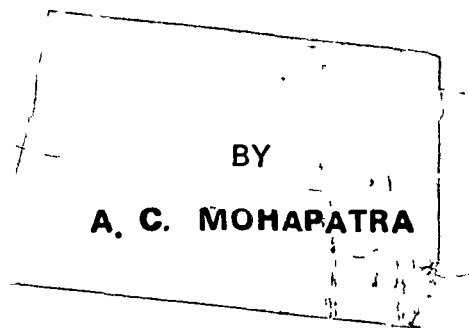


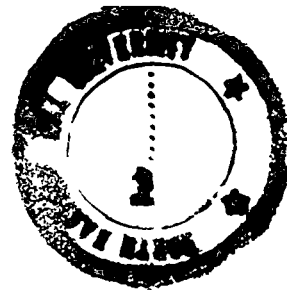
REGIONAL INEQUALITY IN INDIA

(1960-61 to 1978-79)

An Empirical Study of the Income, Population
and Welfare, in the context of Intra-
and Inter-regional Variations.



Thesis Submitted for the Degree of
Doctor of Philosophy



Department of Geography
School of Environmental Sciences

**NORTH EASTERN HILL UNIVERSITY
SHILLONG**

MARCH 10, 1982

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This is to certify that the thesis submitted by Shri A.C. Mohapatra for the degree of the Doctor of Philosophy (Ph.D) at the Department of Geography, North Eastern Hill University, Shillong, Meghalaya, titled, "Regional Inequality in India (1960-61 to 1978-79): An Empirical Study of the Incomes, Population and Welfare, in the Context of Intra - and Inter-regional Variations", is a bonafide study of the author to the best of our knowledge and believes.

This study may now, be placed before the examiners for due evaluation.

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CONTENTS

		<u>Page</u>
	Acknowledgement	i - ii
	Preface	iii - v
	List of Tables	vi - x
	List of Maps	xi
	List of Appendices	xii - xiii
CHAPTER-I	INTRODUCTION	1 - 28
CHAPTER-II	SURVEY OF EXISTING LITERATURE	29 - 47
CHAPTER-III	THE NATURE AND SOURCES OF DATA	48 - 64
CHAPTER-IV	METHODOLOGY	65 - 92
CHAPTER-V	REGIONAL INEQUALITY OF NET DOMESTIC PRODUCT AND PER CAPITA INCOME IN INDIA, 1960-61 TO 1978-79	93 - 136
CHAPTER-VI	INEQUALITY OF SECTORAL INCOME IN INDIA, 1960-61 TO 1975-76	137 - 170
CHAPTER-VII	INEQUALITY OF PER CAPITA AGRICUL- TURAL OUTPUT (INCOMES) IN INDIA, 1962-65 TO 1970-73	171 - 218
CHAPTER-VIII	GROWTH OF REGIONAL INEQUALITY : AN AGRICULTURE ORIENTED HYPOTHESIS	219 - 243
CHAPTER-IX	INTRA-REGIONAL INEQUALITY : A CASE STUDY OF THE STATE OF MADHYA PRADESH, 1960-61 TO 1972-73	244 - 287
CHAPTER-X	CONCLUSION	288 - 300
	Appendices	301 - 354
	Bibliography	355 - 368
	Glossary	369
	Addendum	370 - 373
	Bio-data	374

ACKNOWLEDGEMENT

The author is greatly indebted to Dr. Majid Husain for his kind supervision of the study and painstaking editing of several drafts of the manuscript. The author is also indebted to Professor Moonis Raza, Professor R.C.Sharma, Professor G.S. Bhalla, Professor C.R. Pathak, Professor L.S. Bhat, Dr. Shri Prakash, Dr. Edward vandre velde (Fulbright Fellow) and Dr. Sanjoy Chandra for inspirations and encouragements at several stages of the study. Thanks are also to the Vice-Chancellor, North Eastern Hill University and Dr. R.K. Rai, Head, Department of Geography, North Eastern Hill University, Shillong for making available possible facilities at NEHU for carrying out this research.

Special mention of thanks must be made to colleague, Shri N.P. Goel, and Research Scholars, Sarvashri R. Sahu, P. Panda, S.K. Rai, S. Chatteraj and S.C. Majumdar for immense help rendered by them at several stages of the work.

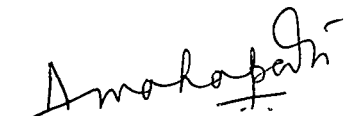
The author is grateful to the NERC - ICSSR for providing a sum of grant for field investigations and collection of data and research materials during the winter of 1980-81. Thanks are also to the Computer Centre, Gauhati University for providing computational facilities for some sections of the study. The author is indebted to the Librarian, North Eastern Hill University, Shillong, Librarian, Jawaharlal Nehru University, New Delhi, the National Income Cell, Central Statistical Organisation, New Delhi, Perspective Planning Division, Planning Commission, New Delhi and the Directorate of Economics and Statistics, Government of Madhya Pradesh, Bhopal for kind cooperation and making available research materials.

(ii)

Furthermore, there are a host of friends, colleagues and students to whom the author is grateful, but would not be able to acknowledge here by name.

The views expressed in the study are entirely of the author and the views and opinions of other scholars are duly cited in the text. Needless to say that the omissions in the study are either of ignorance or of negligence and the mistakes, the sole responsibility of the author.

March 10, 1982
SHILLONG


(A C MOHAPATRA)

P R E F A C E

India is a poor country. It is not because, it is less endowed in terms of physical resources, nor because that the environment is less suitable for hardwork by the people, as has been argued by a host of Anglo-Saxon anthropo-geographers in support of the perpetuation of the Empire (i.e. environmental determinism). The root lies in her heritage of century old slavery and the history of unimpeded exploitation. It is also, imbedded in the methods of exploitation over centuries, i.e. the unequal terms of trade. The roots of poverty also lies in the nature and character of the socio-economic system which was ushered in, implanted in the soil of the country and was nourished. One may agree, one may not agree but the truth remains unchallenged in the continuing miseries of the people. As R.C. Dutt says, "There is a verdict on the conduct of great rulers which is more true and more abiding than that of historians and that verdict is the verdict of the people."*

However, poverty of people is not only confined to their individual realm but is also, manifested in the areas/regions they live in. Unfortunately, the academic interests in the study of people, as manifested in the character of their regions, are of relatively recent origin and particularly so, from the point of view of the discipline of geography. As evident from studies of Myrdal and Hirschman** not only inequalities between the standard of living of people in different regions of a backward country is more glaring than a developed country but, such inequalities tend to increase over time. The limited

* R.C. Dutt (1902), The Economic History of India 1757-1837, vol.I, Routledge & Kegan Paul, London, p.54.

** Gunnar Myrdal (1957), Economic Theory and Underdeveloped Regions, Rautledge & Kegan Paul, London.
A.O. Hirschman (1958), The Strategy of Economic Development, Yale, New York.

studies which could be examined point to no clear conclusion, as to whether in the process of planned development in India the levels of regional inequalities are declining or accentuating. It need not be emphasised further, that the reduction of such inequalities have remained one of the major objectives of the national plans, right from its inception in 1951. On the other hand, these studies are inconclusive in terms of the root causes of such inequalities.

The aim of the present study is limited. The objective is very specific. It tries to explore, systematically the process of regional inequality in India at various regional levels, over a period of eighteen years. From the beginning of the third Five Year Plan to the end of the Fifth Five Year Plan (1960-61 to 1978-79). The choice of the period of the study is important in light of the fundamental structural changes in the spatial economy of the country, i.e. the beginning of the era of Green Revolution or, its ramifications in terms of the 'capitalist development' of agriculture in certain pockets of the country. It is expected that a few of the issues can be probed into and a still fewer can be answered. A lot shall be left for others to judge.

In Chapter-I the main issues are raised, the problem identified and the objectives pin-pointed. Additionally, some of the controversial issues, e.g. the role of a geographer in the social context and the 'region' have been tried to be defined.

Chapter-II deals with a systematic critique of the related literature. Needless to say the literatures available are vast and only, a very limited number of books and articles could be surveyed in a selective manner. In Chapter-III, a systematic study has been attempted in elaborating and selecting official and private information and data to be used in the empirical analysis of the problem.

In Chapter-IV a detailed discussion of the methodology has been carried out. This Chapter is broken up into

three sections, dealing with three different empirical levels of the study, i.e. (i) per capita income at the national and state levels, (ii) per capita agricultural income at the level of districts and natural regions and (iii) study of the intra-regional inequality of socio-economic criteria with relation to a specific region i.e. Madhya Pradesh.

Chapter-V deals with the analysis of statewide net domestic products and per capita income from 1960-61 to 1978-79 and the process of regional inequalities over the period of the two decades. An attempt has also been made to introduce a new algorithm of measuring spatial inequalities in this Chapter. In Chapter-VI an analysis of per capita income and inequalities has been attempted in their sectoral compositions. Chapter-VII deals with a disaggregated analysis of the inequality of per capita agricultural income at the district level for two points of time, one prior to the Green Revolution, i.e. 1962-65 and the other at a reasonable peak of it, i.e. 1970-73. In Chapter-VIII, some tentative answers have been provided to a number of issues, raised in the preceding chapters. This chapter is largely, supportive and the arguments put forward are based on some of the findings of the author and in the studies of other scholars.

The last empirical section of the study (Chapter-IX) deals with the specific, intra-regional issues of a case region, i.e. Madhya Pradesh. The method used is deductive to a certain extent. Some of the issues thrown at the national level, in the preceding chapters are verified at the specific level of a region. On the other hand, in this chapter a detailed study is attempted over a continuous length of the period, from 1960-61 to 1972-73.

As has been pointed out earlier, the aims and objectives are limited to the scope of a dissertation and it is only hoped that a few of the questions are answered to some satisfaction and a lot more issues are raised for others to explore.

March 10, 1982
SHILLONG


(A C MOHAPATRA)

LIST OF TABLES

Sl.No	No	Caption	page
1.	V.1	Net Domestic Product at Factor Cost, India 1960-61 to 1978-79 at 1960-61 prices	96
2.	V.2	Index Numbers of Per Capita NSDP (1960-61 to 1978-79)	101
3.	V.3	Ranking of States by Per Capita N & P (1960-61 to 1978-79)	103
4.	V.4	Percentage Share of States in Indian population (1961, 1971 and 1981)	107
5.	V.5	Annual Compound Growth Rates of Population of Indian States	109
6.	V.6	Compound Growth Rates of Per Capita NDP (1960-61 to 1978-79)	111
7.	V.7	Correlation Matrix of Per Capita NDP from 1960-61 to 1978-79	113-114
8.	V.8	Linear Trend Rates of NSDP and Per Capita NSDP at Factor Cost, 1960-61 to 1978-79	116
9.	V.9	Unweighted (Vuw) and Weighted (Vw) coefficient of Variations of Per Capita NSDP at (1960-61 prices)	118
10.	V.10	Annual Compound Growth Rates of Inequality Indices of Per Capita Income	119
11.	V.11	Per Capita NDP at Factor Cost at 1960-61 prices	121-12
12.	V.12	Annual Compound Growth Rates of Per Capita NDP (Comparable)	123
13.	V.13	Inequality of Per Capita Incomes (Based on Comparable data)	125
14.	V.14	Annual Compound Growth Rates of Inequality Indices at Per Capita Income	126
15.	V.15	Weighted Income distances of Indian States, 1960-61 to 1978-79 (by modified algorithm)	129-13
16.	V.16	Annual Compound Growth Rates of Weighted Income Distances of Statewise Per Capita NDP, 1960-61 to 1978-79	132

Sl.No	No	Caption	pages
17.	v.17	Linear Lagged Regression	134
18.	VI.1	Net Domestic Product by Sector (Industry) of origin at 1960-61 prices	140
19.	VI.1(a)	Compound Growth rates of sectoral NDP from 1960-61 to 1975-76	139
20.	VI.2	Share at NDP by Sector of Origin (1960-61 to 1975-76)	142
21.	VI.2(a)	Annual Compound Growth Rates of Sectoral Share of NDP	143
22.	VI.3	Sectoral NDP at Factor Cost, Agricultural Sector (at 1960-61 prices)	144
23.	VI.4	Sectoral NDP at Factor cost, Non-agricultural Sector (at 1960-61 prices)	146
24.	VI.5	Percentage Sectoral share of NDP from State total	147
25.	VI.6	Percentage Share of Sectoral NDP, Agricultural Income	149
26.	VI.7	Percentage Share of Sectoral NDP, Non-agricultural Income	151
27.	VI.8	Per Capita Sectoral NDP, Agricultural Incomes (at 1960-61 prices)	152
28.	VI.9	Ranking of States on the Basis of Per Capita Agricultural Income, 1960-61 to 1975-76	154
29.	VI.10	Index Number of Per Capita Agricultural Income, 1960-61 to 1975-76	155
30.	VI.11	Per Capita Sectoral NDP, Non-agricultural Income, (at 1960-61 Prices)	157
31.	VI.12	Ranking of States on the Basis of Per Capita Non-Agricultural Income, 1960-61 to 1975-76	158
32.	VI.13	Index Numbers of Per Capita Non-agricultural Income, 1960-61 to 1975-76	160
33.	VI.14	Annual Compound Growth Rates of Per Capita Agricultural Income	162

Sl.No	No	Captions	Page
34.	VI.15	Annual Compound Growth Rates of Per Capita Non-Agricultural Income	164
35.	VI.16	Correlation Matrix of Per Capita Sectoral Income 1960-61 to 1975-76	165
36.	VI.17	Unweighted (Vuw) and Weighted (Vw) coefficient of variations of Sectoral Incomes	167
37.	VI.18	Annual Compound Growth Rates of Unweighted and Weighted Inequality Indices	167
38.	VII.1	Per Capita Agricultural Income (State-wise), 1962-65 to 1970-71	175
39.	VII.2	Index Numbers and Ranks of Per capita Agricultural Output (1962-65 to 1970-73)	176
40.	VII.3	Frequency Distribution of Per Capita Agricultural Income (Districtwise), 1962-65	180
41.	VII.4	Frequency Distribution of Per Capita Agricultural Income (Districtwise), 1970-73	182
42.	VII.5	Frequency Distribution of Growth Rates of Per Capita Income (1962-65 to 1970-73)	183
43.	VII.6	Frequency Distribution of Per Capita Agricultural Output(1962-65)	184
44.	VII.7	Frequency Distribution of Per Capita Agricultural Output(1962-65)	185
45.	VII.8	Frequency Distribution of Growth Rates of Per Capita Agricultural Output (1962-65 to 1970-73)	196
46.	VII.9	Per Capita Agricultural Output, Natural regionwise (1962-65 to 1970-73)	197
47.	VII.10	Index Numbers and Ranks of Regions According to Per Capita Agricultural Income (1962-65 and 1970-73)	199
48.	VII.11	Unweighted Coefficient of variations of Per Capita Agricultural Output (1962-65 and 1970-73)	210
49.			

Sl.No	No	Captions	Page
49.	VII.12	Weighted Coefficient of Variations of Per Capita Agricultural Output (1962-65 and 1970-73)	211
50.	VII.13	Natural Regionwise unweighted Coefficient of Variations of per Capita Agricultural Incomes (1962-65 to 1970-73)	213
51.	VII.14	Natural Regionwise weighted Coefficient of Variations of Per Capita Agricultural Income (1962-65 and 1970-73)	214
52.	VIII.1	Growth Rates of Crop Output and Area (1952-55 to 1969-72)	225
53.	VIII.2	Statewise Growth Rates of Crops (1952-55 to 1969-72)	227
54.	VIII.3	Concentration of Land Holdings and Rich Farmers in Early Sixties	229
55.	VIII.4	Marketed Surplus and Size of Holding (1950-51 and 1960-61)	231
56.	VIII.5	Composite Price Indices of Agricultural and Industrial Goods	236
57.	VIII.6	Indices of Terms of Trade (1951-52 to 1964-65)	239
58.	VIII.7	Indices of Terms of Trade (1964-65 to 1972-73)	241
59.	IX.1	Highest Eigen values and Percentage of Explained variations, Block-A and Block-B (1960-61 to 1972-73)	252
60.	IX.2	Annual Compound Growth Rates of Indices of the Traditional Sectors(Block-A)	259-260
61.	IX.3	Annual Compound Growth Rates of Indices of the Modern Sectors (Block-B)	262-263
62.	IX.4	Final Composite Index of Levels of Development in Madhya Pradesh(Block-I), (1960-61 to 1972-73)	265.266
63.	IX.5	Annual Compound Growth Rates of Indices of Final Index of Levels of Development in Madhya Pradesh (Block-I)	268-269

(x)

Sl.No	No	Captions	Page
64.	IX.6	Lagged Regressions of the Final Index of Development in Madhya Pradesh (1960-61 to 1972-73)	271
65.	IX.7	Unweighted Coefficient of variations (Vu _w) of Block-A, Block-B and Block-I	272
66.	IX.8	Weighted Coefficient of Variation (V _w) of Block-A, Block-B and Block-I	281
67.	IX.9	Intra-quartile and Inter-quartile Deviations of Indices of Development in Madhya Pradesh (Block-I)	283

LIST OF MAPS

Sl.No.	No.	Caption	page
1.	VII.1	Per Capita Agricultural Output, 1962-65 (districtwise)	186
2.	VII.2	Per Capita Agricultural Output 1970-73 (districtwise)	189
3.	VII.3	Compound Growth Rate of Per Capita Agricultural Output(1962-65 to 1970-73)	194
4.	VII.4	Per Capita Agricultural Output, 1962-65 (Natural Regionwise)	203
5.	VII.5	Per Capita Agricultural Output, 1970-73 (Natural regionwise)	205
6.	VII.6	Compound Growth Rates of Per Capita Agricultural Output, (1962-65 to 1970-73)	208
7.	VII.1	Levels of Regional Development, 1960-61, 1961-62, 1962-63 and 1963-64 (Districtwise)	274
8.	IX.2	Levels of Regional Development, 1964-65, 1965-66, 1966-68 and 1967-68 (districtwise)	275
9.	IX.3	Levels of Regional Development, 1968-69, 1969-70, 1970-71 and 1971-72 (districtwise)	276
10.	IX.4	Levels of Regional Development, 1972-73 and Compound Growth-rates, 1960-61 to 1966-67, 1966-67 to 1972-73 and 1960-61 to 1966-67 (districtwise)	277

LIST OF APPENDICES

Sl.No	No	Caption	Page
1.	V.A	Net State Domestic Product of Factor cost (at 1960-61 prices)	301-302
2.	V.B	Percentage Share of NSDP by States (1960-61 to 1978-79)	303-304
3.	V.C	Per Capita Net State Domestic Product (at 1960-61 prices)	305-306
4.	V.D	Net Domestic Product at Factor Cost (Comparable Series, (at 1960-61 prices)	307-308
5.	V.E	Population Composition of Indian States and Union Territories (1961, 1971, 1981)	309
6.	VII.A	Per Capita Agricultural Incomes, Districtwise (1962-65 to 1970-73)	310-321
7.	VII.B	Divisionwise Per Capita Agricultural Output (Income) (1962-65 and 1970-73)	322-324
8.	VII.C	Unweighted and Weighted coefficient of variations of per Capita Agricultural Output (Income) (1962-65 and 1970-73) Natural Divisions	325-327
9.	VII.D(i)	Statewise Projected Rural Population and Share in India's Population (1962-65 and 1970-73)	328
10.	VII.D(ii)	Regionwise Projected Rural Population and Share in India's Population (1962-65 and 1970-73)	329-330
11.	VIII.A	Index Numbers of Whole-Sale Prices (1965-66 to 1973-74)	331
12.	IX.A	Correlation Matrix of the Original 14 variables (1968-69)	332
13.	IX.B	Correlation Matrix of the Traditional Sectors: Block-A (1960-61 to 1972-73)	333-336

Sl.No	No	Caption	Page
14.	IX.C	Correlation Matrix of the Modern Sectors: Block-B (1960-61 to 1972-73)	337-340
15.	IX.D	Eigen Roots, Percentage Variations Explained and Factor Loadings of 14 variables	341
16.	IX.E	Eigen roots, Percentage of variation Explained and Factor Loading of the Traditional Sectors - Block-A	342-346
17.	IX.F	Eigen roots, Percentage of variation Explained and Factor Loadings of the Modern Sectors - Block-B	347-350
18.	IX.G	Composite Index of the Traditional Sectors : Block-A (1960-61 to 1972-73)	352-352
19.	IX.H	Composite Index of the Modern Sectors: Block-B (1960-61 to 1972-73)	353-354

CHAPTER - I

"It is the boast of inductive Philosophy that it draws its conclusions from the careful observation and accumulation of facts; and it is equally business of all philosophical research to determine facts before it ventures upon speculations."

Nirod C. Choudhury
(Scholar Extra-Ordinary)

INTRODUCTION

Political Economy :

"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner," says Adam Smith "but from their regard to their own interest. We address ourselves not to their humanity but to their self-love and never talk to them of our necessities but their advantages."¹ This is typical of the despair of the classical political economy over the growing free competition and the resultant class differentiation ushered in by the Capitalist Era. David Ricardo defines political economy as "the produce of the earth - all that is derived from its surface by the united application of labour, machinery, and capital is divided among three classes of the community, namely, the proprietor of the land, the owner of the stock or capital necessary for its cultivation, and the labourers by whose industry it is cultivated To determine the laws which regulate this distribution is the principal

¹Adam Smith (1910) Vol. 1, p.13.

problem in Political Economy."² So from Jevons to Mill,³ Adam Smith and Ricardo the concern in the academia is at the growing class differentiation manifested around the gradually flourishing Industrial Revolution and to a great extent in support of it (as for example, Ricardo).

But, it was not until Marx and Engels that it could get a sound footing within a delicate end - Nineteenth century intellectual setting. Engels defines political economy as "the science of the laws governing the production and exchange of the material means of subsistence in human society."⁴ Even Marx in defence of Ricardo says, in his Critique, "Economist like Ricardo, who are accused above all, of having paid exclusive attention to production, defines distribution, therefore, as the exclusive subject of political economy, because they instinctively regard the form of distribution as the clearest forms in which the agents of production find expression in a given society."⁵ But, it has been both production and distribution activities in the society

²David Ricardo (1911), p.1.

³J.S. Mill (1864), defines Political Economy, "Political Economy considers mankind as occupied solely in acquiring and consuming wealth, and aims at showing what is the course of action into which mankind, living in a state of society would be impelled if that motive were absolute ruler of all their actions.", p.138.

⁴F. Engels, Anti Duhring, p.203.

⁵K. Marx., Op.cit., p.285.

which forms the basis of all Marxian foundation of political economy. It has been very aptly summarised by Lange, "Political economy, or social economy, is the study of the social laws governing the production and distribution of material means of satisfying human needs."⁶

It is, however, not the isolated, fragmented, and illogical analogy of production and distribution which concerns the Marxian framework, but, a clear dialectical relationship of the conditions of material existence of man in the society. For example, Marx makes it explicit, "In production the person is embodied in things, in (consumption) things are embodied in persons Distribution determines what proportion (quantity) of the products the individual is to receive; exchange determines the products in which the individual desires to receive his share allotted to him by distribution."⁷ Therefore, distribution (share) has always played the focal point of classical discussions of political economy except that in Marx-Engels scheme it forms only an inseparable part of the material conditions of production - distribution - exchange system

⁶O. Lange, (1963), Vol. I, p.1.

⁷K. Marx, Op.cit., p.275.

in the society. Even, welfare economist like Schumpeter argues that 'the sole study of economics should be around the distribution of national income.'⁸

Inequality :

So, logically what follows from the distribution is a premise of inequality, or else, if, everyone was equal then there is hardly any necessity of considering the problem of distribution. The frame of Marx - Engels, around the historical materialism, the growing pauperisation of working class under capitalism, the precipitation of class antagonism and ultimately, the revolutionary break into the socialist mode of production singularly point to the dialectical process through which the social development passes to achieve from unequal to a more equal position of the objective living condition for man. As Bauer and Prest say 'inequality may either be applied quite generally to cases where incomes or wealth are simply different, just as we might refer to two people living of unequal height or to a moralistic tune of the Oxford English Dictionary,' the fact of occupying a more or less advantageous position.⁹ But the crux of the issue is neither the factor share, nor the simplistic,

⁸J.A. Schumpeter (1952), pp.428-435.

⁹A.B. Atkinson (1975), p.4.

incompassionate look at the ordinal difference, but the normative approach to the question of "social desirability of such social inequalities whether incomes or by other social standards as pointed out by Tinbergen.¹⁰ But, hardly are there unanimous answer to the problem. This is evident in the desperate statement of Pen.

"Everybody known that incomes are unequally distributed, but everybody has his own idea about the causes of this and about the steps that would lead to an improvement... The debate has generated more heat than light."¹¹

This was the feeling, largely because, until the dawn of the Twentieth century, political economy had no objective method in measuring the amount of inequality in the society. This was the time Vilfredo Pareto put forth his famous law, "In given circumstances, an optimum position was defined when nobody could be shifted to a higher indifference - curve without causing a downward shift for someone else."¹² In other words, given the unequal levels of income distribution (size) it would require more than average effort to improve the lot of

¹⁰J. Tinbergen (1956), quoted in J.Pen (1971), p.252.

¹¹J. Pen (1971), p.15.

¹²V. Pareto (1927), p.295.

the poor. Pigou cross refers, "to raise the level of minimum income or to diminish the inequality of income, it is necessary that wealth should grow more rapidly than population."¹³ In a way Pareto's analysis was two way beneficial, (i) providing a universal proposition as to the quantitative behaviour of income distribution within the society (with the necessary variance of ' α ') and (ii) a clear normative answer to the problem. Naturally, this generated a greater theoretical and empirical interest in the West.¹⁴ But, with the growing utilitarianism and marginalism, many of the questions remained unanswered from Marshall to halfway of the Keynesian Revolution. Gibrat, D.G. Champernowne (1953) and M. Friedman (1953) provided some new insights into the problem on the basis of the random probability effect of increase in income on the line of the Markov's process.¹⁵ Yet, other explanations are of the Multiple-Effect Theory of Roy (1956)¹⁶ and Social Hierarchy Theory of Lydall (1968).¹⁷

The problem however, remains unanswered on two

¹³A.C. Pigou (1920), p.648.

¹⁴M.O. Lorenz (1905), p.152 and C. Ginui (1935), on the Measures of Concentration with Special Reference to Income and Wealth, Report on the Cowles Commission, U.K.

¹⁵For details see J. Pen, Op.cit., p.241.

¹⁶A.D. Roy (1950), pp.152-178.

¹⁷H. Lydall (1968), The structure of earnings. For other explanations see, A.K. Sen (1973), On Economic Inequality, pp.24-46.

accounts, (i) that income inequality, in one way or other has not been completely removed by structural changes as advocated under Marxism - Leninism, not at least in the manifest form of socialist societies, seen today, although around economic achievements cannot be overlooked, and (ii) secondly, the 'share' or 'size' distributions, particularly, the emphasis on the latter has not led to any new insight into either the problem or the solution.

It is felt that many of the questions have remained unanswered, due to the scanty attention provided to the objective conditions of man in their spatial manifestations. After all, any study of distribution has one way or other, to be seen at an aggregative level, (more of a cognitive parlance,) than just at the level of objective reality. "The petty and middle bourgeois critique of capitalist monopolies is also, expressed in what is known as welfare economics,"¹⁸ headed by its founder A.G.Pigou. It would be argued that scant attention has been paid to the inequality problem in its 'regional manifestation' (as part of the objective reality) both by Marxist and non-Marxist alike. After all, regions are not geographical expressions without human component, but

¹⁸ O. Lange, Op.cit., p.317.

human aggregates, in clear, comprehensive and dialectical rapport with the natural environment.

The Region :

'Region' is a dialectical synthesis (of areal phenomena on earth) of two significant but, mutually contradicting characters of 'man-nature' relationship, i.e. 'homogeniety' and 'heterogeniety', which define the material conditions of existence of man. Let it be elaborated. In the process of all natural phenomena, all forces are directed from inequity to equity, from complexity to simplicity but, in the process newer inequities are created as explained by all natural laws, e.g. say Plate Techtonics or the resultant processes of mountain building, or the process of levelling-up, seen by the erosional processes associated with that. But human-beings, being the most active force in this process, in search of a material niche, have^{been} continuously becoming a progressive force to become compatible with the eternal processes of nature. That is what becomes crucial for 'man-environment (nature) relationship', so very crucial to Marx and Engels.¹⁹

On the otherhand, at any historical stage of

¹⁹Say for example, the 'production relation' as Marx says "an exchange between man and nature" discussed in O. Lange (1963), p.20.

human society, the earth is but a canvass portrayed, simultaneously by the natural as well as the human forces. The resultant picture is, but a synthesis of two antagonistic characters, 'homogeneity' or 'equality' and at the sametime, 'heterogeneity' or 'inequity'. A defined area is homogeneous or equal by certain physical or material characters of the society (cultural) and at the sametime heterogeneous or unequal by other characteristics.

But, hardly, in the two centuries of classical and modern studies, the term region has ever been clarified with unanimity in any accepted parlance. R. Hartshorne while commenting on 'region' expressed the fact that many geographers have stated the concept in question 'region' as a fundamental axiom of regional geography does not mean that regional geography itself necessarily stands or falls with the axiom, nor that the more general concept of geography as a chorographic subject depends upon this axiom. Consequently, the feeling has been a general indecision and a growing despair.²⁰ In fact, trying to define 'region', R.B. Vance in the International Encyclopaedia of Social Sciences reduces the concept from simplicity to naivety.

²⁰P. Haggett (1972), p.257.

A region is a homogeneous area with physical and cultural characteristics distinct from those of the neighbouring areas.²¹ But, these are the 'formal' categories. What about the 'functional' or 'nodal' types? The effort to define this concept, so rudimentary but, so fundamental to geography was done half a century back, by Richard Hartshorne.²² Through the process of preparing a comprehensive review the earlier concepts of region, i.e. the 'natural regions' of Gatzert; the ambiguous 'landscape' of the German; the early Twentieth Century 'organic' concept of Ratzel and followers in America; Renner's 'regions as genuine entities'; or Leigh's 'arbitrarily chosen fragment of land,' he has journeyed from the evil to the vice. His edifice stands on the scourage of pure intellectual activity, 'region as a mental reconstruction;' as he says, "since the hypothesis with which we are concerned represents an intellectual construction rather than either a statement of obvious fact or a product of research."²³ So, the essence is lost for any human significance, to what Vidal de la Blache stated a decade

²¹R.B. Vance in D.L. Sill (Ed) (1968), p.377.

²²R. Hartshorne, *Op.cit.*, pp.285-361.

²³*Ibid.*, p.253. Also subsequently says; "Since, nature (reality) has been so unkind as not to present us with obviously individual concrete objects such as those that are ready to hand for the Astronomer, or Zoologist, and we must construct our own by intellectual activity, it follows that any principles we attempt to develop can have no more validity than the 'objects' we have constructed as their foundation." p.254.

earlier, "A region is a reservoir of energy which origin lies in nature but whose development depends on man."²⁴ But, Hartshorne's position has been avidly buttressed by half a century of Western intellectual thinking i.e. by James and many others.²⁵

Naturally, this is not quite acceptable an idea to large part of the socialist geographers, which is aptly summarised by Pokshishevskiy in his essay 'on the Soviet concept of economic regionalisation;' "Geographical reality' is a complex situation of closely interwoven and diversely interlinked phenomena. Regions may be delimited when analysing these phenomena, based on separate features (components) or a set of them."²⁶ On the otherhand, rejecting the American understanding of region 'Carte Blanche' further says "the idealist concept of a region as a 'mental construction' having only Cognitive significance, entered Russian science from abroad, only in the last decade before the Revolution; it existed for sometime in the Soviet period and was then, rapidly eliminated by the victory of the Marxist materialist point of view."²⁷ This position has earlier been vindicated by Alampiev and Sauskhin etc., in the early sixties.

²⁴D.L. Sill (1968), p.378.

²⁵P. James (1954), for example defines, "The region is a device for illuminating factors of a problem. It is not an objective fact, rather, it is an intellectual concept" cited in V.V. Pokshishevskiy (1975).vol.7,p.6.

²⁶Ibid., p.4.

²⁷Ibid., p.6.

It seems the basic arguments around defining a region has, axiomatically, always remained with the concept of internal homogeneity or what has been mentioned earlier of the equality.²⁸ This naturally, cannot be taken for granted since, inequality or heterogeneity is as much the reality as homogeneity, in the realm of the phenomenal world. What really cries attention, is the nature of the process itself, dialectics of the material realities of man. In the quest for a better application of the concept, there is the necessity of, understanding the 'axiomatic basis', a logical, as well as universally agreed, thesis in defining a region. There would be few axioms which is found suitable to provide this basis.

