenz (1905), whereby the percentages of the population (households) arranged from the poorest to the richest are represented on the horizontal axis and the percentage of income (assets) enjoyed by the bottom x% of the population is shown on the vertical axis. So, a Lorenz curve runs from one corner of the unit square to the diametrically opposite corner. If everyone has the same income (assets), the Lorenz curve will be simply the diagonal, but in the absence of perfect equality, the bottom income (asset) groups will enjoy a proportionately lower share of income (assets). It is

obvious, therefore, that any Lorenz curve must lie below the diagonal; and its slope will increasingly rise as we move to richer sections of the population.

In this study, Lorenz curves had been plotted in the graphs. There were 3 Lorenz curves for each region. In the first two graphs, percentage of households was plotted on X-axis and percentage of productive assets and percentage of total assets respectively on the Y-axis, (explained in the following chapter). In the third graph, percentage of households was once again plotted on X-axis but the percentage of operated land was taken on Y-Axis. From these graphs, the Gini coefficient was calculated, as the ratio of the difference between the line of absolute equality (the diagonal) and the Lorenz curve to the triangular region underneath the diagonal.

In taking differences over all pairs of incomes (i.e., all pairs of assets), the Gini coefficient or the absolute mean difference avoids the total concentration on differences vis-a-vis the mean. It also seems to be a more direct approach, without sacrificing the quality of being sensitive to transfers from the rich to the poor at every level. Undoubtedly, one appeal of the Gini coefficient lies in the fact that it is a very direct measure of income (asset) difference, taking note of differences between <u>every</u> pair of incomes (assets).

The Gini coefficient also passes the Pigon-Dalton test, i.e., a transfer from a richer man to a poorer person always reduces the value of Gini coefficient. But its sensitivity depends not on the size of the income (asset) levels but on the number of people (households) between them. It is invariant if everyone's income is raised in the same proportion.

Gini coefficient is a 'complete' measure. And it is arguable that it leads to some rather absurd results precisely because it aims at giving a complete ordering representation to a concept of inequality that is essentially one of partial ranking.

This concept of inequality is based primarily on the concept of needs, and not desert. For instance, if the incentive-oriented interpretation of desert is considered, a system of incentives would appear to be a means to an end rather than an end in itself, whereas the fulfilment of needs would be a good thing in itself. (This corroborates the hypothesis that equality has to be dealt with as an issue by itself - this point is elaborated in the conclusion.

One can conclude by saying that no matter however inadequate a measure of inequality, Gini coefficient is, one must bear in mind, that the concept of inequality is a

mixture of descriptive and normative considerations. Since the concept is inherently incomplete, inequality evaluation ought to be in terms of non-compulsive,* evaluative judgements expressed as quasi-orderings.**

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* non-compulsive (i.e., there is a reason for acting in a certain way, but it is not a compelling recommendation and contrary reasons could be produced).

* quasi-orderings (transitive, but not necessarily a complete relation).

CHAPTER III

GROWTH AS A FUNCTION OF ASSET INEQUALITY--INSIGNIFICANT RESULTS

A review of some of the existing literature shows the standard and well-accepted variables, which are chosen for fitting the production functions, e.g., B.M. Desai and D.K. Desai[1] have taken variables like gross cropped area, fertiliser expenditure, payment to hired labour, other cash and kind expenditure and gross crop output. With such variables selected, it was not surprising that they explained

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1. B.M. Desai & D.K. Desai, Farm Production Credit in Changing Agriculture, Indian Institute of Management, Ahmedabad, 1971, (A Survey of research in Economics - ICSSR).

83% and 91% of variations in gross value of crop production in the more and less developed regions respectively. C.H. Hanumantha Rao[2] made each dependent variable of his study (multiple cropping, yield, output and employment) a function of the following independent variables - operated area, percentage of operated area irrigated, tube-wells, tractorisation, HYV* and fertilizers.

According to G.D. Agrawal,[3] the output in agriculture is determined not only by the quantity of input factors such as seed, manure, labour etc consumed in the process of production, but also by the quality of land and subsequent improvements effected in it by human agency. Management too plays a significant part.

In A. Parikh's[4] production function approach, output is made a function of the percentage of irrigated area to total area, consumption of chemical fertilisers and time as a catch-all variable for slowly changing factors such as farm practices, new capital inputs, improved seed, crop rotation practices etc. Weather variable is not used and technical change is neutral.

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2. Technological Change and Distribution of Gains in Indian Agriculture, (Institute of Economic Growth).

* High Yielding Varieties

3. (Indian Society of Agricultural Economics, Bombay-1,) January-March, 1958. I J A E.

4. Artha Vijnana, March-June, 1966, (Journal of Gokhale Institute of Economics & Politics).

The approach adopted in this study is very different from the above production function approaches. It is not the output but the growth in output (1962-63, 63-64, 64-65 to 70-71, 71-72 & 72-73) which is made a function of inequality in productive assets; in total assets; and in operated land. The selected variables are different and it is the inequality in these and not the levels, which is considered.

'Assets' have been defined by the "All India Debt and Investment Survey" (RBI) - 1971-72 to include all items owned by households[5] which had money value such as land, buildings, livestock, agricultural implements and machineries, non-farm and transport equipment, durable household assets, dues receivable on loans advanced in cash and kind, shares in co-operative societies, banks, etc., national plan saving certificates and the like, deposits in companies, banks, post offices and with individuals. Crops standing in the fields, currency notes and coins in hand and stocks of commodities were however omitted from enumeration.

Certain conclusions have been obtained by various economists on the basis of the 'Rural Credit Survey' in

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5. Group of persons normally living together and taking food from a common kitchen.

fifties and 'All-India Rural Debt and Investment Survey 1961-62'. It has been assumed in this chapter that there could not have been much change (particularly because of the kinds of assets considered) over the decade, and so a brief review of all these studies, before going on to testing the hypothesis formulated on the basis of 'All-India Debt and Investment Survey 1971-72'. The distribution of credit from the co-operatives was found to be inequitous as among different asset groups. Tara Shukla,[6] on the basis of 1961-62 RBI study, concluded that there was an unequal distribution of assets, pre-eminence of land and buildings among assets, relatively larger share among borrowings of large asset holders, and heavier debt burden on small asset holders.

P.G.K. Panikar[7] has come to some significant conclusions, again on the basis of 'All-India Rural Debt and Investment Survey 1961-62'. An overwhelming proportion of total assets is accounted for by land. Next in order is house property. Equipment used in farm and non-farm business constitutes a negligible fraction of the total. States which lead in capital formation are also the ones which are ahead in over-all agricultural progress; the

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6. Capital Formation in Agriculture in India, (A Survey of Research in Economics - ICSSR).

7. (Indian Society of Agricultural Economics, Bombay,) October-December, 1969. IJAE.

proportion of productive assets (land and equipment) to total tangible wealth (land, house property, livestock and durable household assets) is greater, and the share of value of livestock is lower. Differences in the composition of assets reflect the differences in level of agricultural technology. Dr. K.N. Raj[8] surveyed the Rural Credit Survey-(RBI data) of fifties and came to conclusions which hold in seventies also. Though, numerically, most of the indebted households belonged to categories which have either no land or relatively small holdings, their percentage share of total indebtedness was not very far in excess of their share of total land held by rural households; on the other hand, top deciles of rural households which held greater part of the land also accounted for a very large part of total rural debt. In all the regions of India, taken together, nearly half of the cultivating families took grain loans, almost all such loans were repaid within a year, but nevertheless, the grain rate of interest was as high as 30%. High risk premia are not necessarily the only explanation for high rates of interest. High rates can be realised indirectly by the manipulation of prices at which commodities are bought and sold.

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8. (Indian Society of Agricultural Economics, Bombay, January-March, 1975. IJAE)

The review of literature cited above highlights the inequality, the composition of assets and the extent of indebtedness on the basis of Rural Credit Survey, and Debt and Investment Survey of fifties and sixties respectively.

This study, however, analyses the data as given in the 'All India Debt and Investment Survey' (RBI) 1971-72. There are five exercises attempted in this context. The first pertains to the inequality in total assets for each region and its correlation[9] with and regression[10] on it of growth indices. There are eleven asset groups (in rupees); and the average value per household for each group is calculated in the RBI studies by adding up the average value per household of land, vacant house site, building, livestock, implements and machinery, durable household assets, financial assets (sharea and deposits), and dues receivable (cash and kind). (The composition of these assets is not being studied here). From the above data, the cumulative percentage of total assets was calculated[11] and it was plotted against the cumulative percentage of households; and Lorenz curves were graphed for each of the 51 regions; and from these, 51 Gini coefficients were calculated. The Gini coefficient of

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9. Determines the degree of relationship.

10. Indicates a functional relationship, i.e., cause & effect relation.

11. One of the 51 tables given as a sample, is attached (Table 2).

inequality in total assets was as high as .77 in Coastal A.P. and as low as .46 in J & K and in southern Rajasthan. But even a cursory glance at the table 3 (column 3) shows that the Gini coefficients are uniformly high in almost all the regions, irrespective of their growth rates.

From the correlation matrix,[12] it is found that the correlation between the indices of growth in agricultural production and the Gini coefficients of total assets in all the 51 regions comes out to -.122191. When tested with F-test, its value is insignificant.[13] If growth indices (X_6) are a dependent variable and inequality in total assets (X_3) - an independent variable, the regression equation is as follows:

$$X_6 = 192.50932 - 103.125730\ X_3$$

Value of regression coefficient = -103.12573
< 1.96 S.E. (119.663810)

and also Student T = .861 $<$ 1.68 (5%, 48 d.f.)
Also < 2.41 (1%, 48 d.f.)

Thus the correlation is insignificant and so one cannot say anything about growth rate of agricultural production and the Gini coefficient of total assets, i.e., cannot say whether growth and inequality in total assets are related or not. To make a stronger statement, can't say whether growth is dependent on inequality in total assets.

(C.V. of total assets was .47)

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12. Table 4.

13. F = .742 $<$ Tabulated value = 4.04 at 5% points.
DF = (1,49) and = 7.20 at 1% point.

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The second exercise pertains to productive assets.[14] Livestock and implements and machinery have been considered as productive assets. The cumulative percentages, corresponding to each of those asset groups, for each of the 51 regions were plotted; and the Gini coefficients obtained. The highest Gini coefficient was in Northern Kerala (.79) and lowest in H.P. (.29).

The correlation between the Gini coefficient of productive assets and the growth rate is -.205015. Once again, when tested with F-test, it is insignificant.[15] Growth (X_6) is a dependent variable and inequality in productive assets (X_2), an independent variable; and the regression equation is:

$$X_6 = 193.27492 - 121.904960\ X_2$$

Value of regression coefficient = -121.904960
$<$ 1.96 S.E. (83.140516)

and also Student T = 1.466 $<$ 1.68 (5%, 48 d.f.)

Thus it is once again insignificant at 5% level of significance - cannot say whether inequality in these productive assets is related to growth or not, i.e., whether inequality is the cause of growth or not.

G- 38087

(C.V. of productive assets was just .18)

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14. Refer to table 2.

15. F = 2.149 $<$ Tabulated value = 4.04 at 5% points.
DF = (1,49).

The third exercise refers to the growth indices and the Gini coefficient of operated land. Operational holding, as defined in 'All India Debt and Investment Survey' was all land which was used wholly or partly for agricultural production and was operated (directed/managed) by a household alone or jointly with other households, with or without the assistance of others and regardless of title, size or location.