- a) Territorial Axiom : It is universally agreed that a region is basically an areal concept; or spatial concept to which specific geographical location and territory is of utmost importance.
- b) Completeness Axiom : It can be easily seen that any part of the earth which is sub-divided into regions should be complete in the sum-total and not leaving scope for undefined territories in the intervening space between

²⁸The same is reflected in a recent study by A.Kundu (1980) he defines, "Region as an agglomeration of geographically contiguous units, identified with a specific objective in mind on the basis of homogeneity in terms of certain physical, economic and social characteristics," p.17.

two regions. To specify, if, A and B are two regions of an universal region, any other region 'C' in the interface of A and B, is only a null set. Therefore, this also, ushers in the concept of 'contiguity' which is also fundamental to the above axiom.

- c) Axiom of Human Aggregation : This is fundamental to two ideas of geography, (i) the man-environment relationship; so, avidly putforth by the French Possibilist School of La Blache, Brunhes and Demangeon etc.; the central role of man; and (ii) secondly, the Robinson Crusoe - analogy²⁹ putforth by Marx as an unacceptable reality, since, man's position is essentially defined by his being part of the social reality. Therefore, a region can be neither Sans human, nor contain a single, isolated individual, but a society of men, defined upon by his historical existence and production relations. This is fundamental to all regional concept, that the basis being a society (and therefore, aggregation) in a historical process.
- d) Group Axiom : A region cannot be defined in isolation. It is meaningless to say about 'world as a region' unless, there are other worldscontiguous to it. Therefore, it is essentially a group concept.

²⁹K. Marx, (1959) Critique, in the outline he refers the Robinson Crusoe episode as a fiction, romantic adventurism and has nothing to do with the real world conditions, for example, O. Lange (1963) says,

"The social character of production is a result of the social character of labour. Men producing goods do not work in isolation." p.5.

- e) The Axiom of Order (Hierarchy) : Like any other scientific approach to understand reality, an ordinal scaling is necessary, as to in what magnitude demands a precise understanding. This is true of the ordering in landforms or in any other scientific taxonomy, so necessary to all scientific disciplines concerning the understanding of the processes of nature and man.
- f) Equality Axiom or Axiom of Homogeneity : In the historical process of man-nature relationship a certain amount of homogeneity emerges, whether on the basis of a purely physical process of, say, delta formation or reduction of mountains to plateaus and ultimately, to the 'base level'. Same is the case of cultural characteristics, human practices, say of agricultural systems, cropping practices and patterns etc.. Such a concept of internal homogeneity, of which so much has been said, is certainly a vital element in the region-making process. Lange says "If concrete economic processes are discussed with regard to their distribution on the surface of the earth, then this is the concern of economic geography."³⁰

To summarise if, there are two regions A & B, $a_1, a_2, \dots, a_n \in A$ and $b_1, b_2, \dots, b_n \in B$, then, $a_1 = a_2 = \dots = a_n$ to the extent, that in the same manner $b_1 = b_2 = b_n$ and $a_1 \neq b_1, a_2 \neq b_2$ to the extent that, $A \neq B$.

³⁰ O. Lange, Op.cit., p.92.



g) Axiom of Inequity or Heterogeneity : As a counterpose to the axiom of equality (f), is the axiom of inequity and here, only lies the essence of the dialectical method of understanding concrete material processes in history, and society. The same way regions can be differentiated with the concept of internal equality and external difference as outlined in (f), in the same way it can be seen that two contiguous regions (homogeneous) are no separate entities, but internally, inconsistent with all equality conditions, i.e. $a_1 = a_2 \dots = a_n$, and can be dealt with a field axiom, that it may be so, that there exists an ordinal field from one element to other and can be defined as

$a_1 \gg a_2 \gg \dots \gg a_n$.. But since, the difference of membership vanishes $a_1, a_2, \dots, a_n \notin A$ or, $b_1, b_2, \dots, b_n \notin B$, but are only of U (the universe) and the field may flow from A to B or from B to A , which for that matter no longer is significant. It is fundamental to the understanding of inequality, to that extent, that the ordinal scale turns to the cardinal point, i.e. the running water explained by the field of 'altitude', 'base level' and the 'distance'; so also, is the case of population concentration, from the city to its hinterland, defined by a changed in the field of density.

Naturally, both the axioms (f) and (g) cohabit in all physical and material phenomena and ought to be

understood in proper dialectical perspective, to understand the nature of a region. In fact, Pokshishevskiy commenting on the Alampiev - Sauskhin debate of the sixties, hints at this processes without being explicit.

"Actually the process of discovering objectively - existing regions, is a gradual, not instantaneous process; it may involve a number of stages of successive approximation to forms which will ultimately correspond to reality."³¹

Regional Inequality :

'Regional concept being so fundamental to all studies in economic geography, and inequality being so crucial to studies in distribution and therefore, as mentioned, to political economy, that the combination of the two concepts opens of new possibilities in social science research. As Amin puts forth, "The only possible science is the science of the society, for social reality is one: its never 'economic' or 'political' or 'ideological' etc., even though social reality can be approached, upto a certain point from a particular angle - that of anyone of the traditional university disciplines."³² Naturally, its only the social reality which matters and disciplinary

³¹V.V. Pokshishevskiy, (1975), p.16.

³²Samir Amin, (1974), p.5.

approach can be useful to a certain extent, but, for a fuller comprehension, painful incursions are necessary in essential directions. As has already been discussed, the 'axiom of human aggregates' makes the crucial point of departure of traditional geographer and regional scientists from the current one. After all, as every grain of the earth cannot be adequately explained, but only aggregated, human aggregations are necessary in their social formations, so as to explore general principles of the society and its operators. Thus, studies of this nature can only be another manifestation of distribution studies of 'size type' under the utilitarian - welfare framework, but to the extent that it is the spatial, or regional manifestation of the distribution.

The other question is of course, intimately related with the problem of under-development, a term needing hardly any further introduction. Quite obviously, the world scenario is only too disparate in terms of economic achievements, or even, in terms of subsistence conditions, not to attract attention of even the most phillistine.³³ Naturally, the question of under-development

³³D.E. Keeble (1967) in R.J. Chorley and P.Haggett (1967) (Eds.) says "The existence of regional inequality in income - in both absolute and per capita - within virtually all countries is by now well attested. Put another way, economic development is scarcely ever spread evenly over the whole area of a given state unit, but rather concentrated at certain points, producing a mosaic of regions at different levels of economic prosperity," p.257.

being the moot-point for the post.- Second World War canvass of the Third World countries. With the euphoria of a new born, the order from the international to sub-national formations are inseparable and only, integral part of the same manifestation of the reality." A Gunder Frank says, "the contemporary under-developed institutions of the so-called backward or feudal domestic areas of an under-developed country are no less the product of the single historical process of capitalist development than are the so-called capitalist institutions of the supposedly more progressive areas."³⁴ So, the problem is of an integrated nature; from personal inequality, to regional inequality and therefore, to the problem of under-development. ' 1

World Formations :

The quest for an answer to underdevelopment is not new, but, the answers themselves are varied, quite often in juxtaposition to each other and internally, inconsistent. The reality being what Pareto said, at least half a century back 'History teaches us that the governing classes have always tried to speak to the people not in words they believe are the most truth, but

³⁴A. Gunder Frank (1975), The Development of Underdevelopment, p.3.

in those which best suit the objectives they have in mind.³⁵

Quite naturally, all kinds of theoretical and empirical propositions are placed for the understanding of the world manifestation of underdevelopment. Say for example, Hoover and Fisher (1949) put forth the theory of 'autonomous growth' for a region passing through a number of stages - a sort of 'evolutionary theory' of regional development.³⁶ Quite soon, Rostow tried to convince that after all the advanced countries have also, gone through the painful reality of being backward, and quite naturally, the Third World Countries have to be in the waiting till their turn of 'unlimited' mass consumption comes.³⁷ Quite incredible to be acceptable. Quite soon the 'Export Base Model' was advocated, that capital (the thing) being naturally short in backward countries or regions the way out is to export the primary commodity and import the capital goods. That is Douglas North.³⁸ Marginalists and Neo-Keyensians have number of mathematical solution, with little realism, nor scope for application. The II World War transformed the

³⁵V. Pareto (1927), p.98.

³⁶E.M. Hoover and J. Fisher (1949) "Research in Regional Economic Growth", Problems in the Study of Economic Growth, National Bureau of Economic Research, NY, pp.180-188.

³⁷W.W. Rostow, (1969), pp. 156-186.

³⁸D.C. North (1955), "Location & Regional Economic Growth", Journal of Political Economy, vol.63(3), pp.243-258, reprinted in Regional Policy, Friedman & Alonso, MIT, Mass, 1974.

scenario. Reorganisation of political boundaries in Europe and the spurt in national liberation movements in Asia and Africa, led to ramification of newer relationship and resultant world economic formations. Keynesian theory was by very nature short term oriented and naturally, provided no answer to the novel realities faced by the colonial infrastructure. The North - South dualism has become only too apparent. With the Neo-Keynesian temper, Harris explained the situation as a 'passing phase' within a general equilibrium framework, i.e. the free mobility of factors would lead to equalisation of the levels of differential development.³⁹ This position was not acceptable to many. Gunnar Myrdal (1957)⁴⁰ and Albert O. Hirschman (1958),⁴¹ basing their experience in the European and Latin American scene, respectively, came to a certain common, but independent conclusions, that 'factor mobility' has an inbuilt bias to favour the already developed regions of the world or even parts of a country due to external economies of scale conditions.⁴² Myrdal quite penchantly quotes the Bible, "For unto everyone that hath shall be given, and he shall have abundance; but from him that hath not

³⁹S.E. Harris (1954), pp.367-380.

⁴⁰G. Myrdal (1957) Economic Theory & Underdeveloped Regions, Methuen & Co., London.

⁴¹A.O. Hirschman (1958), The Strategy of Economic Development, Yale U.P., London, pp.183-202.

⁴²G. Myrdal, Op.cit., p.29.

shall be taken away even that which he hath."⁴³

Analysis of the 'vicious circle' on the study of the American Negro Problem and later, on the findings of the U.N. Economic Commission on Europe (1955),⁴⁴ Myrdal developed his theory of 'Cummulative Causation', in explaining the persisting problem of underdevelopment in the Third World.⁴⁵ Conclusions of Hirschman, with his Latin American bureaucratic experience, was similar in content and character.⁴⁶ But, the solution provided was of an active role of the state in those colonial economies to reverse the process of the 'Cummulative Causation' (or, its manifestation what Myrdal calls the "Backwash effect" or Hirschman calls the "Polorisation effect") towards a "spread effect" or the "trickling-down effect" respectively, both internationally, as well as interregionally. Now, this position was vindicated by J.G. Williamson in a worldwide study of inter-regional disparities (Inequalities) of incomes, in mid-sixties, as an empirical investigation, that the process of interregional inequality over sufficient length of time being an inverted 'U' shaped curve, is similar to both

⁴³G. Myrdal, op.cit., p.12.

⁴⁴Report of the Economic Commission on Europe, U.N., (1955).

⁴⁵G. Myrdal, op.cit., pp.11-20.

⁴⁶A.O. Hirschman (1968) for example says "We see, then, the underdevelopment is not a necessary stage in the process of formation of the capitalist economy. It is a special process due to the penetration of modern capitalist enterprises into archaic structures", p.138.

advanced group of countries like U.S.A., Canada, U.K. etc. as well as the underdeveloped countries like Brazil, India, Phillipines or even, Yugoslavia.⁴⁷ This position can only lead to a retracing of steps to the earlier stages theories, that after all, underdevelopment and the inequity in the interregional scene is only a passing phase. These discussions have led to their influence on studies on the regional inequalities or underdevelopment problem of India by scholars both Indian and from abroad.⁴⁸ Myrdal-Hirschman model has naturally, raised quite a number of criticism from many quarters.⁴⁹

A group of researchers broadly referred as the 'Latin American School' including Perloff (1960), Furtado (1964), Prebisch (1971), Gunder Frank (1967) and Samir Amin (1974) and a host others visualise the issue on an 'Unitary structure' basis and not quite on the assumption of 'dualistic' philosophy, so much in common parlance, in mid-fifties to mid-sixties. Largely, studies based on the Latin American experience, the problematic is understood in the perspective of a 'core'

⁴⁷ J.G. Williamson (1965) "Regional Inequality and the Process of National Development", EDCC, Vol.13(4) Part II

⁴⁸ The fuller treatment of such studies will be done in the II Chapter of the present study.

⁴⁹ G.B. Khromvshin (1976) for example says (Myrdal nevertheless attempts to stand above class interests, thereby making it impossible to resolve the fundamental problem: What social structure can provide a way out of economic backwardness and ensure progressive social development", p.14.

or 'centre' consisting of the developed world and the 'periphery' consisting of the underdeveloped, colonial Third World (largely of Asia, Africa and Latin American countries), irrespective of the international division of the capitalist and socialist institution, the 'transfer of values from the periphery to the core' being the real crux of the issue.⁵⁰ For example, Samir Amin explicitly states.

Relations between the formations of the 'developed' or advanced world (the centre), and those of the 'under-developed' world (the periphery) are affected by transfer of value, and these constitute the essence of the problem of accumulation on a world scale.⁵¹ Overallly, the whole argument is on the line with V.I. Lenin's 'Theory of Imperialism',⁵² in its latent manifestations in the contemporary changed conditions. Underdevelopment, whether of a country or part of it (a region)

⁵⁰ Samir Amin (1974) says, "... main scope of my analysis embraces relations between the centre (North America, Western Europe, Japan, Australia, New Zealand and South Africa on the one hand; Russia & Eastern Europe on the other) and the periphery, 'the three continents'. p.4.

A. Gunder Frank (1975) for example says "... historical research demonstrates that contemporary underdevelopment is in large part the historical product of the past and the continuing economic and other relations between the satellite underdeveloped & metropolitan countries," p.1.

⁵¹ S. Amin, Op.cit., p.3.

⁵² V.I. Lenin, in the introduction to N. Bukharin (1972), Imperialism and World Economy, Merlin Press, London, pp.vi - viii.

is largely due to the integrated character of world capitalist system, particularly, the world market, whose tenacles touches the most obscure corners of the earth, persisting as a historical consequences of the days of 'Rule Britannia'. Pertinently, Amin says "strictly speaking, growth in the periphery based on integration into the world market, is development of underdevelopment."⁵³ Development and underdevelopment are corollary to each other.⁵⁴

The wide variations in the levels of development within national territories, particularly, of the Third World countries can only be understood in the light of the colonial history of those regions and their current integration into the world capitalist order, as a form of periphery.⁵⁵

The Problem of Study :

The existence of gross regional inequities in

⁵³S. Amin, Op.cit., pp.18-19.

⁵⁴A. Gunder Frank (1975) says "... within this world embracing metropolist - satellite structure the metropolist tends to develop and the satellites to underdeveloped," p.10.

⁵⁵For example C. Furtado (1964) says, "The effect of the impact of capitalist expansion on the archaic structures varied from region to region, being considered by local circumstances, the type of capitalist penetration, and the intensity of penetration. The result, however, was almost always to create hybrid structures, part tending to behave as capitalist system, part perpetuating the features of the previously existing system. The phenomenon of underdevelopment today is precisely a matter of this type of dualistic economy". p.129.

the Indian sub-continent, as past legacy of the colonial history of the country and part of the historical processes of development, has been quite an acknowledged fact, in all circles, whether academic, bureaucratic or policy making bodies and slogans, of a 'balanced regional development' right from the First Five Year Plan period onwards has been raised to a crescendo. But, realisation of the persisting problem of underdevelopment in the interregional perspective and at least, scientific study has only a recent history in India, certainly, not much before the mid-sixties and if, at all, only being articulated in the seventies.⁵⁶ The theoretical studies lack a sound empirical proof and the empirical studies have little of theory; although, now at least there exists a large body of empirical research on the levels of regional development in India (at different regional levels, from macro-regions of the nature of large states, to micro level studies even at the level of villages). But, the understanding we obtain is quite fragmented, and naturally, incomplete in inferences to be of any normative use.

⁵⁶B. Chattopadhyaya, Moonis Raza (1975), pp.11-34. It provides theoretical discussion on the issue as a pioneering work on India.

Objectives :

Therefore, our contemplation in the present study is to make an empirical verification of the processes of regional inequality in India, in both its theoretical ramification and empirical manifestation.

The task is naturally, quite ambitious and only, certain aspects in cross currents of contemporary economic history of the country's can, only be highlighted. Our main outline would be to understand the behaviour of incomes, total and per capita, also in their sectoral composition over approximately two decades, from the beginning of the Third Five Year Plan (1960-61) to the end of the Fifth Five Year Plan (around '78-79). The choice of this period is essential to an earlier hypothesis developed, regarding the role of the structural changes in Indian economy around the early seventies and its impact, on the regional manifestation of development and inequities.⁵⁷ This would be broadly at a macro regional level. But insight, also, will be cast into behaviour of inequality in terms of incomes in rural areas, particularly, originating from agriculture, and

⁵⁷A.C. Mohapatra (1976), The Capitalist Path and Growth of Inequalities between Regions in India(1961-1971), Unpublished M.Phil dissertation submitted at J.N.U., New Delhi.

then, a detailed study of one of the 'unarticulated' macro regions of the country (Madhya Pradesh) in greater details. An explanation for the selection of Madhya Pradesh as a macro-region for the study has been given later, in Chapter IV.

Quite obviously, it can be only the role of a 'torch bearer' and in the progress of the growth of knowledge, others would carry the torch, eternally.

CHAPTER - II

"The term concrete universality must be understood ... as the sum total of men living in a given society. If the writers public could ever be extended to the point of embracing the total, the result would not be that he would necessarily have to limit the reverberations of his work to the present time, but rather he would oppose to the abstract eternity of glory, which is an impossible and hollow dream of the absolute, a concrete and finite duration which he would determine by the very choice of his subjects and which, far from uprooting him from history, would define his situation in social time."

J. P. Sartre
(What is Literature?)

THE SURVEY OF EXISTING LITERATURE

In the field of regional development in India one comes across two major types of work, (1) the official or the governmental outlook of the problem and (2) the academic research on the problem. In the present chapter, a brief review of the available literature for both the type of studies has been attempted.

The Official Account :

Since, the official policies of the Government of India are largely stated in the plan documents, naturally, it is from there that any comprehensive view can be taken. As it seems, consciousness regarding the most apparent and glaringly disparate conditions of development was quite in the minds of the founding leaders of the new India; but in the urgencies of the struggle for independence such ideas could be only kept in abeyance for the time being. But, once the country was independent, the constitution approved and became operational, the stocks and balances of the country appreciated, the country embarked upon a concert, still new to the Third World, i.e. 'planned development'. One cannot but find the presence of the astute consciousness of the problem

of regional disparities appearing along with other urgent matters of the Post-Independent India in the First Plan document.¹ Naturally, the problem was obvious. However, with the other exigencies on the anvil, there was neither any clear ideology nor concrete measures to hinge on a problem of immense importance, but of equally immense confusion. Obviously, the problem of regional development had to be linked with the campaign for Grow-More-Food and many other such incipient schemes. The emphasis was on construction of the multipurpose projects like Bhakra-Nangal, Damodar valley Corporation² and Hirakud etc. It was not until the II Five Year Plan that the concept of Balanced Regional Development appeared in the Indian economy.³ The basis of the above concept lies in the Industrial Policy Resolution placed before the Parliament

¹Planning Commission, Govt. of India (1951) First Five Year Plan : A Draft outline goes on saying, "A connection of regional dispart development must necessarily be a gradual process. It has to start by laying the foundation for development in areas where potential resources for expansion exist but have not been fully exploited. This would mean, in most cases, large-scale extensive irrigation facilities for agricultural development and adequate provisions for power and transport for industrial expansion.", p.42.

²Damodar valley Corporation (DVC) was conceived as a multipurpose project in the line of TVA(USA) in 1943 and for formal statutory status by an Act of Parliament in 1948.

³Planning Commission, Govt. of India (1956) goes on to state, "This brings us to the question of regional disparities.... In any plan of, it is axiomatic that the special needs of the less developed areas should receive due attention. The pattern of investment must be so derived as to lead to Balanced Regional Development." p.36.

on the 30th of April, 1956 and the latter being concretised into the latent concept of 'industrial dispersal' envisaged in the Industrial Policy Resolution of 1948, in which an active role of the State in the process of industrialisation was approved.⁴ This is also, apparent in the on going debate of those days between the Public Vs. the Private sector. The snow balling effect was done by no other a personality than the dynamic Nehru on the 9th of November, 1954 in a meeting of the National Development Council at Delhi. "The picture I have in mind is definitely and absolutely a socialistic picture of society.... I mean largely that the means of production should be socially owned and controlled for the benefit of the society as a whole."⁵ What he meant was the big way participation of the public sector. These are interrelated events. The shape of an ever active Public Sector, emphasis on industrialisation of the country and industrialisation as a tool in bringing in large parts of the backward areas of the country into the mainstream of social and economic development was a much more concrete proposal than what has been heard during the First

⁴ Planning Commission, Op.cit., p.38.

⁵ J. Nehru (1956), p.17.

Plan period of 'resource utilization' (etc.). NDC, the apex body of making important decisions since, the First Plan recommended the following clear cut programme :

- (1) de-centralised industrial production;
- (2) industries as nuclei in backward regions; and
- (3) greater mobility of labour, particularly from high density areas.⁶

The Governmental concern for the backward regions is evident during this time on the parliamentary debates on the Second Plan by speeches of Nehru.

"It is admitted that there should be attempt to make every region, every part of India develop equally in so far we can, and that we should remove the disparities that exist in India. There are some tremendous disparities. Some of our provinces, I would not name them are extremely poor. They do not deserve to be poor."⁷

An objective assessment upto the Second Plan would show the obvious sincerity of the Government in resolving the

⁶Planning Commission, Govt. of India, (1956), ".... that in location of new enterprises, whether public or private, consideration should be given to the need for developing a balanced economy for different parts of the country. Some industries have to be located in certain areas due to availability of necessary natural resources. But, there are other industries in regard to the location of which, on economic considerations, there is a field of choice often, the disadvantages of comparative cost are only reflection of the basic development. Once this is taken in hand, the initial handicaps progressively disappear. A wide diffusion of development nuclei is essential from this point of view." p.37.

⁷J. Nehru (1956), Debate on the II Five Year Plan, Lok Sabha, 23rd May 1956, compiled in Speeches on Planning and Development, p.73.

problem of the glaring regional disparities, but the objectivity in the approaches of the Government could be said to be only very limited due to the enormity of the problem itself, the weak data base, a methodology of contradictions, between the 'factor mobility' of 'lessez faire theories' and the 'role of the Public Sector' in realising the goal of a socialistic pattern of society.

Taking into cognizance of the hitherto efforts of 'project extensions' and industrial dispersal through licensing policy measures, the Third Five Year Plan makes additional concrete commitments, now a full section (Chapter-V, Section-3) dealing exclusively on the Balanced Regional Growth in the Draft Plan.⁸ The policies outlined are as the following :

- (1) "... effort to secure dispersal of industries will be continued....";⁹
- (2) Dispersal of technical education regionally;
- (3) Complimentary projects; i.e.
 - (a) agricultural packages around the multi-purpose projects,
 - (b) ancilliary packages around large scale public sector firms;

⁸ Planning Commission, Govt. of India (1960), pp.71-78.

⁹ Ibid., p.73.

- (4) possibilities of technological advances in backward areas, as the nuclear power in fuel etc.; and
- (5) Labour mobility, largely from high density areas to low density areas.¹⁰

As it would seem the confrontations of the sixties, the three international wars and other failures like, the persistent droughts in the mid-sixties, stagnation in the industrial sector etc. have changed the perspectives before the country to such an extent, that the spirit of the first three plans, particularly, in relation to the regional development issues seem to have been quietly scuttled in the beginning of the new plan era of the seventies.

The Fourth Five Year Plan makes no firm commitment in regards to the balanced regional development leaving the issue as concern of the states concerned. Except the industrial licensing policy, the central assistance in terms of targeted problem areas like the drought-prone areas, the hill areas and the tribal areas, the central planning cannot afford to share the responsibilities.¹¹ Quite obviously, the issues of regional development were

¹⁰ on Planning Commission, Op.cit., p.78. The Plan goes to say "... continuous study of economic trends and rates of growth in different regions is essential for securing more balanced regional development."

¹¹ Planning Commission, Govt. of India (1966). Draft: Fourth Five Year Plan, (1969-74), p.29.

to some extent esoteric in bureaucratic circles and naturally, treated expectedly, only to be scoffed at. But, the stylization of Myrdal - Hirshchman has certainly caught the imagination of the planners and the 'free play of market' concept abandoned, which seemingly creates 'backwash effects' on the already backward regions. This change in ideology seems to be more articulated in the Draft Fifth Plan.¹² Although, the Fifth Plan devotes a full chapter on backward areas, it does not say anything additional to the policy outlines of the Fourth Plan, which states in clear terms, identification of 229 industrially backward districts out of which 44 were made 'eligible' for cash subsidy to the new industrial establishments.¹³ It also, kept the central commitments to the 'area oriented' plans, as the 'sub-plans' of hill areas, (within the state plans), tribal area plans, national minimum needs programme etc., but withdrew the explicit responsibility of upliftment of backward regions, which has been the hall-mark of the Nehru Era.¹⁴ Despite the change in

¹² Planning Commission, Govt. of India (1973), "Development of backward areas, represents a very complex problem in planning. Market forces normally operate in such a way that growth tends to be attracted to the already developed areas." p.282.

¹³ Ibid., pp.283-84.

¹⁴ Ibid., Op.cit., "That in view of the individuality of the plan & non-plan activities and the basic administrative structure, the states would have to continue to bear the main responsibility for their backward areas....." p.284.

the ideology of the Government, the official planning document for the Sixth Five Year Plan (1978-83), only indicates a policy hitherto followed in the post Nehru Era, i.e. the progressive 'peripheralisation' of all issues of regional development in India. The official document goes on to state,

"Our experience with large industrial projects in backward areas shows that their 'spread effects' are low and the surrounding areas continue to remain poor and underdeveloped.... Moreover, the barriers to development in the backward regions are such that integrated approach is required. Such an integrated approach underlies the proposals for rural development in this Plan."¹⁵

Academic Work on the Problem :

This is quite in contrary to the zeal and enthusiasm shown in the academic scene. The academic interests in the issues of regional disparities arise largely out of the frustrations expressed in the first three Five Year Plan documents regarding the data limitations and inadequacy in methodology in studying the problem. A committee of experts under the auspices of Planning Commission, first ever took up the problem of assessing

¹⁵Planning Commission, Govt. of India (1978),p.111.

the problem of regional disparities in 1962.¹⁶ This report was largely, of an exploratory nature, studying the behaviour of income, public and private investment patterns from 1950-51 to 1960-61, in five broad zones of the country, defined by the State Reorganisation Act of 1956. Concern from academic circles could be seen gathering momentum from mid-sixties onwards to highest pitches of mid-seventies, which can be broadly broken up into two categories; (i) one set of studies dealing with the problem of 'identification' of backward regions at different levels of regional aggregation; and (ii) the second set, dealing with the magnitude of the regional inequalities and its behaviour inter-temporally and trying to explain any emergent hypothesis.

(i) The Identification Problem

As it would seem the criteria set forth by the Industrial Licensing Policy of 1956 and the Gadgil Formulae for locational policy and central assistance respectively, were either rudimentary and inadequate enough and there was general disagreement over using states as regions, being either too large or too

¹⁶Planning Commission, Govt. of India (1962), goes on to state "Realising the limitations of data, in the report of the Third Plan, the Planning Commission has stressed on the importance of: (a) carrying out systematic surveys for identifying the problems of different regions, (b) careful watch on progress in different regions and additional steps to speed up development in particular areas which are found to be seriously lagging behind; (c) measures for the fullest development of the growth potentials of each region, having regard to its special needs, conditions and possibilities; and (d) close inter-dependence of and need for balance between national and regional development." p.2.

heterogeneous to be viable enough. The efforts of the Census Commissioner and his dynamism, led to new strides in this direction and the mimeograph prepared by the Census Organisation can therefore, be called a pioneering work.¹⁷ The elaborate data base and the disaggregate level of study (district level) was certainly, first of its kind in the country. But, as obvious, all pioneering works can, only be taken as first approximations. The Indo-Soviet collaborative study on 'Economic Regionalisation' of the country in mid-sixties can be taken as, only another pioneering effort, in understanding the process of economic 'region-formations process' on the basis of experience of the Soviet Planners in fifties and sixties.¹⁸ The project study of the Mysore State, under the group leadership of Learmonth, under the sponsorship of Planning Commission and Indian Statistical Institute and later, the byproducts in the form of the study on regionalisation of South India are also, some of the works of note.¹⁹ So also, the comprehensive and rigorous methodologies used by Pal²⁰ and Dasgupta²¹ in the early seventies largely, on the study of district level variations of economic development, in line with the pioneering work of

¹⁷ A. Mitra (1967), Levels of Regional Development in India, Census of India, 1961, Vol.I, Part-I-A(1).

¹⁸ P. Sengupta & G. Sdasyuk (1968), Economic Regionalization of India: Problems and Approaches, Census of India, 1961, Monograph Series Vol.1, No.8.

¹⁹ M.N. Pal (1971), pp.1-33.

²⁰ M.N. Pal (1975), pp.35-52.

²¹ B. Dasgupta (1971), pp.1032-1051.

Mitra (Registrar General of Census, 1961). The early seventies sees a spurt of such studies; i.e. Pathak, Aziz and Chattopadhyay,²² Somasekhara,²³ Basu,²⁴ Sharma,²⁵ Pal,²⁶ Sharma,²⁷ Patnaik and Chattopadhyay,²⁸ Pandit²⁹ and Nair³⁰ are only a few to cite. Quite naturally, the objective has been limited, that of either providing a better methodology for classifying regional units (states, districts or further lower order administrative units) or of inter-temporal studies at the state level provide for only limited insight into the problem despite the growing sophistication in analytical methods. There have been various issues regarding the choice of indicators and method of classification. It would be important to note, that the technical issues involved were taken up by the Planning Commission itself, in a committee formed by it, to deal with the identification of backward areas, the report of the working group being published in 1969,³¹ to provide for an adequate background for the Fourth Five Year Plan. The Working Group accepted the district, as a practical unit of

²²C.R. Pathak, A. Aziz and R.N.Chattopadhyay (1970), pp.64-91.

²³N.Somasekhara (1970), pp.157-174.

²⁴S.K. Basu (1972), pp.76-89.

²⁵P.S. Sharma (1973), pp.121-135.

²⁶M.N. Pal, Op.cit., p.29.

²⁷K.L. Sharma (1976), pp.88-98.

²⁸S.Patnaik and R.N.Chattopadhyay(1975), pp.99-110.

²⁹M.L. Pandit (1974), pp.124-136.

³⁰K.R.G. Nair (1977), pp.207-215.

³¹Planning Commission, Government of India,(1969), pp.5-6.

study for 'identification of backward areas' and recommended fifteen basic indicators for the purpose. On the other hand, they provided for five main 'practicable types' of backward areas namely:

- (a) desert areas;
- (b) chronically, drought affected areas;
- (c) hill areas, including border areas;
- (d) areas with high concentration of tribal population; and
- (e) areas with high density of population, with low level of income, employment and level of living etc.³²

This seems quite in line with the governmental policies of the Fourth and Fifth Plan, of the 'target areas' and 'target population' oriented programmes.

(ii) Trend Studies in Regional Inequalities

Despite the limitations of availability of data, and the reliability problems, a number of studies have been undertaken to analyse the trend of regional inequalities over the first two decades of planning in India (1950 to 1970). Studies on the pattern and trend of regional inequalities, (particularly at the level of states as regions) have been carried out by Rao,³³ Gupta,³⁴ Choudhury,³⁵ Mahajan,³⁶

³²Planning Commission, Govt. of India(1969), p.7.

³³S.K.Rao (1972), Growth of Inequality of Incomes and Population in India from 1950-51 to 1964-65, Doctoral Thesis, Cambridge, U.K.(Unpublished).

³⁴S.Gupta (1973), pp.243-260.

³⁵M.D.Choudhury (1974), "Behaviour of spatial income inequality in a developing economy: India, 1950-70" Indian Association for Research in National Income, Delhi(Mimeographed).