For each of the 51 regions, 15 classes in terms of land operated (in acres) were taken. The first group in the table (nil)[16] was defined to include households without operational holdings as well as those having holdings of less than .005 acre each, and thus comprised all non-cultivator households. After the calculation of the cumulative percentage of land operated and cumulative percentage of households, Gini coefficients were calculated for each of the 51 regions. Once again, the lowest (.33) Gini coefficient was in the case of J & K and the highest (.74) in coastal and ghats region of Karnataka. The correlation between the growth indices (X_6) and the inequality in operated land (X_4) was -.059654. When tested with F-test,[17] its value is insignificant. If growth is a dependent

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16. Table 2.

17. $F = .174 < $ Tabulated value (4.04) at 5% sig. level. DF = (1,49).

variable and inequality in operated land an independent variable, the regression equation is:

$$X_6 = 152.59398 - 42.319323\ X_4$$

Regression coefficient = $-42.319323 < 1.96$
S.E. (101.163720)

and also Student T = $.418 < 1.68$ (5%, 48 d.f.)

The correlation is insignificant at 5% level of significance. Growth thus cannot be regarded as a function of land inequality, i.e., cannot say anything positive to that effect.

(C.V. of operated land = .14)

Comparing the relative inequalities, C.H. Hanumantha Rao[18] holds that between 1953-54 and 1961-62, inequality in distribution of owned land remained unchanged, whereas inequality in distribution of operated area decreased. Following were the reasons given:- land reform measures, whereby transfer of land to tenants, ceilings on ownership and distribution of surplus lands was done; sale of land by large land owners as well as sale of marginal holdings to small and medium land owners; higher rates of sub-division among large land-owners than small with a view to keeping size of holding less than ceiling level; and lastly benami transfers of land to relatives and friends to evade ceiling

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18. Op.cit. C.H.H. Rao.

legislation. Pranab K. Bardhan[19] cites NSS and other data to suggest that inequality in rural incomes is less than that in distribution of operational holdings. And income inequality is usually expected to be less than the inequality in wealth distribution.

On the other hand, on the basis of this study, the comparisons of the coefficients of regression of growth on inequality in total assets (-103.125730), on inequality in productive assets (-121.904960) and on inequality in operated land (-42.319323) is fairly irrelevant, as all these are insignificant.

The fourth exercise refers to the degree and direction of correlation between inequality in various assets. The coefficient of correlation between the Gini coefficient of productive assets and the Gini coefficient of total assets is as high as .830811; the correlation between the Gini coefficient of productive assets and that of operated land is .749616; and the inequality in total assets and in operated land is also very highly correlated (.906393). These statistical claculations prove that there is a high correlation between the ownership of various assets. Dr. K.N. Raj[20] also holds that the choices open in the land, labour,

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19. Economic and Political Weekly, February 1974 (Annual number).

20. Op.cit. K.N. Raj

commodity and capital markets are not independent of each other, but are very closely inter-dependent.

The fifth and the last exercise in this section, deals with relating growth rates with percentage of operated land less than 5 acres (1971). In this exercise, no Gini coefficient as a measure of inequality has been used. Five acres was taken because it was observed from the data that it was between 2.50 and 5 acres that the percentage value of land operated was almost the highest in practically every region; it seemed as a kind of a peak of the frequency curve or a dividing line. Paresh Chattopadhyay[21] estimates that a little less than 2/3 of all the operational holdings are less than 5 acres each, which is well below the average of 6.5 acres, and about a fifth of the total area operated; whereas the very top 3% of the households have more than 30 acres each and about a 1/4 of the total area operated. As seen earlier, the assets distribution at the disposal of the peasantry also shows great differentiation.

The correlation coefficient between growth and percentage of operated land less than 5 acres is -.086497.

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21. Imperialism and Revolution in South Asia, edited by Katheleen Gough & Hari P. Sharma, (Monthly Review Press, New York & London).

When tested with F-test,[22] its value is insignificant. If growth index is a dependent variable (X_6) and percentage of operated land less than 5 acres (X_5), an independent variable, the regression equation is:

$$X_6 = 137.40517 - .265082\ X_5$$

Regression coefficient = $-.265082 < 1.96$
S.E. (.436161)

and also Student T = $.607 < 1.68$ (5%, 48 d.f.)

Thus the correlation is insignificant and so cannot say if any cause and effect relation exists between percentage of operated land less than 5 acres and growth in agricultural output.

(C.V. of percentage of operated land less than 5 acres = .55)

All the correlation coefficients between indices of growth in agricultural production and inequality and total assets, in productive assets and in operated land were insignificant. The regression coefficients, as they ought to, show a similar picture. All are negative and insignificant. Thus, can't say, if growth in output is the effect and inequality the cause.

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22. $F = .369 < $ Tabulated value = 4.04 at 5% points.
DF = (1,49).

CHAPTER IV

PRODUCTIVITY LEVEL AS A FUNCTION OF ASSET INEQUALITY--SIGNIFICANT RESULTS

The previous chapter was confined to an analysis of growth in output being a function of asset inequality. The results obtained were insignificant. One obvious reason for this can be that the growth variable was a time-series variable (from 1962-63, 63-64 and 64-65 to 70-71, 71-72 and 72-73) and this was made a function of asset inequality as on 30th June 1971, i.e., a cross-sectional variable, at one point of time. Perhaps, if growth in asset inequality was considered along with growth in agricultural output, the results could have been quite different.

So, another set of five exercises was done to correlate and to treat as cause and effect relation, the two cross-sectional variables. Asset inequality during 1971 was taken into account, and level of output value per hectare* was taken as an average for 1970-71, 71-72 and 72-73. Each of the 51 regions' output value was divided by the gross cropped area in that region.

In this study, output per gross cropped hectare has been considered. There is however a controversy about the relevant measure of productivity. According to McNamara, "it is of course output per hectare which is the relevant measure of agricultural productivity in land-scarce, labour-surplus economies; not output per worker". But, according to Ernest Feder,[1] this statement is false in one respect and misleading in another. In fact, there are no countries where there is at the present time any scarcity of land whatever for the big land owners, who control most of the farm land as well as access to virgin land. Land is scarce only for the poor peasants. McNamara also implies that the surplus labour is a function of land scarcity. This is obviously incorrect, because excess labour is the result of the lop-sided tenure structure and the pattern of the use of land and labour, which is itself again determined by this structure.

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1. Economic and Political Weekly, April 3, 1976.

* C.V. of value of agricultural output per hectare or productivity level = .40.

Now to the misleading portion of McNamara's statement. To say that land productivity (output per hectare), not labour productivity (output per worker), is 'the relevant measure of agricultural productivity' begs the question - relevant for what? Since increased labour productivity is more essential than increased land productivity to raise small holders' incomes, how is their poverty problem ever to be resolved? Similar argument has been put forth by Erich Jacoby.[2] To quote him, "it is an unfortunate assumption that increased output per area unit irrespective of the productivity per labour unit is necessarily identical with development. Such a one-sided criterion can be applied only in the rare instances of static technology and static standards of living and is unsuitable, therefore, as a yardstick for agricultural progress. Yet, the fact that in both theoretical discussion and practical policy increased output is equated, time and again, with agricultural development, has contributed to the dangerous misinterpretation of fundamental development issues which benefits the privileged few without improving the lot of the peasant population". If one agrees with Ernest Feder and Jacoby, then, perhaps, the concept of

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2. Mentioned in Ernest Feder's article in Economic and Political Weekly, April 3, 1976, from Man & Land 1971

productivity used in this study too is limited and quite restrictive in the sense they use it.

Now, reviewing some other studies, one finds that C.H. Hanumantha Rao[3] has correlated net output per agricultural worker (and not output per hectare) with the amount of short term loan (i.e., just one kind of asset) per hectare as well as per capita (rural population); and this was not significant in 1960-61 (r being .09 and .12 respectively). But according to him, by 1970-71, correlation of loans with net output of agricultural worker (of 1960-61) improved, suggesting that co-operative credit tended to flow into high income and credit-worthy regions. According to P.G.K. Panikar,[4] high rate of investment in more productive assets (modern technology, i.e., different from the ones considered in this study), leads to higher output and not conversely. High income may facilitate high capital formation, but need not be the cause of high capital formation. Rate of interest (also lower in high growth areas) can influence investment behaviour. A. Parikh[5] holds that increase in productivity is a mixed bag, containing a variety of residual elements besides technological progress. He, however, obtains a significant rank correlation between capital formation and growth rate in productivity.

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3. Op.cit.
4. Op.cit.
5. Op.cit.

After a brief survey of some work done on productivity and of controversies about the concept, one can go on to discuss the concept, as used in this study. Farm efficiency can be defined either as output per unit of a single input, acreage, or output per unit of cost of all inputs.[6] It is in the former sense that it is used in the current study.

The first exercise pertains to productivity* per hectare treated as a function of inequality in total assets. How this inequality is calculated by the Gini coefficients and what are the components of total assets has been already discussed in the previous chapter. From the correlation matrix, it is found that the correlation between productivity (average value of agricultural production per hectare in 1970-71, 71-72 and 72-73) and the Gini coefficient of total assets in all the 51 regions comes out to .407513. When tested with F-test, it is significant. Estimated F-value = 9,747 is greater than tabulated value = 4.04 at 5% level and also > 7.20 at 1% point at DF = (1,49). If productivity (X_1) is a dependent variable and inequality in total assets (X_3) an independent variable, the regression equation is:

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6. Op.cit.

* Productivity is <u>level</u> of output at a point of time. Output is divided by area, to remove the scale effect. Growth, on the other hand, as analysed in the previous chapter, is change in output between two points of time.

$X_1 = -2.8285644 + 14.408478\ X_3$
Regression coefficient = ~~-3.308378~~ 14.408478 is greater than 1.96 x S.E. (4.612578)
Student T = 3.123 is also greater than 1.68 from the tables (5%, 48 d.f.) and > 2.41 (1%, 48 d.f.)

Thus, the correlation and the regression coefficient is significant.[7] In other words, inequality in total assets can be regarded as the cause of productivity. Greater the inequality in total assets, higher is the productivity.

The second exercise concerns the regression of productivity (X_1) on the Gini coefficient or inequality in productive assets (X_2). So, with productivity as a dependent variable and the Gini coefficient of productive assets as an independent variable, one gets multiple correlation coefficient = .304750. Its F-value = 4.016 and this is greater than the tabulated value (4.04) at 5% significance level (DF = 1,49). The regression equation is:

$X_1 = 2.1254512 + 7.591513\ X_2$
Regression coefficient = 7.591513 is greater than 1.96 S.E. (3.389377)
and Student T = ~~1.129~~ 2.239 is also greater than tabulated t = ~~4~~.68 (5%, 48 d.f.)

There is thus a significant cause and effect relationship, i.e., higher inequality in productive assets results in greater productivity. at 5% but not 1% sig. level.

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7. Table 4--'Statistically significant' implies that conclusions can be arrived at in terms of probabilities and not certainties.

The next exercise relates to the dependent variable X_1 (productivity level) and the independent variable X_4 (inequality in operated land). The multiple correlation coefficient is .424370. F-value = 10.762 and this is greater than the tabulated value. (DF = 1,49). The regression equation is $X_1 = -1.1570721 + 12.612199\ X_4$. Here, the constant is negative, i.e., the regression line starts below the origin. The regression coefficient = 12.612199 is greater than 1.96 S.E. (3.844419). Student T = 3.280 is also higher than the tabulated value (5%, 48 d.f.). Thus a significant and positive correlation exists between these two variables; and inequality in the operated land can be the cause of productivity, the effect.

So far, these 3 exercises have used Gini coefficients, as a measure of inequality. The results are significant and it can be stated that there is every probability of productivity being a function of asset inequality and of land inequality.

Comparing the three regression coefficients, i.e., change in productivity per unit change in inequality, one finds that the regression coefficient is the highest (14.408478) in case of total assets. This is a perfectly valid result, because total assets include the productive

assets as well, i.e., livestocks and implements and machinery. The next highest regression coefficient (12.612199) was for the operated land. And for productive assets, it was 7.591513. This was not very high, perhaps, because productive assets did not include 'modern inputs' and it was not significant at 1% significance level.

Here is a slight digression - a survey of one or two studies, before proceeding on to the percentage of operated area less than 5 acres and relating it to productivity. G.D. Agrawal[8] holds that value of output per acre is greater in lower size groups (farms), because of higher intensity of cropping on smaller farms. Even so, the output-input ratio is more favourable on large farms, because of greater reduction in the cost of input factors per acre. Cost of bullock and human labour is highest size group of farms is half as compared with smallest size group of farms. But the advantage of large area in the shape of decreased cost of input factors (bullock and human labour) on farms in higher size groups is neutralised by a relatively much larger wage bill on them as compared with smaller farms. Ernest Feder [9] opines there is lack of understanding of the meaning of the ~~universal~~ inverse relationship between land productivity and farm size and of the direct relationship between

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8. Op.cit.

9. Op.cit.

labour productivity and farm size. What most people overlook is that the 'advantage' they have over large units in terms of higher land productivity is systematically and inexorably being eroded away as their soils become poorer. Labour productivity on large estates is higher. This reflects the widespread under-utilisation or non-use of the land and mechanisation, e.g., extensive livestock enterprises use little labour and yield little income per hectare. But labour productivity is high in relation to small holdings. Hence these broad relationships are a reflection of the land tenure structure, the distribution of wealth and income and the patterns of resource use (Institutional factors discussed in Chapter VI).

Pranab K. Bardhan[10] talks in terms of farm business income[11] per acre (and not output per acre) which in some cases increases with increased farm size. Because even when output per acre decreases with increased farm size, the bigger farms have some economies of scale in paid-out costs, e.g., lower rents paid per acre (small proportion of land leased-in), lower interest rate (because higher valued collateral in bigger farms) can be the possible explanations

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10. Op.cit.

11. Surplus of value of total farm output over the sum of following items of costs - wages of hired labour, cost of bullock labour, seed, fertiliser, irrigation charges, depreciation, interest, land revenue, rent, etc.

for the concentration index for farm business incomes being greater than that for farm size. A.M. Khusro[12] believes that the use of simple, uncorrected acreage as a measure of farm size is apt to create an optical illusion about the behaviour of returns to scale, and if proper variables are chosen, there is a strong general tendency towards constant returns to scale in Indian agriculture. Farm business income per corrected* area is found to be constant with increase in farm size; and so is the gross output per acre.

Now on to the last exercise of this section, namely productivity (X_1) as a function of percentage of operated land less than 5 acres (X_5). The multiple correlation coefficient was .501342. The estimated F-value = 16.450 is greater than tabulated F-value = 4.04 at 5% significance level. The regression equation is:

$$X_1 = 3.8929858 + .064366\ X_5$$

The regression coefficient = .064366 is slightly more than 1.96 x S.E. (.015869)

And the Student T = 4.055 is also higher than the tabulated t-value = 1.68.

Thus, the cause and effect relationship between the independent and the dependent variable is significant, i.e.,

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12. Op.cit.

* Corrected with index of fertility, which can be land revenue per acre itself--i.e., mean acreage A in each size group is multiplied by an index of efficiency based on land revenue per acre. $A_c = A(L/A) = A$.

productivity is a function of percentage of operated land less than 5 acres. This proves higher productivity of small sized farms.

In a nutshell, it can be said that unlike growth of agricultural production (which involved time series variable being related to cross sectional variable), the level of agricultural output per hectare is significantly correlated with inequalities and more precisely is a function of inequalities.

CHAPTER V

TECHNOLOGICAL FACTORS AS EXPLANATIONS OF INEQUALITY AND PRODUCTIVITY LEVEL

The most significant conclusion in this study is pertaining to productivity, rather level of production per gross cropped hectare, and how this is a function of inequality in assets. Actually, productivity is one of the variables, i.e., apart from area and change in cropping pattern, which contribute to output as such. And these can be isolated one by one from the composite measure of agricultural production. In the major part of this study, one is concerned with one variable, namely, productivity. Contribution to output can be factor-wise as well, such as

extension of irrigation, extension of chemical fertilisers etc., and these too can be isolated from aggregate agricultural production and their relative contribution can be assessed.

C.H. Hanumantha Rao[1] defines 'technique' which influences productivity and inequality, as a function of both technology (use of new factors of production) and the relative prices of input factors. Magnitude of technological change can be measured by estimating increase in output attributable to modern inputs and by measuring growth in the use of modern inputs themselves. The former approach has been used in this study, where output per hectare is attributed to asset inequality. And the latter in turn influences the flow of modern inputs and thereby the productivity. The level of production per hectare is thus a function of a 'catch all' variable, that being 'green revolution', which has all the qualities of a good slogan.[2] It is catchy; it simplifies a complex reality; and most important, it carries the conviction that fundamental problems are being solved.

The so-called green revolution has been characterised basically by a technology in which exotic varieties of seed,

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1. Op.cit.

2. India's Green Revolution - Economic Gains and Political Costs, Francine Frankel, (Bombay - Oxford University Press, Princeton University Press).

existence (or creation) of assured irrigation and use of modern inputs like chemical fertilisers play a crucial role. It is frequently described as seed-fertiliser technology.

The output per hectare (rather yield) of operated area, which is influenced by the above technology, is a function of both cropping intensity and yield per planted hectare. HYV was found to be the most important explanatory variable followed by irrigation.

According to Ernest Feder,[3] it is the process of capitalist expansion in third world agricultures and a part of this is known by the peasant title 'the green revolution'. It consists of massive transfers of capital and technology from the industrial nations; first to the landed oligarch, and subsequently to agriculture-related industries and services.

Successes of recent application of science to peasant agriculture, say, in terms of productivity, could be interpreted as an exploitation of 'technical gap' in food crops left by years of neglect. If current developments merely represent a 'catching up', then as soon as population overtakes current development, we are back to 'square one'. Target should not be a new technology but ever-new technology.

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3. Op.cit.

*Somehow, technological changes seem to explain only about 27 to 40% of growth achieved since mid-sixties. A good part of agricultural growth, or more specifically, of productivity, is traceable to autonomous factors, which are not attributable to conscious public policies. Rather the latter are influenced by forces generated by the former. One autonomous factor is growth of population and hence increasing agricultural labour force, i.e., younger and healthier and therefore better exploitation of land through intensive cropping is possible; also increasing demand for agricultural commodities and therefore favourable terms of trade enjoyed by agriculture. The other factor, which is very important in the context of this study, is the rise of agricultural classes to political power, and therefore increasing use of State machinery and resources for agricultural betterment. Because of asset inequality, such an access to resources is possible and this results in an increasing output per hectare. Thus, greater the inequality, greater the wielding of social and political power; and resulting of pressure groups, which can manage to lay hands on 'modern inputs', i.e., greater the productivity. (This relation between productivity and inequality was proved in the previous chapter).

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* Op.cit. C.H.H. Rao

The rich farmer has been made the lynch pin of agricultural development. If the Ford Foundation had not provided the new technology to India, the new class of Indian kulaks would sooner or later have imported it from wherever it was available.[4]

The decade of rapid growth has been accompanied by greater maldistribution of income. This is probably a well-accepted hypothesis and has not been tested, but merely cited from the existing literature.

The disparities derive partly from the character of technological change and partly from the regional differences in factor endowments, physical and institutional infrastructure and entrepreneurship.

Within the framework of a traditional agriculture, the small farmers, with their relative abundance of family labour, would attain a relatively higher intensity of cultivation and also claim a relatively higher productivity per unit of land[5] through increased input of human labour (and other traditional resources) in farming. The small farmers were thus able to reduce the inequalities in income

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4. Op.cit. Hari P. Sharma.

5. Both inequality in operated area and percentage of operated area less than 5 acres were significantly and positively correlated with productivity.

arising out of the unequal distribution of land among cultivating households. But the emergence of capital-intensive technology now seems to have shifted the advantage of productivity per hectare (hitherto enjoyed by small farmers) in favour of big farmers. In terms of economic feasibility, relative cost and returns to investment, the big farmers are thus clearly placed in a far superior positive vis-a-vis their smaller counterparts for exploiting the benefits of the green revolution. (No wonder, level of agricultural output per gross cropped hectare, was a function of asset inequality). Consequently, the inequalities among farm families in terms of farm incomes are bound to grow under the impact of the green revolution.[6]

The high risk and uncertainty, large credit requirements, ignorance of the new technology, unavailability of the inputs, absence of controlled irrigation are the well-known factors which discourage small farmers from participating in the program, at least in the initial stages.

The green revolution is limited in scope, both as to acreage and participants. Recognising the promise, but not sharing in it creates its own grave social and economic problems - disparity in levels of production and income.[7]

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6. G.R. Saini, Economic and Political Weekly, March, 1976.

7. Wolf Ladejinsky, Economic and Political Weekly, September 1969.

Tensions are heightened by the fact that the new technology applies equally beneficially on large as well as small holdings, i.e., those with more or less assets, and the overwhelming majority of cultivators are in the latter category.

There is a major imbalance between foodgrain and non-foodgrain components of agricultural production. The need is for achieving for cash crops a much higher growth rate of output than for foodgrains - reverse is happening since mid-sixties. With the pull of the cereals in drawing area away from other crops, imbalance exists between cereals and pulses, within the foodgrain basket. And lastly, the imbalance is also introduced by technological lag within the cereals basket, i.e., disparate performance of rice and wheat.[8] And the greater the importance of wheat, the larger the impact on farm incomes, and consequently, the more serious the ensuing consequences in terms of inequalities of income.[9]

The latest economic survey also suggests that if high prices are granted to surplus farmers, the distribution of money incomes will tilt in their favour. And subsidi-

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8. Imbalances discussed by Dharm Narain, Economic and Political Weekly, March 25, 1972.

9. Income inequalities seem to stem from asset inequalities via inequality in production levels.

sation of irrigation and power supply will benefit only a small section of the population, i.e., those with a large amount of assets, whereas the burden of the subsidy has to be borne by other sectors, including farmers without irrigation and those owning fewer assets.

If the inter-regional and intra-regional disparities and divergences (attempt with regard to growth indices made in Chapter I) are not duly stressed or are assumed away, there tends to be confusion and the efficacy of the policy recommendations gets reduced.