³⁶O.P.Mahajan (1972), Regional Economic Development in India, 1950-51 to 1965-66, Doctoral Thesis, Kurukshetra(Unpublished)

Nair³⁷ and Sampath.³⁸ Rao's study covers the first three plan periods from 1951 to 1965 and uses proxy variables, instead of the per capita state domestic product, the latter being unsuitable due to comparison inadequacies. The study concerns at the level of 14 larger states, the composition of an index being done by using factor analysis technique at three points of time.³⁹ The findings of Rao indicate no significant decline in the levels of regional inequality, in the sense, that within the frame of Myrdal - Hirschman, a stage of, what he calls to be 'stability' occurs during the period. Rao's study is rigorous from theoretical point of view, but empirically weak at the level of generalisation and the temporal analysis being at three points of time only. Nair in one of his earlier studies, comparing between 1950 and 1960 finds 'some divergence over the period.'⁴⁰ Gupta estimates the coefficients of concentration for four different years, 1950-51, 1955-56, 1960-61 and 1964-65, corresponding to the first three plan period and infers, that disparities have converged. Mahajan, who studies the same first 15 years of the plans by using indices of state per capita incomes around the national average, infers that there is convergence of regional income inequalities.

³⁷ K.R.G. Nair (1975), Inter-state Income Disparities in India, 1950-51 to 1965-66, Doctoral Thesis, D.U., Delhi. (Unpublished).

³⁸ R.K. Sampath (1977), pp.1-12.

³⁹ S.K. Rao (1973), pp.793-800.

⁴⁰ K.R.G. Nair (1971), pp.441-447.

However, Choudhury and Sampath cover by far the longest period, from 1950 to 1970, the former arriving out of the conclusions from the trend of coefficient of variations, that the disparities have remained more or less unchanged, while the latter argues, that the inequality levels have been converging. Hemlata Rao⁴¹ studies 3 points of time from 1956 to 1965 using twentyfour variables and composited by factor analysis. On the basis of this study, it has been concluded, that the level of inequalities have come down. A study by the author,⁴² stretching from 1960-61 to 1970-71 and a latter study⁴³ covering the period from 1960-61 to 1974-75 on a continuous basis concludes, that there has been a tendency of reduction in inequality upto the mid-sixties which supports the results of the earlier studies. In the early seventies, the inequality level, however, seems to have been accentuated. This position has also, been supported by Sampath. The summary of the position is therefore, still unclear as some scholars argued for trend of divergence, others to no change (stability), and some others, still for convergence.

Studies in terms of different sectoral aspects and their trend of inequalities show important highlights

⁴¹Hemlata Rao (1972) "Identification of backward regions and the study of trends in regional disparities in India", paper presented at the Seminar on Regional Imbalances, the Problems and Policies, IIPA, New Delhi, March.

⁴²A.C. Mohapatra (1976), The Capitalist path and Growth of Inequality between Regions in India (1961 to 1971) Dissertation, J.N.U., New Delhi (Unpublished).

⁴³Ibid., (1978), pp.39-50.

of the issues involved. Raj⁴⁴ examines the statewise rate of growth in agriculture to find the possible causes on inter-state variations, between 1949-50 and 1958-59, in terms of value added from seven major crops. He takes into consideration independent variables, like changes in area, and irrigation, size distribution of holdings and techniques used, as the use of chemical fertilisers, degree of mechanisation and infers, that the larger is the share of big farmers, larger is the growth of agricultural output. This position was refuted by Bagchi, with the help of some districtwise data for the states of Madras (Tamil Nadu), Punjab and West-Bengal.⁴⁵ In a detailed analysis Rao infers, that the changes in growth of agricultural sector, is largely contributed by the differences in the changes in amount of irrigated land.⁴⁶ This position is still held to be an important causal hypothesis. Majumdar concerns himself to the inter-state variations in differences in prices, productivity and crop-pattern and arrives at a conclusion after rigorous study that the variations are more significantly explained in terms of the cropping

⁴⁴K.N. Raj (1961), pp.253-271.

⁴⁵A.K. Bagchi (1965), pp.267-276.

⁴⁶S.K. Rao (1971), pp.1333-1346.

pattern.⁴⁷ On the other hand, in a study by Minhas and Vaidyanathan⁴⁸ and later, by Parikh⁴⁹ try to understand the growth pattern in agriculture in its component structure. The 'Additive Model' of Minhas and Vaidyanathan does not lead to any definite conclusion, whereas Parikh's explanation is in terms of the extension of irrigated area, use of chemical fertilisers and changes in total area.

The studies made by Krishnaji⁵⁰ and Jose⁵¹ are concerned with real wage rates in agriculture. Krishnaji considering agricultural wages from 1956-57, 1960-61 and 1964-65, infers that the inter-state variations in wage rates have come down. This is also, corroborated by the study of Jose between 1964-65 and 1971-72. Sukla⁵² in a study of relationship between output per acre and net income per agricultural worker, arrives at the conclusion that larger the stock of capital (including irrigation facilities), the more secure tenancy rights, greater pressure on land, the more is the income per worker and

⁴⁷A.G. Majumdar (1964), pp.89-95.

⁴⁸B.S. Minhas and A. Vaidyanathan (1965), pp.230-252.

⁴⁹A. Parikh (1966), pp.1-52.

⁵⁰N.Krishnaji (1971), pp.(A) 148-151.

⁵¹A.V. Jose (1974), "Trends in Real Wage Rates of Agricultural Labourers," Working Paper No.22, C.D.S. Trivandrum (Unpublished).

⁵²Tara Sukla (1965), pp.1001-1006.

productivity of land.

Dhar and Sashtrey⁵³ and Lahiri⁵⁴ study the inter-state variations in industrial output. The former use power consumption as indicative of industrial output and calculating the coefficient of variations they find out that the inequalities have been reduced between 1951 and 1961. The latter, compares the share of employment in industrial sectors between 1956 and 1965 and only, comes to the previous conclusion. In a study on the economic development of states for 1951, Schwartzberg⁵⁵ concludes, that the sectoral composition of states and the level of the economy are positively correlated. This is in line with Clark - Kuznets hypothesis.⁵⁶ Gupta's study for the years of 1950-51, 1955-56 and 1960-61 further corroborate the position of Schwartzberg.

Other studies include Basu's on the regional concentrations of banks and bank deposits.⁵⁷ He concludes, that there is not a significant correlation between the

⁵³P.N. Dhar and D.U. Sashtrey (1969), pp.535-538.

⁵⁴R.K. Lahiri (1969), pp.523-532.

⁵⁵J.E.Schwartzberg (1963), Occupational Structure and Levels of economic development in India, a regional analysis, Census of India 1961, Monograph No.4, Office of the Registrar General, Govt of India, New Delhi.

⁵⁶C. Clark (1957), Conditions of Economic Progress, Macmillan, London; and Simon Kuznets (1969), Modern economic growth : rate, structure and spread, Yale University Press, London.

⁵⁷S.K. Basu (1972), pp.76-89.

number of banks and money deposits, but a very high correlation of deposits with level of development. Sharma studies the variations in rice output on a fairly disaggregated level (districts). He concludes that the variations in the production of the High Yielding varieties which are free from the size and scale bias is mainly due to the level of development and thus corroborates the official position.⁵⁸

In fact, there exists a host of published material on the subject and it is only selectivity which can help comprehension. It is generally felt that there is much less agreement on any single issue in regards to the inter-regional variation. The studies are largely fragmented, i.e. holding to only limited time periods and largely, on single points of time. On the otherhand, there seems to be no methodological improvements in terms of the large scale use of the coefficient of variation which could measure variations from the centre of the distribution. It is also, felt that there exists a large gap in standardization of the use of data and agreed methods of study. In the present study, attempts have been made to improve upon many of the shortcomings discussed, hither to.

⁵⁸ P.S. Sharma (1973), pp.121-135.

CHAPTER - III

"Abstraction consists in the mental elimination of everything which is casual or accidental, i.e. occurring only occasionally, and in singling out the event which constantly under given conditions reappear, which constantly repeat itself, i.e. is essential or necessary."

Oscar Lange
(Political Economy)

THE SOURCES AND NATURE OF DATA

Reliable and comparable data is the foundation of any empirical study. Since, the scope of the present study stretches from state level income inequalities and their sectoral composition, to inequalities of per capita agricultural incomes and then, to the specific multi-variable study of the state of Madhya Pradesh at the level of the districts, a detailed discussion on the choice of data sources, their scope, nature and limitations is quite essential.

Data On Net Domestic Products :

As mentioned at the outset, the present study is concerned roughly with the two decades i.e. from 1960-61 to 1978-79 and identifies the income inequality and its inter-temporal, inter-regional patterns and trends. Reliable and comparable estimates of Net Domestic Products at both, the national and the state levels for the above period are necessary. Moreover, since the major objectives of the study is to ascertain the inter-state variations over time, ideally speaking, the available data should be

at constant prices over time and also comparable between the different states.

Strictly comparable, continuous time - series, state-wise data on Net Domestic Products are not available for the entire period of study (1960-61 to 1978-79) covering the Third, Fourth and Fifth Five Year Plans. Estimates are however, available for different sets of years, from a number of sources, which need a careful evaluation. The data available can be classified into two broad categories i.e. (i) one from the 'official documents', and (ii) the other from the 'private estimates' and researches.

Official Sources :

The official estimates of state Net Domestic Products are available from two different sources. The State Statistical Bureaus presently known as the Directorate of Economics and Statistics (DES). The Directorates of Economics and Statistics are entrusted with the task of bringing out Annual Estimates of the Net State Domestic Products (after, the frustrating experience of the framing of the II Five Year Plan, due to the non-availability of data), from 1956-57 for 15 major states and for many of the newly formed states such estimates are not

available, even before 1970-71.¹ The Central Statistical Organisation (CSO) has endeavoured in bringing about broadly two sets of estimates of Net Domestic Products for the period of study; (i) one is basically, compilation of the data provided by SSBs(DESS), both in current as well as constant prices² (even with different base years) and (ii) the second set of comparable estimates, at current prices, especially prepared for the Fifth Finance Commission (1962-63 to 1964-65), the Sixth Finance Commission (1967-68 to 1969-70) and the Seventh Finance Commission (1970-71 to 1975-76).³ As it would become clear later on, the difference in both the sets of estimates becomes less and less significant in the seventies, due to the gradual switch over of methodology followed by DESS of different states in following a common guideline provided for by the CSO in estimating the NSDP.

¹ Meghalaya, for example, the NDP is not available for the preceding years, before the formation of the state; so, is the case of Sikkim, and varies at different length for Haryana, H.P., Nagaland and Mizoram.

² Constant prices are in state terms. But, this apparently, is unavailable, even for the most developed countries.

³ Data (i) for 1962-63 to 1964-65 published in the Report of the Fifth Finance Commission, Govt. of India, New Delhi, 1969, (ii) for 1967-68 to 1969-70 in the report of the Sixth Finance Commission, Govt. of India, New Delhi, 1974 and (iii) for 1970-71 to 1975-76, in NAS, C.S.O. Ministry of Planning, Govt. of India, Jan., 1979, New Delhi.

But, a number of critics have already commented on the reliability and comparability of the estimates brought out by the various DESSs.⁴ Most of the criticisms levelled against the DES estimates are apparently justified. If, agricultural sector alone is taken, which naturally, contributes the single most share of the Net Domestic Products of states, a number of anomalies are easily discernible. There seems to be a great deal of variation between different states in the manner in which the by-products are evaluated; in the manner in which the outputs are measured; and in the way in which the costs of inputs from other sectors are estimated to find out the 'value added' of the sector.⁵ Similar problems exist in the case of other commodity producing sectors also as in these sectors the method of estimation is the 'product method.'⁶ In case of those sectors in which income method is prevalently used, such difficulties in

⁴ M.D. Choudhury (1966), Regional Income Accounting in an Underdeveloped Economy - A case study of India, Firma Mukhopadhyaya, Calcutta; (ii) M. Mukherjee (1969), National Income of India - Trends and structure, Statistical Pub. Society, Calcutta, pp.490-512; and (iii) K.L. Narang (1972) "State Income Estimates in India", Paper at Indian Conference on Research in National Income (ICRNI), New Delhi.

⁵ M.D. Choudhury, Op.cit., highlights the variations in cost deductions from 37.8% in West Bengal to only 10.8% in Orissa.

⁶ Generally, with the 3 ways of NDP estimation, the 'value added', the product and 'the income methods'; broadly the DESS follow the value added method for agricultural sector, 'product method' for productive sectors and 'income method' for service sectors.

estimation are even more serious. The method of working out sector-wise estimates of working force and of calculating per head earnings vary from state to state. The problem gets further accentuated as one comes across, the manner in which some sectors of this category are defined (not uniform) in all the States.⁷ The inter-temporal comparability of these estimates are also open to question since, in more than ten of the states, the methods used in estimation have undergone substantial change. Therefore, generally, two different series of DES data is available. One of these series is based on the earlier method of the fifties, (which are no longer useful to us) and the other is based on the CSO guidelines in the sixties and seventies. An additional difficulty is presented in the case of constant-price estimates because of the fact, that the base years for the constant price calculations are not the same for all the states.⁸

The CSO estimates at current prices have been prepared with the specific intention of overcoming the comparability problem. This has been done on the basis

⁷For example, the small industry sector is defined to include only hand pounding of rice in the state of Kerala, West Bengal and U.P., but includes construction in the case of Tamil Nadu and Karnataka.

⁸With the availability of the current price figures, this problem can be overcome, in changing the base years of the data.

of the W.G.S.I.(1957)⁹ recommendations of using, a standard methodology and sources, all over the country.⁹ From mid-sixties onwards, the SSBs (later DES)¹⁰ have been directed to follow a uniform methodology for estimation which has been adopted by larger part of the DESs. Consequently the major part of the data of late Sixties and early Seventies is fairly comparable. On the other hand, in periodic reviews the CSO goes on modifying the DES tabulations to bring them at par with the common methodology followed.

The CSO also, provides both state-wise and the national break up of the Net Domestic Products by the sector of origin. They are available in current prices and for reasons outlined earlier, the data upto the sixties are not comparable. However, the data compiled for the first half of the seventies (1970-71 to 1975-76) are based on standard methodology and is therefore comparable. Owing to their reliability, these statistics are used in the analysis in understanding the sectoral composition of NDPs (State-wise) and the structural

⁹Working Group on State Incomes. The Group was set up after the inadequacies of income estimates were felt during the finalisation of the Second Five Year Plan, under the Chief guidance of Prof. P.C.Mahalonobis.

¹⁰Directorate of Economics and Statistics. These were formed along with the formations of the State Planning Boards as a feed up organisations.

changes, thereof. The above sectoral data is classified into the following sixteen major sectors of origin. The sectors are;

- (i) Agriculture and animal husbandry;
- (ii) forestry and logging;
- (iii) fishing;
- (iv) mining and quarrying;
- (v) large scale manufacturing;
- (vi) small scale manufacturing;
- (vii) construction;
- (viii) electricity, gas and water supply;
- (ix) railways;
- (x) transport by other means;
- (xi) communication;
- (xii) trade, storage, hotels and restaurants;
- (xiii) banking and insurance;
- (xiv) public administration;
- (xv) real estates, banking and insurance;¹¹
- (xvi) other services.

Private Estimates :

For the reorganised states of the Indian Union (vide, SRC 1956), a number of private or non-official estimates of state NDPs are available, largely, prepared either to overcome the shortcomings of the CSO and SSB as sources or for a specific project purpose. Naturally,

¹¹CSO, Ministry of Planning, Govt. of India, National Income Statistics, Jan., 1979, New Delhi.

they are based on different methodologies, of different sources and relate to different years. From the point of view of the number of years covered, these estimates are of two types. Firstly, there are estimates which give value of state-wise NDPs for a few years. There are three such estimates namely, the estimates by Verma,¹² the Indian Institute of Public Opinion (IIPO);¹³ and the National Council for Applied Economic Research (NCAER).¹⁴ Verma's estimates are for the years 1951-52 to 1959-60 at constant prices (1948). This period does not come under our purview since, our main concern starts from the early sixties. The NCAER has estimated NDP of the states for the years 1950-51, 1955-56 and 1960-61 at constant prices (1960-61).¹⁵ These estimates also do not serve our purpose. The IIPO has brought out such estimates for the years 1950-51, 1955-56, 1958-59, 1960-61 and 1964-65 at constant prices (1955-56).¹⁶ Naturally, this concerns only less than 25% of our period of coverage and secondly, they are fragmentary in nature, while we are

¹²R. Varma, (1961) "Estimates of State income for 1951-52 to 1959-60 at constant 1948-49 prices", ICRNI New Delhi.

¹³IIPO (1960), "Regional incomes over the three plans - An analysis of disparities in regional income growth", Quarterly Economic Report, Vol. 7, No.1, pp.20-21.

¹⁴NCAER (1967), Estimates of State Income, New Delhi.

¹⁵The NCAER (1963) also has made estimates earlier for the years 1955-56 and 1960-61, separately in inter-district and inter-state income differentials NCAER (1965). But, according to NCAER the estimates for 1950-57 to 1955-56 and 1960-61 together are their best estimates. Occasional paper, No.6, New Delhi.

¹⁶IIPO, Op.cit.,

searching for continuous timeseries information.

On the contrary, there are estimates which give values covering just one year of this study. There are three such estimates and all these are for the year 1958-59. These are the ones by Raj,¹⁷ by Ojha¹⁸ and by Tiwari and others.¹⁹

A distinction can also be made between the estimates on the basis of the method used for estimates. The NCAER estimates are the only ones based on the 'direct method' in which the estimates are made directly for each state on the basis of data for these states. The estimates of Varma, Raj and Ojha are based on the 'allocation method' in which the estimates are made by allocating the national totals of income among the various states on the basis of indicators, considered suitable for the purpose. The estimates by IIPO and by Tiwari and others are based on direct method for some sectors and by the allocation method for others.

As it seems clear, direct method is more reliable

¹⁷K.N. Raj (1961), pp.253-271.

¹⁸P.D. Ojha (1963), "Estimation of State Income in India", Indian Economic Journal, Vol. II, No.1, pp.1-11.

¹⁹B.G. Tiwari (1962) "State income estimates at the net values of goods and services of the Indian Economy, Paper at ICRNI, New Delhi.

as compared to either allocation or consumption methods. Methodologically speaking, therefore, the NCAER estimates of NDP are the most reliable and the detailed procedures are also available for critical verification.²⁰ But, it does not suffice the period of coverage of the present study. With the limitation already outlined about the CSO's direct estimates as well as the compilation of DES data, three sets of CSO data is utilized in the present study for two broad reasons, i.e., (i) that it is the only source which provides with continuous data of State NDPs from 1960-61 to 1978-79, as per the latest informations, and (ii) secondly, it is the only source which provides with the sectoral break-up of state NDP by the industry of origin.

Therefore, the limitations are rationalised on the following basis that (i) since, gradually from the mid-sixties onwards, the DES data is based on a progressively common methodology and corrected from time to time by the CSO (through their independent sources), the limitation for most part of seventies are only negligible; (ii) secondly, the independent estimates prepared by the CSO for the Fifth Finance Commission, Sixth Finance Commission and the Seventh Finance Commission.²¹

²⁰K.R.G. Nair (1975), p.46.

²¹In fact, after the Seventh Finance Commission, the CSO has only one methodology, since the gap of compilation and independent estimates being progressively bridged.

in current prices are at least as good as the NCAER estimates and these estimates have also been used in the study as a cross checking method, after converting them into constant prices (1960-61), on the basis of the price indices provided by the CSO. (iii)

Thirdly, the CSO estimates of state NDPs, in their sectoral composition (from 1970-71 to 1975-76) have been used in this study. In fact, this data is in constant prices of 1970-71 and to bring them at par with rest of the estimates the base has been changed to 1960-61. There is little doubt about the credibility of this part of the CSO statistics.

Data on Population :

Largely, two sets of population data is used in the present study, i.e. (i) the state-wise population statistics for the Census years of 1961, 1971 and 1981²² and (ii) district-wise rural population figures for the years of 1961 and 1971. Obviously, at least, for such total figures provided by the Registrar General of Census are quite reliable.* On both counts, the Final Population Tables (for 1961, 1971) and Provisional (1981)

²² Only the provisional figures are as yet available.

* The post 1961 Census of India needs special praise for generating a wide range of social demographic and economic statistics, thanks to the erstwhile Registrar General (Professor Asok Mitra).

estimates have been used in the present study.²³

On Agricultural Statistics :

For the purposes of studying regional inequality over a fairly disaggregated level of regional units, districts are being used as the lowest units of study. In fact reliable and comprehensive data is not available for any other conceivable regional units of India. In the absence of any useful per capita district-wise SDP estimates,²⁴ the available course open is to use a fairly accurate proxy and therefore, an attempt at estimating the per capita agricultural output has been made.

The data available at the district level, regarding the output, area and yield is fairly accurate. The main source being publications of the Ministry of Agriculture, through their reporting journal, Agricultural Situations in India as well as the compiled, periodic publications titled Estimates of Area & Production of Principal Crops. The methods of collection of information (both seasonal and annual) regarding the crops cultivated, their coverage and level of output, are often found faulty,

²³ Census of India (1981), Govt. of India, Provisional Population Estimates, 1981, New Delhi. Till date, only provisional figures are available, of which the information of the States of Assam and Jammu & Kashmir are only estimates, no census (of 1981) could be carried out there for various administrative reasons.

²⁴ NCAER (1956), Estimates of District Incomes, New Delhi.

because of the over dependence on the Patwari (lakhpal) records. The changes brought forward in seasonal 'crop-cutting methods' in mid-sixties onwards are found to be relatively reliable. On the otherhand, no other source, particularly, the NSS (National Sample Surveys) is stated to be much less reliable compared to the above mentioned source.²⁵

As the detailed methodology will be discussed in the subsequent Chapter, it will be worth mentioning that the task of standardizing 19 principal crops at the district level for two trienniums, the 1962-65 and 1970-73 periods are formidable enough, and in this regard the standardized data for the above period compiled from sources outlined earlier are used from already published project report of the Planning Commission, the Perspective Planning Division and the Centre for the Study of Regional Development (JNU) under the Directorship of G.S. Bhalla.²⁶

Prices :

Data on standard prices of the selected crops

²⁵National Sample Survey (NSS) Organisation operating under the aegies of Central Statistical Organisation collects agricultural, as well as a number of industrial and infrastructural data on a sample basis, from each district. But, for planning purposes, even the CSO & Planning Commission uses data of the Ministry of Agriculture for that sector only.

²⁶G.S. Bhalla (1978), Provisional Report on the Project "Food Grains Growth : A District Wise Study." New Delhi.

for conversion purposes are the moving averages for 1970-73 period. These prices were obtained by first adding the all India value of output of each crop at current prices for 1970-71, 1971-72 and 1972-73 and dividing this aggregate value by the sum of physical output for that crop for these years. Value of output figures were obtained from National Accounts Statistics, disaggregated tables 1960-61 to 1972-73,²⁷ while physical output data is taken from the source cited above.

Data on Socio-Economic Indicators of Madhya Pradesh :

Since, a full length case study of the state of Madhya Pradesh is contemplated, regarding the intra-state inequality, comprehensive and reliable data is required for the purpose. The study involves fourteen district-wise indicators for socio-economic development in the state, under the broad categories of population, workforce, agriculture, industries, electrification, health and education over a continuous period from 1960-61 to 1972-73. The Directorate of Economics and Statistics (DES) of Madhya Pradesh was one of the pioneering organisations to prepare the annual districtwise indicators,

²⁷ C.S.O., Ministry of Planning, Govt. of India (1975) and National Accounts Statistics, Directorate of publications, New Delhi.

based on data generated by them and compiled from a number of Central and State Governmental sources.²⁸ The other sources used for compilation purposes are as the following :

- a) Census of India 1961, 1971;
- b) The Directorate of Land Records, Madhya Pradesh, Gwalior;
- c) The Registrar of Co-operative Societies, Madhya Pradesh, Bhopal;
- d) Chief Inspector of Factories, Madhya Pradesh, Indore;
- e) The Directorate of Employment and Training, Madhya Pradesh, Jabalpur;
- f) Madhya Pradesh Electricity Board, Jabalpur;
- g) The Directorate of Health Services, Madhya Pradesh, Bhopal; and
- h) The Directorate of Public Instructions, Madhya Pradesh, Bhopal.

The compilations carried out are not full proof, but, can be said to be the best available in the situation. In fact, the DES of M.P. is one among the few DESs, like of Maharashtra, Gujarat and Punjab, which at least prepares and publishes such informations. On the otherhand, other sources like the Census Registrar General's office, the NCAER etc. do publish certain indicators at the district level, but they are largely, for one point of time

²⁸ DES, Madhya Pradesh - District-wise economic Indicators (1960-61 to 1970-71), Economic Analysis Division, Bhopal, 1973. Some data for the subsequent years, were taken from unpublished estimates of the directorate (1971-72 and 1972-73).

and therefore, has restrictive use in intertemporal studies.

So, looking at the retrospective the data base is vast and covers a wide range of information from NDP and SNDP, to the agricultural data at the district levels and then, comprehensive coverage of district-wise indicators for one state, Madhya Pradesh. As in the case of using all such secondary information, it can be said the best possible has only been selected for the purpose, but as inherent in such exercises it is not expected, that the limitations of data used would affect results of the study in any significant adverse manner.

CHAPTER - IV

"Scientific theory is, after all, not theory that merely takes into account of facts, but theory that proceeds from facts in order to integrate them into a coherent system."

Samir Amin
(Accumulation in World Scale)

METHODOLOGY

The main thrust of the study is in three directions, i.e.,

- (i) estimates and measurement of inter-state income inequalities of per caput NDPs and by their components over the two decades from 1960-61 to 1978-79;
- (ii) the inter - and intra-state inequalities of per caput agricultural incomes over the trienniums of 1962-65 and 1970-71; and finally,
- (iii) estimates and measurement of intra-state inequalities, their regional manifestation and temporal changes between the continuous decade from 1960-61 to 1972-73. In order to achieve the above objectives, separate methodology for each of the above three areas of study have been adopted. The research methodology has been discussed in three main sub-sections of the present chapter.

SECTION - A

The first section of the study is devoted to the inter-state income inequalities. In the absence of any other suitable regional units, states of the Indian Union have been used as the units of study. Naturally, this cannot be claimed as a foolproof method, since

there exist wide differences between states on their areal size, population size, density and great inter- and intra-state physiographic and climatic diversities. But, for any practical policy implications, it is the administrative units particularly, the states and the districts are absolutely indispensable; more so, with the cases of the states with their planning apparatus gradually strengthened over time. On the contrary, data base for any meaningful analysis, is only available at the level of political administrative regions, i.e. the states particularly in the case of NDP information. Uniform and reliable data is not available for all the meso-level administrative units, as has already been discussed in the previous chapter. Therefore, only 18 major¹ states and the union territory of Delhi has been included in the analysis. States of Meghalaya, Nagaland, Manipur, Tripura and Sikkim and all the Union Territories except that of Delhi have therefore, been excluded from the analysis.

The time horizon stretches from 1960-61 to 1978-79 on a continuous basis. But, for various subsections of the study different stretches of time are

¹State having more than 0.5 per cent of the total population of the country has been considered as a major state in the present work.

used. The detail is in the following manner;

- (i) C.S.O. data is on a continuous basis from 1960-61 to 1978-79;
- (ii) C.S.O. comparable estimates prepared for the 5th, 6th and 7th Finance Commissions, between 1962-63 and 1963-64; 1967-68 and 1968-69 and 1970-71 to 1975-76 in constant prices; and
- (iii) Sectorally dicomposed data for the period 1970-71 to 1975-76 is on a continuous basis.

The choice of the time period has been on the following reasons:

- (i) None of the studies made in this field has adequately taken into account the decade of the seventies into ~~its~~ analysis.
- (ii) The study is undertaken on a continuous basis, compared to the frag-mentary time choices in other studies discussed in chapter-II.
- (iii) Lastly, the time is chosen to compare the pre-1965 period with the subsequent years in the light of the inequalities emerging, due to the effect of the changes brought forth by the socalled Green Revolution.

The study largely uses the inequality measures used by Williamson² with some modifications. Looking at the inadequacies of the measures used by Williamson a new model for the measurement of inequalities has been

²J.G. williamson, Op.cit., p.166.

designed by the author and applies in the present study.

Williamson uses 3 measures of inequality M_w , V_w and V_u , out of which only the later two are used in the present study. The measures are the following;

$$V_u = \frac{\left\{ \sum_{i=1}^n (I_i - \bar{I})^2 \right\}^{0.5}}{\bar{I}} \dots (1)$$

$$V_w = \frac{\left\{ \sum_{i=1}^n (I_i - \bar{I})^2 \times \frac{P_i}{P} \right\}^{0.5}}{\bar{I}} \dots (2)$$

Whereas, V_u is the unweighted co-efficient of variation (the inequality measure), I_i is the percaput NDP for the i^{th} state, \bar{I} is the mean per caput NDP (in this case the national average) n , is the number of regional units, V_w is the weighted co-efficient of variation (also, the inequality measure), P_i is the population of the i^{th} state and P is the national population. Since, inequality of per capita NDPs have been measured on a continuous basis for the 18 year period, trend rates of the weighted and unweighted coefficient of variation have also, been estimated using the following linear equation;

$$V^t = a + ry \dots (3)$$

where, v^t is the estimated coefficient of variation, y is the year (independent variable), a is the intercept and r ($\times 100$) is the percentage of linear trend per year.

Log-linear trend rates have also been used in measuring the trend of the national NDPs and state NDPs, as well as the per caput NDPs for the entire period. The log-linear trend rate is given by the following equation;

$$I = ae^{ry}$$

$$\text{or } \log_e I = \log_e a + ry \quad \dots (4)$$

where, I is the estimated NDP or NSDP, Y , the years and r is the rate of growth (trend rate).

A five year break point has also been used to identify and analyse the cyclical pattern in the growth of NDPs, per caput NDPs and the inequality coefficients. The break points are 1960-61, 1965-66, 1970-71 and 1975-76. To this effect annual compound growth rates over the entire period, as well as for the shorter spans, have been estimated using the following Formulae;

$$I_1 = I_0(1 + r)^t$$

$$\text{Or } r = \left[\text{Ant Log } \left\{ \frac{\text{Log } \frac{I_1}{I_0}}{t} \right\} - 1 \right] \times 100 \quad (5)$$

Where, I_1 is the NDP or per caput NDP for the terminal year, I_0 , for the base year, r is the rate of growth and t is the time interval between I_1 and I_0 . The above method is also used in a number of other places for appropriate use.

NDP, per capita NDP, and NSDPs and certain inequality coefficients have been converted into index numbers using the national coefficients as the norm. The conversion has been done according to the following formula:

$$D_{it} = \frac{I_{it}}{I_t} \times 100 \quad \dots (6)$$

Where, D_{it} is the index value of the i^{th} state for the t^{th} year, I_{it} is the NDP or per capita NDP of the i^{th} state for the t^{th} year and I_t is the national norm for the t^{th} year.

Since, strict application of Williamsons measures can only be accounted at the national level, for a clearer inter-state study of income inequality, an alternative measure of dispersion is proposed. The following are the main assumptions of the proposed measure;

- a) A serious limitation of using per capita income statistics, admittedly takes in an equality assumption intra-regionally, and inequality at only inter-regional level.
- b) Since, the per capita income of any i^{th}

region represent a size (population of P_i and $A+p_j$; , with admissible exceptions), their difference (income difference) can be treated representative only with the weightage of the population proportions.

- c) When, overtime A varies (change in the proportion) for any t^{th} year, p_j also, varies and thus, a change in the population shares overtime might affect the income difference by a variant of p_i^t / p_j^t

The model is as following:

when, N_i^t , N_j^t and p_i^t , p_j^t are known,

$$\text{then, } G_{ij}^t = (N_i^t \sim N_j^t) p_i^t + (N_j^t \sim N_i^t) p_j^t \times 0.5(7-i)$$

$$\text{or Putting, } (N_i^t \sim N_j^t) = d_i^t,$$

$$\text{and } (N_j^t \sim N_i^t) = d_j^t;$$

$$d_{ij}^t = (d_i^t p_i^t + d_j^t p_j^t) \times 0.5 \quad (7.2)$$

where, d_{ij}^t = the weighted income distance between i^{th} and the j^{th} regions in the t^{th} year;

N_i^t , N_j^t are the per capita incomes for the i^{th} and the j^{th} region in the t^{th} year; p_i^t , p_j^t are population proportion of the i^{th} and j^{th} regions in the t^{th} year.