HYV program, for instance, favours the promising and developing regions in which the necessary infrastructure for growth already exists; and therefore within the regions, thus marked for growth, the small farmers are less well endowed in terms of assets etc. compared to large farmers to take on new technology. Besides, since the green revolution has so far been restricted to agricultural regions[10] which were already prosperous[11] (e.g., western U.P., Punjab and Haryana), growing inter-regional inequalities in farm incomes is, perhaps, inescapable.

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10. This restriction to certain regions is discussed in Chapter I, though their relative prosperity at the base period is not considered.

11. Pranab K. Bardhan, Op.cit.

Costs of transfer from the surplus to the deficit regions is greater than the reduction in production costs, specially in the initial stages of technological change. Regional unevenness in the rate of technological change may therefore confer greater benefits to consumers in surplus zones than in deficit zones.

C.H. Hanumantha Rao[12] holds that regional (horizontal) disparities in income increased more than vertical disparities between different income groups within regions experiencing technological change. In this study, asset inequalities between different regions are also dealt with, by calculating Gini coefficients for each of the 51 regions. But when it comes to regressing productivity on inequality, it is for the whole economy.

Growth in, say, output per hectare, would have been less costly from the social point of view and prices would have been lower if public investments were stepped up and technological changes were widespread in labour-abundant sectors (backward regions and small farms, i.e., those with less endowments of assets or resources).

The World Bank came up in 1973 with a proposal to help the rural poor ('Little Green Revolution'). But,

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12. Op.cit.

Ernest Feder[13] holds that the World Bank scheme is a hard-boiled business proposition, i.e., the expansion of capitalist agriculture in the small holder sector for the benefit of the multinational corporations producing farm inputs. To quote Feder, "If we strip McNamara's scheme of its pretences - including his claim that development assistance is a moral issue, that he is out to help the rural poor, and all the false arguments behind the 'logic' of his reoriented 'development' strategy - we discover that the real aim is to increase and strengthen the private large land-holding sector and agri-business and that his 'socially oriented' programme is nothing but a facade. I cannot help but think that there is a true Machiavellian component to McNamara's plan".

According to G. Ojha,[14] prior to the introduction of the new technology, the disparity between lower and higher size groups of farms was more pronounced only in terms of resources, while per acre income did not vary much. After the introduction of new technology, disparity is reflected not only in terms of resources and their use, but also in terms of net return. In this study, however, it is the disparity in assets (or disparity in access to inputs) that

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13. Op.cit.

14. Economic and Political Weekly, April 4, 1970.

is analysed. This is positively related to level of output per hectare or productivity, which in turn results in disparity in income or net return (latter hypothesis is not tested). Thus, inequality and productivity can be partially explained by technological factors.

CHAPTER VI

HISTORICAL AND INSTITUTIONAL FACTORS AS EXPLANATIONS OF INEQUALITY AND PRODUCTIVITY

India was kept predominantly as an appendage of the Western powers, operating as agrarian raw-material producing area, subserving the interests of the colonial masters. These masters did create an indent on the agrarian social structure which disfigured it and made this country an agrarian hinterland for industry and for capital organisation and thus brought it into a vortex of modern economic relations without allowing the consequences of these trends to mature in the form of a fully industrialised society, with the agrarian structure as a healthy but subordinate part.[1]

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1. Economic Weekly, September 18, 1965, A.R. Desai.

First, analysing the historical factors, one finds that in the nineteenth century, there was impoverishment of land on account of excessive exploitation of the soil for the purpose of raising cash crops and failure to return to the soil, the necessary ingredients of plant food. Elizabeth Whitcombe[2] holds that the dominant aim of the British government was nowhere to make a desert blossom, but to stimulate the lagging traditional productivity of traditional agriculture into realising a greater and greater share of its potential wealth, within the shortest space of time and in areas where the investment necessary to achieve this aim might be assured of a generous as well as rapid return. This accounted for sharp inequalities in assets and in resources.

Between the benefits of higher prices for produce and the majority of producers, stood the ubiquitous creditor in his many forms - zamindar, rich peasant, headman, dealer and money-lander. The lender's concern was not so much to try to regain their capital but rather to create a regular source of income by pitching the charge high enough to make repayment of loan difficult in view of frequency of indifferent harvests. The provision of agricultural loans was the means par excellence of earning a rapid and sizable return on capital, as compared with other pursuits.

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2. "Agrarian Conditions in Northern India", Volume I, The United Provinces Under British Rule - 1860-1900, Elizabeth Whitcombe, (New Delhi, Thomson Press Ltd.)

Equality of rights to irrigation might well exist on paper. In practice, access was controlled by the distribution of local power in the regions through which canals ran. Besides, irrigation favoured exportable crops like wheat, cotton, sugarcane, etc. but not staple food-grains and fodder.

Landlords, in spite of all the assets they had, spent little on improving their estates, little in promoting the comfort or happiness of the numerous classes of labourers, who tilled their lands. If kacha well was to be dug, it was the tenant who found the capital. If seed grain was to be purchased, it was the landlord, perhaps, who did supply the money, but at a rate of interest of 25 or 36% to be afterwards repaid with capital.* The landlords were the focal points for local accumulation of capital in cash and kind.

Who could have informed the peasants of newly developed techniques? There was lack of any agency for instruction.

Claims to shares in the out turn of the harvest showed the marked disparity between the privileged and the under-privileged. The legal rights of the latter had amounted in effect to an hereditary status of subordination to the former. Production was controlled by the distribution of superior and inferior rights over land.

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* Elizabeth Whitcombe *Op. cit.*

The old zamindars, as a class, held their own; if some were sold out for debt, their places were taken by others of the same class and the redistribution did not bring in new men, aliens to the soil.

The British government's attempt at technological improvements on a small scale, in line with the best of contemporary farming practices in Britain, were far removed from the millions of small cultivators and their needs, to be in any sense efficacious.[3]

Thus, the differences in factor endowments and in assets, natural and man-made, were inherited from the pre-independence period.

A major impediment to viewing the problems of agricultural development in a more balanced perspective has been the notion popularised, that phenomenally high rates of growth in say, productivity, can be and will be achieved through the application of modern inputs.

Moreover, certain obvious measures such as extension of irrigation have been found to be to a large extent infructuous on account of various institutional impediments arising from the pattern of land holdings and the consequent inability to adopt all the necessary and otherwise feasible

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3. Elizabeth Whitcombe, "Agrarian Conditions in Northern India", The United Provinces Under British Rule, Vol.I. 1860-1900.

steps required for efficient water management. It would be therefore a serious error to repeat the mistake made earlier - of believing that a rapid acceleration in agricultural growth in output and more precisely in productivity is feasible in the immediate future if only much larger inputs such as chemical fertilisers are applied.[4] In fact, the demand for such inputs is itself likely to grow less rapidly than otherwise on account of the constraints of the kind referred to. Thus doubts are being expressed on productivity in future being a function of current seed-fertiliser technology. This is, of course, besides the point, that even the access to this technology is greater or less, depending on the inequality in the ownership of various assets.

According to B.P. Maheshwari,* it is not merely a question of enlarging the supplies of current inputs, it is at least as much a question of creating the social and institutional conditions within which these peasants will have adequate incentive to raise output and improve productivity of land.

The green revolution which affected productivity level had occurred not because of the introduction of new

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4. Dr. K.N. Raj, Economic and Political Weekly, (Annual number) 1976.

*. Industrial and Agricultural Development of India since 1914.

technology but because of the acceptance of it by the farmers. And the answer lay in the institutional and structural shifts, which ought to continue.

At this stage a pertinent question is: Are the growing inequalities in income due to greater inequality in the distribution of land among the farm households? The answer, according to Saini, is in the negative,[5] (though this study refutes Saini's point). Inequalities in the distribution of income have grown in spite of a relatively more equal distribution of cultivated land. This study however does not test the hypothesis relating to income, but proves that level of output value per hectare does increase with growing inequalities in land operated or in assets.

The weaker than FMS hypothesis that output per unit on smaller holdings was at least as large as on bigger holdings was sufficient to justify redistribution of land in favour of the farmer. This is the institutional reform suggested and widely accepted. It seems to contradict the conclusion of this study, namely the correlation existing between inequality and output level. But what one forgets

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5. G.R. Saini, Economic and Political Weekly, March 1976.

is that this result was arrived at on the basis of the existing social, political and institutional conditions, which are biassed towards those with more resources and more assets.

Owner-farmers with irrigated land are making money hand over fist; the bigger the farmers, the more they make. Of the burden of taxation, there is none to speak of; land values are spiralling; rents going up and condition of tenants is not better, if not worse. Demand for casual labour has increased and so have wages. Landless labour is somewhat better off. Yet there is no shortage of labour and with further sophistication of mechanisation, there is going to be confrontation with increasing number of unemployed. These were the observations of Wolf Ladejinsky,[6] after making a field trip to Punjab (a prosperous region, at that!)

[7]Despite a steep decrease in the relative share of land (land saving technology - irrigation) the combined share of interest, rent and profit income rises, indicating that land-owner farmers operating with hired labour gain absolutely and relatively from land augmenting technological change, whereas landless labour gain somewhat absolutely

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6. Economic and Political Weekly, June 28, 1969.

7. C.H. Hanumantha Rao, "Technological Change and Distribution of Gains in Indian Agriculture".

but lose in relative terms. There is a decreasing relative share of labour in output; but significant increase in absolute income of labour because of increased demand for labour and to the consequent increase in wage rate. Land augmenting change by itself decreased the relative share of land more than labour; relative share of hired labour in large farm sector decreased more than that of land, because of mechanisation. Therefore, there has been widening of income disparities between large land-owner farm and land-less labourers. And these are stemming from asset inequalities.

One reason for the big increase in the number of agricultural labourers over the past decade has been the shift of individuals from other usual occupations to agricultural labour. There is, in addition, a new class of agricultural labourers from households whose main income source is cultivation. Finally, according to Sheila Bhalla,[8] there has been the 'main occupation' shift of landless persons who were formerly artisans, unskilled non-agricultural labourers or self-employed in tending animal stock. Sheila Bhalla has analysed that in case of Haryana, it is surprising that the green revolution and the post-green revolution periods have seen virtually no collective

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8. Economic and Political Weekly, March 27, 1976.

exercise of their apparent bargaining strength. This is in spite of their earning more than they did, their standard of living in real terms improving, and large numbers shifting from casual to permanent labour status. The factor which has offset the rise in bargaining is the direct link which has been forged in prosperous regions between employment and new forms of indebtedness. Thus, the inequity in some form or the other continues to exist even in prosperous regions. No wonder, the access to resources is confined to a privileged few and that accounts for the cause and effect relation between inequality and productivity level.

Ernest Feder[9] has very rightly said that the surplus labour is not merely a function of land scarcity. But it is the result of lopsided tenure structure and pattern of use of land and labour, which is itself again determined by this structure.

The attitude of the British government was ... "the less we interfere the better. The welfare of the cultivator was, after all, the landlord's responsibility!"

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9. Economic and Political Weekly, April 3, 1976.

Structural and institutional changes have brought to the surface a stratum of Indian agriculturists, who are much more secure in terms of legal rights in their vast holdings, much more articulated - economically and politically vis-a-vis the wider society, and much less committed to village based needs of reciprocity and interdependence than were their predecessors of some 20 years ago.

According to J.S. Mill, ... "that government is always in the hands, or passing into the hands, of whatever is the strongest power in society, and that what this power is does not depend on institutions, but institutions on it".

Shorn of all verbiage, the 'new strategy' boiled down to accelerating the growth of capitalism in agriculture, without basic agrarian reforms - a modified version of what Lenin called, "the Prussian path", a path that was followed, though in a different context, by Stolypin in pre-revolutionary Russia.[10]

[11]It is not, however, the new technology which is the primary cause of the accentuated imbalances in the countryside. It is not the fault of the new technology that

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10. Paresh Chattopadhyay, "Imperialism and Revolution in South Asia", edited by Katheleen Gough and Hari P. Sharma.

11. Wolf Ladejinsky, Economic and Political Weekly, September 1969.

the credit service does not serve those for whom it was originally intended; that the extension services are not living up to expectations; that the panchayats are political, rather than development bodies; that security of tenure is a luxury of the few; that rents are exorbitant; that for the greater part, tenurial legislation is deliberately miscarried; or that wage scales are hardly sufficient to keep soul and body together.

These are man-made institutional inequities. Since, from the standpoint of the poor, an equitable distribution of the gains of development is much more important than a higher rate of overall growth, therefore agricultural modernization and production level and inequality should not be treated as a combination of technical factors, but also in which institutional problems and human conditions have a place.

CHAPTER VII

CONCLUSIONS - CONCEPT OF TRADE-OFF BETWEEN GROWTH AND EQUALITY

After analysing regional disparities in terms of growth indices, measure of inequality was discussed. The two were correlated and growth was regarded as a dependent variable and inequality, an independent variable. The regression coefficient was insignificant and so could not say, if any cause and effect relationship existed between the two. Time series variable (growth) had been related to cross-sectional variables (inequality in total assets, in productive assets and in operated land). To overcome this shortcoming, the level of agricultural production per hectare and inequality were correlated. Results were found to be

positive and significant. Thus it was proved that productivity is a function of asset inequality. Some of the existing literature was cited to show that technological and institutional factors can explain the level of output per hectare and inequality.

The argument that greater inequality is the cause of greater level of agricultural production, as empirically proved in this study, is however, a well accepted hypothesis in the Western, capitalist part of the world and is alternatively known as the famous conflict between efficiency and equity or between growth and social justice. But, to quote Mahbut al Haq, there is no use dusting off old theories and polishing up old ideas. The time is ripe for us to take a fresh look at the entire theory and practice of economic development. What is the point in indulging in polemics or in cliches and then arriving at most superficial, or at least highly irrelevant and trivial conclusions.? Thus, one must go beyond the conclusion reached in this study, namely that productivity is a function of asset inequality. And when one does, one finds that this assumes a static institutional and structural set-up. The hypothesis was not tested and can't be tested in a hypothetical situation, where a different set of social, political and economic institutions exist. Perhaps, in that situation, the hypothesis

may even get rejected. The existing conditions are biassed towards those with more resources and more assets, because they are economically and politically articulated. On the other hand, the need is of creating social and institutional conditions within which peasants will have adequate incentive to raise output and improve productivity.

As almost every one knows, the quickest and the most direct way to help the rural poor is to do away with the blatant inequalities in the distribution of land, by expropriating without compensation the entire landed oligarchy practically at one stroke, turning over the land to the peasants under an entirely new and more just land tenure system and thereby preparing the way for rapid increases in output, productivity and income and undertaking all the steps necessary (e.g., the nationalisation of the marketing system) so that the benefits accruing to the peasants will not be whittled away by the enemies of the reform and of the peasant. Leave alone such drastic, even much less drastic reforms are not undertaken. The argument that only the uncultivated portion of a big landholding ought to be expropriated is a counter-reform argument. The peasants are entitled precisely to the best cultivated land; otherwise the land reform will soon turn against them. To suggest

that a reform can be carried out 'without a hint of an attack on rights to property' is absurd.[1]

McNamara's 'Little Green Revolution' to help the rural poor has been criticised by Ernest Feder. How can the World Bank be certain that funds channelled to the poor will really reach them and not the rich landlords, merchants, farm input dealers and other exploiters? Besides, even if some of the small holders succeed in becoming richer in the competitive struggle, they will also become the exploiters of the less fortunate. Secondly, the more the small holders become involved in the capitalist economy, the greater will be the power of the rich to extract a surplus from them, leaving them with a net income no larger than they had before. Thus McNamara's strategy implicitly includes the calculated risk that hundreds of millions of these forgotten most absolutely poor will be led to death from absolute poverty and starvation. Ernest Feder asks, "Could this be the World Bank's revenge on the poor for creating the problemsit admittedly does not know exactly how to solve?"

A scheme which relies heavily on the market processes, (particularly for reallotment after consolidation of agricultural land) cannot but be heavily loaded in favour of

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1. Ernest Feder, Economic and Political Weekly, April 3, 1976.

those who have commanding positions in markets. Without a drastic redistribution of land holdings, or extension of technology any significant increase in productivity cannot be ensured. Another opinion is that proper corrective actions such as public investment in irrigation, consolidation of land holdings, rationalising input supply system, could extend this technology. The need for institutional change would differ from region to region. The nature and degree of the structural obstacles in land, labour, capital and commodity markets may differ from area to area and call for distinct remedies, not denying the inter-relationship among the markets.

The most obvious way to increase the income of small farms is to intensify the use of land through a proper combination of modern inputs and technology, the scope of which is limited, and to increase the total income by providing greater employment in farm and non-farm activities. Agricultural wage, forms a significant part of total income of small farmers. And HYVP can provide greater employment and higher wage rate, as a result of heavy demand for agricultural labour. Price of crop decreases due to increase in production and this results in lower farm income for large farms and higher real income for small farms. Introduction of new enterprises such as dairy, poultry, vegetable farming etc. are other avenues open to small farms.

Hence, a fly in the ointment, which stems from the fact that growth and prosperity cannot hide the fact that the new agricultural policy which has done a yeoman job in generating them is also the indirect cause of widening the gap between rich and poor. Both, i.e., prosperity and disparities, however, stem from asset and land inequalities. Others see the new technology as opening of Pandora's box.[2] Its very success will produce a number of problems which are far more subtle and difficult than those faced during the development of new technology.

It is not the fault of the new seeds that a technological breakthrough has not simultaneously occurred across the board. Science cannot be ordered about to produce the desired results, precisely when they are needed. Nevertheless, when a technological breakthrough in one segment transmits its ripples to the others, the emerging imbalances have to be corrected.[3]

The problems facing the country are complex, so are the solutions; and one should at least be humble enough to say that one does not quite know how they are all to be tackled. It is enough, however, if one knows the directions

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2. Foreign Affairs, April 1969, Clifton R. Wharton.

3. Dharm Narain, Economic and Political Weekly, March 25, 1972.

in which one needs to move in order to make progress and avoid following false signals and accepting false promises.[4]

The economy is bound to move in a direction in the good old English style of "muddling through", as a result of a series of ad-hoc measures and policies devised apparently in a practical spirit to deal with concrete problems as and when they arise.

[5]There should be determination to tackle the problems at the root, even if it implies facing squarely the power groups that are in the way and there is a period of apparent dislocation in the economy, while the gears are being changed and new directions set. This would require above all tackling the problems of agriculture in a comprehensive and thorough fashion, recognising the differences from region to region and even within each region. A different kind of planning from the sort had so far, is required - much more aware of the inter-regional differences; hence more decentralised, and more genuinely experimental and innovative with fewer models, directives and guidelines imposed from above. This would require a decentralised system of decision-making and of political arrangements.

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4. K.N. Raj, Economic and Political Weekly, (Annual number) February 1976.

5. K.N. Raj, Economic and Political Weekly, (Annual number) February 1976. op. cit.

It is only when the poor and landless peasants, the majority of the rural people, directly take politics into their own hands that the indispensable agrarian transformation can be effected, the main obstacles to economic development removed and India's dependence on imperialism done away with.[6]

On the other hand, the government is always in the hands or passes into the hands of the strongest power in society and what this power is does not depend on institutions, but institutions on it.

The concept of trade-off between growth and improved distribution is used sometimes not only to rationalise the prevailing unequal distribution of agricultural land and other asset inequalities but also to justify the intensive use (per acre) of scarce inputs like fertiliser and water on large farms and in developed regions, when it is clear that social product would be greater by spreading such inputs relatively thinly over a large number of farms in a wider area.

According to C.H. Hanumantha Rao[7] the processes of decision-making are not immune to, and in fact, are actively

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6. Imperialism and Revolution in South Asia, edited by Katheleen Gough and Hari P. Sharma. — Paresh Chattopadhyaya

7. Paresh Chattopadhyaya, Technological Change & Distribution of Gains in Indian Agriculture.

influenced by the efforts of dominant groups (say, those with large amounts of assets) to promote their own interest. So, the proposition of trade-off between growth and improved distribution is uninteresting, even if it does exist. It has little to do with the prevailing strategy, but is nevertheless used to rationalise the prevailing strategy. Besides, 'growth rate' or 'productivity' are aggregate magnitudes, which abstract entirely from distribution of gains. For it is quite possible that as a result of improved distribution, even if over-all growth of output is slowed down, share of poorer classes may remain higher in the long run, when compared to what they would have obtained in the absence of redistribution and with a higher growth rate. Slower growth implies a cut into the share of richer classes, because higher growth would have served largely to support elitist consumption. Besides, the fact that the improved distribution must slow down the overall rate of growth is open to serious doubt. Better distribution decreases investable surplus, because it increases the consumption of the poor. But it increases it efficiency and thus there can be an improvement in output-capital ratio and non-monetary capital formation.

Political prudence suggests that an appropriate balance between production and distribution goals should be sought. These are not irreconciliable goals. Gandhi had

very rightly pleaded with the propertied castes to 'read the signs of the time and revise their notion of God-given rights to all they possess'.

Production level and inequality should not be treated as a combination of technical factors, but also as variables in which institutional problems and human conditions have a place. Thus, it calls for a direct attack on poverty, involving institutional changes like land reform, employment-oriented growth and correction of the structural disproportionalities in production and highly skewed distribution of assets.

Somehow, the smug assumption that the pattern of inequality will remain the same as in the past and that therefore a high rate of growth is all that is needed to abolish poverty, makes little sense. One is certainly not concluding this study with a plea for a lower rate of growth, but a warning, that a high rate of growth is not a substitute for deliberate policies to ensure equitable distribution of the gains of development.

Thus the humanistic critique of economic development is today, more than ever before, necessary.[8] A genuine commitment to social reform is required, if the problems related to growth in agricultural output, productivity level and inequalities are to be given long-term solutions, which sustain

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8. E.P. Schumacher, Paths to Economic Growth, edited by Amlan Datta (Allied Publishers).