By summing up all the individual weighted income distances between the i^{th} and the j^{th} regions at a particular time point 't', the coefficient value will provide for the total distance between i^{th} and all other j^{th} regions in the t^{th} year.

$$D_i^t = \sum_{j=1}^n \delta_{ij}^t \quad (7.3)$$

The above procedure can be transformed into matrix methods in the following manner,

$$Y^t = // d_{ij}^t // \quad (7.4)$$

where, Y^t is the matrix of weighted per capita income distances between i^{th} and all the j^{th} regions for the t^{th} year. It need not be emphasised that the diagonal elements would be zeros.

$$\text{Let, matrix } \phi_t = // P_i^t // \quad (7.5)$$

$$\text{Where } \phi_i = \frac{r_i^t}{p^t} \quad (7.6)$$

ϕ^t is the matrix of population proportions, p_i^t and p_j^t are population proportions r_i^t is the actual population size of the i^{th} state in the t^{th} year, p^t is the actual population size of the universe (national) for the t^{th} year.

$$\text{Therefore, } D_i^t = (Y^t \cdot V_i^t) + (Y^t \cdot V_j^t) \times 0.5 \quad (7.7)$$

$$V_i^t = U \cdot P_i^t \quad (7.8)$$

Where, D_i is a vector of weighted income distances for the t^{th} year,

U is a unit column vector and

P_i^t is a scalar value,

$$V_j^t = //P_j^t// \quad (7.9)$$

where $//P_i^t//$ is a vector, with $[P_i^t \dots P_j^t \dots P_n^t]$ elements.

The above procedure helps in obtaining an inequality quotient for each of the regional units (in this case the states) for each year of the analysis. Therefore, over the years it is easier to identify, as to whether the inequality (distance) of one region vs. all other regions is increasing or decreasing. This aspect is treated with the trend rate analysis.

But, to take the entire D_i^t matrix into consideration a multivariate linear regression analysis is done (as, lagged regression) making the terminal year 1978-79 as dependent factors and other years as independent factors. The regressions equations are used stepwise, to identify the cyclical fluctuations, over the

entire period. The equations are as the following:

$$I_t^t = \alpha + \beta_1 I_0 + \beta_2 I_{0+1} + \dots + \beta_{t-1} I_{t-1}^{t-1} \quad (8)$$

The standard errors of the equations and multiple coefficient of correlation (r) and coefficients of determination (R^2) are estimated to test the lagged significance of the equations, and the percentage variations explained by the independent factors (inequality coefficients, over years)

SECTION - B

The second section of the study deals with intra-state/region inequality of per capita agricultural incomes between the trienniums of 1962-65 and 1970-73. The choice of the time period is based on some of the preliminary findings of earlier studies, that the increase in inter-state inequalities in the seventies compared to the sixties are due to the contributions of the uneven development in the agricultural sector.⁴ To elaborate since there is significance of the so-called Green Revolution and its uneven impact over different regions of the country, it was contemplated to study the intra-state

⁴A.C. Mahapatra (1978); "An Alternative Model of Measuring Divergence - Convergence Hypothesis", IJRS Vol.X, No.2, pp.39-52.

patterns of income inequalities in a period representing immediate precedes to the Green Revolution (1962-65) and almost, at a reasonable peak of it (1970-73). The trienniums are used, to arrive at moving averages of values (whether income or produce) to avoid the annual fluctuations, which especially, are common to the agricultural sector.

The coverage of the districts are as wide as possible under the constraints of availability of data. The recently carved out small states of Tripura, Meghalaya, Nagaland, Sikkim and Manipur have not been included in the present study due to the non-availability of data for the sixties and the seventies. The Union Territories of Arunachal Pradesh, Chandigarh, Goa-Damn-Diu, Dadra and Nagar Haveli, Delhi, Andaman and Nicobar Islands, Lakshadweep, Mizoram and Pondicherry have also been excluded for the same reasons. Out of 334 districts in the remaining seventeen states of India, 289 'district units'⁵ have been formed for undertaking the study. The hill districts of U.P. have also been neglected, making the final tally of 284 district-units in the study, falling into the 17 major states of India. Because of the

⁵A few districts in some states had to be combined in order to make them comparable during the Sixties and the Seventies. For example, all the 12 districts of M.P. have been combined into one unit and 10 districts of Jammu & Kashmir have been grouped into only 3 units, Jammu, Kashmir and Ladakh.

non-inclusion of some of the areal units of the country, the total estimates of production and value for the country as a whole are invariably smaller than the actual. The difference between the estimated production and value is however, marginal and therefore, can be said as insignificant.

To obtain districtwise per capita⁶ agricultural output in value terms (which is used as a rationally, better substitute for income) 19 major crops⁶ covering cereals, pulses, oilseeds, fibre crops and other cash crops have been taken into consideration and their productions have been converted into money terms. In terms of the gross cropped area (G.C.A) these nineteen crops occupy between 80 to 96 per cent of the gross cropped area in most of the states excepting Kerala in which their share is only 15 per cent of the total cropped area. Total output of each of the crops for each of the 284 component areal units has been obtained for the trienniums 1962-65 and 1970-73 and the averages (moving) are used as representative data for both the periods. The crop-wise data has been converted into value terms of all India Prices at constant prices of 1970-73 and the summed

⁶Crops - rice, wheat, Jower, bajra, maize, ragi, barley, gram, tur, groundnut, rapeseed, mustard, sésamum, linseed, castorseed, Jute, mesta, cotton, sugarcane and tobacco.

up districtwise, to obtain the total output in value terms, for each of the units. To arrive at the per capita output figures, the rural population figures for 1961 and 1971 have been projected, using the compound growth rates for the appropriate mid point of 1962-65 and 1970-73 and the total output are deflated by these projected rural population figures. It must be mentioned that the deflation by rural population estimates has been done due to the fact, that more than 75 per cent of the population, of the country are living in rural areas, as well as more than 70 per cent of the population are directly or indirectly involved in agricultural occupation. Therefore, the income generated from agricultural sector naturally should be accounted as the income of only rural population, except a small cross accounting for the urban agriculturist, for rural non-agricultural occupants etc.. The method used for estimation of agricultural income is as follows :

$$I_j = \frac{\sum_{i=1}^n C_{ij} \cdot p_i}{R_j} \quad \dots (9)$$

where, I_j is the per capita agricultural income of the j^{th} district unit, C_{ij} is the output of the i^{th} crop in the j^{th} district and p_i is the price of the

i^{th} crop (at 1970-73 prices) and R_j is the projected rural population figures for the j^{th} district.

The resultant income estimates have been classified into five frequency groups of very low incomes (less than Rs.100), low incomes (Rs.100 - Rs.299), Medium incomes (Rs.300 - Rs.499), high incomes (Rs.500 - Rs.699) and very high incomes (Rs.700 and above), for the purpose of analysis. Compound growth rates of per capita agricultural incomes, of total output in value terms and that of the rural population have been estimated for the analysis of inter-temporal as well as, the components of those changes for the intervening period of eight years.

The compound growth rates of per capita agricultural incomes have also been classified into five categories, i.e. high negative (-1.0 per cent per annum or less), marginal negative (-1.0 to 0 per cent), marginal positive (0 to 0.99 per cent per annum), medium positive (1 to 2.99 per cent) and high positive growth rates (3 per cent and more).

To a great extent in India the agricultural output and the prosperity of the people dependent on this activity depends on the diversity elements of the

natural environment. Therefore, a study of the agricultural income needs to be seen in the context of the natural environment. For this purpose, per capita incomes generated at the level of the districts have been recasted into 82 lower order natural regions ('Divisions') and 29 meso-order natural regions ('Regions'); on the basis of the Registrar General of Census (1961).⁷ Minor adjustments have however, been made keeping in view the availability of data for these regional units based on the stated physiographic considerations.

Per capita agricultural incomes, their growth rates, growth of total output, growth rates of rural population and the levels and pattern of the inequality by both unweighted (vw) and weighted (vw) measures have been estimated on the basis of the natural regions. Thematic maps have also been provided on the framework of natural regions. This analytical method highlights many interesting issues which otherwise could not be considered.

⁷A. Mitra (1968), in P. Sengupta and G. Sdasyuk (1968), Economic Regionalisation of India: Problems and Approaches, Census of India (1961). The Office of the Registrar General of India, Government of India, New Delhi, Statement 1.1, pp.237-240. A modified version of the above classification on the basis of the census, 1971 is available in unpublished form and has actually, been used in this study.

SECTION - C

The third major section of the study is concerned with a detailed intra-regional analysis of district-wise inequality in the State of Madhya Pradesh. By means of composite indices of development, derived from factor analysis (using principal components) this section attempts to analyse on a district basis the intra-regional developmental differences and temporal changes therein, that have occurred over the decade from 1960-61 to 1972-73. The choice of the State of Madhya Pradesh for the present study is admittedly, somewhat arbitrary but largely, as a choice emerging out of our earlier studies that it provides a good example of a large backward state away from the pale of metropolitan influences located somewhere in the interface of the agriculturally advanced regions and the backward ones; interface of the predominantly wheat and rice regions; a fast industrialising region, with immense mineral resource potentials and ultimately, due to the availability and nature of data on a continuous basis. But unlike other studies in which factor analysis has been used to estimate spatial inequalities at a particular time from cross sectional data,⁸ the main objective

⁸B. Dasgupta, Op.cit., and M.N.Pal (1975), Op.cit.;

of this study is primarily to examine the magnitude and direction of these inequality - changes as a result of development, at a meso-level (state) and integrating it to the overall frame of analysis as a testing case. There are other technical points of interest as for example using principal components on a continuous time-series basis, grouping of variables on the basis of inter-correlations and identifying the factors responsible for differential levels of development which have been discussed in the following lines.

Indicators of Development:

Fifteen factors which represent the development of agriculture, industry, health, power, employment and education have been included in the study for analysis.

Agriculture:

Land is a crucial but a limiting factor of agricultural development. The area sown in a year reflects, by and large, the amount of land available for cultivation, but the land availability alone is not a sufficient indicator of agricultural development. The quality of land intensity of cropping, availability of inputs like water and fertilisers, overall investment in land and the size of population dependent upon it are

some of the important factors on which agricultural development hinges. In order to neutralise the influence of population size, the gross and net area sown per capita in rural areas have been considered.

Investment in land and agricultural inputs are both dependent upon the availability of resources for investment which always constitute a stumbling block in development but paucity of personal financial resources is mitigated to a large extent by institutional finance which in the case of agriculture in India is mainly provided by co-operatives.

The per capita credit has, therefore, been included as one of the factors. Rural prosperity is largely dependent upon the level of agricultural income, which in turn depends upon the area of land and productivity. The size of the rural population also plays an important role in the determination of their standard of living. Therefore, the agricultural output and per capita share in it have been considered. While the former is an indicator of the productivity of land, the latter indicates prosperity levels. Productivity of land is however, affected by a number of factors, some of which have already been mentioned. Multiple cropping and irrigation are significantly important among these

factors. The author has therefore, included both of them in the analysis. They are represented by the irrigated and double cropped area as proportion of net area sown. Thus, eight out of the fifteen indicators included in the study relate to agriculture. This is justified in view of the fact, that agriculture is the predominant activity in the economy of Madhya Pradesh.

Industrialisation :

Industrialisation is represented by the number of working registered factories and the workers employed in them. The value of industrial output and proportion of its contribution to gross domestic product would have provided a better measure of industrial development but this could not be used because of the non-availability of data at the district level.

Employment :

The degree of employment prevailing in an economy is often a reflection on its health and it can very well be measured by the proportion of persons employed in the total labour force. It is however, difficult to obtain such data, on a district level. Therefore the researcher used as a measure the number of job placements as a proportion of total registrants with the Employment

Exchanges. The Employment Exchange data suffers from the well known limitations, for example, less than adequate coverage of the unemployed and presence of employed among the registrants. To the extent to which they provide an idea about the broad magnitude of the problem and the direction in which the economy is moving at a given time, they could usefully be used.

Power :

Development of power is represented by a number of towns and villages in a district with electricity supplies. Actual consumption of power, preferably by use would have been a better indicator, but it was one that could not be used because of the non-availability of data. In a situation in which vast areas, particularly the rural ones, still remain without power, the indicator used in the study, however, could be considered generally to reflect the differences in development levels attained by the various district.

Human Resources Development:

Development of human resources is mainly determined by the extent of provision of educational and medical facilities. Government Allopathic, Ayurvedic, Unani and hospitals and dispensaries per lakh of

population are used as indicators of development in the field of health. No doubt, these conceals important qualitative differences such as the quality of services in terms ^{of} numbers of doctors and auxiliary health workers, beds, medicines and equipments but when vast masses of rural people have to go unattended because of the almost complete absence of health facilities, the existence of hospitals and dispensaries could make an important difference. In this case, we could not but manage with broad indicators.

The percent of 14-16 year old school going boys and girls in the total population of this age group is taken to represent the extent of educational development, because at this age the population is on the threshold of entering the workforce and therefore, the value of educated manpower at this age-group has immense potentiality in measuring the levels of development.

The original data matrices have been standardised. A correlation matrix for all the fifteen variables has been estimated for the year 1968-69 (on a random basis) and the degree of positive correlation between variables has been used for clustering the variables into two separate blocks of factors, A & B. It can be mentioned

that the 15th variable (percentage of School going girls in age group of 14-16 years to total girls in that age group) has been finally excluded due to the non-conformity with either of the blocks. The variables in the two blocks are as the following :

Block - A

- X₁ Net area sown per capita (rural population).
- X₂ Gross cultivated area per capita(rural population).
- X₆ Gross value of agricultural output per capita
(rural population)
- X₇ Co-operative credit per capita (rural population).
- X₁₀ Percentage of placements total registrants
(with employment exchanges)
- X₁₂ Government Allopathic and dispensaries per
lakh of population.
- X₁₃ Ayurvedic, Unani and Homeopathic hospitals and
dispensaries per lakh of population.

Block - B

- X₃ Double cropped area as proportion of net area
sown.
- X₄ Net irrigated area as proportion of net area
sown.
- X₅ Gross value of agricultural output per hectare.
- X₈ Number of working registered factories.
- X₉ Workers in working registered factories
- X₁₁ Number of electrified villages and towns.
- X₁₄ Percentage of school-going boys in the popu-
lation of 14-16 years old.

It will be interesting to note that in the process of blocking all the variables clearly associate on the basis

of either the variable is a static factor and thereby 'traditional', or dynamic and thereby 'modern sector'. The association of variables in Block-A are clearly of traditional nature, and thereby provide only potentiality for development; while the variables in Block-B are by nature dynamic and demonstrate the actual levels of development.

The composite indices for both the blocks of variables for all the 121 years of data have been constructed with the help of principal components (of factor analysis).⁹ First, the correlation matrices, R_s , are derived for each of the blocks for each of the year. It has been taken care of so that the R matrices have to be positive, or else, the factor loadings would be negative, which naturally, is not an acceptable proposition, i.e. weighing a variable negatively while defining it as an indicator of development. The eigen values (characteristic roots) ' λ_i ' are derived from the characteristic equation;

$$|R - \lambda_j I| = 0 \quad \dots (10)$$

while, R is the correlation matrix, I , is the corresponding identity matrix and λ_j is the j^{th} characteristic root.

⁹This is a standard procedure first propounded by M.G. Kendall, (1939) 'Geographical Distribution of Crop Productivity in England Journal of the Royal Statistical Society, 102, pp.21-62.

It may be noted that one derives number of roots, n , being the dimension of the R matrix.

Following Kendall only the highest λ_i value is used for deriving the eigen vector, which ultimately is used as the factor loadings. All important roots (factors) and the factor loadings have also been analysed in identifying the communality and relative importance of individual as well as a group of variables. The composite index is derived using the highest eigen value because then the index explains maximum possible variations within the data matrix by maximising the squared sums of correlations. To elaborate;

$$\frac{\lambda_i}{n} \times 100 = \text{highest per cent of variation explained} \quad (11)$$

The eigen vector x_j is derived from the simultaneous equation of the order 'n', given by

$$/ R - \lambda I / \cdot / X / = 0 \quad (12)$$

To derive the weight vector or the factor loadings w_j , the eigen vector x_j is normalised to unity by division by length of the vector,

$$W_j = \frac{X_j}{\sqrt{X_1^2 + X_2^2 + \dots + X_n^2}} \quad (13)$$

Now, the variable formats for each block for the i^{th} year is multiplied by the factor loading vector W_i to arrive at the composite vector I_{ij} ;

$$I_{ij} = D_{ij}^* \times W_{ij} \quad (14)$$

where, I_{ij} is the composite index of i^{th} year for the j^{th} block, D_{ij}^* is the scale free data matrix¹⁰ of the i^{th} year for the j^{th} block and W_{ij} is the factor loading vector of the i^{th} year for the j^{th} block.

Now, both the blocks A, and B, for each year is summed up observation wise and divided by 2 to arrive at the final composite index¹¹ I_i

Data for this section of the study has been processed by a system TDC - 316, installed at the Gauhati University, Assam. The programme in Fortran-4 language is provided in the Addendum-A.

The above composite indices indicating the level

¹⁰Data matrix D_{ij} is made scale free by division by the mean of each of the variable.

¹¹It may be noted that irrespective of the values of correlation, for two variables the weight derived by principal components will always be equal.

of development and inequality levels are analysed in the following manners.

- (1) Annual compound growth rates have been estimated to analyse the differential rates of development of different districts, with a break point at 1966-67.
- (2) The inequality measures, coefficient of variations (both V_w and V_w) have been estimated, for the indices of each year to know the level of inequalities and the trends of inequality measures over the 12 year period have also been estimated.
- (3) In the Final Index of development (I), intra - and inter-quartile deviations have also been analysed.
- (4) Multivariate Linear Lagged regressions have been done over the entire period for the final index, to understand the nature of annual contributions to the break point year and the terminal years as explanatory variables, and
- (5) lastly, each of the composite indices are classified by quartiling and thematically mapped to understand the regional patterns development within the state and the nature of changes over the decade, with the particular context of the green revolution in the later years of the study.

The above discussions on methodology provides only the broader framework of analysis, but there are a number of details, which would come up in each of the analytical chapters. It should also be noted, that the nature of

methodology cannot be homogeneous, seeing the broader spectrum of the study undertaken and the varied nature of data used to support the analysis. It would only be useful to understand the three sections of the methodology in the context of their analytical framework and the sequence of logic over discussions in a continuum.

CHAPTER - V

"It is admitted that there should be attempt to make every region, every part of India develop equally in so far as we can, and that we should remove the disparities that exist in India. There are some tremendous disparities. Some of our provinces, I would not name them are extremely poor. They do not deserve to be poor."

(
J. Nehru
(Speeches))

REGIONAL INEQUALITY OF NET DOMESTIC PRODUCT
AND PER CAPITA NET DOMESTIC PRODUCT IN INDIA
1960-61 TO 1978-79*

As pointed out in the earlier chapters, the study calls for a detailed analysis of income inequality in India during the latter three national plans, i.e. the Third Five Year Plan, the Inter-regnum¹ between the Third Plan and the Fourth Five Year Plan and between the latter plan, and the Fifth Five Year Plan. The choice of time to a great extent satisfies the above requirement, despite, apparent difficulties of obtaining reliable and comparable data.

In the present chapter an attempt has been made to make a clear and in depth study of the inter-regional (inter-state) pattern and temporal changes in the levels of income inequality in the light of the theoretical positions elucidated in Chapter-II. For the purpose of

*A part of this study has been published in the form of an article by the author as referred below :

A.C. Mohapatra (1978), "An Alternative Model of Measuring Divergence - convergence Hypothesis : A study of Regional Per Capita Income in India, (1960-61 to 1973-74)", IJRS, Vol. X, No.2, pp.39-50.

¹This is also called a 'plan holiday' i.e. between 1965-67 to 1968-69.

clarity, the current chapter has been divided into the following sub-sections.

- A. Regional pattern of distribution of NDP and per capita NDP (1960-61 to 1978-79),
- B. Pattern of regional population and growth,
- C. Comparison of two sets of NDP estimates,
- D. Pattern of regional inequality based on Williamson's measures and changes thereof,
- E. Pattern of regional inequality based on a new algorithm, proposed by the author in this study and changes thereof, and
- F. Findings and some tentative hypotheses.

A. Regional pattern of distribution of NDP and per capita NDP :

It would be interesting to note from Table-V.1, that the Net Domestic Product (at factor cost) of the country increased from Rs.13,335 crores in 1960-61 to Rs.24,890 crores in 1978-79 at an arithmetic rate of about 86.7 per cent over a period of eighteen years. This is at constant prices of 1960-61. Although, it is not a commendable performance, yet looking at the size of the country, large population and colonial exploitation for about two hundred years, the achievements can be said as fairly satisfactory. But, more remarkable is the growth in population, which has grown from 434 million

TABLE V.1

Net Domestic Product at Factor Cost, India,
1960-61 to 1978-79 at 1960-61 prices

Years	NDP in Rs. crores	Population in million*	Per capita income, Rs.
(1)	(2)	(3)	(4)
1960-61	13,335	434	305.60
1961-62	13,825	444	309.20
1962-63	14,103	454	308.20
1963-64	14,882	464	318.30
1964-65	16,028	474	335.10
1965-66	15,234	485	311.00
1966-67	15,365	495	307.40
1967-68	16,644	506	325.40
1968-69	17,112	518	327.40
1969-70	18,202	529	340.60
1970-71	19,282	541	353.00
1971-72	19,486	553	349.00
1972-73	19,235	565	337.00
1973-74	20,281	577	349.10
1974-75	20,281	588	343.20
1975-76	21,998	600	366.63
1976-77	22,201	613	362.17
1977-78	23,932	625	382.91
1978-79	24,890	637	390.74

* Projected figures for the corresponding years

Source :- National Accounts Statistics,
CSO, Ministry of Planning,
Govt. of India, 1976

in 1960-61 to 637 million² in 1978-79, a growth well over 46.5 per cent for the same period. In fact, during the two decades (1961 to 1981), the population has grown steadily by about 2.5 per cent per annum. Quite obviously, the impact on the per capita growth of income has been just marginal, i.e. it has changed from Rs.305.60 in 1960-61 to Rs.390.74 in 1978-79. Thus, it is a meagre change of only 27 per cent over a period of eighteen years, which comes roughly to 1.5 per cent per annum. A break point in the period of the study will show that in the first eight years, i.e. upto the end of the plan holidays (1968-69), the NDP rose by only 28 per cent as compared to the IVth and Vth Plan periods, when it went up to 59 per cent. The slow increase in the NDP during the period from 1960-61 to 1968-69 can be attributed to the two major wars³ and the pronounced droughts of the mid-sixties (i.e. the years of 1965-66, 1966-67 and 1967-68). The per capita income has grown poorly in the sixties (1960-61 to 1968-69), growing only from Rs.305.60 to Rs.327.40. This change is less than 7 per cent over the entire period, accounting for less than one per cent

²Based on projections by compound rates.

³In 1962, the Chinese aggression and in 1965 the second Kashmir conflict with Pakistan.

per annum. In comparison to this, in the later decade (1968-69 to 1978-79), the per capita income has increased by about 20 per cent allowing for 2 per cent growth per annum which is almost twice of the rate of the preceding decade.⁴

Appendix-V.A provides for a detailed estimates of Net Domestic Product of the country, for the entire period of eighteen years (1960-61 to 1978-79) at factor cost. The NDP is at constant prices of 1960-61. This is available for the seventeen major states and the Union Territory of Delhi.⁵ The Net Domestic Product at factor cost in 1960-61, varies from Rs.67 crores in Himachal Pradesh to Rs.1799 in Uttar Pradesh, which is almost 30 times of the former State. The extremes in 1978-79 being Rs.149 crores in Himachal Pradesh to Rs.3135 crores in Maharashtra. In the seventies this range has however, shown a marginal reduction as compared to 1960-61.

The statewise share of NDP (Appendix V.B) also, varies widely, being 0.50 per cent in Himachal Pradesh

⁴This is also, in light of the international war of 1971, with a refugee burden of 10 million, which has cost the national coffers to the tune over 10 billion rupees.

⁵The selection of the regional units has been done on the basis of a minimum 0.5 per cent threshold population share of the country.

to 13.49 per cent in Uttar Pradesh in 1960-61. The range of variations has however, slightly decreased in 1978-79⁶, which is 0.60 per cent in Himachal Pradesh and 12.60 per cent in Maharashtra. The variations (coefficient of variations) are wide, as much as 70.32 per cent in 1960-61 and having come down marginally in 1978-79 to 65.89 per cent. This marginal decrease can be attributed to the fact that there occurred variations in the areal and population sizes of the constituent states and union territories. It will be shown later, that 40 per cent of variations are accounted for by the size bias of the states/regions.

The linear trend rates of the NSDP (annual rates in percentage, Table-V.8, Column 1) over the 18 years period show wide variations. It is the lowest in Rajasthan with a percentage of 2.75 and the highest in Haryana having 13.52 per cent, followed by 10.05 per cent in Punjab, while the all India average trend rate is 4.97 per cent per annum. There are seven states and the Union Territory of Delhi, which have trend values higher than the average for the country, whereas the rest of the states have lower trend values. In fact, with the exception of the state of Maharashtra, the

⁶The last row, Appendix-V.A.

traditional triumvirate of the developed states, i.e. West Bengal, Gujarat and Tamil Nadu have a lower trend value compared to the national norm and have not fared as desired.

A study of per capita NSDP (at 1960-61 prices; see, Appendix-V.C.) shows great variation from state to state in different years. The per capita annual incomes in 1960-61 varies from as low as Rs.211 in Orissa to Rs.759 in Delhi,⁷ the next highest of Rs.409 being for Maharashtra. In 1978-79 the per capita lowest income of Rs.233 was in Bihar, while Punjab with a per capita income of Rs.650 emerged at the top, excepting Delhi in which the per capita income was Rs.793. For the purpose of a more meaningful understanding, the plan-wise analysis has been made, i.e. using the break points at 1960-61, 1965-66, 1968-69, 1973-74 and the terminal year of 1978-79. Index numbers (Table-V.2) using all India per capita income as 100 shows that in 1960-61, there were as many as 10 states/regions with index values of more than 100, the highest being of Delhi (248), followed by Maharashtra (134), while the rest of the units have index values less than 100. Orissa with an index value of 69 was at the bottom of the ladder.

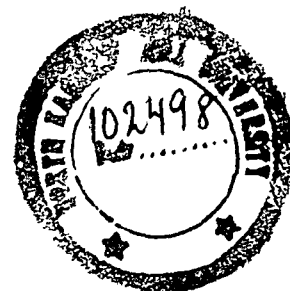
⁷This is largely, because of the high urban component in the union territories of Delhi.

Table V.2

Index Numbers of Per capita NSDP
(1960-61 to 1978-79)

States	1960-61	1965-66	1968-69	1973-74	1978-79
1. Andhra Pradesh	90	89	84	93	90
2. Assam	103	106	104	95	89
3. Bihar	70	71	63	59	60
4. Gujarat	119	121	111	112	112
5. Haryana	107	103	108	121	137
6. Himachal Pradesh	118	105	101	99	94
7. Jammu & Kashmir	88	75	85	90	97
8. Karnataka	93	94	105	111	98
9. Kerala	87	86	80	81	72
10. Madhya Pradesh	94	77	85	84	73
11. Maharashtra	134	124	129	128	135
12. Orissa	69	74	76	76	72
13. Punjab	122	126	137	156	166
14. Rajasthan	104	104	105	92	81
15. Tamil Nadu	108	103	101	107	107
16. Uttar Pradesh	81	79	78	70	71
17. West Bengal	105	108	103	94	90
18. Delhi (U.T.)	248	254	247	216	203
India	100	100	100	100	100

Source :- C.S.O. (based on Appendix-V.C.)



The situation remains more or less unchanged, until the end of the Fourth Plan (1973-74), when only 8 states retain an index position higher than 100 indicating that many states have not succeeded in following the general trend in the income increase in the country. The situation seems to have further aggravated in 1978-79 (end of the Fifth Plan⁸), when only 6 states/regions recorded index value higher than 100, while the remaining 12 units seem to have lagged behind the general pattern of national economic progress. This is further, demonstrated with the range of indices increasing considerably, the lowest of 60 being registered in Bihar and the highest of 203 and 166 in Delhi and Punjab, respectively. There is however, a significant decline in the index value of Delhi by no less than 45 units.

The ranks of states in terms of their per capita incomes (Table-V.3) have changed considerably. Delhi, which always retains the premier position and Bihar, the lowest position are however, the exceptions. The states of Punjab and Haryana have gained substantial ground, improving from the 3rd to the 2nd rank and 2nd

⁸ Although, a new regime at the centre terminated the Fifth Five Year Plan one year in advance (1977-78), for all practical purposes the status-quo ante has been retained in the analysis.

Table V.3

Ranking of States by Per Capita NDP
(1960-61 to 1978-79) *

States	1960-61	1965-66	1968-69	1973-74	1978-79
1. Andhra Pradesh	13	12	14	11	10.5
2. Assam	10	6	8	9	12
3. Bihar	17	18	18	18	18
4. Guharat	4	4	4	5	5
5. Haryana	7	9.5	5	4	3
6. Himachal Pradesh	5	7	10.5	8	9
7. Jammu & Kashmir	14	16	12.5	13	8
8. Karnataka	12	11	6.5	6	7
9. Kerala	15	13	15	15	15.5
10. Madhya Pradesh	11	15	12.5	14	14
11. Maharashtra	2	3	3	3	4
12. Orissa	18	17	17	16	15.5
13. Rajasthan	9	8	6.5	12	13
14. Punjab	3	2	2	2	2
15. Tamil Nadu	6	9.5	10.5	7	6
16. Uttar Pradesh	16	14	16	17	17
17. West Bengal	8	5	9	10	10.5
18. Delhi	1	1	1	1	1

* Ranking done in ascending order

and 3rd ranks, respectively. In the lower orders, three states i.e. Andhra Pradesh, Jammu & Kashmir and Karnataka have improved their ranks significantly, despite indices below or around the national norm.

The changes occurred in the per capita incomes of different states are also, quite significant (Table-V.8, Column 2). Estimates of linear trend rates per annum over the entire period of study (18 years) shows that except the state of Rajasthan (-0.32) rest of the states and union territories enjoy positive annual trend rates varying from 0.05 per cent in Kerala to the highest of 4.65 per cent in Punjab, followed by 3.95 per cent in Haryana. This is in comparison to the all India average trend of 1.41 per cent per annum.

As pointed out earlier, the per capita income (in constant prices of 1960-61) grew at an annual compound growth rate of 1.37 per cent, though the growth during the sixties was limited to only 0.87 per cent. In comparison to this, almost double the rate of 1.78 per cent was observed between 1968-69 and 1978-79 (Table-V.6). Excepting the states of Rajasthan and Madhya Pradesh (-0.04 each), chronically affected by droughts, the remaining states observed a positive

growth rate of per capita income ranging from 0.11 per cent in Himachal Pradesh to 3.12 per cent in Punjab. This growth rate was 2.78 per cent in Haryana, 1.94 per cent in Jammu & Kashmir. There are only six states,⁹ which observed a rate of growth higher than that of the national average.

On the contrary, the sixties (particularly, during the Fourth Plan Period) is marked by a deceleration in the growth of per capita income, i.e. as much as that seven states suffered from a negative rate of growth, while the highest positive rate is registered by Orissa (1.74 per cent). During this period, even the fast developing states of Punjab has shown a deceleration, having a growth rate of only 0.89 per cent, for the five year period.

The later two plan periods are marked by high positive growth rates for the states of Punjab (3.62 per cent), Haryana (4.90 per cent), Jammu & Kashmir (3.82 per cent) and even, U.P. (2.57 per cent¹⁰) and Tamil Nadu (2.19 per cent). The traditionally developed states of Gujarat, Maharashtra and West Bengal have,

⁹The states are Punjab (3.12), Haryana (2.78), Jammu & Kashmir (1.94), Karnataka (1.64), Orissa (1.62) and Maharashtra (1.44).

¹⁰This is apparently, because of the western part of U.P. coming under the strong influence of the 'Green Revolution' in the early seventies.

however, observed only marginal positive rates of growth being 1.79 for Gujarat and 2.6 and 0.41 per cent for Maharashtra and West Bengal, respectively.