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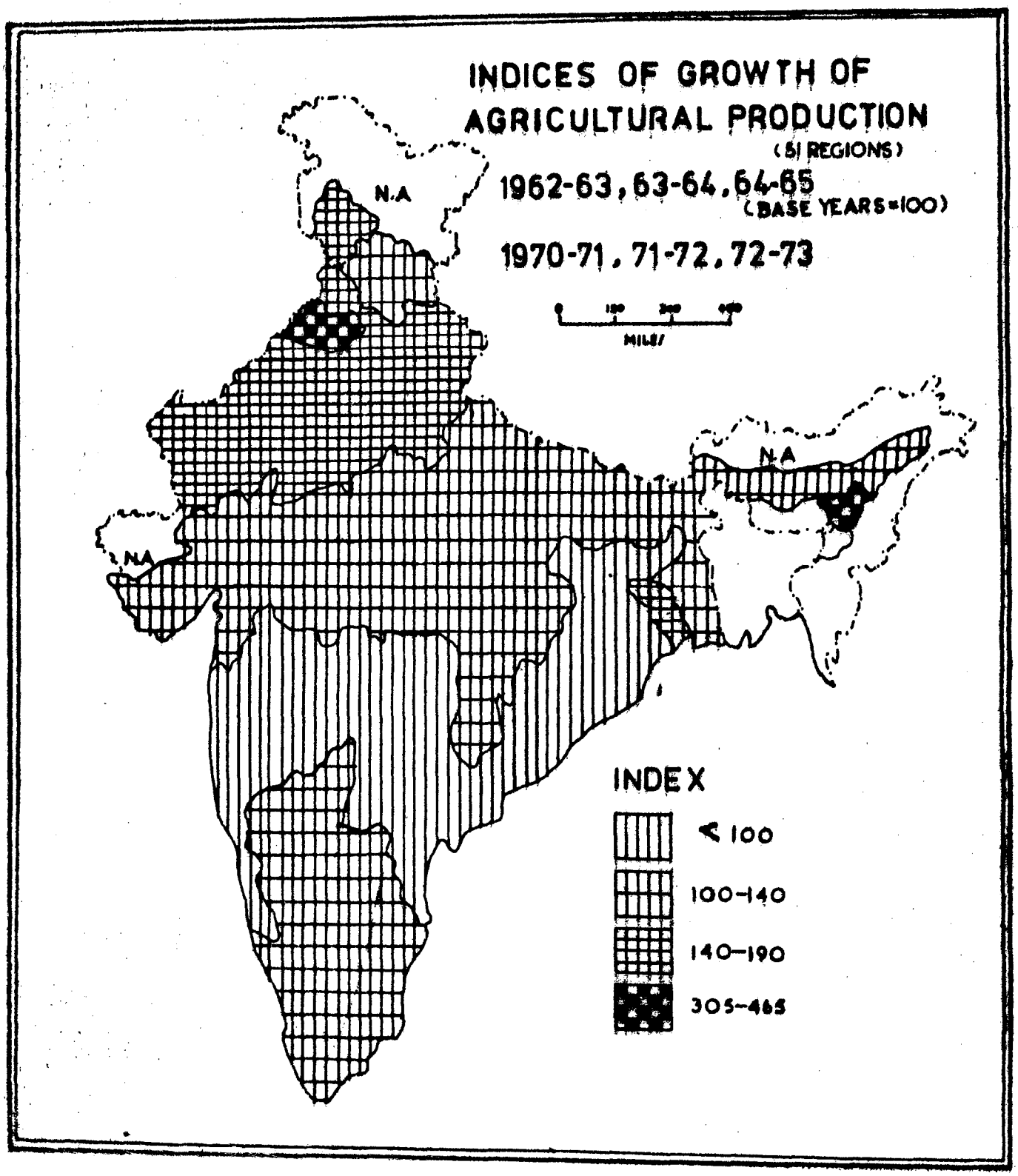
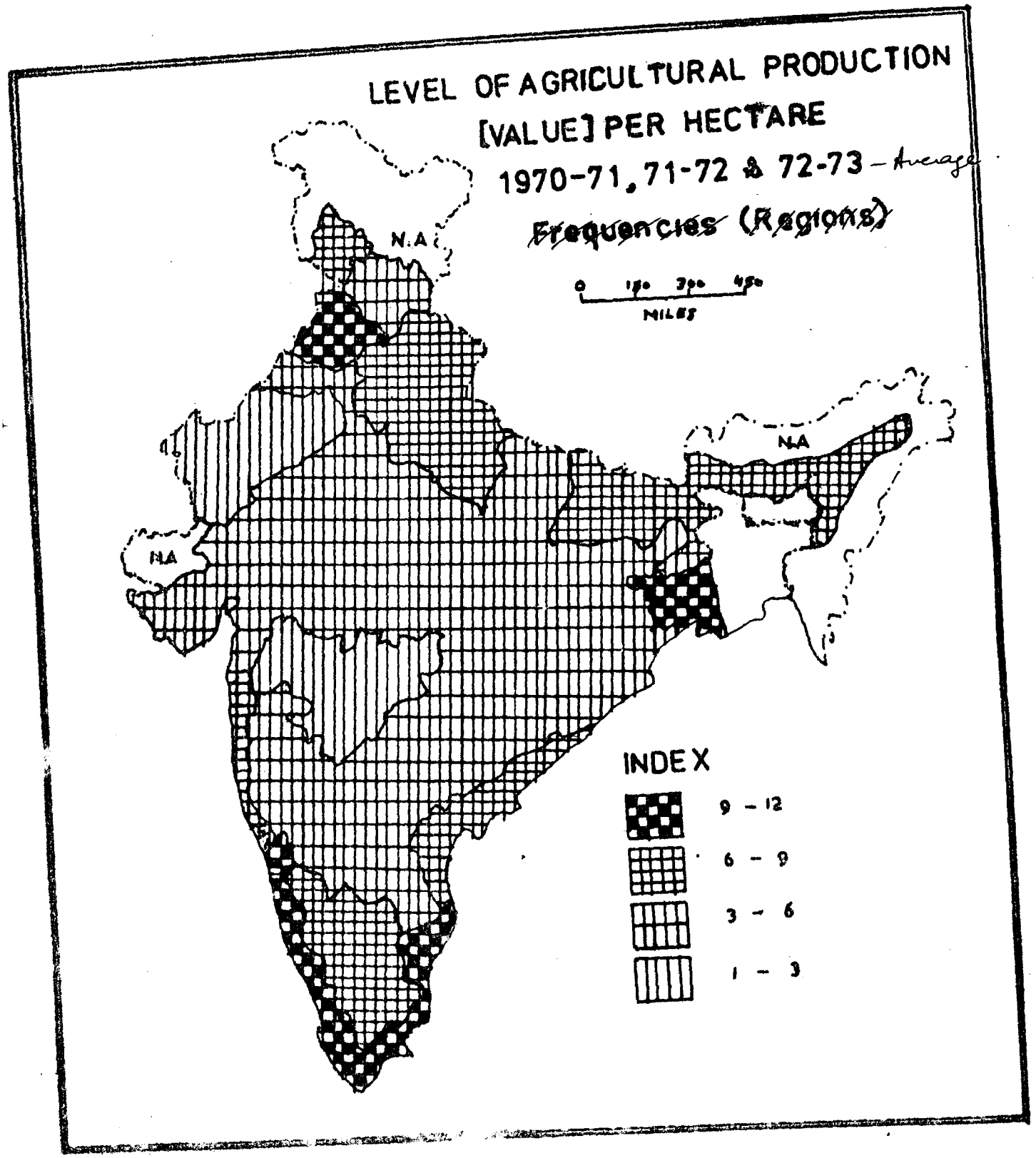
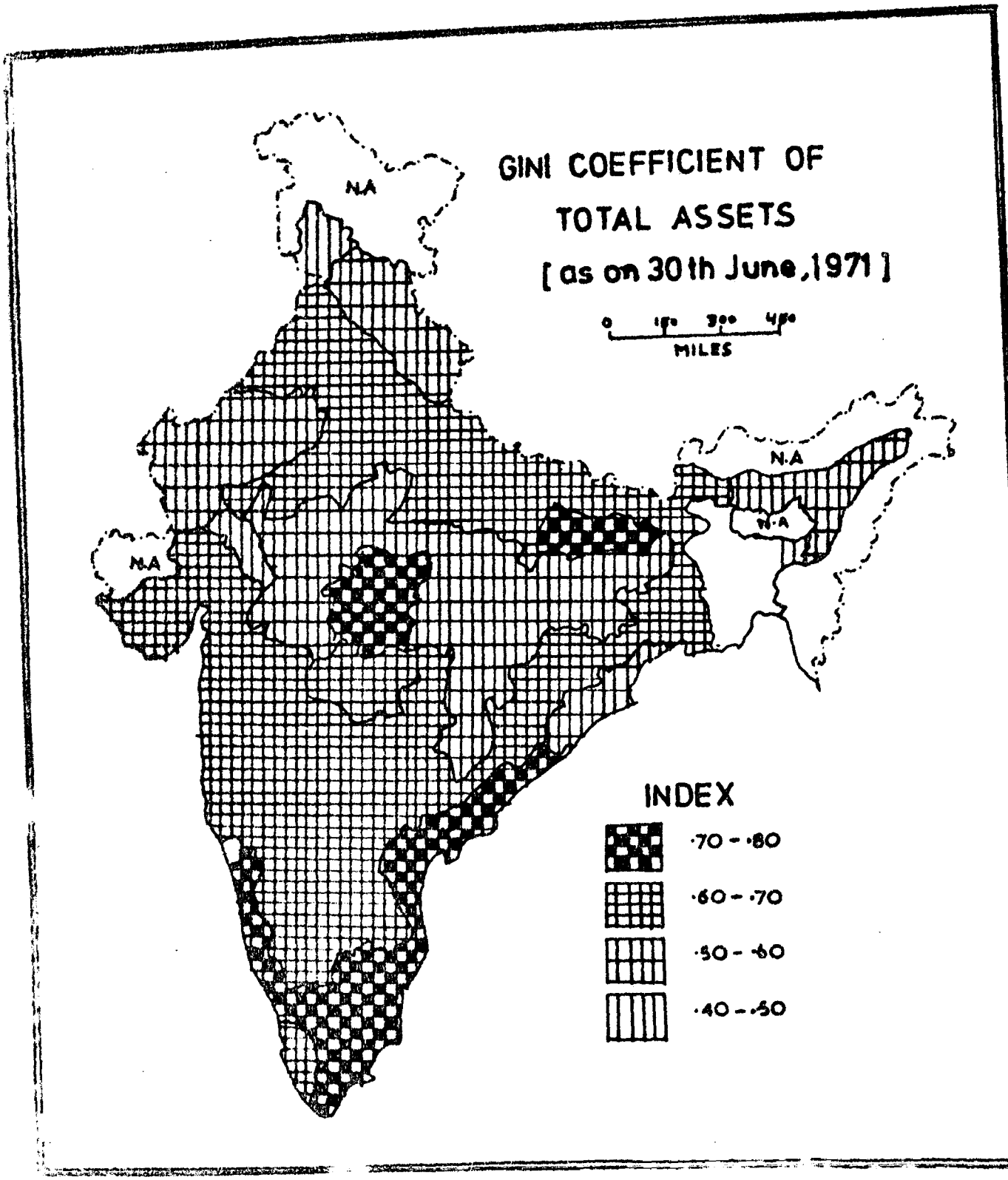
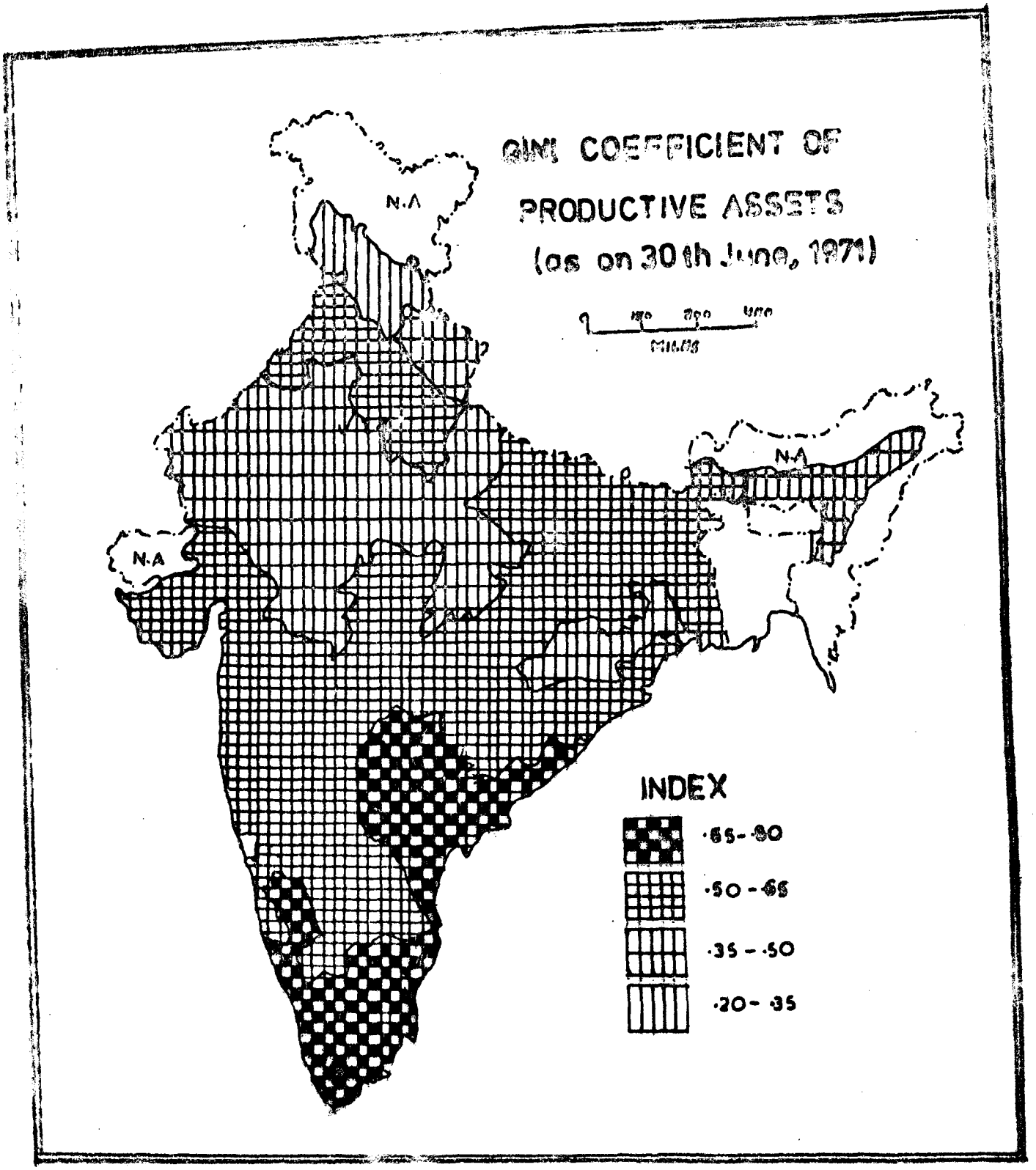