**B. Patterns of Regional
Population Growth :**

The study of per capita income is integrally linked with the size and growth rate of population. In the process of planning a region with low per capita income as well as small size of population has relatively less significance as compared to a region with low income but, large population, as far as national policy decisions are concerned (also, followed in the country on the basis of the recommendations of the Gadgil Commission on the principles of allocation of plan resources to states). The regional units chosen, vary widely in terms of population sizes and their composition from as little as 2.66 millions (Delhi) to 73.74 millions of Uttar Pradesh in 1961 (Appendix-V.E). In 1981, the relative position remained the same, the range varying from 6.2 millions in Delhi to 110.86 millions in Uttar Pradesh. The relative shares vary from 0.61 per cent of Delhi to 16.79 per cent of Uttar Pradesh in 1961 (Table-V.4). In 1971, Delhi constituted 0.74 per cent and Uttar Pradesh 16.21 per cent of the National

Table V.4

Percentage share of States in Indian Population,
(1961, 1971 & 1981)

States/U.Ts.	1961	1971	1981
1. Andhra Pradesh	8.19	7.94	7.81
2. Assam	2.53	2.67	2.91
3. Bihar	10.58	10.28	10.21
4. Gujarat	4.70	4.87	4.97
5. Haryana	1.73	1.83	1.88
6. Himachal Pradesh	0.64	0.63	0.62
7. Jammu & Kashmir	0.68	0.87	0.87
8. Karnataka	5.37	5.35	5.42
9. Kerala	3.85	3.90	3.71
10. Madhya Pradesh	7.37	7.60	7.67
11. Maharashtra	9.00	9.20	9.17
12. Manipur	0.18	0.20	0.17
13. Meghalaya	0.18	0.18	0.19
14. Nagaland	0.08	0.09	0.11
15. Orissa	4.00	4.00	3.84
16. Punjab	2.53	2.47	2.44
17. Rajasthan	4.59	4.70	4.99
18. Sikkim	0.04	-	0.05
19. Tamil Nadu	7.67	7.52	7.06
20. Tripura	0.26	0.28	0.30
21. Uttar Pradesh	16.79	16.12	16.21
22. West Bengal	7.95	8.02	7.97
<u>U.Ts.</u>			
23. Arunachal Pradesh	0.08	0.09	0.09
24. Andaman Island	0.01	0.02	0.03
25. Chandigarh	0.02	0.05	0.07
26. Delhi	0.61	0.74	0.91
27. Mizoram	0.06	0.06	0.07
India	100.00	100.00	100.00

Source: Census of India
(Based on Appendix V.E)

population total. In 1981, this position has further changed, as the share of Delhi went up to 0.91 per cent and that of Uttar Pradesh to 16.21 per cent.

The annual compound growth rates also, vary greatly from region to region, as well as from decade to decade (Table-V.5). Compared to the all India average compounded rate of 2.23 per cent during 1961-71 decade, the rates in different states vary from 1.66 per cent in Rajasthan (which is the lowest) to 4.35 per cent in Delhi, the highest for the latter. Among larger states the highest growth rate is found in Assam, which is 3.02 per cent.¹¹

The growth rate of population of the nation during the period of 1971-81 decade, remained almost unchanged, the variation among the constituent states show that Tamil Nadu had the lowest rate of 1.60 per cent compared to the highest of 3.68 per cent for Rajasthan. The growth rate in Delhi and Nagaland were however, the highest being 4.30 and 4 per cent, respectively. Compared to the earlier decade there has been a significant decline in the rates of growth in some of the

¹¹ Among the minor states, Nagaland leads with 3.46 per cent and among the Union territories, Andaman & Nicobar Islands with 11.92 per cent, followed by 11.19 per cent of Chandigarh.

Table V.5

Annual Compound Growth Rates of Population of
Indian States

States/U.Ts.	in percentage		
	1961 to 1971	1971 to 1981	Change
1. Andhra Pradesh	1.92	2.07	+0.15
2. Assam	3.02	3.12	+0.10
3. Bihar	1.98	2.13	+0.15
4. Gujarat	2.61	2.43	-0.18
5. Haryana	2.84	2.50	-0.34
6. Himachal Pradesh	2.10	2.05	-0.05
7. Jammu & Kashmir	2.67	2.61	-0.06
8. Karnataka	2.19	2.37	+0.18
9. Kerala	2.36	1.75	-0.61
10. Madhya Pradesh	2.40	2.27	-0.13
11. Maharashtra	2.46	2.20	-0.26
12. Manipur	3.21	2.94	-0.27
13. Meghalaya	2.75	2.79	+0.04
14. Nagaland	3.46	4.00	+0.54
15. Orissa	2.26	1.82	-0.44
16. Punjab	1.98	2.09	+0.11
17. Rajasthan	1.66	3.68	+2.02
18. Sikkim	-	-	-
19. Tamil Nadu	2.03	1.60	-0.43
20. Tripura	3.29	2.82	-0.47
21. Uttar Pradesh	1.82	2.30	+0.48
22. West Bengal	2.41	2.09	-0.32
<u>U.Ts.</u>			
23. Arunachal Pradesh	7.18	2.97	-4.21
24. Andaman Island	11.92	4.70	-7.22
25. Chandigarh	11.19	5.64	-5.55
26. Delhi	4.35	4.30	-0.05
27. Mizoram	2.03	4.03	+2.00
India	2.23	2.24	+0.01

Source :- Census of India,
(Based on Appendix-V.E)

major states of the country, e.g. Kerala (-0.61 per cent), Tamil Nadu (-0.43 per cent), Orissa (-0.44 per cent), West Bengal (-0.32 per cent), Haryana (-0.34 per cent) and Maharashtra (-0.26 per cent).¹² In general, the population growth has been more in the less densely population states, having hilly areas, except Uttar Pradesh which recorded a high positive growth rate. In fact, the population of Uttar Pradesh, reached to the size of the total population of Japan.

C. Comparison of the two sets
of NDP estimates :

As outlined in chapter-III, due to strict, comparability problem, the 'compiled estimates' of central Statistical Organisation, a different series, especially prepared by the latter for the Finance Commissions (the Fifth, the Sixth and the Seventh) are also, used in the study as a method of cross checking hypotheses emerging out of the first series. The latter series are however, not continuous (Appendix-V.D). Moreover, they are available only for 16 out of the 18 units, taken into consideration in present work. Data for Delhi and many other states and Union territories

¹² For large scale re-peopling of Rajasthan, around the new canal colonies in the arid areas, seems to have helped for an abnormally high rate of growth of population.

Table V.6

Compound Growth Rates of Per Capita NDP,
1960-61 to 1978-79
(at 1960-61 prices) *

States	1960-61 to 1965-66	1965-66 to 1968-69	1960-61 to 1968-69	1968-69 to 1973-74	1973-74 to 1978-79	1968-69 to 1978-79	1960-61 to 1978-79
1. Andhra Pradesh	0.07	0.0	0.05	3.39	1.49	2.43	1.36
2. Assam	0.93	1.00	0.96	0.60	0.95	0.18	0.52
3. Bihar	0.55	-2.47	-0.59	0.77	1.81	1.29	0.45
4. Gujārat	0.71	-0.90	0.10	1.44	2.15	1.79	1.04
5. Haryana	-0.49	3.34	0.93	3.69	4.30	4.29	2.78
6. Himachal Pradesh	-1.91	0.51	-1.01	0.83	1.19	1.01	0.11
7. Jammu & Kashmir	-2.92	6.34	0.46	2.46	3.82	3.14	1.94
8. Karnataka	0.49	5.51	2.34	2.39	-0.21	1.08	1.64
9. Kerala	0.23	-0.75	-0.14	1.55	-0.07	0.74	0.35
10. Madhya Pradesh	-3.50	4.75	-0.49	1.20	0.14	0.32	-0.04
11. Maharashtra	-1.15	3.10	0.42	1.06	3.47	2.26	1.44
12. Orissa	1.74	2.82	2.14	1.17	1.25	1.21	1.62
13. Punjab	0.89	4.80	2.34	3.87	3.62	3.75	3.12
14. Rajasthan	0.31	2.02	0.95	-1.38	-0.25	-0.82	-0.04
15. Tamil Nadu	-0.68	1.34	0.08	2.47	2.19	2.33	1.32
16. Uttar Pradesh	-0.08	1.47	0.50	-0.96	2.57	0.79	0.66
17. West Bengal	0.98	0.10	0.65	-0.66	1.48	0.41	0.51
18. Delhi	0.78	0.88	0.82	-1.45	1.04	-0.21	0.24
India	0.35	1.73	0.87	1.29	2.28	1.78	1.31

* Based on Appendix -V.C

was not available. It is interesting to note that the total NDP values are the same as that provided in the estimated in the National Accounts Statistics. In order to ascertain a comparable picture the NDP values given in current prices for 1962-63 to 1964-65 and 1967-68 to 1969-70 and at 1970-71 prices from 1970-71 to 1975-76 have been duly changed to the prices of 1960-61, using the whole sale price indices of CSO.¹³

The NDP (statwise) values for the comparable estimates are on an average a little higher than the values of the compiled series (Appendix-V.A.), viz. in case of Uttar Pradesh, they are respectively, Rs.1988 crores and Rs.1839 crores, for Maharashtra, a little lower, (Rs.1604 crores to Rs.1643 crores) etc.. The different vary within a range of \pm 10 per cent.

Consequently, the per capita NDP have slightly higher values (Table-V.II) the range being from Rs.220 (in Bihar), Rs.391 (in West Bengal) and to Rs.387 (in Maharashtra) in 1962-63. In 1975-76 the NDP ranges varies from Rs.227 in Bihar to Rs.578 in Punjab. The Net Domestic Product for Haryana and Maharashtra were Rs.534 and Rs.505, respectively. These results are not

¹³ There are reasons to believe that these price indices are not fool proof, but are largely, reasonable for the purpose.

Table V.7

Correlation Matrix of Per Capita NDP from 1960-61 to 1978-79 *

	1960-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70
1960-61	1.00	1.00	0.99	0.99	0.99	0.99	0.97	0.98	0.98	0.97
61-62		1.00	0.99	0.99	0.99	0.99	0.97	0.97	0.98	0.96
62-63			1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.97
63-64				1.00	1.00	0.99	0.98	0.98	0.98	0.97
64-65					1.00	0.99	0.98	0.98	0.98	0.98
65-66						1.00	0.99	0.98	0.99	0.97
66-67							1.00	0.99	0.99	0.99
67-68								1.00	0.99	0.99
68-69									1.00	0.99
69-70										1.00
70-71										
71-72										
72-73										
73-74										
74-75										
75-76										
76-77										
77-78										
78-79										

Contd..

Contd.. Table V.7 *

	1970-71	71-72	72-73	73-74	74-75	75-76	76-77	77-78	78-79
1960-61	0.96	0.94	0.94	0.93	0.92	0.93	0.91	0.89	0.86
61-62	0.96	0.94	0.92	0.92	0.90	0.92	0.89	0.88	0.84
62-63	0.96	0.94	0.93	0.92	0.90	0.92	0.90	0.88	0.85
63-64	0.96	0.94	0.93	0.93	0.91	0.93	0.90	0.89	0.86
64-65	0.97	0.95	0.94	0.94	0.92	0.94	0.92	0.90	0.87
65-66	0.97	0.95	0.94	0.93	0.91	0.93	0.90	0.89	0.86
66-67	0.98	0.96	0.95	0.95	0.93	0.95	0.92	0.91	0.89
67-68	0.99	0.98	0.96	0.96	0.94	0.96	0.94	0.93	0.91
68-69	0.98	0.97	0.97	0.96	0.95	0.96	0.94	0.93	0.90
69-70	0.99	0.98	0.97	0.97	0.96	0.97	0.96	0.95	0.93
70-71	1.00	0.98	0.96	0.96	0.93	0.95	0.94	0.93	0.91
71-72		1.00	0.98	0.99	0.97	0.98	0.98	0.98	0.96
72-73			1.00	0.98	0.98	0.98	0.97	0.97	0.95
73-74				1.00	0.98	0.99	0.98	0.98	0.97
74-75					1.00	0.99	0.98	0.98	0.97
75-76						1.00	0.99	0.99	0.98
76-77							1.00	0.99	0.99
77-78								1.00	0.99
78-79									1.00

* Correlation coefficient estimated on the basis of Appendix V.C.

cardinally different from the earlier 'compiled series.'

The annual compound growth rates of per capita NDP (comparable series) show that Haryana (3.60 per cent) and Punjab (3.15 per cent) retain premier position in terms of annual growth rates compared to all India average of 1.34 per cent for the entire period (1962-63 to 1975-76)¹⁴ (Table-V.12). During the entire period there is, however, negative growth rates in two states, i.e. Uttar Pradesh and West Bengal. A break point at 1968-69,¹⁵ indicates that between 1962-63 and 1968-69 the annual growth rates are considerably lower (for the country only, 0.99 per cent per annum) compared to the latter years (all India figures being 1.65 per cent). In the sixties there seems to be a negative growth in the per capita income in a number of states, e.g. Andhra Pradesh, Bihar, Gujarat, Jammu & Kashmir, Kerala and Uttar Pradesh. In comparison to the later period of seventies this has only two states namely Rajasthan and West Bengal with negative growth rates of -1.28 per cent and -2.12 per cent, respectively.

¹⁴. This compared to 1.50 per cent of the earlier series of data.

¹⁵ Same as the case of break point of the earlier series, at the end of the 'plan holiday'

Table V.8

Linear Trend Rates of NSDP and Per Capita NSDP
at Factor Cost 1960-61 to 1978-79

States	in percentage	
	NDP	Per capita NDP
1. Andhra Pradesh	4.46	1.14
2. Assam	5.71	0.40
3. Bihar	3.22	2.73*
4. Gujarat	4.21	0.36
5. Haryana	13.52	3.95
6. Himachal Pradesh	7.31	0.07
7. Jammu & Kashmir	8.52	2.33
8. Karnataka	6.43	2.16
9. Kerala	3.46	0.05
10. Madhya Pradesh	4.02	0.43
11. Maharashtra	6.46	1.82
12. Orissa	4.46	0.86
13. Punjab	10.05	4.65
14. Rajasthan	2.72	-0.32
15. Tamil Nadu	4.08	1.11
16. Uttar Pradesh	3.55	0.63
17. West Bengal	3.78	0.44
18. Delhi	7.79	0.08
India	4.97	1.41

* Statistically insignificant

Source :- C.S.O., Govt. of India
(Based on Appendices, V.A & V.C)

D. Pattern of regional inequality based on Williamsons' measures and changes thereof :

An analysis of the inter-state inequality of the per capita income, using Williamson's unweighted variations (Vuw) suggest that the index of inequality has increased from the value of 0.3918 in 1960-61 to 0.4248 in 1966-67 and then, came down gradually towards the seventies, reaching the value of 0.3694 in 1978-79 (Table-V.9).¹⁶ The overall decline of inequality is by an annual compounded rate of -0.33 per cent (Table-V.10). In fact, during the 'plan holidays' (1965-66 to 1968-69) a negative growth of -0.50 per cent per annum has been observed. The years of the Fourth Plan has been marked by a significant decline in the rate of inequality (-2.23 per cent per annum). On the whole, in the seventies (1968-69 to 1978-79) the rate of decline is -0.79 per cent per annum. This is in comparison to the sixties (1960-61 to 1968-69), in which a positive growth in the rate is observed (0.26 per cent per annum). This in view of the sluggish rate in the increase in per capita income in the sixties is significant, and consequently, the inequality between states seems to have increased. But, any conclusion arrived on the basis of this (relatively) crude index can lead to erroneous conclusions,

¹⁶J.G. Williamson, Op.cit., p.166.

Table V.9

Unweighted (Vuw) and Weighted (Vw)
Coefficient of Variations of per capita
NSDP, (at 1960-61 prices)

Years	Vuw	Vw
1960-61	0.3918	0.2220
1961-62	0.3942	0.2163
1962-63	0.3942	0.2191
1963-64	0.3969	0.2232
1964-65	0.3677	0.2206
1965-66	0.4060	0.2253
1966-67	0.4248	0.2455
1967-68	0.3995	0.2384
1968-69	0.3999	0.2403
1969-70	0.3925	0.2412
1970-71	0.3823	0.2336
1971-72	0.3685	0.2453
1972-73	0.3861	0.2384
1973-74	0.3573	0.2574
1974-75	0.3790	0.2641
1975-76	0.3656	0.2604
1976-77	0.3851	0.2808
1977-78	0.3672	0.2725
1978-79	0.3694	0.2837

Source :- C.S.O., Government of India
(Based on Appendix-V.C.)

Table V.10

Annual Compound Growth Rates
of Inequality Indices of
Per Capita Income *

Years	in percentage	
	Vuw	Vw
1960-61 to 1965-66	0.71	0.30
1965-66 to 1968-69	-0.50	2.17
1960-61 to 1968-69	0.26	1.00
1968-69 to 1973-74	-2.23	1.38
1973-74 to 1978-79	0.67	1.96
1968-69 to 1978-79	-0.79	1.67
1960-61 to 1978-79	-0.33	1.37

* Based on Table V.9

since the per capita income of a region is biased by the 'proportionality constraint' of its population size. Therefore, a study of weighted variations of Williamson (WV)¹⁷ shows a very different picture of the situation (Table-V.9, Column 2). Contrary, to the arguments putforth by many scholars like Rao and Sampath,¹⁸ that there has no significant change in the level of inter-state inequality, it is found that the inequality indices have grown consistently over the eighteen years (except 1964-65). The value of the inequality measure was 0.222 in 1960-61 which went upto 0.2837 in 1978-79, with an overall growth rate of 1.37 per cent per annum. The compounded growth rate in the sixties (1960-61 to 1968-69) is considerably lower (1.0 per cent per annum) than the seventies (1968-69 to 1978-79) by as much as 67 per cent (the actual value being 1.67 per cent per annum). The growth rate during the Fifth Plan (1973-74 to 1978-79) is almost double to that of the sixties (1.96 per cent).

This position is partially supported by Sampath¹⁹

¹⁷ Population shares have been used as weight, as argued by Williamson.

¹⁸ For detailed treatment See, Chapter-II.

¹⁹ R.K. Sampath (1977), "Inter-regional Inequality in India", IJRS, Vol.IX, No.1, pp.1-17.

Table V.11

Per Capita NDP at Factor Cost
at 1960-61 prices

States	in Rs. crores					
	1962-63	1963-64	1964-65	1967-68	1968-69	1969-70
1. Andhra Pradesh	316	317	343	311	291	298
2. Assam*	347	353	391	420	379	375
3. Bihar	220	224	224	215	216	205
4. Gujarat	394	422	437	409	372	387
5. Haryana	337	371	380	432	395	478
6. Jammu & Kashmir	257	247	274	253	251	267
7. Karnataka	315	319	334	368	382	408
8. Kerala	276	286	289	269	275	292
9. Madhya Pradesh	244	261	275	307	278	298
10. Maharashtra	387	399	408	395	401	402
11. Orissa	222	255	266	253	271	272
12. Punjab	386	405	439	470	477	486
13. Rajasthan	287	290	318	380	337	356
14. Tamil Nadu	349	365	373	356	360	314
15. Uttar Pradesh	260	236	262	244	243	253
16. West Bengal	391	424	430	438	446	446
India	308.20	318.3	335.10	325.40	327.00	340.60

*Includes Meghalaya

Contd...

Contd..Table V.11

States	in Rs. crores					
	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
1. Andhra Pradesh	310	309	287	334	331	320
2. Assam*	349	342	374	353	340	382
3. Bihar	211	210	225	202	220	227
4. Gujarat	440	444	329	382	334	409
5. Haryana	480	473	462	452	477	534
6. Jammu & Kashmir	303	289	323	315	342	304
7. Karnataka	407	410	387	427	408	413
8. Kerala	305	313	314	314	311	308
9. Madhya Pradesh	278	292	280	273	276	285
10. Maharashtra	490	434	404	461	485	505
11. Orissa	291	257	272	288	261	314
12. Punjab	518	520	528	540	545	578
13. Rajasthan	429	308	278	308	282	308
14. Tamil Nadu	360	374	366	384	349	413
15. Uttar Pradesh	268	249	263	240	238	258
16. West Bengal	382	381	362	357	370	384
India	353.00	349.00	357.00	349.10	343.20	366.60

Source : Same as Appendix V.D.

Table V.12

Annual Compound Growth Rates of
Per capita NDP (comparable) *

States	1962-63	1968-69	1962-63
	to	to	to
	1968-69	1975-76	1975-76
1. Andhra Pradesh	-1.36	1.37	0.10
2. Assam	1.48	0.11	0.74
3. Bihar	-0.31	0.71	0.24
4. Gujarat	-0.95	1.36	0.29
5. Haryana	2.68	4.40	3.60
6. Jammu & Kashmir	-0.39	2.77	1.30
7. Karnataka	3.27	1.12	2.11
8. Kerala	-0.06	1.63	0.85
9. Madhya Pradesh	2.20	0.36	1.20
10. Maharashtra	0.59	3.35	2.07
11. Orissa	3.38	2.13	2.70
12. Punjab	3.60	2.78	3.15
13. Rajasthan	2.71	-1.28	0.54
14. Tamil Nadu	0.52	1.98	1.30
15. Uttar Pradesh	-1.12	0.86	-0.06
16. West Bengal	2.22	-2.12	-0.14
India	0.99	1.65	1.34

* Table estimated (based on Table V.9)

and in some earlier studies by the author.²⁰ This is corroborated by the fact, that compared to the dark economic front of the sixties, marked by depressing drought conditions, large scale import of foodgrains, chronic capital shortages, the seventies (the later two plans) are marked by an ushering in of a new era of agricultural prosperity and reaching a stage of not only self-sufficiency but even, surplus in certain years. This has been the era of the 'Green Revolution'. As discussed earlier, the per capita income overallly, has increased quite steadily in the seventies then in the sixties. On the basis of which it can be said that the agricultural prosperity has accentuated the rate of inter-state inequality in India.

But, one cannot be doubly sure, unless, it is cross checked with the data of the comparable series (Table-V.13 and V.14). Both, unweighted and weighted coefficient of variations (Vuw and Vw) seem to have increased appreciably. The unweighted variations increases from 0.1926 in 1962-63 to 0.2294 in 1968-69 (at rate of 2.96 per cent per annum) and to 0.266 in 1975-76 (at a rate of 2.14 per cent) compared to the

²⁰A.C. Mohapatra, Op.cit.,

Table V.13

Inequality of Per capita incomes *
 (Based on comparable data)

Years	Vuw	Vw
1962-63	0.1926	0.1965
1963-64	0.2108	0.2224
1964-65	0.2034	0.2103
1967-68	0.2483	0.2350
1968-69	0.2294	0.2147
1969-70	0.2389	0.2143
1970-71	0.2482	0.2473
1971-72	0.2434	0.2381
1972-73	0.2277	0.2068
1973-74	0.2432	0.2608
1974-75	0.2588	0.2547
1975-76	0.2660	0.2555

* Based on Table V.9

Table V.14

Annual compound growth rates of
inequality Indices of per
capita income *

Years	in percentage	
	Vuw	Vw
1962-63 to 1968-69	2.96	1.49
1968-69 to 1975-76	2.14	2.52
1962-63 to 1975-76	2.51	2.04

* Based on the Table V.13

overall growth rate of 2.51 per cent per annum. This is a much significant rate of growth. The weighted variations (Vw) increases at the rate of 1.49 per cent from 1962-63 to 1968-69 compared to a high rate of 2.52 per cent between 1968-69 to 1975-76, the overall rate of growth being 2.04 per cent per annum.

This makes the situation much clearer and corroborates the earlier position that the rate of growth of inequality of per capita income becomes much higher in the seventies compared to the sixties. Infact, a correlation matrix (Table-V.7) of statewise per capita income over the entire period (1960-61 to 1978-79) shows a declining value of the coefficients of correlations (between years), particularly between the sixties and seventies and in a progressive manner, indicating that not only the pattern of income growth has been changing over the decades but also, its composition has been undergoing transformation.

E. Patterns of regional inequality and changes thereof; based on a new algorithm^{am} proposed in the study :

As has been seen, that although, Williamson's measures (particularly, vw) provide with important insights into the problems of regional inequalities,

they are not capable of 'decomposition' of the pattern of inequality into their component regional units. The new algorithm proposed²¹ not only provides for a decomposed index of inequality but has additional advantage of measuring weighted income distances from a variable origin²² of the data, within the regional distribution of per capita income.

The index values have been estimated for all the eighteen regional units over the entire period of the study, i.e. 1960-61 to 1978-79 (Table-V.15). The indices range from as low as 32.48 of Jammu & Kashmir to 137.02 for Maharashtra (252.37 for Delhi), followed by 122.28 for Uttar Pradesh and 119.24 for Bihar in 1960-61.²³ This is in comparison to 1978, when the range increases considerably, to 46.75 of Himachal Pradesh and 237.53 of Maharashtra, followed by 231.34 of Uttar Pradesh, 228.11 of Delhi and 204.85 of Punjab. In case of Punjab, which has only 2.5 per cent of the total population of the country, has increased fourfold in terms of the indices.

²¹The mathematical details are given in the chapter on methodology (Chapter-IV).

²²The distance is measured from the per capita value of each state from rest other states/regions, instead of using the distance from the mean of the distribution, as happens in case of Williamson's measures.

²³It may be noted, that the index values for both very low and very high income states with high population weights will be high.

Table V.15

Weighted Income Distances of Indian States
(by Modified Algorithm)
1960-61 to 1978-79

States/ Years	1960-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70
1. Andhra Pradesh	57.40	53.69	53.98	55.09	55.43	59.90	66.89	84.62	70.80	71.59
2. Assam	34.38	34.05	35.60	36.60	35.06	32.22	39.49	40.53	42.80	41.19
3. Bihar	119.34	114.20	107.29	116.10	136.37	109.50	148.00	158.00	195.13	164.29
4. Gujarat	68.91	78.96	73.59	80.36	88.25	73.29	66.26	84.90	67.01	73.31
5. Haryana	33.89	29.27	32.56	35.42	36.00	32.70	40.83	58.47	44.94	71.22
6. Himachal Pradesh	40.60	47.47	34.77	38.19	36.35	29.61	29.91	29.71	34.15	31.44
7. Jammu & Kashmir	32.48	28.27	26.43	28.73	29.86	32.37	32.75	33.14	33.08	32.17
8. Karnataka	43.80	42.16	46.62	45.67	45.02	47.83	50.61	50.64	66.15	56.99
9. Kerala	42.18	59.00	39.24	42.81	48.21	41.25	44.67	55.73	52.28	53.75
10. Madhya Pradesh	51.32	54.53	52.85	54.70	56.42	68.00	72.82	62.61	65.66	67.57
11. Maharashtra	137.02	119.66	128.25	127.88	117.81	112.28	121.50	128.44	134.01	130.48
12. Orissa	72.18	66.06	51.32	46.22	51.70	55.40	52.81	64.54	60.61	65.93
13. Punjab	58.18	51.19	56.80	60.53	69.98	67.70	76.45	96.92	105.88	104.74
14. Rajasthan	42.45	45.98	45.11	42.11	42.75	43.98	47.22	56.02	52.07	55.81
15. Tamil Nadu	58.77	70.76	62.56	56.98	55.54	55.11	56.61	60.38	62.49	61.82
16. Uttar Pradesh	112.28	122.08	119.31	138.99	127.13	106.67	132.87	135.33	128.08	128.85
17. West Bengal	55.84	52.19	54.58	63.11	65.29	72.16	82.00	64.40	65.97	69.04
18. Delhi	252.37	258.34	257.62	257.52	264.18	271.49	268.46	272.54	276.18	179.15
India	1323.05	1325.61	1278.49	1327.01	1361.35	1371.46	1409.65	1536.92	1557.29	1559.34

Contd...

Contd.. Table V.15

States/ Years	1970-71	71-72	72-73	73-74	74-75	75-76	76-77	77-78	78-79
1. Andhra Pradesh	67.50	73.45	80.36	128.75	86.71	93.09	68.06	102.42	106.23
2. Assam	42.00	48.66	48.88	51.09	49.52	54.40	57.41	59.95	64.51
3. Bihar	159.10	162.72	169.72	176.88	184.62	198.82	185.70	206.84	207.84
4. Gujarat	85.21	78.20	49.39	78.67	64.89	92.48	106.06	101.81	108.85
5. Haryana	71.44	62.50	72.38	80.31	81.13	90.67	108.68	105.52	122.90
6. Himachal Pradesh	32.58	33.29	30.08	38.76	38.03	42.95	40.74	42.24	46.75
7. Jammu & Kashmir	34.26	38.05	30.27	48.99	36.47	39.53	42.74	43.83	51.40
8. Karnataka	61.89	61.29	55.68	75.18	88.85	83.06	77.68	87.12	92.58
9. Kerala	55.40	58.15	50.66	55.94	62.61	71.69	74.15	81.38	84.77
10. Madhya Pradesh	69.54	69.19	64.45	87.20	92.33	103.31	111.96	106.74	126.12
11. Maharashtra	113.89	118.69	132.27	153.36	202.09	199.26	227.61	228.25	237.53
12. Orissa	63.94	65.67	54.13	63.62	86.52	77.48	97.06	85.61	86.12
13. Punjab	97.17	100.24	120.06	122.62	154.23	164.00	178.32	185.85	204.85
14. Rajasthan	73.07	58.50	69.11	72.87	66.25	71.42	73.17	80.34	87.47
15. Tamil Nadu	71.58	74.30	76.86	84.59	84.62	90.31	96.44	102.83	124.30
16. Uttar Pradesh	135.08	156.48	127.87	143.86	207.05	233.17	208.43	220.29	231.34
17. West Bengal	68.36	70.43	66.62	86.64	89.61	94.45	100.45	102.40	126.82
18. Delhi	249.69	262.18	237.27	246.09	249.55	256.40	253.77	246.16	228.11
India	1551.70	1591.98	1506.06	1825.42	1925.08	2056.59	2108.43	2189.58	2340.49

Source : C.S.O., Govt. of India (Based on Appendix-V.C)

The above analysis reveals that excepting Delhi (-0.56 per cent) all the other states record a positive compound rate of growth of the inequality indices over the entire period ranging from 0.79 per cent per annum in case of Himachal Pradesh to 7.42 per cent per annum in case of Haryana, and 7.24 per cent in Punjab, compared to the overall rate of growth for the country as 3.22 per cent per annum (Table-V.16).

During the Third Plan period, it seems that there has been a decline in the indices of inequality in 10 states out of the 18 and a marginal decline in the all India index by -0.18 per cent, can be noticed. During the 'plan holidays', there has been a mixed tendency, but in the seventies (in the IV and V Plans) the inequality indices increases sharply and consistently. During 1968-69 to 1978-79 decade, the state wise increase of the inequalities range from 0.61 per cent in Bihar to 10.58 per cent per annum in Haryana, 6.82 per cent in Punjab, 6.75 per cent for Madhya Pradesh and 7.12 per cent in Tamil Nadu, compared to the overall growth rate for the nation as 4.16 per cent per annum. Besides, the rate of growth of the inequality indices for the country for the entire period of study was

Table V.16

Annual Compound Growth Rates of weighted
income distances of Statewise per capita NDP
1960-61 to 1978-79

States	in percentage						
	1960-61 to 1965-66	1965-66 to 1968-69	1960-61 to 1968-69	1968-69 to 1973-74	1973-74 to 1978-79	1968-69 to 1978-79	1960-61 to 1978-79
1. Andhra Pradesh	0.86	5.73	2.66	12.70	-3.41	4.34	3.59
2. Assam	-1.29	9.93	2.78	3.60	4.78	4.19	3.56
3. Bihar	-1.69	21.24	+6.35	- 1.94	0.27	0.61	3.13
4. Gujarat	1.24	-2.94	-0.35	3.26	6.71	4.97	2.57
5. Haryana	-0.71	11.18	3.59	12.31	8.88	10.58	7.42
6. Himachal Pradesh	-6.12	4.87	-2.14	2.56	3.82	3.19	0.79
7. Jammu & Kashmir	-0.07	0.73	0.23	8.17	0.97	4.51	2.58
8. Karnataka	1.78	11.44	5.29	3.59	5.25	3.42	4.25
9. Kerala	-0.44	8.22	2.72	1.36	8.71	4.95	3.95
10. Madhya Pradesh	5.79	-1.16	3.13	5.84	7.66	6.75	5.12
11. Maharashtra	-3.87	6.07	-0.28	2.73	9.14	5.89	3.10
12. Orissa	-5.15	3.04	-2.16	0.97	6.24	3.58	0.99
13. Punjab	3.08	16.08	7.77	7.81	10.81	6.82	7.24
14. Rajasthan	0.71	5.79	2.59	6.95	3.72	5.32	4.10
15. Tamil Nadu	-1.28	4.28	0.77	6.24	8.00	7.12	4.25
16. Uttar Pradesh	-2.69	6.29	0.58	2.35	9.97	6.09	3.61
17. West Bengal	5.26	-2.95	2.11	5.60	7.92	6.75	4.66
18. Delhi	1.47	0.62	1.13	-2.28	-1.51	-1.89	-0.56
India	-0.18	5.36	2.06	3.23	5.10	4.16	3.22

Source : Table V.12

3.22 per cent per annum. In the later decade of the study, there are twelve states which register a higher rate of growth of the inequality indices as compared to the average rate for the nation.

This, further strengthens the earlier findings, that the inter-state inequalities have sharpened and got accentuated during the Fourth and the Fifth Five Year Plans. What happens within this pattern is the identifications of two sets of regions/states, either poor in terms of per capita income or rich, which achieve an increasing rate of growth of differences with the rest of the other states. The cases of Punjab and Haryana are unique, as these two states happen to be the most beneficiaries of whatever has entailed the so called green revolution.

To analyse the time series contribution to the pattern of changes of overall inequality levels (by the new algorithm), a multivariate linear lagged regression has been carried out. The level of inequalities at the final year (1978-79) is made the explained variable and the preceding break points (1960-61), 1965-66, 1968-69 and 1973-74) have been made the independent variables (Table-V.17). In the overall equation, the year 1965-66

Table V.17
 Linear Lagged Regression *

Steps		B ₁ 1960-61	B ₂ 1965-66	B ₃ 1968-69	B ₄ 1973-74	S.E.	R ²
Step - 1	25.77+				+1.05 X ₄	31.75	+0.76
Step - 2	17.63+			+0.310X ₃	+1.40 X ₄	32.28	+0.74
Step - 3	17.45+		-0.51X ₂	+0.12X ₃	+1.39 X ₄	31.84	+0.76
Step - 4	19.00+	0.74 X ₁	-1.03 X ₂	+0.17X ₃	+1.15 X ₄	34.55	+0.70

*
 X₁ = 1960-61 X₄ = 1973-74
 X₂ = 1965-66 Y = 1978-79
 X₃ = 1968-69 S.E. = Standard Error

R = Coefficient of Determination

Source : Based on Table V.15

(x_2) provides for a negative β_2 coefficient, which further justifies the position that there has been some decline in the level of interstate inequalities during the Third Plan period. This period also is marked by a decline in the per capita income in the country. The amount of variations explained (R^2) is 70 per cent which can be said as satisfactory.

In a stepwise manner (Step-3) discarding 1960-61, the position remains unchanged, i.e. the β_2 is still negative (-0.51) and the overall variations explained improves by 6 per cent more ($R^2 = 0.76$). In Step-2, discarding 1960-61 (x_1) and 1965-66 (x_2) shows, that 1968-69 (β_3) becomes negative (-0.31) and the overall variations explained comes down by 2 per cent. This indicates, that the years 1965-66 and 1968-69 have contributed negatively by an amount of 6 per cent and 2 per cent to the overall variations in the levels of inter-state inequalities in 1978-79, the end Fourth Plan (1973-74) contributing maximum to the variation of the index in the terminal year, by over 70 per cent.

I. Findings :

The discussions carried out in the present Chapter lead to some very definite conclusions. Firstly,

the level of per capita income has appreciably increased during the later two plans (the Fourth and the Fifth Plans) compared to the decade of uncertainties and stagnations in the sixties (the Third Plan and the triennium of the plan holidays). Secondly, the pattern of increases in per capita incomes have been vastly uneven, particularly, disfavoured the traditionally backward states. Thirdly, the traditionally industrialised states like West Bengal, Tamil Nadu and Gujarat (except, Maharashtra) do not show any appreciable increase in the per capita income in the seventies, whereas the predominantly agricultural states, like Punjab and Haryana have shown considerable resilience. Lastly, the level of inequality of per capita income between different states/regions has increased more sharply in the seventies compared to the sixties (1960-61 to 1968-69), while in the latter period there is indication of some decline in the levels of inequality. The sharp increase in the rate of inter-state inequalities of the seventies are associated with a sharp increase in the per capita income in some states, as contributed largely, by the sharp increases in the agricultural output associated with the 'green revolution.'

CHAPTER - VI

"The cataclysm that is sweeping over the earth today is a great sign. As a chaotic force it is pernicious, but it has at its back a noble object, it desires reform, it seeks the reign of equity and justice.

Mahatma Gandhi
(in Chester Bowles)

INEQUALITY OF SECTORAL INCOMES IN INDIA
(STATEWISE)

1960-61 to 1975-76

The tentative conclusions arrived at in Chapter-V, from analytical point of view needs further substantiation from the incomes originating from different sectors. But, this is a difficult proposition owing to the inadequacy of data, their nature and comprehension. In the present chapter, a modest attempt has been made to study the NDP as well as the per capita NDP in their sectoral composition. In the absence of comprehensive and comparable data, the economy has only been divided into two broad sectors, i.e. the agricultural sector and the non-agricultural sector. The non-agricultural sector consists of industries and all services. Comparable data (as has been discussed earlier) is available only for four points of time, i.e. 1960-61, 1964-65, 1970-71 and 1975-76.¹ Attempt has also, been made to assess the nature of regional inequality emerging from the sectoral percapita NDP and the inter-temporal changes thereof.

¹Data is available for some continuous years in the Seventies, through NAS, CSO, Ministry of Planning, Govt. of India.

A look at the broad division of the economy into primary, secondary and tertiary sectors² provides us with some insight into the nature of the sectoral composition and their growth over time (Table-VI.1). The NDP, originating from the primary sector increases from Rs.6965 crores in 1960-61 to Rs.9933 in 1976-77, at a compound rate of change of 2.24 per cent per annum. If, beginning of the fourth plan (1969-70) is taken into consideration, the growth rate in the early to mid-seventies seems to have been substantial i.e. 3.37 per cent per annum the corresponding figures for the preceding period being a meagre 1.13 per cent per annum (Table-VI.1-a).

TABLE VI.1(a)

Compound growth rates of sectoral
NDP from 1960-61 to 1976-77*

Sectors	1960-61 to 1968-69	1968-69 to 1976-77	1960-61 to 1976-77
Primary	1.13	3.37	2.24
Secondary	5.38	3.26	4.31
Tertiary	4.73	4.03	4.38

*Based on Table-VI-1.

On the other hand, the total NDP originating from

²NAS classifications.

Table - VI.1
 Net Domestic Product by Sector (Industry) of
 Origin
 (at 1960-61 prices)

Years	in Rs. crores		
	Primary sector*	Secondary sector	Tertiary Sector
1960-61	6965	2549	3821
1961-62	7032	2744	4049
1962-63	6869	2930	4304
1963-64	7061	3223	4598
1964-65	7682	3467	4879
1965-66	6667	3553	5014
1966-67	6574	3588	5183
1967-68	7578	3701	5365
1968-69	7618	3875	5531
1969-70	8084	4207	5798
1970-71	8752	4319	6082
1971-72	8583	4357	6367
1972-73	7985	4524	6613
1973-74	8667	4651	6810
1974-75	8359	4748	7174
1975-76	10511	4537	7178
1976-77	9933	5007	7587

* Includes mining and quarring.

Source : N.A.S., C.S.O., Ministry of Planning,
 Govt. of India; Oct. 1976 and Jan. 1979

the secondary sector increased from Rs.2549 crores in 1960-61 to Rs.5007 crores in 1976-77. But, compared to the Primary Sector the NDP grew at a faster rate in 1960-61 to 1968-69 period (5.38 per cent) than the subsequent period. The overall growth rate in the secondary sector has however, been much higher, (almost double) than the primary sector. The tertiary sector seems to have grown at a steady rate of above 4 per cent per annum during the entire period.

The share of sectoral NDP (out of total for the nation) has changed in a peculiar manner (Table-VI.2). The share of the Primary Sector, which was 52.2 per cent in 1960-61 came down to 44.1 per cent in 1976-77 and declined further in 1974-75 being only 41.2 per cent. This can be said as a commendable performance as only 25 years before, the share was as high as over 70 per cent. But, this shift from primary activity is not reflected in the increase of the productive activities of the Secondary Sector, as has been argued by North³ in case of the American Economy. For example, the increase in the share of the Secondary Sector has ~~changed~~ from 19.1 per cent in 1960-61 to 22.2 per cent in 1976-77, a compound rate of only 0.94 per cent per annum. (Table-VI.2-a). When

³D.C. North (1955), pp.243-258.

Table VI.2

Share of NDP by sector of origin
(1960-61 to 1976-77) *

Years	in percentage		
	Primary sector	Secondary sector	Tertiary sector
1960-61	52.2	19.1	28.7
1961-62	50.9	19.8	29.3
1962-63	48.7	20.8	30.5
1963-64	47.4	21.7	30.9
1964-65	44.9	21.6	30.4
1965-66	43.8	23.3	32.9
1966-67	42.9	23.4	33.7
1967-68	44.5	22.2	32.2
1968-69	44.5	22.6	32.3
1969-70	44.4	23.1	31.9
1970-71	45.4	22.4	31.5
1971-72	44.0	22.4	32.7
1972-73	41.5	23.5	34.4
1973-74	42.7	22.9	33.6
1974-75	41.2	23.4	35.4
1975-76	47.3	20.4	32.3
1976-77	44.1	22.2	33.7

* Based on Table VI.1

compared with the rate of growth in the service sector this growth rate is significant in the sense that, the share of the latter has increased at a faster rate (1.01 per cent).

TABLE - VI.2(a)

Annual Compound Growth Rates of Sectoral Share of NDP*

Sectors	1960-61 to 1968-69	1968-69 to 1976-77	1960-61 to 1976-77
Primary	-1.98	-0.11	-1.05
Secondary	2.13	-0.22	0.94
Tertiary	1.49	0.53	1.09

*Based on Table-VI.2.

A statewise break-up of sectoral NDP which is available⁴ for the 15 years starting from 1960-61 (at 1960-61 prices) shows that the NDP in the agricultural sector varies from Rs.241.36 crores in Assam to Rs.1449.60 crores in Uttar Pradesh (Table-VI.3). Although, the total agricultural NDP of the country has increased to Rs.9277 crores in 1975-76 from Rs.7718 crores in 1960-61, there is striking regional variation in the amount of increase which differs from state to state. In fact the increase has been

⁴This is available for 14 major states of India. The data for the state of Punjab includes Haryana also.

Table VI.3

Sectoral NDP at Factor Cost
Agricultural Sector
(at 1960-61 prices)

States	in Rs. crores			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	592.26	864.28	763.87	751.68
2. Assam	241.36	288.95	307.23	347.10
3. Bihar	588.05	683.71	658.06	681.54
4. Gujarat	382.21	499.12	564.57	459.15
5. Karnataka	423.56	501.37	654.43	634.06
6. Kerala	308.55	316.45	326.95	326.03
7. Madhya Pradesh	575.32	673.33	662.52	700.07
8. Maharashtra	692.46	727.93	586.95	791.19
9. Orissa	314.89	332.91	424.22	477.19
10. Punjab*	511.15	419.36	727.74	813.09
11. Rajasthan	349.63	426.57	647.47	495.90
12. Tamil Nadu	537.41	565.28	570.69	607.43
13. Uttar Pradesh	1449.60	1664.23	1383.67	1350.79
14. West Bengal	589.86	613.83	709.32	700.44
India (Total)	7718.00	9074.48	9687.83	9277.00

* Punjab includes Haryana

Source : NAS., C.S.O., Ministry of Planning,
Govt. of India, 1972, 1976 and 1979

significant, particularly during 1970-71 to 1975-76 period, except the state of Uttar Pradesh where the total NDP has declined.

The position in the NDP of the non-agricultural sector has been much better (Table-VI.4). The total NDP of the nation has increased by more than double and rose from Rs.7026 crores in 1960-61 to Rs.15345 crores in 1975-76, (118 per cent change, with an annual change of around 8 per cent). This increase has however not been entirely due to the productive activities but to a great extent the 'accounting results' of the service sectors. The range of non-agricultural income vary from Rs.148.57 crores of Assam to Rs.1203.66 crores of Maharashtra in 1960-61. In 1975-76 the position of the lowest and the highest remained almost the same, except for a far more increased value of the non-agricultural NDP.

The change in Sectoral shares in NDP (Agricultural and non-Agricultural) throws some light upon the problem and reveals some interesting facts (Table-VI.5). The share of agricultural income in 1960-61 was 52.35 per cent, which has drastically, come down to 37.68 per cent⁵ in 1975-76, the non-agricultural income sharing as much as

⁵ This figure is lower than the figure for the Primary Sector, because of the exclusion of the mining sector.

Table VI. 4

Sectoral NDP at Factor Cost
Non-Agricultural Sector
(at 1960-61 prices)

States	in Rs. crores			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	448.17	655.89	586.37	791.75
2. Assam	148.57	210.20	210.31	302.29
3. Bihar	443.32	658.42	533.62	741.06
4. Gujarat	440.87	564.59	608.26	772.36
5. Karnataka	314.28	461.03	539.03	726.68
6. Kerala	242.79	334.98	324.69	391.49
7. Madhya Pradesh	374.46	523.94	494.12	628.67
8. Maharashtra	1203.66	1316.51	1561.95	2027.15
9. Orissa	155.21	272.31	214.24	276.88
10. Punjab*	335.01	199.53	454.85	662.33
11. Rajasthan	198.58	280.12	372.64	382.20
12. Tamil Nadu	620.71	839.03	912.12	1235.31
13. Uttar Pradesh	701.87	985.18	987.71	1202.81
14. West Bengal	1023.22	1104.73	976.30	1185.40
India (Total)	7026.00	8640.97	10719.00	15345.00

*Punjab includes Haryana

Source : Same as of Table VI.3

TABLE - VI.5

Percentage Sectoral Share of NDP from State Total*

	1960-61		1964-65		1970-71		1975-76	
	Ag.	Non-Ag.	Ag.	Non-Ag.	Ag.	Non-Ag.	Ag.	Non-Ag.
1. Andhra Pradesh	56.92	43.08	56.85	43.15	56.57	43.43	48.70	51.30
2. Assam	61.90	38.10	57.89	42.11	59.36	40.64	43.45	56.55
3. Bihar	58.02	42.98	50.94	49.06	55.22	44.78	47.93	52.09
4. Gujarat	45.99	54.01	46.92	53.08	48.14	51.86	37.28	26.72
5. Karnataka	57.41	42.59	52.10	47.90	54.83	45.17	46.60	53.40
6. Kerala	55.96	44.04	48.58	51.42	50.18	49.82	45.46	54.56
7. Madhya Pradesh	60.57	30.43	56.24	43.76	50.18	49.82	52.69	47.31
8. Maharashtra	36.52	63.48	35.61	64.39	27.31	72.69	28.07	71.93
9. Orissa	66.98	33.02	55.01	44.99	66.44	33.56	63.28	36.72
10. Punjab**	57.04	42.96	67.76	32.24	61.54	38.46	55.11	44.89
11. Rajasthan	63.78	36.22	60.36	39.64	63.47	36.53	56.47	43.53
12. Tamil Nadu	46.40	53.60	40.25	59.75	38.49	61.51	32.96	67.04
13. Uttar Pradesh	67.38	32.62	62.82	37.18	58.35	41.65	52.90	47.10
14. West Bengal	36.57	63.43	35.72	64.28	42.08	57.92	37.13	62.87
INDIA	52.35	47.65	51.22	48.75	47.47	52.53	37.68	62.32

* Based on Tables VI 3 & 4

** Includes Haryana

62.32 per cent of the NDP. In 1960-61, only 4 states have the shares of non-agricultural sector more than 50 per cent headed by Maharashtra (63.48 per cent) and following by West Bengal (63.43 per cent), Gujarat (54.01 per cent) and Tamil Nadu (53.60 per cent). This is quite in line with the expectation, due to the influence of metropolitan and industrial agglomerations and the peculiar history of colonial industrial development of the country.⁶ In 1975-76, the picture has some added relevance, that only five states have remained predominantly agricultural, four of them in North Western India (U.P., Punjab, M.P. and Rajasthan). Despite all the industrialisation, Orissa has only remained what it was in the beginning of the sixties, with no appreciable change in the share of the non-agricultural sector.

The statewise share of agricultural NDP (Table-VI.6) shows, that the position of Uttar Pradesh in 1960-61 has the primacy over all the other states with a share of 18.78 per cent, a little higher than the share of population of this state (16.72 per cent). But, over years, this position has continued to deteriorate reaching a share of only 11.51 per cent well below the population

⁶B. Chattopadhyay and M. Raza (1975), "Regional Disparities in India", IJRS, Vol. VII, No.2, Pp. 1-29

Table VI.6

Percentage Share of Sectoral NDP
Agricultural Incomes*

States	in percentage			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	7.67	9.43	7.88	6.95
2. Assam	3.13	3.15	3.17	2.93
3. Bihar	7.62	7.46	6.79	6.41
4. Gujarat	4.95	5.45	5.83	5.55
5. Karnataka	5.49	5.47	6.76	6.13
6. Kerala	4.00	3.45	3.37	3.23
7. Madhya Pradesh	7.49	7.34	6.84	5.99
8. Maharashtra	8.97	7.94	6.06	12.70
9. Orissa	4.08	3.63	4.38	3.40
10. Punjab	6.62	4.58	7.51	6.65
11. Rajasthan	4.53	4.65	6.68	3.96
12. Tamil Nadu	6.96	7.16	5.89	8.30
13. Uttar Pradesh	18.78	18.16	14.28	11.51
14. West Bengal	7.64	6.70	7.32	8.50
India	100.00	100.00	100.00	100.00

* Based on Table VI.3

share. Bihar, for example, has always remained below the mark of population share, at least by 40 per cent. The only states with some semblance of compatibility are Assam, Orissa (except 1964-65), Gujarat and Punjab (the latter has more than double the population share).

The share positions in terms of non-agricultural income by states are understandably, cardinally different. States like Maharashtra (17.13 per cent), West Bengal (14.87 per cent), Tamil Nadu (8.84 per cent) dominate the scene, with higher compatibility with the population shares (Table-VI.7). Although, the relative positions remained almost unchanged the shares of the premier non-agricultural states seem to have been eroded, particularly of West-Bengal, its share going down by 90 per cent (7.84 per cent in 1975-76). The states of Punjab (and Haryana), Maharashtra, Gujarat however, retained compatibility.

A look at the position of per capita agricultural income also does not present a rosy picture (Table-VI.8). In fact, the per capita income generated from the agricultural sector for the country as a whole has improved only marginally from Rs.175.71 in 1960-61 to Rs.189.15 in 1964-65. But, in 1970-71 it has gradually slid down

Table VI.7

Percentage share of Sectoral NDP
Non-Agricultural Incomes*

States	in percentage			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	6.38	7.59	5.47	5.16
2. Assam	2.11	2.43	1.96	1.97
3. Bihar	6.31	7.62	4.98	4.83
4. Gujarat	6.39	6.53	5.67	5.03
5. Karnataka	4.47	5.34	3.03	4.74
6. Kerala	3.46	3.88	5.03	2.55
7. Madhya Pradesh	5.33	6.06	4.61	4.10
8. Maharashtra	17.13	15.24	14.57	13.21
9. Orissa	2.21	3.15	2.00	1.80
10. Punjab	5.48	2.31	4.24	4.32
11. Rajasthan	2.83	3.24	3.48	2.49
12. Tamil Nadu	8.84	9.71	8.57	8.05
13. Uttar Pradesh	9.99	11.40	9.21	7.84
14. West Bengal	14.57	12.78	9.11	7.72
India	100.00	100.00	100.00	100.00

* Based on Table VI.4

Table VI.8

Per Capita Sectoral NDP
Agricultural Incomes*
(at 1960-61 prices)

States	in Rs. crores			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	164.84	222.64	175.53	155.95
2. Assam	217.25	230.10	205.54	209.73
3. Bihar	126.60	136.61	116.41	110.80
4. Gujarat	185.27	218.24	211.45	159.98
5. Karnataka	179.55	194.86	223.35	192.49
6. Kerala	182.57	170.59	153.14	139.99
7. Madhya Pradesh	177.79	189.30	185.23	150.23
8. Maharashtra	174.91	167.11	116.44	141.87
9. Orissa	179.42	173.57	193.34	198.75
10. Punjab	273.05	204.28	308.50	308.11
11. Rajasthan	173.42	198.13	272.39	174.18
12. Tamil Nadu	159.52	154.83	138.52	136.16
13. Uttar Pradesh	196.58	209.97	156.63	136.50
14. West Bengal	168.92	159.81	160.08	142.54
India	175.71	189.15	176.80	151.55

* Based on Table VI.3

to Rs.176.80 while in 1975-76⁷ it registered a further decline to the extent of only Rs.151.55. Per capita income, within the states in 1960-61 varies from Rs.126.60 in Bihar to Rs.273.05 in Punjab (including Haryana). The position in 1975-76 was even more dismal as Bihar has a meagre income of Rs.110.80, while in Punjab this income was Rs.308.11 which was slightly better as compared to this 1960-61 position. The relative position was however, retained unequivocally by these states.

The relative ranks of the states by per capita agricultural income indicate, that the premier position is more or less retained by Punjab (except, 1964-65) followed by either Assam⁸ or Andhra Pradesh or Rajasthan in different years. Over years, the position of the states of Karnataka (from 7th to 3rd), West Bengal (11th to 9th) and Rajasthan (10th to 5th) have improved while the relative positions of the remaining states have only deteriorated.

The index numbers of per capita agricultural income shows that in 1960-61 there were only 8 out of the 14 states which enjoyed a per capita agricultural income higher than that of the national average. The position of Punjab

⁷ 1975-76 was one of those unpredictable drought years in which the agricultural NDP was considerably lower than the preceding years.

⁸ The position of Assam is better because of a high land man ratio.

Table VI.9

Ranking of States on the Basis
of per capita Agricultural Income
1960-61 to 1975-76*

States	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	12	2	8	7
2. Assam	2	1	5	2
3. Bihar	14	14	14	14
4. Gujarat	4	3	4	6
5. Karnataka	6	7	3	4
6. Kerala	5	10	11	11
7. Madhya Pradesh	8	8	7	8
8. Maharashtra	9	11	13	10
9. Orissa	7	9	6	3
10. Punjab	1	5	1	1
11. Rajasthan	10	6	2	5
12. Tamil Nadu	13	13	12	13
13. Uttar Pradesh	3	4	10	12
14. West Bengal	11	12	9	9

* Based on Table VI.8
Ranked in ascending order

Table VI.10

Index Numbers of Per capita
Agricultural Income
1960-61 to 1975-76*

States	in Rs. crores			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	93.80	117.71	99.28	102.90
2. Assam	123.64	121.65	116.26	138.39
3. Bihar	72.05	72.22	65.84	73.11
4. Gujarat	105.44	115.38	119.60	105.56
5. Karnataka	102.19	103.02	126.32	127.01
6. Kerala	103.90	90.19	86.62	92.37
7. Madhya Pradesh	101.18	100.08	104.77	99.13
8. Maharashtra	99.54	88.35	65.86	93.61
9. Orissa	102.11	91.76	109.36	131.14
10. Punjab	155.61	107.52	174.49	203.31
11. Rajasthan	98.70	104.75	154.07	114.93
12. Tamil Nadu	90.79	81.86	78.35	89.84
13. Uttar Pradesh	111.88	111.01	88.59	90.07
14. West Bengal	96.14	84.49	90.54	94.05
India	100.00	100.00	100.00	100.00

*Based on Table VI.4

was prominent having over 56 per cent higher income than the national average (Table-VI.12). The state of Bihar, which trails all other states, had a percapita agricultural income about 28 per cent lower than the national average. In the year of 1975-76 the gulf seems to have widened which can be seen from the fact that while Punjab has an index value over 100 per cent above the national average the position of Bihar and other backward states seem to have changed only marginally. Moreover, the number of states with index values above the national average have been reduced to only 7 against 8 in 1960-61.

The position of the percapita non-agricultural income seems to be satisfactory (Table-VI.11). The national average of the percapita non-agricultural income has shown a steady increase from Rs.159.96 in 1960-61 to Rs.250.68 in 1975-76, the rate of increase being slightly more in the Seventies as compared to the sixties. The inter-state variation in this type of income is quite wide being Rs.95.44 in Bihar and Rs.304.03 for Maharashtra in 1960-61. The states of Orissa, Uttar Pradesh and Rajasthan however, have a very low percapita non-agricultural income which is less than Rs.100.00. In 1975-76 the lowest and the highest positions have been claimed by Orissa (Rs.115.32)

Table VI.11
Per Capita Sectoral NDP
Non-Agricultural Income
(at 1960-61 prices) *

States	in Rs.			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	124.49	168.96	134.55	164.26
2. Assam	133.91	168.11	140.58	182.65
3. Bihar	95.44	131.05	94.40	120.48
4. Gujarat	217.58	246.87	227.81	269.11
5. Karnataka	133.23	179.18	183.97	220.61
6. Kerala	143.66	180.58	152.08	168.09
7. Madhya Pradesh	115.72	147.30	151.28	134.91
8. Maharashtra	304.03	301.23	309.85	363.48
9. Orissa	88.44	141.98	97.65	115.32
10. Punjab	205.67	94.97	192.81	250.98
11. Rajasthan	98.50	130.11	156.77	134.25
12. Tamil Nadu	184.24	229.81	221.79	276.91
13. Uttar Pradesh	95.19	124.30	111.81	121.55
14. West Bengal	293.02	287.62	220.33	241.32
India	159.96	180.11	195.62	250.68

* Based on Table VI.4

Table VI.12

Ranking of States on the Basis
of Per capita Non-Agricultural
Income, 1960-61 to 1975-76*

States	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	9	7	11	9
2. Assam	7	8	10	7
3. Bihar	12	11	14	13
4. Gujarat	3	3	2	3
5. Karnataka	8	6	6	6
6. Kerala	6	5	8	8
7. Madhya Pradesh	10	9	9	10
8. Maharashtra	4	1	1	1
9. Orissa	14	10	13	14
10. Punjab	4	14	5	4
11. Rajasthan	11	12	7	11
12. Tamil Nadu	5	4	4	2
13. Uttar Pradesh	13	13	12	12
14. West Bengal	2	2	3	5

*Based on Table VI.11;
ranked in ascending order

and Maharashtra (Rs.363.48) respectively. There is also no appreciable change in the percapita non-agricultural income for the traditionally backward states.

The ranks of states according to their percapita non-agricultural income show that Maharashtra throughout retains a premier position. West Bengal occupied the second position throughout the sixties but was reduced to the middle order in the seventies. Gujarat and Tamil Nadu fare better in the seventies. The lowest ranks in different years have been shared by either Bihar, Orissa or Uttar Pradesh followed by Rajasthan.

The index numbers of non-agricultural per capita income indicate that in 1960-61, there were only 5 states having a value higher than the national average income (Table-VI.13). These states are the traditional, industrial states excepting Punjab (including Haryana) in which agriculture is the dominant activity. Maharashtra in 1960-61 has an index value of 190.07, 90 per cent higher than the national norm, while at the bottom rung Orissa has it lower by 45 per cent. In 1975-76, the range seems to have come down marginally. The state of West Bengal seems to have loosened ground consistently, reaching a less than hundred position in 1975-76. Punjab, which

Table VI. 13

Index Numbers of Per capita
Non-Agricultural Income
1960-61 to 1975-76*

States	in Rs.			
	1960-61	1964-65	1970-71	1975-76
1. Andhra Pradesh	77.83	93.81	68.78	65.53
2. Assam	83.71	93.34	71.86	72.86
3. Bihar	59.66	72.76	48.26	48.06
4. Gujarat	136.02	137.07	116.46	107.35
5. Karnataka	83.29	99.48	94.04	88.00
6. Kerala	89.81	100.26	77.74	67.05
7. Madhya Pradesh	72.34	81.78	77.33	53.82
8. Maharashtra	190.07	167.25	158.39	144.99
9. Orissa	55.29	78.83	49.92	46.00
10. Punjab	128.58	52.73	98.56	100.12
11. Rajasthan	61.58	72.24	80.14	53.55
12. Tamil Nadu	115.18	127.59	113.17	110.46
13. Uttar Pradesh	59.51	69.01	57.16	48.49
14. West Bengal	183.18	159.69	112.63	96.27
India	100.00	100.00	100.00	100.00

* Based on Table VI.11

lost index points in the mid-sixties has reasonably retrieved.

An analysis of the annual compound growth rates of percapita agricultural income highlights, that for the country as a whole during the entire period the percapita income has marginally come down by 0.98 per cent per annum, this is in comparison to the 1960-61 to 1964-65, when it grew positively by 1.86 per cent per annum (Table-VI.14). In the initial years the inter-state differences are wide, for example, out of 14 state units 5 recorded a negative growth rate and the highest positive growth rate was registered by Andhra Pradesh being 7.8 per cent per annum. On the other hand, between 1970-71 to 1975-76 except the states of Assam and Maharashtra all the other states suffered from minor decelerations in the growth rate of agricultural income.

On the contrary, annual compound growth rates of non-agricultural income shows overallly, a positive trend (Table-VI.15). During the entire period of 15 years (1960-61 to 1975-76), the percapita non-agricultural income for the whole country increased by 3.04 per cent per annum, while the rate in the Seventies is particularly higher (5.09 per cent). The statewise break up indicates that

Table VI.14

Annual Compound Growth Rates of
Per capita Agricultural Income *

States	in percentage			
	1960-61 to 1964-65	1964-65 to 1970-71	1970-71 to 1975-76	1960-61 to 1975-76
1. Andhra Pradesh	7.80	-3.88	-2.34	-0.36
2. Assam	1.45	-1.86	0.40	-0.23
3. Bihar	1.92	-2.63	-0.98	-0.88
4. Gujarat	4.18	-0.53	-5.53	-0.97
5. Karnataka	2.07	2.30	-2.93	-0.47
6. Kerala	-1.68	-1.78	-1.78	-1.75
7. Madhya Pradesh	+1.58	-0.36	-4.70	-1.12
8. Maharashtra	-1.13	-5.84	+4.03	-1.38
9. Orissa	-0.83	1.81	0.55	0.68
10. Punjab	-6.99	7.11	-0.03	0.81
11. Rajasthan	3.39	5.45	-8.55	0.03
12. Tamil Nadu	-0.74	-1.84	-0.34	-1.05
13. Uttar Pradesh	1.66	-4.77	-2.71	-2.40
14. West Bengal	-1.38	0.03	-2.29	-1.13
India	+1.86	-1.12	-3.04	-0.98

during the entire stretch of one and half decades, except for the state of West Bengal (-1.29 per cent), all the other states recorded a positive growth rate, ranging from 1.03 per cent in Madhya Pradesh to 3.64 per cent in Maharashtra, followed by 3.42 per cent in Karnataka and 2.75 per cent in Tamil Nadu. After, a brief set-back during 1960-61 to 1964-65 period, Punjab achieved a larger growth rate in the subsequent decade (12.53 per cent and 5.41 per cent during 1964-65 to 1970-71 and 1970-71 to 1975-76, respectively). The States of Assam, Gujarat, Orissa and Rajasthan have made steady progress.

In Table-VI.16, the yearly associations of per-capita agricultural and non-agricultural income have been shown by bivariate correlation co-efficients. In the analysis of the correlation matrix for agricultural income, one finds that the inter-state distribution of income are not so strongly correlated in the initial years (1960-61 with 1964-65) but the initial year is significantly correlated with the terminal year, 1975-76 (0.88). Overall, there are no weak correlations, neither negative correlations, indicating that the regional distribution of agricultural income has atleast, not changed in any cardinal manner.

Table VI.15

Annual Compound Growth Rates of
Per Capita Non-Agricultural Income*

States	in percentage			
	1960-61 to 1964-65	1964-65 to 1970-71	1970-71 to 1975-76	1960-61 to 1975-76
1. Andhra Pradesh	7.94	-3.72	4.07	1.87
2. Assam	5.85	-2.94	5.38	2.09
3. Bihar	8.25	-5.32	5.00	1.57
4. Gujarat	3.21	-1.33	3.39	1.43
5. Karnataka	7.69	0.44	3.70	3.42
6. Kerala	5.88	-2.82	2.02	1.05
7. Madhya Pradesh	6.22	0.45	-2.26	1.03
8. Maharashtra	-0.23	0.47	3.24	3.64
9. Orissa	12.56	-6.05	3.38	1.78
10. Punjab	-17.57	12.53	5.41	1.34
11. Rajasthan	7.21	3.16	-3.05	2.09
12. Tamil Nadu	5.68	-0.62	4.58	2.75
13. Uttar Pradesh	6.90	-1.75	1.68	1.64
14. West Bengal	-0.46	-4.34	1.84	-1.29
India	3.01	1.39	5.09	3.04

*Based on Table VI.11

Table VI.16

Correlation Matrix of Per capita
Sectoral Incomes, 1960-61 to 1975-76*

Years/ Years	A. Agricultural Incomes			
	1960-61	1964-65	1970-71	1975-76
1960-61	1.00	+0.54	+0.70	+0.88
1964-65		1.00	+0.55	+0.43
1970-71			1.00	+0.84
1975-76				1.00

Years/ Years	B. Non-Agricultural Incomes			
	1960-61	1964-65	1970-71	1975-76
1960-61	1.00	+0.82	+0.90	+0.89
1964-65		1.00	+0.79	+0.75
1970-71			1.00	+0.96
1975-76				1.00

* Based on Tables - VI.8 & VI.11

The correlation matrix for the non-agricultural sector (Table-VI.16-B) shows a much stronger annual association compared to the matrix for the agricultural income. In 1964-65 and 1970-71 period the correlation coefficients are slightly lower. The absolute values of the correlation coefficients for the non-agricultural income also, prove to be invariably positive and higher than the figures for the agricultural sector. This seems to prove, what has been said about the other sector, that the pattern of interstate distribution of non-agricultural income can not be said to have changed; in the sense, that both in terms of agricultural income percapita as well as non-agricultural income percapita the pattern of regional inequality has little changed.