INDICES OF GROWTH OF
AGRICULTURAL PRODUCTION
(51 REGIONS)
1962-63, 63-64, 64-65
(BASE YEARS=100)
1970-71, 71-72, 72-73
MILES
N.A
N.A
N.A
INDEX
< 100
100-140
140-190
305-465


LEVEL OF AGRICULTURAL PRODUCTION
[VALUE] PER HECTARE
1970-71, 71-72 & 72-73 – Average
~~Frequencies~~ (Regions)
0 150 300 450
MILES
N.A
N.A
N.A
INDEX
9 – 12
6 – 9
3 – 6
1 – 3


GINI COEFFICIENT OF
TOTAL ASSETS
[as on 30th June, 1971]
0 150 300 450
MILES
N.A
N.A
N.A
N.A
INDEX
·70 - ·80
·60 - ·70
·50 - ·60
·40 - ·50


GINI COEFFICIENT OF
PRODUCTIVE ASSETS
(as on 30th June, 1971)
N.A
N.A
N.A
INDEX
·65-·80
·50-·65
·35-·50
·20-·35

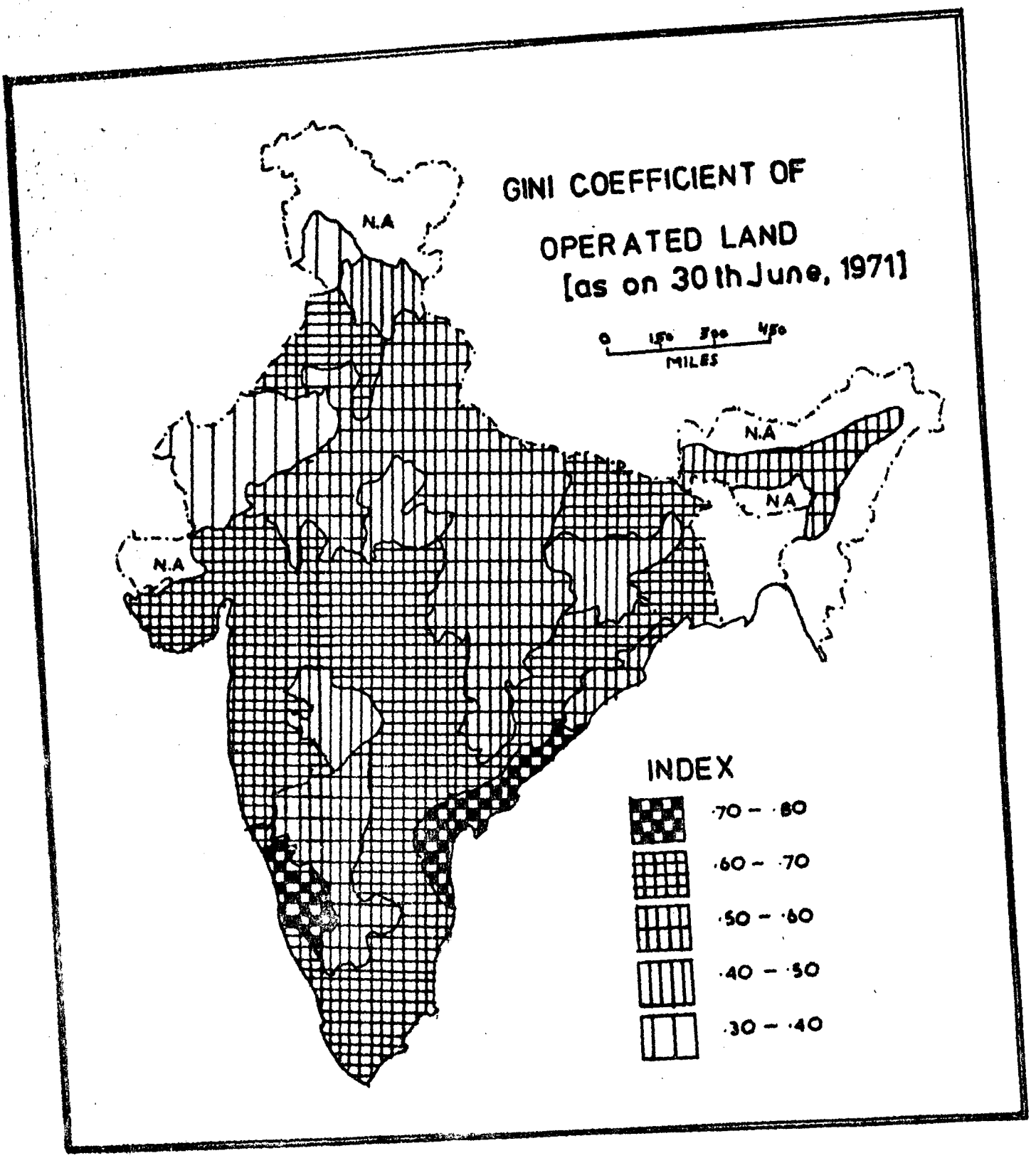

GINI COEFFICIENT OF
OPERATED LAND
[as on 30th June, 1971]
0 150 300 450
MILES
N.A
N.A
N.A
N.A
INDEX
·70 – ·80
·60 – ·70
·50 – ·60
·40 – ·50
·30 – ·40

Table - 1

Indices of growth of agricultural production for the 51 regions

(1970-71, 71-72 & 72-73) (19 crops)

(1962-63, 63-64 & 64-65 - Base years = 100)

ANDHRA PRADESH		**KERALA**	
1. Coastal	80.11	18. Northern	115.36
2. Inland northern	75.49	19. Southern	118.10
3. Inland southern	102.66		
		MADHYA PRADESH	
ASSAM		20. Eastern	112.81
4. Plains	117.50	21. Inland eastern	114.04
5. Hills	306.03	22. Inland western	111.74
		23. Western	112.60
BIHAR		24. Northern	118.95
6. Southern	91.10	**MAHARASHTRA**	
7. Northern	126.44		
8. Central	112.71	25. Coastal	96.54
		26. Inland western	74.58
9. GUJARAT	121.46	27. Inland northern	67.16
		28. Inland central	57.66
HARYANA		29. Inland eastern	80.73
10. Eastern	162.28	30. Eastern	68.05
11. Western	185.09		
		ORISSA	
12. HIMACHAL PRADESH	129.41	31. Central	97.17
		32. Southern	98.34
13. JAMMU & KASHMIR	157.13	33. Northern	98.01
KARNATAKA		**PUNJAB**	
14. Coastal & Ghats	94.09	34. Northern	143.03
15. Inland eastern	129.06	35. Southern	463.18
16. Inland southern	115.79		
17. Inland northern	113.97		

Table - 1 (Contd.)

RAJASTHAN		**UTTAR PRADESH**	
36. Western	153.62	43. Himalayan	172.70
37. North-eastern	158.15	44. Western	140.00
38. Southern	115.36	45. Central	119.72
39. South-eastern	148.32	46. Eastern	115.51
		47. Southern	125.09
TAMIL NADU		**WEST BENGAL**	
40. Coastal northern	132.62	48. Himalayan	120.50
41. Coastal southern	129.90	49. Eastern Plains	128.21
42. Inland	110.52	50. Central Plains	121.60
		51. Western Plains	163.95

Table - 2

Calculation of Cimulative Percentages of Households of Productive Assets, of Total Assets & Land Operated

(A Sample - A.P. Coastal Region : Such tables for each of the 51 regions)

Asset Group in rupees	% of HH	No. of HH	Livestock (Average value per HH ~~per~~ in rupees)	Total value of livestock (2) x (3)	Implements and machinery (Average value per HH in rupees)	Total value of implements and machinery (2) x (5)	Total value of productive assets (4) + (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Upto 500	26.53	843.12	13.94	11753.09	7.41	6247.52	18000.61
500 - 1000	14.44	458.90	88.36	40777.85	21.99	10091.21	50869.06
1000 - 2500	16.28	517.38	191.25	98948.93	44.16	22847.5	121796.43
2500 - 5000	13.43	426.81	299.72	127923.49	49.79	21250.87	149174.36
5000 - 10000	12.34	392.17	512.49	200983.2	138.78	54425.35	255408.55
10000 - 15000	5.53	175.74	754.68	132627.46	212.55	37353.54	169981.0
15000 - 20000	3.05	96.93	916.52	88838.28	345.7	33508.70	122347.04
20000 - 30000	3.00	95.34	1188.97	113356.39	610.23	58179.33	171535.72
30000 - 50000	2.52	80.09	1533.13	122788.38	711.14	56955.20	179743.58
50000 - 100000	2.11	67.06	2046.38	137230.24	1313.39	88075.93	225306.17
100000 & Above	0.78	24.79	3131.45	77628.65	7065.12	175144.32	252772.97
Total	100.00		362.69		177.64		Σ = 1716935.4

Table - 2 (Contd.)