Using Williamson's measures of inequality (both unweighted and weighted) one finds that in 1960-61 the unweighted variations (Table-VI.17) in the agricultural income is much smaller than the inequality of percapita non-agricultural income, being 0.1841 and 0.4311, respectively. The inequality of agricultural income (V_{uw}) has consistently increased over time to a peak of 0.3292 in 1975-76, at a positive compound rate of 3.95 per cent per annum (Table-VI.18). On the other hand, the inequality of per capita non-agricultural income has marginally

Table VI.17

Unweighted (Vuw) and Weighted (Vw)
Coefficient of Variations of Sectoral
Incomes*

Years	Vuw		Vw	
	Ag.	Non-Ag.	Ag.	Non-Ag.
1960-61	0.1841	0.4311	0.1670	0.4599
1964-65	0.1425	0.3358	0.1464	0.3511
1970-71	0.3062	0.3190	0.2221	0.3466
1975-76	0.3292	0.3577	0.1540	0.3797

* Based on Tables VI.8 & VI.11

Table VI.18

Annual Compound Growth Rates
of Unweighted and Weighted
Inequality Indices*

Years	Vuw		Vw	
	Ag.	Non-Ag.	Ag.	Non-Ag.
1960-61 to 1964-65	-6.20	-6.05	-3.24	-6.53
1964-65 to 1970-71	13.60	-0.85	7.19	-0.21
1960-61 to 1970-71	5.22	-2.97	2.89	-2.79
1970-71 to 1975-76	1.46	2.32	-7.06	1.84
1960-61 to 1975-76	3.95	-1.24	-0.53	-1.27

* Based on Table VI.17

come down from 0.4311 in 1960-61 to 0.3577 in 1975-76 at an annual compound rate of -1.24 per cent per annum. The weighted coefficient of variation (Vw) shows, that the indices both for agricultural as well as the non-agricultural income per capita have come down, at a similar rate. The inequality of agricultural income has declined by, at a rather negligible rate of only -0.53 per cent per annum. The period between 1964-65 and 1970-71 recorded a very fast rate (7.19 per cent) of growth in the agricultural inequality, while the period between 1970-71 and 1975-76 sees a nominal increase in the non-agricultural income inequality (1.84 per cent). It may also be noted from Table-VI.17 and VI.18, that the indices of weighted co-efficient of variation for non-agricultural income and thereby the inequality is always more than double that of the agricultural sector.

Findings :

It is apparently a difficult task to arrive at a clear position, because of a comparatively weak data base than the preceding chapter. There are, however, certain points which emerge out of the present analysis which help in the understanding of the trends of inequality are the level of the inter-state incomes of the agricultural

and the non-agricultural sectors.

Firstly, the analysis leads to the conclusion that over the period of one and half decades from the early sixties to the mid seventies the Indian economy as well as the economies of the constituent states half drifted substantially, from an over dependence on the agricultural sector to the non-agricultural sectors. This shift is however, not always in a desirable direction, as the shift has led to a higher share of the non-productive⁹ service sectors.

Secondly, the performance of the agricultural sector is not as rosy as has been pointed by the official media, except being relatively higher than the growth rates of the sixties. In fact, there are states which have suffered from a declining income originating in the agricultural sector, in the early seventies. On the other hand, the performance of the non-agricultural sector has been relatively much better and satisfactory all over the country excepting the state of West Bengal.

Thirdly, the level of inequality of income per capita in the agricultural sector is always much smaller

⁹ Non-productive only means relatively to that of no material production.

than the level of inequality in the non-agricultural sector. There seems to be a marginal decline in the level of inequality of the non-agricultural income, but no significant decline in the case of the agricultural income.

CHAPTER - VII

"Qui Si convien lasciare ongi Sospetto,
Ogni vilita Convien che qui sia morta"

(Here all mistrust must be abandoned,
and here must perish every craven thought)

Karl Marx
(The Critique)

REGIONAL INEQUALITY OF PER CAPITA AGRICULTURAL OUTPUT (INCOME) IN INDIA:
1962-65 TO 1970-73*

As it has been pointed out earlier, most of the studies hitherto done, concentrate mainly on the inter-temporal analysis of income inequality at the broad regional levels taking states as the units of study. Such studies however, do not provide adequate insight into the patterns of intra-regional inequalities operating at a reasonably micro-level and therefore, a micro-level study is essential to ascertain a comprehensive inter-regional and inter-temporal picture.

In the present chapter, an attempt has been made to bridge up the gap outlined above, by using the analysis of regional inequality in terms of per capita agricultural output (incomes, in value terms) at the level of districts and natural divisions.¹ Districts have been generally,

*A major part of this chapter was presented by the author at the International Conference on Urban and Regional Changes in Third World Countries, held at IIT, Kharagpur, West Bengal, from 12-15 December, 1981 and is likely to be published in the proceedings of the Conference titled, "Agricultural Income Inequality and Regional Change in India."

¹A Mitra (1968), "Levels of Regional Development in India," in P. Sengupta and G. Sdasyuk (1968), Economic Regionalisation of India; Problems and Approaches, Census of India, 1961; office of the Registrar General of India, Govt. of India, New Delhi, Supplement-I, Statement 1.1, pp.237-244. A revised version for the 1971 census is also available in the form of an unpublished brochure and the scheme based on both have been used here.

accepted as a suitable micro-regional unit.² On the other hand, there appears to be no other alternative, so far as, adequate and reliable availability of data is concerned. The current chapter can be broadly sanctioned into two parts, the first part dealing with the patterns of regional per capita income distribution during the trienniums of 1962-65 and 1970-71, at the levels of districts, states and the natural regions.³ The second part is concerned with the levels of regional inequality⁴ in 1962-65 and 1970-73 and the temporal changes thereof.

Patterns of Per Capita Agricultural Income :

Contrary to popular opinions, it seems that the per capita agricultural income (output) in India, in 1962-65 period was Rs.284.77 which grew at a very sluggish rate, i.e. only 0.39 per cent annually compounded to Rs.293.80 in 1970-73 at 1970-73 prices. This happened during a period when the total agricultural output grew at a rate of 2.15 per cent,⁵ annually and the rural population

²Govt. of India (1969), Report of the Working Group on Identification of Backward Regions, Planning Commission, Ministry of Planning, New Delhi, pp.11-15.

³Detailed methodology is discussed in Chapter-IV.

⁴For the purpose of simplicity only Williamson's measures of inequality are used in this chapter. In the absence of suitable infrastructure the algorithm suggested earlier in Chapter-V could not be applied in the analysis of the current chapter.

⁵This value shall be slightly higher if, estimated arithmetically.

grew at the rate of 1.84 per cent per annum. It is not a very convincing situation to boast of a 'Green Revolution'. On the contrary, there are ample studies to indicate that the rate of growth of the agricultural sector (output) was slightly higher in the previous decade, i.e. 1950 to 1960.⁶

The statewise distribution of per capita incomes (Table-VII.1) in 1962-65 indicates that they vary from as low as Rs.92.06 in Kerala⁷ to as high as Rs.469.83 in Punjab. In the triennium of 1970-73 the range varies from Rs.90.59 in Kerala to Rs.806.76 in Punjab, followed by Rs.602.07 in Haryana. The position of the index numbers of per capita incomes by states (Table-VII.2) shows that nine states out of the seventeen states have values higher than 100, while the remaining eight states have values lower than 100, in 1962-63. Naturally, states of Punjab (168.49) and Haryana (161.93) lead the other states in terms of the index numbers, while Kerala (32.32) and Bihar (62.99) trail the rest of the states. On the other hand, in 1970-73 the positions of the index numbers and

⁶P. Patnaik and S.K. Rao (1975): "Some Aspects of Agricultural Development of Post Independence India", New Delhi (Unpublished). Of course, it is admitted that the net contribution to the growth rate of agriculture in the fifties was largely because of the expansion of area (NSA), while in the latter decade the growth rates were contributed because of a higher growth rate of the yield per unit area.

⁷The very low figures for the state of Kerala is not actually representative, since the nineteen crops used, represent less than 20 per cent of total agricultural output in some of the districts of Kerala. This point has already been discussed in Chapter-IV.

TABLE-VII.1

Per Capita Agricultural Incomes (State-wise)
1962-65 and 1970-73*

Sl. No.	Name of States	P.C.A.I. 1962-65 in Rs.	P.C.A.I. 1970-73 in Rs.	Annual Compound G.R. in per cent	A.C.G.R. of rural pop. in per cent	A.C.G.R. of Gross Agri. output in per cent
1		2	3	4	5	6
1.	Andhra Pradesh	338.23	294.59	-1.71	1.68	-0.06
2.	Assam	225.69	265.05	2.03	0.50	2.04
3.	Bihar	179.40	162.66	-1.22	1.78	0.54
4.	Gujarat	406.29	395.69	-0.33	2.29	1.95
5.	Haryana	461.15	602.07	3.39	2.27	5.73
6.	Himachal Pradesh	204.55	220.24	0.93	2.21	3.15
7.	Jammu & Kashmir	193.71	264.64	3.98	1.63	5.67
8.	Karnataka	361.34	322.98	-1.39	1.82	2.08
9.	Kerala	92.06	90.59	-0.20	2.23	2.02
10.	Madhya Pradesh	326.76	304.49	-0.88	2.29	1.39
11.	Maharashtra	324.67	203.49	-5.68	2.03	-3.77
12.	Orissa	314.67	261.58	-2.28	2.03	-0.23
13.	Punjab	479.83	806.76	6.71	1.12	7.91
14.	Rajasthan	235.09	291.32	2.72	2.32	5.10
15.	Tamil Nadu	329.51	354.94	0.94	1.53	2.47
16.	Uttar Pradesh	263.05	294.73	1.52	1.41	2.94
17.	West Bengal	270.28	271.12	0.004	2.38	2.42
	INDIA	284.77	293.80	0.39	1.84	2.15

*Based on Appendix-VII.A.

NB:

PCAI = Per Capita Agricultural Income
ACGR = Annual Compound Growth Rate

Table VII.2

Index Numbers and Ranks of Per capita Agricultural output (1962-65 and 1970-73)*

Sl. No.	States	1962-65		1970-73	
		Index Numbers	Ranks	Index Numbers	Ranks
	(1)	(2)	(3)	(4)	(5)
1.	Andhra Pradesh	118.77	5	100.26	8
2.	Assam	79.25	13	90.21	11
3.	Bihar	62.99	16	55.36	16
4.	Gujarat	142.67	3	134.68	3
5.	Haryana	161.93	2	204.92	2
6.	Himachal Pradesh	71.82	14	74.96	14
7.	Jammu & Kashmir	68.02	15	90.07	12
8.	Karnataka	126.88	4	109.93	5
9.	Kerala	32.32	17	30.83	17
10.	Madhya Pradesh	114.74	7	103.63	6
11.	Maharashtra	114.01	8	69.26	15
12.	Orissa	110.49	9	89.03	13
13.	Punjab	168.49	1	274.59	1
14.	Rajasthan	82.55	12	99.15	9
15.	Tamil Nadu	115.71	6	120.81	4
16.	Uttar Pradesh	92.37	11	100.31	7
17.	West Bengal	94.91	10	92.28	10
	India	100.00		100.00	

* Based on Table VII.1

ranks remain almost identical, i.e. Punjab (274.59), Haryana (204.92) leading the Table and Kerala (30.83) and Bihar (55.36) trailing the rest. The gap between the values of Punjab, Haryana and that of Kerala and Bihar has increased considerably.

The changes in the per capita agricultural income highlight points of interest and it can be noted that during the period between 1962-63 and 1970-73, there are atleast eight states which suffered from a negative growth rate of income. The maximum negative growth rate of -5.68 per cent was recorded in the state of Maharashtra, while the rest of the states enjoyed a moderate to high positive growth rate, headed by Punjab and Haryana, having a growth rate of 6.71 per cent and 3.39 per cent respectively. This is in comparison to the situation that total agricultural output has actually declined (in absolute quantity) in only three states, i.e. Maharashtra, Orissa and Andhra Pradesh, the rest of the states registering a positive growth rate as high as 7.19 per cent in Punjab, 5.73 per cent in Haryana and 5.10 per cent in Rajasthan. The major part of the increase in the total output seems to have been neutralised by the increase in rural population, growing

at rates varying from 1.12 per cent in Punjab to 2.38 per cent in West Bengal.

The districtwise estimates of per capita agricultural incomes (Appendix-VII.A) indicate that during the triennium of 1962-65 the income was as low as Rs.27.82 (at 1970-73 prices) in the district of Ladakh of the state of Jammu & Kashmir, to as high as Rs.747.50 in the district of Bhatinda of Punjab. There also, remains a wide variation in per capita incomes between the 284 district units used in the current analysis.

An analysis of the frequency classes in 1962-65 (Table-VII.3) indicates that out of the 284 district units, a total of 8 districts fall within the lowest group (less than Rs.100 per capita), 151 districts in the low income group (II class, income between Rs.100-299), 106 districts in the medium and high income classes (III and IV classes, income between Rs.300-699) and only 2 districts in the very high category (group V with per capita income more than Rs.700/-). The maximum numbers of districts (257) are concentrated in the low and medium groups (II and III classes, with a range of Rs.100-499 income per capita), accounting for as much as 90.49 per cent of the total number of the component areal units.

A statewise break up, however, shows that most of the districts of the very low per capita income are concentrated in the states of Kerala (4), Rajasthan (2), Tamil Nadu (1) and Jammu & Kashmir (1). The low income class (II) of districts are concentrated in the states of Uttar Pradesh (33 out of 48 units), Rajasthan (17 out of 26 units), Orissa (6 out of 11 units), Madhya Pradesh (15 out of 43 units), Andhra Pradesh (9 out of 17 districts) and Bihar and Assam having all the 15 and 8 district units entirely, within this group. The States of Assam, Bihar, Jammu & Kashmir, Kerala, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West-Bengal have no district in either the high (IV) or the very high (V) income categories.

An analysis of the thematic map (see, Map-VII.1) for 1962-63 shows a clear regional pattern in the concentration of districts of different income classes. The very low group (I) and the low income group (II) of districts are concentrated in the following contiguous zones :

- (i) In the east and the north-east, in Assam, West Bengal (except, North Bengal), Bihar and coastal Orissa;
- (ii) In whole of Uttar Pradesh (except, north-western part) and Madhya Pradesh (except, the north-central part);

TABLE-VII.3

Frequency Distribution of Per Capita Agricultural Income
(District-wise) 1962-65*

Sl. No.	Name of states	Less than 100	100-299	300-499	500-699	700 and above	Total
1		2	3	4	5	6	7
1.	Andhra Pradesh	0	9	6	2	0	17
2.	Assam	0	8	0	0	0	8
3.	Bihar	0	15	0	0	0	15
4.	Gujarat	0	6	5	5	1	17
5.	Haryana	0	4	3	0	0	7
6.	Jammu & Kashmir	1	2	0	0	0	3
7.	Karnataka	0	9	8	2	0	19
8.	Kerala	4	3	0	0	0	7
9.	Madhya Pradesh	0	16	26	1	0	43
10.	Maharashtra	0	9	16	0	0	25
11.	Orissa	0	6	5	0	0	11
12.	Punjab	0	2	5	3	1	11
13.	Rajasthan	2	17	7	0	0	26
14.	Tamil Nadu	2	4	6	0	0	12
15.	Uttar Pradesh	0	33	15	0	0	48
16.	West Bengal	0	9	6	0	0	15
	ALL INDIA	9	152	108	13	2	284

*Based on Appendix VII.A.

- (iii) In Rajasthan and north-western Gujarat;
- (iv) In Telengana area of Andhra Pradesh and
- (v) The south-western coast and the dry areas of the state of Karnataka.

The district units with medium per capita agricultural income (III class) are concentrated in the following regions :

- (i) The north-western India (parts of Punjab, Haryana and Uttar Pradesh);
- (ii) The north-central India (parts of eastern Rajasthan, north-western Madhya Pradesh and Gujarat);
- (iii) Maharashtra - Karnataka transitional areas and
- (iv) The south-eastern coastal plains of Tamil Nadu and Andhra Pradesh.

The high (IV) and very high (V) agricultural income classes of districts are regionally concentrated in one major region, i.e. the Punjab and Haryana plains and in isolated pockets scattered in the states of Gujarat, coastal Andhra Pradesh and the districts of Mandya and Bellary in Karnataka.

The situation in the triennium of 1970-73 shows cardinal changes (Appendix-VII.A, Col.2). The per capita agricultural incomes vary from Rs.23.50 in Ladakh district to the highest of Rs.1076.54 in the Ferozpur district of Punjab. The frequency classes (Table-VII.4) indicate that

TABLE-VII.4

Frequency Distribution of Per Capita Agricultural Income
(District-wise) 1970-73*

Sl. No.	Name of states	Less than 100	100-299	300-499	500-699	700 and above	Total
1		2	3	4	5	6	7
1.	Andhra Pradesh	0	11	6	0	0	17
2.	Assam	0	7	1	0	0	8
3.	Bihar	1	14	0	0	0	15
4.	Gujarat	0	4	8	5	0	17
5.	Haryana	0	0	2	3	2	7
6.	Jammu & Kashmir	1	1	1	0	0	3
7.	Karnataka	0	10	6	3	0	19
8.	Kerala	4	3	0	0	0	7
9.	Madhya Pradesh	0	21	22	0	0	43
10.	Maharashtra	0	24	1	0	0	25
11.	Orissa	0	8	3	0	0	11
12.	Punjab	0	0	2	3	6	11
13.	Rajasthan	3	14	8	0	1	26
14.	Tamil Nadu	1	4	6	1	0	12
15.	Uttar Pradesh	0	30	16	2	0	48
16.	West Bengal	0	6	9	1	0	15
	ALL INDIA	0	156	91	18	9	284

*Based on Appendix-VII.A.

TABLE-VII.5

State-wise Frequency Distribution of Growth Rates of Per
Capita Incomes
(1962-65 to 1970-73)*

Sl. No.	Name of the states	C.G.R. less than -1.0	C.G.R. -1.0 to 0.0	C.G.R. 0.0 to 1.0	C.G.R. 1.01 to 3.0	C.G.R. 3.01 and above	Total No. of Districts
1	2	3	4	5	6	7	8
1.	Andhra Pradesh	12	3	1	1	-	17
2.	Assam	2	4	-	1	1	8
3.	Bihar	8	2	3	2	-	1
4.	Gujarat	7	2	2	4	2	17
5.	Haryana	-	-	2	1	4	7
6.	Jammu & Kashmir	1	-	-	-	2	3
7.	Karnataka	9	3	1	4	2	19
8.	Kerala	3	2	1	1	-	7
9.	Madhya Pradesh	21	10	9	3	-	43
10.	Maharashtra	21	1	3	-	-	25
11.	Orissa	11	-	-	-	-	11
12.	Punjab	-	-	-	-	11	11
13.	Rajasthan	7	2	1	7	9	26
14.	Tamil Nadu	-	5	3	1	3	12
15.	Uttar Pradesh	6	8	16	12	6	48
16.	West Bengal	-	1	3	7	4	15
	INDIA	108	43	45	44	44	284

*Based on Appendix VII.A.

Table VII.6

Frequency Distribution of Per capita
Agricultural output (1962-65)*

Sl. No.	Codes	Regions	<100	100-299	300-499	500-699	700 +	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	(1.1)	Wn. Himalayas	1	3	0	0	0	4
2.	(1.2)	E.Himalayas	0	1	0	0	0	1
3.	(1.3)	N.En. Ranges	0	1	0	0	0	1
4.	(2.1)	Rajasthan Plains	0	2	0	0	0	2
5.	(2.2)	Punjab Plains	0	0	3	1	0	4
6.	(2.3)	U.P. Plains	0	4	2	0	0	6
7.	(2.4)	Bihar Plains	0	2	0	0	0	2
8.	(2.5)	W.B. Plains	0	2	2	0	0	4
9.	(2.6)	Assam Valley	0	2	0	0	0	2
10.	(3.1)	Rajasthan Hills & Plateaus	0	3	1	0	0	4
11.	(3.2)	Bundelkhand	0	1	2	0	0	3
12.	(3.3)	Malwa	0	0	2	0	0	2
13.	(3.4)	Vindhyan Ranges and Plateaus	0	1	2	0	0	3
14.	(3.5)	Central M.P.	0	2	5	0	0	7
15.	(3.6)	Orissa Hills and Plateaus	0	0	2	0	0	2
16.	(3.7)	Sn. Bihar Hills and Plateaus	0	3	0	0	0	3
17.	(3.8)	W.B. Uplands	0	1	1	0	0	2
18.	(4.1)	Maharashtra Deccan	0	2	4	0	0	6
19.	(4.2)	Andhra Deccan	0	1	1	0	0	2
20.	(4.3)	Mysore Deccan	0	1	4	0	0	5
21.	(4.4)	T.N. Hills and Uplands	1	1	0	0	0	2
22.	(5.1)	Kutch and Kathiawar	0	1	1	1	0	3
23.	(5.2)	Gujarat Plains and Dangs	0	1	1	0	0	2
24.	(5.3)	Konkan Coastal lowlands	0	2	0	0	0	2
25.	(5.4)	Konkan Kerala Transition	0	1	0	0	0	1
26.	(5.5)	Kerala Coastal Plains & Ghats	2	0	0	0	0	2
27.	(6.1)	T.N.Coastal Plains	0	2	1	0	0	3
28.	(6.2)	Andhra Coastal Plains	0	0	1	0	0	1
29.	(6.3)	Orissa Coastal Plains	0	1	0	0	0	1

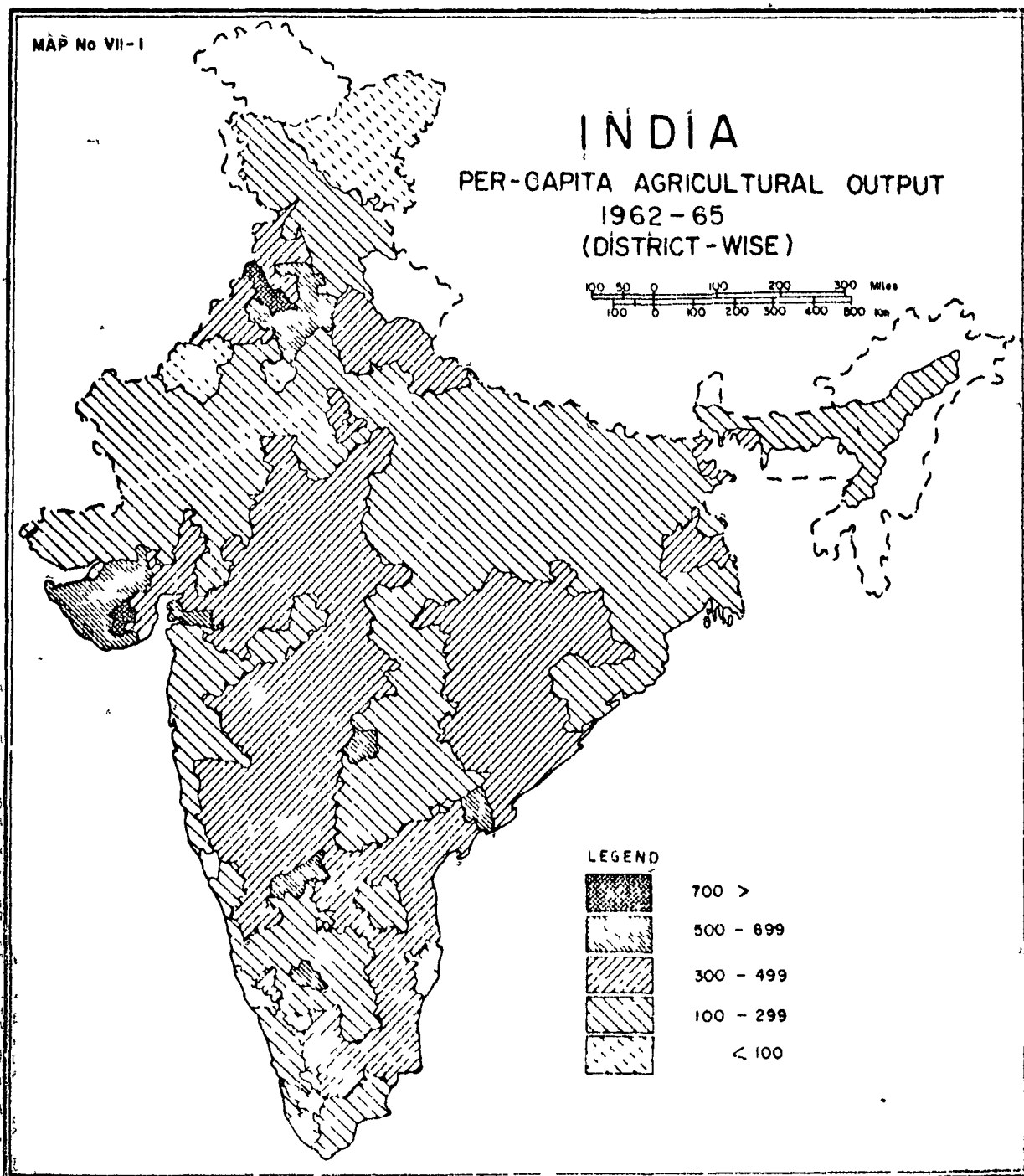
* Based on Appendix - VII.B(Col.1)

Table VII.7

Frequency Distribution of per capita
Agricultural Output (1970-73)*

Sl. No.	Codes	Regions	100	100-299	300-499	500-699	700 +	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	(1.1)	Wn. Himalayas	1	2	1	0	0	4
2.	(1.2)	E. Himalayas	0	1	0	0	0	1
3.	(1.3)	N.En. Ranges	0	0	1	0	0	1
4.	(2.1)	Rajasthan Plains	0	1	1	0	0	2
5.	(2.2)	Punjab Plains	0	0	0	1	3	4
6.	(2.3)	U.P. Plains	0	4	2	0	0	6
7.	(2.4)	Bihar Plains	0	2	0	0	0	2
8.	(2.5)	W. B. Plains	0	2	2	0	0	4
9.	(2.6)	Assam Valley	0	2	0	0	0	2
10.	(3.1)	Rajasthan Hills & Plateaus	0	2	2	0	0	4
11.	(3.2)	Bundelkhand	0	1	2	0	0	3
12.	(3.3)	Malwa	0	0	2	0	0	2
13.	(3.4)	Vindhyan Ranges & Plateaus	0	2	1	0	0	3
14.	(3.5)	Central M.P.	0	5	2	0	0	7
15.	(3.6)	Orissa Hills & Plateaus	0	2	0	0	0	2
16.	(3.7)	Sn.Bihar Hills & Plateaus	1	2	0	0	0	3
17.	(3.8)	W.B. Uplands	0	1	1	0	0	2
18.	(4.1)	Maharashtra Deccan	0	6	0	0	0	6
19.	(4.2)	Andhra Deccan	0	1	1	0	0	2
20.	(4.3)	Mysore Deccan	0	3	1	1	0	5
21.	(4.4)	T. N. Hills & Uplands	1	0	1	0	0	2
22.	(5.1)	Kutch & Kathiawar	0	0	2	1	0	3
23.	(5.2)	Gujarat Plains & Dangs	0	1	1	0	0	2
24.	(5.3)	Konkan Coastal lowlands	0	2	0	0	0	2
25.	(5.4)	Konkan Kerala Transition	0	1	0	0	0	1
26.	(5.5)	Kerala Coastal Plains & Ghats	2	0	0	0	0	2
27.	(6.1)	T. N. Coastal Plains	0	2	1	0	0	3
28.	(6.2)	Andhra Coastal Plains	0	1	1	0	0	1
29.	(6.3)	Orissa Coastal Plains	0	1	0	0	0	1
Total:			5	46	25	3	3	82

* Based on Appendix-VII.B(Col.2)



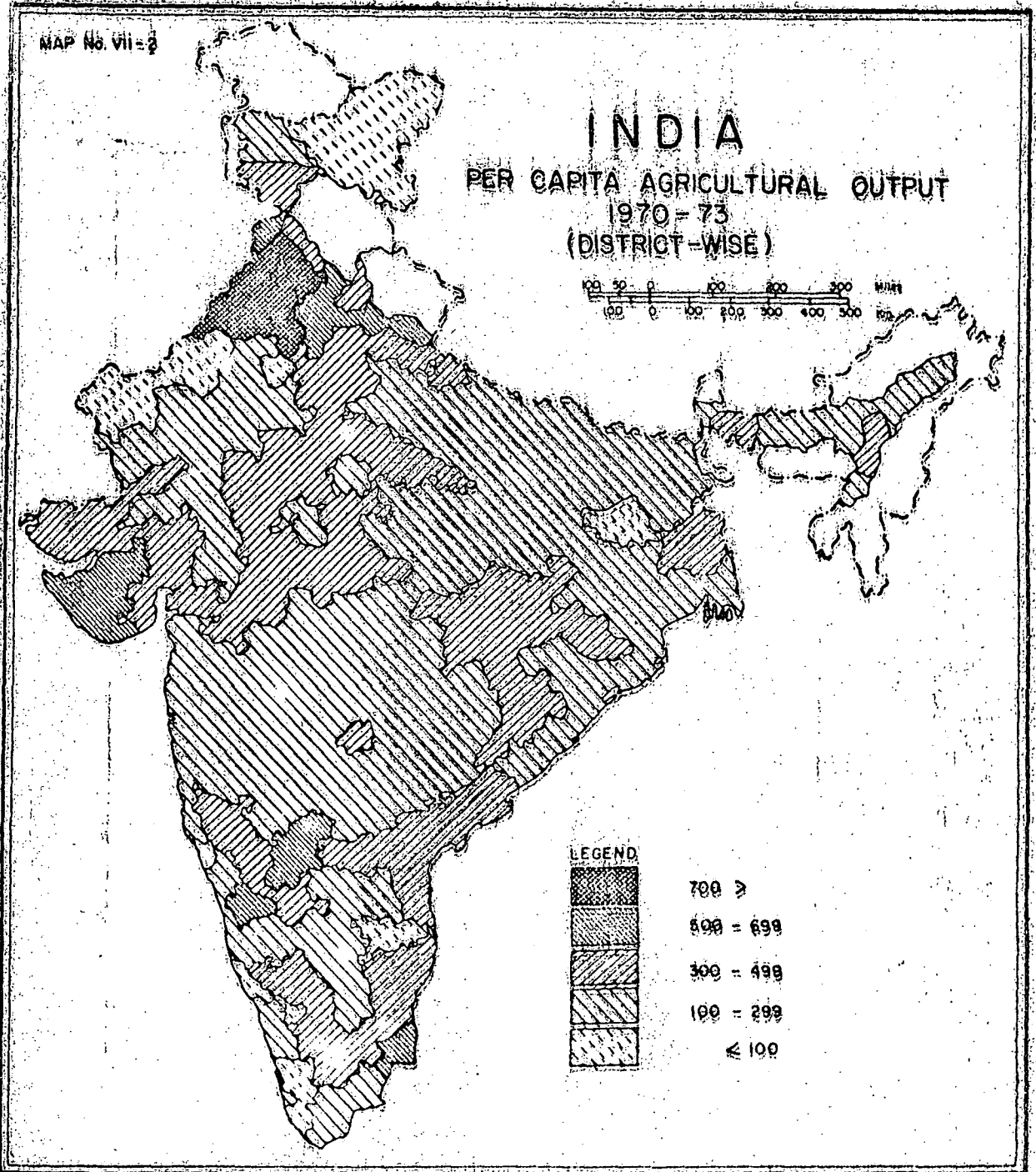
out of the total of 284 district units 10 districts are in the very low income class (I), 156 districts (54.93 per cent) in the low income class (II), 91 districts in the medium income class (III), 18 districts (6.34 per cent) in the high income class and only 9 districts in the very high income group (V). A state-wise distribution shows that the maximum concentration of districts both in the very low and low income categories are generally, frequent in the states of Bihar (all the 15 units), Karnataka (10 out of the 19 districts), Madhya Pradesh (21 out of the 43 districts), Maharashtra (24 out of 25 districts), Orissa (8 out of 11 districts), Rajasthan (17 out of 26 districts) and Uttar Pradesh (30 out of 48 districts). Districts in the medium income category (Rs.300 - 499) are concentrated in the states of Gujarat (8 out of 17 districts), Karnataka (6 out of 19 districts), Madhya Pradesh (22 out of 43 districts), Rajasthan (8 out of 26 districts) Tamil Nadu (6 out of 11 districts), Uttar Pradesh (16 out of 48 districts) and West Bengal (9 out of 15 districts). The high and very high income districts are concentrated in the states of Gujarat (5), Haryana (5), Punjab (9 out of 11 districts), Karnataka (3) and Uttar Pradesh (2).