Asset Group in rupees	% value of productive assets	Cumulative % of productive assets	Cumulative % of HH	Total assets (Average value per HH in rupees)	Total value of total assets (11) x (2)	% value of total assets	Cumulative % of total assets
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Upto 500	1.05	1.05	26.53	237.76	200460.21	.87	.87
500 - 1000	2.96	4.01	40.97	699.41	320959.24	1.40	2.27
1000 - 2500	7.09	11.1	57.25	1612.01	834021.73	3.63	5.90
2500 - 5000	8.69	19.79	70.68	3606.06	1539102.4	6.70	12.6
5000 - 10000	14.88	34.67	83.02	7021.95	2753798.1	11.99	24.59
10000 - 15000	9.90	44.57	88.55	11936.80	2097773.2	9.13	33.72
15000 - 20000	7.13	51.7	91.6	17164.11	1663717.1	7.24	40.96
20000 - 30000	9.99	61.69	94.6	24704.11	2355289.8	10.26	51.22
30000 - 50000	10.47	72.16	97.12	38506.12	3083955.1	13.43	64.65
50000 - 100000	13.12	85.28	99.23	65053.75	4362504.4	19.00	83.65
100000 & Above	14.72	100.00	100.01	151421.02	3753727.0	16.35	100.00
Total				7226.68			
					$\sum$= 22965307		

Table - 2 (Contd.)

Land operated (in acres)	% of HH	No. of HH (in 000's)	Land operated (Average value per HH in rupees)	Total value of land operated (17) x (18)	% value of land operated	Cumulative % of land operated	Cumulative of HH
(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Nil	49.31	1567	606.71	950714.57	5.84	5.84	49.31
.01 - .50	5.38	171	1012.54	173144.34	1.06	6.90	54.69
.50 - 1.00	7.43	236	2188.08	516386.88	3.17	10.07	62.12
1.00 - 1.25	6.39	203	2875.48	583722.44	3.59	13.66	68.51
1.25 - 2.50	11.45	364	4964.85	1807205.4	11.11	24.77	79.96
2.50 - 5.00	8.87	282	8780.74	2476168.6	15.22	39.99	88.83
5.00 - 7.50	4.72	150	13666.91	2050036.5	12.60	52.59	93.55
750 - 10.00	2.08	66	22205.93	1465591.3	9.01	61.60	95.63
10.00 - 12.50	1.51	48	26786.25	1285740.	7.90	69.50	97.14
12.50 - 15.00	0.60	19	37576.76	713958.44	4.39	73.89	97.74
15.00 - 20.00	1.10	35	44930.22	1572557.7	9.66	83.55	98.84
20.00 - 25.00	0.47	15	56903.53	853552.95	5.25	88.80	99.31
25.00 - 30.00	0.31	10	61777.77	617777.7	3.80	92.60	99.62
30.00 - 50.00	0.31	10	95202.28	952022.8	5.85	98.45	99.93
50.00 & Above	0.06	2	126742.53	253485.06	1.56	100.01	99.99
Total	100.00		5107.48				
				$\sum$ = 16272060			

Table - 3

Productivity, Growth and Gini Coefficients (Region-wise)

1. Level of agricultural production (value) per hectare (1970-71, 71-72 & 72-73)
2. Gini coefficient of productive assets (as on 30th June 1971)
3. Gini coefficient of total assets (as on 30th June 1971)
4. Gini coefficient of operated land (as on 30th June 1971)
5. Percentage of operated land less than 5 acres -- 1971
6. Indices of growth of agricultural production (1962-63, 63-64, 64-65 to 70-71, 71-72 & 72-73)

Regions (same as in table 1)	(1)	(2)	(3)	(4)	(5)	(6)
1.	7.37	.68	.77	.72	39.99	80.11
2.	3.06	.69	.66	.62	24.95	75.49
3.	5.29	.63	.69	.60	29.19	102.66
4.	6.69	.43	.52	.56	54.88	117.50
5.	7.85	.45	.51	.52	40.27	306.03
6.	4.83	.55	.57	.44	60.93	91.10
7.	6.25	.53	.68	.61	50.57	126.44
8.	6.31	.55	.72	.67	36.03	112.71
9.	5.17	.58	.64	.66	18.41	121.46
10.	7.97	.52	.66	.66	13.58	162.28
11.	5.39	.48	.62	.57	11.78	185.09

Table - 3 (Contd.)

Regions	(1)	(2)	(3)	(4)	(5)	(6)
12.	5.74	.29	.51	.44	50.21	129.41
13.	6.70	.30	.46	.33	70.79	157.13
14.	9.26	.58	.73	.74	29.77	94.09
15.	8.87	.68	.75	.71	20.03	129.06
16.	8.05	.57	.65	.55	40.92	115.79
17.	3.80	.55	.61	.55	14.64	113.97
18.	9.56	.79	.71	.65	60.17	115.36
19.	9.92	.68	.66	.63	72.77	118.10
20.	4.96	.55	.59	.56	27.98	112.81
21.	3.40	.48	.58	.55	20.14	114.04
22.	3.68	.52	.63	.62	7.58	111.74
23.	3.47	.47	.57	.55	8.74	112.60
24.	4.00	.44	.56	.47	21.28	118.95
25.	7.52	.61	.63	.63	43.57	96.54

Table - 3 (Contd.)

Regions	(1)	(2)	(3)	(4)	(5)	(6)
26.	3.61	.59	.66	.59	22.97	74.58
27.	2.79	.62	.67	.62	12.35	67.16
28.	1.60	.56	.64	.60	7.97	57.66
29.	2.10	.64	.70	.61	7.40	80.73
30.	3.62	.52	.60	.60	28.85	68.05
31.	5.88	.51	.59	.55	59.03	97.17
32.	5.45	.50	.62	.62	37.50	98.34
33.	5.55	.48	.61	.60	37.14	98.01
34.	11.18	.56	.70	.63	26.44	143.03
35.	10.50	.56	.69	.67	8.23	463.18
36.	1.48	.47	.51	.37	6.83	153.62
37.	4.04	.41	.60	.55	16.23	158.15
38.	4.55	.38	.46	.40	41.44	115.36
39.	4.26	.42	.54	.51	14.52	148.32
40.	10.98	.68	.71	.67	55.91	132.62

Table - 3 (Contd.)

Regions	(1)	(2)	(3)	(4)	(5)	(6)
41.	10.04	.66	.72	.66	50.39	129.90
42.	8.47	.72	.71	.69	45.28	110.52
43.	6.35	.44	.55	.51	74.16	172.70
44.	8.29	.51	.63	.59	36.95	140.00
45.	6.00	.46	.57	.50	47.41	119.72
46.	5.51	.51	.60	.55	53.46	115.51
47.	4.25	.45	.60	.54	20.85	125.09
48.	7.26	.42	.63	.57	46.09	120.50
49.	7.45	.60	.68	.63	45.23	128.21
50.	9.40	.59	.67	.65	59.08	121.60
51.	10.63	.48	.60	.59	57.07	163.95

Table - 4

Computer Results

1 -- Productivity (value of agricultural production per hectare in 1970-71, 71-72 & 72-73)

2 -- Gini coefficient of Productive Assets

3 -- Gini coefficient of Total Assets

4 -- Gini coefficient of Operated Land

(As on 30th June 1971)

5 -- Percentage of operated land less than 5 acres - 1971

6 -- Indices of Growth of Agricultural Production (1962-63, 63-64, 64-65 to 70-71, 71-72 & 72-73)

Correlation Matrix

	v(1)	v(2)	v(3)	v(4)	v(5)	v(6)
v(1)	I	.304750	.407513	.424370	.501342	.380540
v(2)		I	.830811	.749616	-.025025	-.205015
v(3)			I	.906393	-.121007	-.122191
v(4)				I	-.128915	-.059654
v(5)					I	-.086497
v(6)						I

Table - 4 (Contd.)

1. Dependent Variable 1 Independent Variable 2 Mult. Corr. Coeff. = .304750 F = 5.016 > Tabulated F-value (4.04) at 5% sig. level but < 7.20 at 1% level DF = (1,49) X_1 = 2.1254512 + 7.591513 X_2 Regr. Coeff. = 7.591513 Standard Error = 3.389377 Student T = 2.239 > 1.68 (5%, 48)	2. Dependent Variable 1 Independent Variable 3 Mult. Corr. Coeff. = .407513 F = 9.757 > Tabulated F value (7.20) at 1% sig. level. DF = (1,49) X_1 = -2.8285644 + 14.408478 X_3 Regr. Coeff. = 14.408478 1.96 S.E. Standard Error = 4.612578 Student T = 3.123 > 2.41 (1%, 48)
3. Dependent Variable 1 Independent Variable 4 Mult. Corr. Coeff. = .424370 F = 10.762 X_1 = -1.1570721 + 12.612199 X_4 Standard Error = 3.844419 Student T = 3.280	4. Dependent Variable 1 Independent Variable 5 Mult. Corr. Coeff. = .501342 F = 16.450 X_1 = 3.8929858 + .064366 X_5 Regr. Coeff. = .064366 Standard Error = .015869 Student T = 4.055

Table - 4 (Contd.)

5. Dependent Variable 6 Independent Variable 2 Mult.Corr. Coeff = -.205015 F = 2.149 < Tabulated value (4.04) X_6 = 193.27492 -121.904960 X_2 Regr. Coeff. = -121.904960 Regr. Coeff. < 1.96 S.E. Standard Error = 83.140516 Student T = 1.466 < 1.68 (5%, 48 d.f.)	6. Dependent Variable 6 Independent Variable 3 Mult. Corr. Coeff. = -.122191 F = .742 X_6 = 192.50932 -103.125730 X_3 Regr. Coeff. = -103.125730 Standard Error = 119.663810 Student T = .861
7. Dependent Variable 6 Independent Variable 4 Mult. Corr. Coeff. = -.059654 F = .174 X_6 = 152.59398 -42.319323 X_4 Regr. Coeff. = -42.319323 Standard Error = 101.163720 Student T = .418	8. Dependent Variable 6 Independent Variable 5 Mult. Corr. Coeff. = -.086497 F = .369 X_6 = 137.40517 -.265082 X_5 Regr. Coeff. = -265082 Standard Error = .436161 Student T = .607

Table - 4 (Contd.)

Variable	A.M.	S.D.	C.V.
1	6.1950979	2.5370768	.40
2	.53607842	.10184734	.18
3	.62627450	.071755849	.11
4	.58294117	.085366567	.14
5	35.765686	19.760971	.55
6	127.92431	60.559854	.47