Map-VII.2 shows that the regional pattern of distribution of per capita agricultural income for the triennium 1970-73. It may be noted from this map that low and very low agricultural income districts constitute of the following contiguous zones:

- (i) The greater parts of north-central and eastern Uttar Pradesh, the whole of Bihar, the south-western West Bengal, the plains of Assam and larger parts of coastal and adjoining areas of Orissa, in a single large belt,
- (ii) A large belt stretching from the Telengana region of Andhra Pradesh and south-eastern Madhya Pradesh into virtually, the whole of Maharashtra, large parts of the latter being new entrants into this low income category and
- (iii) A smaller region formation in the dry Rajasthan plains and in the Malabar coast, stretching southwards upto the district of Kanyakumari and the dry zones of the district of Ramanathapuram.

The spatial distribution of the medium income group reveals the following major areas of concentration:

- (i) Southern Madhya Pradesh;
- (ii) Coastal Andhra Pradesh and Tamil Nadu (excepting the Thanjavur district);
- (iii) Parts of north-western West Bengal;
- (iv) Greater parts of Maidan Karnataka and southern Maharashtra;
- (v) Larger parts of Gujarat, eastern Rajasthan and north-western Madhya Pradesh and



- (vi) The 'developmental peripheries'⁸ of the Punjab-Haryana agricultural belt, extending into the Doab and the Rohilakhand plains of Uttar Pradesh.

The high and very high income districts are concentrated in two belts, i.e. (i) in the Punjab and Haryana plains (extending into the Ganganagar district of Rajasthan and to parts of the Doab area of western Uttar Pradesh) and (ii) in isolated, scattered pockets in the states of Gujarat (Kathiawar Peninsula), the Thanjavur district of Tamil Nadu and the districts of Shimoga, Raichur and Bellary of Karnataka.

What the above regional pattern of districts makes one to conclude is that the regional distribution of income in 1962-65 has not changed in the post Green Revolution period and therefore, the backward regions remained in the low agricultural income groups. Contrary to this, the pattern of concentration has got further accentuated towards either the low order or the higher income classes. This position is buttressed by the fact that the number of districts in the middle income category has come down from 106 in 1962-65 to only 89

⁸ This means, the regions adjacent to the core area of the Punjab-Haryana agricultural belt, which has witnessed a tremendous change in the pattern of agricultural output and yield during Green Revolution.

in 1970-73 (a reduction of 15 per cent), which has got distributed to both extremes of classes. Other point of note is that the states like Orissa and Punjab having 11 district units each have the distinction of the former having 8 of them in the low income category while the latter has 8 of them in high or very high income categories. On the other hand, all the 11 districts of the very high income group constitute of a contiguous zone in the north-western parts of the Great plains of India. Out of the eleven such districts 6 are in Punjab, 4 in Haryana and one (Ganganagar) in Rajasthan.

Changes in the per capita agricultural income (output) over the period of 8 years have been estimated by annual compound growth rates (Appendix-VII.A, Col.3). The growth rates range from as low as a negative rate of -10.97 per cent in Bhir, -10.80 per cent in Aurangabad, -9.97 per cent in Sholapur, -9.23 per cent in Osmanabad (all in Maharashtra) to as high as a positive growth rate of 10.50 per cent at Sangrur, 9.50 per cent at Hoshiarpur (in Punjab) and 8.90 per cent in Ambala (in Haryana). Out of the 284 districts which have been classified into 5 frequency classes (Table-VII.5), 151 districts (53.17 per cent) have shown negative changes,

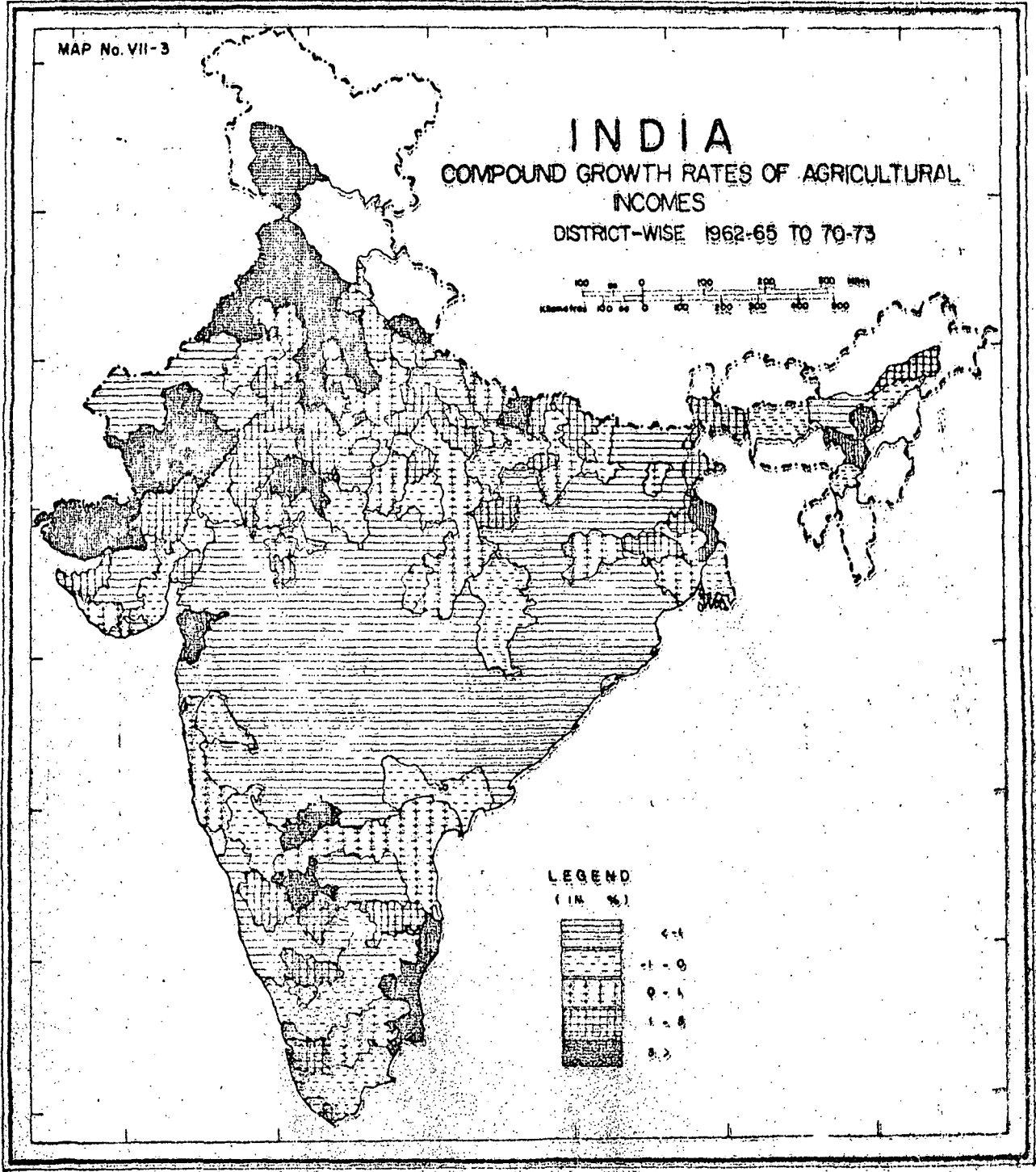
with 108 district units (38.03 per cent) registering a growth rate less than -1.0 per cent per annum. On the other hand, out of the remaining 133 districts which recorded a positive growth rate, 45 districts only show marginal positive growth, i.e. less than 1 per cent per annum. There are however, 88 districts (30.99 per cent) which have shown a significant positive growth rate of per capita agricultural income, i.e. more than 1 per cent per annum.

A statewise break up of the frequency classes indicates that the pattern of positively and negatively growing districts are very unevenly distributed between the states of India. It may be noted from Table-VII.5 that in the state of Orissa, all the 11 areal units fall in the category of high negative growth rate, while all the 11 districts of Punjab fall within the highest positive growth rate category (V). States of Maharashtra, Madhya Pradesh, Andhra Pradesh, parts of Rajasthan, Karnataka and Gujarat registered a negative growth rate in the per capita agricultural income. On the other hand, most of the high to very high positive growth rates are witnessed in the districts of Punjab - Haryana and western Uttar Pradesh and in isolated pockets in Gujarat and coastal Tamil Nadu.

A study of Map-VII.3 clearly depicts the regional picture of the rates of growth of per capita income. The spatial pattern signifies that districts with negative growth rates are concentrated in central and eastern Uttar Pradesh, Bihar, virtually, the whole of central India (peninsular part) including the states of Orissa, large stretches of Madhya Pradesh, Maharashtra, north-central Andhra Pradesh and northern Karnataka. This is indeed, a very large belt, covering almost half of the area and population of the country. The areas of high growth rates are concentrated in three different belts, i.e.

- (i) the north-western plains of Punjab, Haryana and western Uttar Pradesh;
- (ii) the southern Rajasthan and the north-central Gujarat plains and
- (iii) in isolated pockets of Tamil Nadu, Karnataka, West Bengal and Assam⁹ Areas of marginal increase or decrease are located on the fringes of the two clearly divergent regions, outlined above. It can be noted that the numbers of districts registering a negative growth rate in terms of total agricultural output are invariably smaller (68, forming only 23.84 per cent) but a steady increase in the rural population has eaten away whatever progress was achieved in the sphere of changes in total agricultural output.

⁹The only district unit of Assam, i.e. Mikir Hills (Karbi Anglong) and North Cachar Hills, registers a high positive growth rate because of the high land/man or the low population density.



As discussed in Chapter-IV, states cannot always be used as viable regional units due to wide variation in size and composition, particularly, for problem of the current chapter, which is to a great extent dependent on the natural environment. Agriculture and the resultant incomes generated from this activity are intricately related to the natural processes and quite evidently, it is desirable to study the problem of regional inequality, emerging out of the per capita agricultural incomes at the level of natural, regional units. To this extent, the scheme provided by the erstwhile Registrar General of Census (1961) is considered suitable enough, because of the recasting of the administrative units (districts) into approximate natural regions.¹⁰ Consequently, the per capita agricultural income at the district levels have been moulded into the scheme of natural regions.

An analysis of the per capita incomes of the 1962-65 period (Table-VII.9) in light of the meso-natural regions indicates the variations from Rs.58.39 in Kerala-coastal plains and the Ghats region, to the highest of

¹⁰A. Mitra, Op.cit.,

In this study the redefining of the administrative regions (districts and states) in terms of natural regions of the country are particularly suitable in analytical context of the present chapter. This has also been dealt in Chapter-IV. In the present chapter 29 meso-order natural regions and 82 micro-order regions ('Divisions') have been used with necessary modifications and adjustments.

Table-VII.8

Frequency Distribution of Growth Rates of
Per Capita Agricultural Out-put
(1962-65 to 1970-73)*

Sl. No.	Codes	Regions	-6 to -3	-6 to -3	-3 to 0	0 to +3	+3 to +6	+6 to +	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
1.	(1.1)	Wn. Himalayas	0	0	1	1	2	0	4
2.	(1.2)	E. Himalayas	0	0	0	1	0	0	1
3.	(1.3)	N.En. Ranges	0	0	0	0	0	1	1
4.	(2.1)	Rajasthan Plains	0	0	0	0	2	0	2
5.	(2.2)	Punjab Plains	0	0	0	0	1	3	4
6.	(2.3)	U. P. Plains	0	0	1	4	1	0	6
7.	(2.4)	Bihar Plains	0	0	2	0	0	0	2
8.	(2.5)	W.B. Plains	0	0	0	4	0	0	4
9.	(2.6)	Assam Valley	0	0	2	0	0	0	2
10.	(3.1)	Rajasthan Hills & Plateaus	0	0	2	2	0	0	4
11.	(3.2)	Bundelkhand	0	0	0	3	0	0	3
12.	(3.3)	Malwa	0	0	1	1	0	0	2
13.	(3.4)	Vindhyan Ranges & Plateaus	0	0	2	1	0	0	3
14.	(3.5)	Central M.P.	0	0	5	2	0	0	7
15.	(3.6)	Orissa Hills & Plateaus	0	0	2	0	0	0	2
16.	(3.7)	Sn.Bihar Hills & Plateaus	0	2	1	0	0	0	3
17.	(3.8)	W.B. Uplands	0	0	0	2	0	0	2
18.	(4.1)	Maharashtra Deccan	2	2	2	0	0	0	6
19.	(4.2)	Andhra Deccan	0	0	1	1	0	0	2
20.	(4.3)	Mysore Deccan	0	0	4	0	1	0	5
21.	(4.4)	T.N.Hills & Uplands	0	0	0	1	1	0	2
22.	(5.1)	Kutch & Kathiawar	0	0	1	1	1	0	3
23.	(5.2)	Gujarat Plains & Dangs	1	0	1	0	0	0	2
24.	(5.3)	Konkan Coastal low lands	0	1	1	0	0	0	2
25.	(5.4)	Konkan Kerala Transition	0	0	0	1	0	0	1
26.	(5.5)	Kerala Coastal Plains & Ghats	0	0	1	1	0	0	2
27.	(6.1)	T.N. Coastal Plains	0	0	1	2	0	0	3
28.	(6.2)	Andhra Coastal Plains	0	0	1	0	0	0	1
29.	(6.3)	Orissa Coastal Plains	0	1	0	0	0	0	1
Total :			3	6	32	28	9	4	82

* Based on Appendix-VII.B(Col.3)

Table VII.9
Per Capita Agricultural Output
(1962-65 and 1970-73)*

Natural Region-wise

Sl. No.	Codes	Regions	in 1970-73 prices				
			1962-65 in Rs.	1970-73 in Rs.	% ACGR of 3 & 4	% ACGR of rural popula- tion	% ACGR of total Ag. output
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
1.	(1.1)	Wn.Himalayas	200.26	250.20	2.82	1.76	4.63
2.	(1.2)	En.Himalayas	120.87	140.64	1.91	2.28	4.24
3.	(1.3)	N-En. Ranges	190.82	331.72	7.16	4.75	12.25
4.	(2.1)	Rajasthan Plains	201.48	296.03	4.93	2.42	7.46
5.	(2.2)	Punjab Plains	474.71	744.55	5.79	1.50	7.38
6.	(2.3)	U.P. Plains	250.44	275.97	1.22	1.65	2.89
7.	(2.4)	Bihar Plains	176.12	167.36	-0.64	1.85	1.20
8.	(2.5)	W.B. Plains	259.04	303.47	2.00	2.54	4.59
9.	(2.6)	Assam Valleys	226.73	216.14	-0.60	2.81	2.20
10.	(3.1)	Rajasthan Hills and Plateaus	252.12	228.08	-1.24	5.63	4.32
11.	(3.2)	Bundelkhand	326.07	380.89	1.96	1.86	3.84
12.	(3.3)	Malwa	373.22	341.52	-1.10	2.39	1.26
13.	(3.4)	Vindhyan Ranges and Plateaus	291.74	274.24	-0.77	2.76	1.97
14.	(3.5)	Cn.Madhya Pradesh	311.42	296.41	-0.62	2.08	1.45
15.	(3.6)	Orissa Hills and Plateaus	330.38	284.89	-1.83	1.67	-0.19
16.	(3.7)	Sn.Bihar Hills and Plateaus	189.75	151.53	-2.77	1.53	-1.28
17.	(3.8)	W.B.Uplands	313.35	348.74	1.35	1.85	3.23
18.	(4.1)	Maharashtra Deccan	337.24	207.68	-5.88	2.13	-3.87
19.	(4.2)	Andhra Deccan	290.94	287.12	-0.17	1.88	1.71
20.	(4.3)	Mysore Deccan	348.32	325.69	-0.84	2.56	1.70
21.	(4.4)	T.N.Hills and Uplands	241.29	321.79	3.66	1.50	5.22
22.	(5.1)	Kutch & Kathiawar	448.36	460.43	0.33	2.55	2.90
23.	(5.2)	Gujarat Plains and Dangs	412.31	379.98	-1.02	1.85	0.81
24.	(5.3)	Konkan Coastal Lowland	198.00	167.84	-2.04	1.49	-0.59
25.	(5.4)	Konkan Kerala Transition	248.31	291.44	2.02	1.93	1.87
26.	(5.5)	Kerala Coastal Plains & Ghats	58.39	57.19	-0.26	2.23	2.00
27.	(6.1)	T.N. Coastal Plains	326.98	380.31	1.91	1.44	3.38
28.	(6.2)	Andhra Coastal Plains	357.87	347.19	-0.38	1.50	1.12
29.	(6.3)	Orissa Coastal Plains	275.60	212.67	-3.19	2.22	-1.03
		India	284.77	293.80	0.39	1.84	2.15

* Based on Appendix-VII.A and VII.B

Rs.474.81 in the Punjab plains, at 1970-73 prices. The positions of meso-regions in terms of index numbers and ranks (Table-VII 10) classifies that out of a total of 29 regions, there are 14 regions which have index values more than hundred, led by Punjab Plains (166.70). The ranks indicate that the first five leading (rankwise) regions are Punjab Plains, followed by Kutch and Kathiawar region, Gujarat Plains, Malwa and Andhra Pradesh Coastal plains. At the bottom rung, the ranks are led by the Kerala coastal Plains and Ghats region, followed by the Eastern Himalayas (only the district of Darjeeling) Bihar Plains, South-Bihar Hills and Plateaus (the Chhota-nagpur region) and the North-Eastern ranges.

In 1970-73, there seems to be little change in the regional pattern, except that the process of regional concentration and consolidation of per capita incomes have continued at both the ends of the scale. The range of per capita income increased substantially, from Rs.57.19 in Kerala coastal Plains and Ghats, to Rs.744.55 in Punjab Plains. The range of index values also widen from 19.47 to 253.42 for the regions mentioned above, respectively. Rankwise, Punjab Plain is followed by the Kutch and Kathiawar region, Malwa, Tamil Nadu coastal Plain and the Gujarat Plain in order, a relative

Table VI.10

Index Numbers and Ranks of Regions
According to Per capita Agricultural Output
(1962-65 and 1970-73)*

Sl. No.	Code	Regions	1962-65		1970-73	
			Index Numbers	Ranks	Index Numbers	Ranks
(1)	(2)	(3)	(4)	(5)	(6)	
1.	(1.1)	Wn.Himalayas	70.32	23	85.16	20
2.	(1.2)	En.Himalayas	42.44	28	47.87	28
3.	(1.3)	N-En. Ranges	87.01	25	112.91	9
4.	(2.1)	Rajasthan Plains	70.75	22	100.76	14
5.	(2.2)	Punjab Plains	166.70	1	253.42	1
6.	(2.3)	U.P. Plains	87.94	18	93.93	18
7.	(2.4)	Bihar Plains	61.85	27	56.96	26
8.	(2.5)	W.B. Plains	90.96	16	103.29	12
9.	(2.6)	Assam Valleys	79.62	21	73.57	22
10.	(3.1)	Rajasthan Hills and Plateaus	88.53	17	77.63	21
11.	(3.2)	Bundelkhand	114.50	10	129.64	3
12.	(3.3)	Malwa	131.06	4	116.24	8
13.	(3.4)	Vindhyan Ranges and Plateaus	102.45	13	93.34	19
14.	(3.5)	Cn.Madhya Pradesh	109.36	12	100.89	13
15.	(3.6)	Orissa Hills and Plateaus	116.02	8	96.97	17
16.	(3.7)	Sn.Bihar Hills and Plateaus	66.63	26	51.58	27
17.	(3.8)	W.B. Uplands	110.04	11	118.70	6
18.	(4.1)	Maharashtra Deccan	118.43	7	70.69	24
19.	(4.2)	Andhra Deccan	102.17	14	97.73	16
20.	(4.3)	Mysore Deccan	122.32	6	110.85	10
21.	(4.4)	T.N.Hills and Uplands	84.73	20	109.53	11
22.	(5.1)	Kutch & Kathiawar	157.45	2	156.72	2
23.	(5.2)	Gujarat Plains and Dangs	144.79	3	129.33	5
24.	(5.3)	Konkan Coastal Lowland	69.53	24	57.13	25
25.	(5.4)	Konkan Kerala Transition	87.20	19	99.20	15
26.	(5.5)	Kerala Coastal Plains & Ghats	20.50	29	19.47	29
27.	(6.1)	T.N.Coastal Plains	114.82	9	129.45	4
28.	(6.2)	Andhra Coastal Plains	125.67	5	118.17	7
29.	(6.3)	Orissa Coastal Plains	96.78	15	72.39	23
		India	100.00		100.00	

* Based on Table VII.9

down gradation resulting for the latter region. In the lower rung, there seems to be no appreciable change in the ranks, the entrant to the bottom - five being the Konkan Lowlands region.

Meso-regionwise, growth rates of per capita incomes indicate that out of the 29 regions there are 16 regions which register a negative annual compound growth rate during the period of the study. The highest positive growth rate is registered by the North Eastern Ranges region (7.16 per cent annually),¹¹ followed by the Punjab Plains (5.79 per cent), Rajasthan Plains (4.93 per cent) and Tamil Nadu Hills and Uplands (3.66 per cent). Maharashtra Deccan region is marked by a very high negative growth rate of -5.80 per cent per annum, followed by Orissa Coastal Plains. (-3.19 per cent) and Bihar Hills and Plateaus region (-2.77 per cent). This happens despite the fact, that the total agricultural output (in value terms, at 1970-73 prices) actually, declined in no more than 5 regions. Quite understandably, any marginal positive increases have been promptly neutralised by the steadily growing population and also, due to no appreciable changes in the

¹¹This happens because of the low base year (1962-65) figures for the region and high land/man ratio, coupled with developmental activities in the last decade.

share of rural population vis-a-vis the urban population composition of the country.

The detailed analysis of the natural divisions (micro-units) are provided in the Appendix-VII.B. This Table reveals the regional pattern of agricultural development and income distribution, since the beginning of the period of study. A brief account of the variant of distribution follows below. In 1962-65 the per capita incomes, divisionwise varies from as low as Rs.27.82 in Ladakh district of Jammu & Kashmir to as high as Rs.524.33 in the South-West Punjab Plains. A divisionwise frequency distribution indicates that out of the 82 divisions, 4 are in the lowest income class (less than Rs.100 per capita), 41 in the low category (Class II), 35 in the medium category (Class III) and only 2 divisions in the high income category, i.e. Class IV (Table-VII.6).¹² A look at the frequency distribution for 1970-73 period shows (Table-VII.7) that there is a shrinkage in the number of the medium group of divisions (from 35 to 25) by about 30 per cent¹³ and the divisions

¹²The frequency classes and intervals have been retained in the same manner as in the case of districtwise classifications, i.e. Class I = / Rs.100, Class II = Rs.100 - Rs.299, Class III = Rs.300 - Rs.499, Class IV = Rs.500 - Rs.699 and Class V = Rs.700 and above.

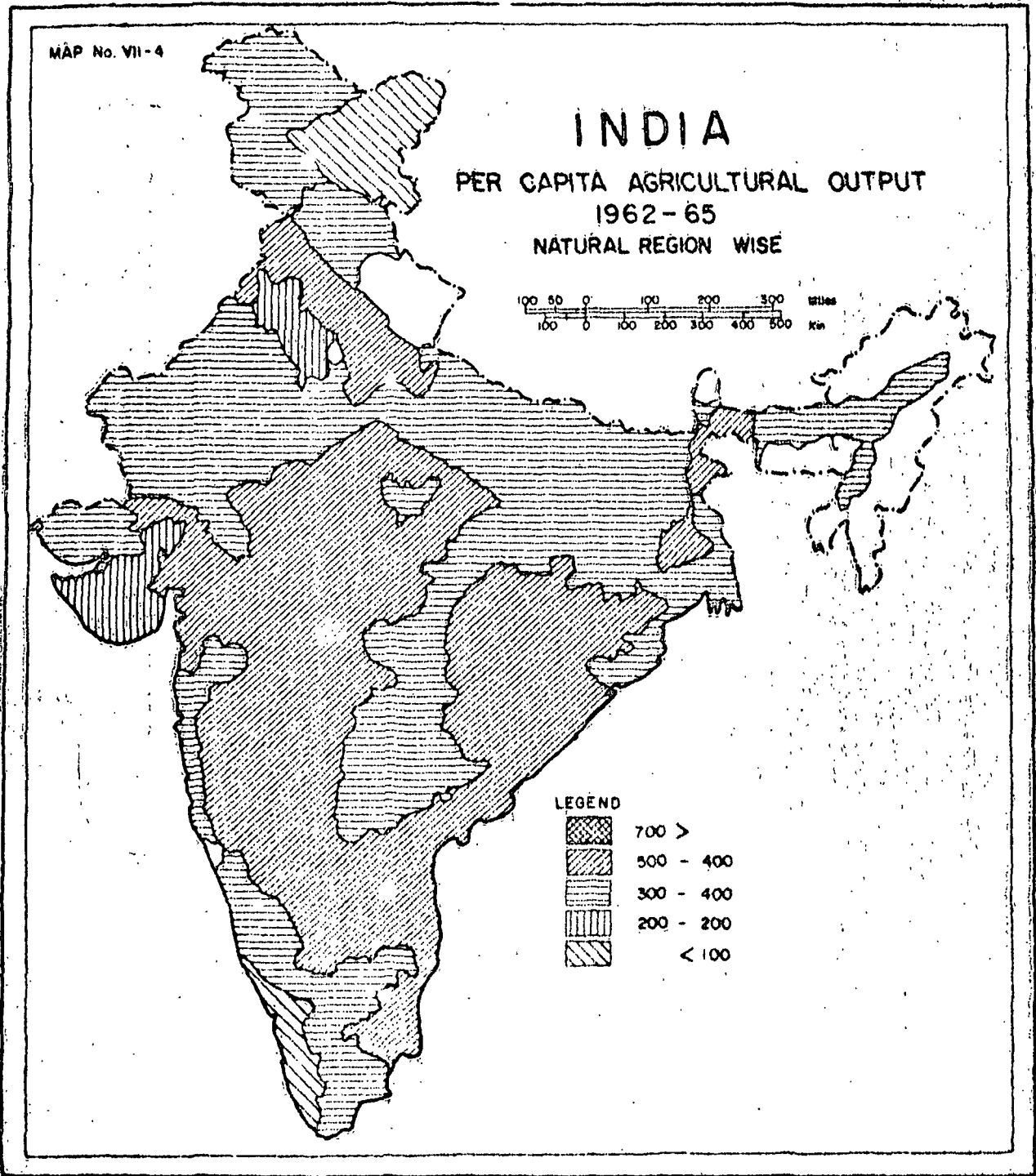
¹³This is almost double that of the rate of shrinkage of medium group of districts in 1970-73, as discussed earlier.

are distributed towards both the ends of distribution, the low category of divisions being boosted by 20 per cent (46 from 41), the high and very high income categories of divisions also, boosted to 6 regions from only 2. The three regions which emerge with a very high class of per capita income are the North Punjab Plains (Rs.795.74), South West Punjab Plains (Rs.743.68) and East Punjab Plains (Rs.744.54), remarkably enough, all of them are located in a contiguous belt within the meso-natural region of Punjab Plains.

A divisionwise map (Map-VII.4) indicates identical spatial pattern of the per capita agricultural incomes, as in the case of the earlier, three district-wise maps, except for a better resolution and clarity, due to changes in the level of aggregation on a higher order. In 1962-65, the high income regions are located in the Punjab Plains and the Kathiawar Peninsula.¹⁴ The Medium income category of divisions form the following regional patterns :

- (i) The areas in and around the core of the high income regions, i.e. to the north, east and south of the Punjab Plains;

¹⁴ In 1962-65 triennium, there is complete absence of any region in the very high income class (Rupees 700 and above).



- (ii) The Gujarat Plains, stretching into the Satpuras and Narmada Valley of Madhya Pradesh and northwards to the Malwa Plateau on the one hand and the south-east of Arravallis of Rajasthan on the other;
- (iii) The coastal areas stretching from the Orissa coast in the north east to the Thanjavur plains of Tamil Nadu in the extreme south;
- (iv) Smaller regions in the Rarh area of West-Bengal and in the Maharashtra-Karnataka transitional areas.

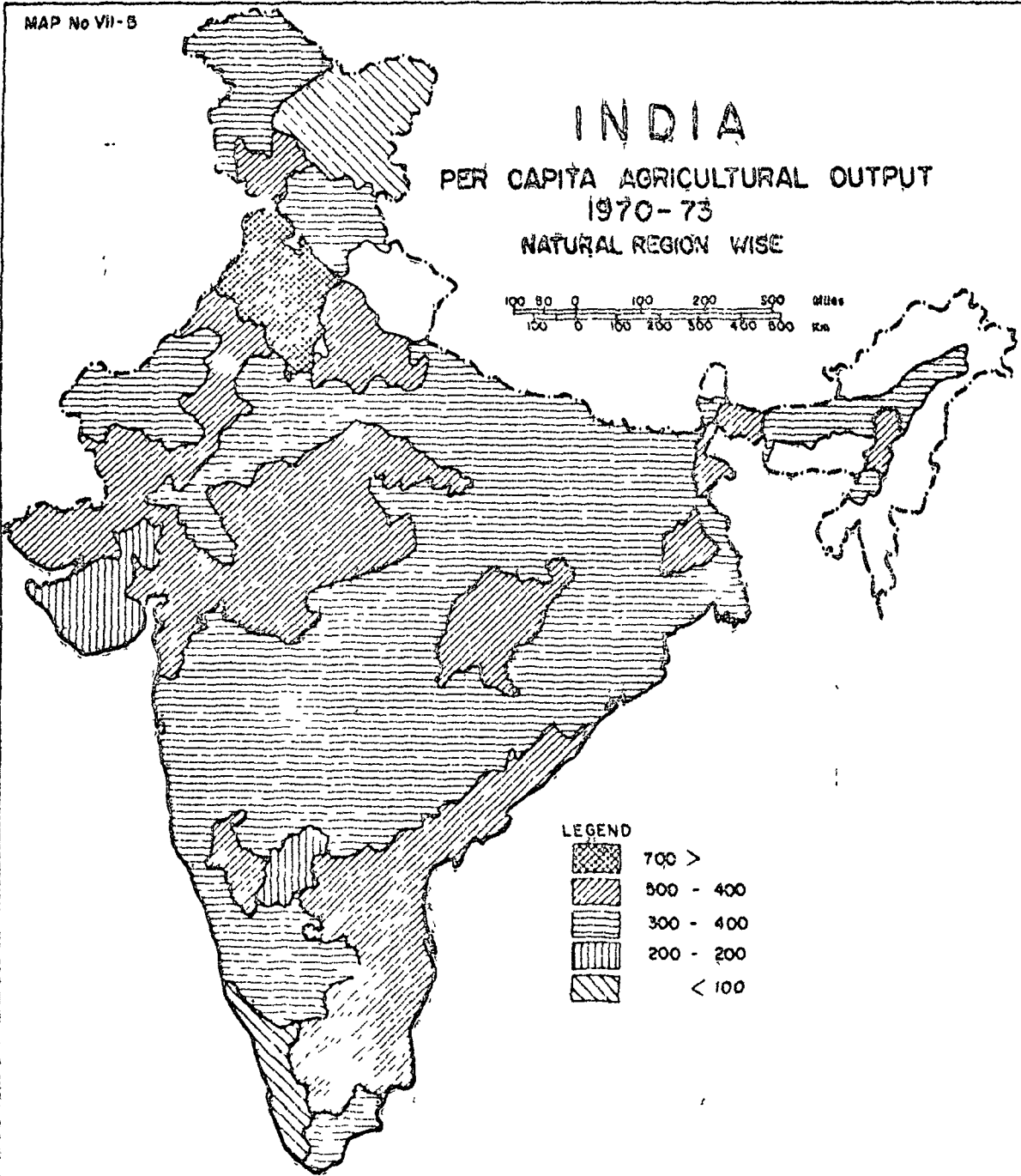
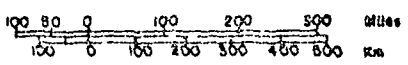
Rest of the large part of the country constitute of divisions either in the very low or low per capita income categories, i.e. the Uttar Pradesh Plains, the Bihar Plains, the Chottanagpur Plateau, the major part of Telengana region and many other isolated areal unit in Tamil Nadu, Karnataka, the Damodar Delta, the Ganga Delta, the Brahmaputra and the Surma valleys of Assam.

The pattern seems to have little changed in favour of the already low income regions (Map-VII.5), rather there has been a continued accentuation of the pattern of disparate regional distribution of income. The highest income regions are concentrated in the Punjab and Haryana Plains, surrounded by regions of extensions from the core area into high and medium income classes. There are other pockets of high income regions as in the Kathiawar plains and northern Karnataka. The medium class divisions

MAP No VII-B

INDIA

PER CAPITA AGRICULTURAL OUTPUT
1970-73
NATURAL REGION WISE



LEGEND

	700 >
	500 - 400
	300 - 400
	200 - 200
	< 100

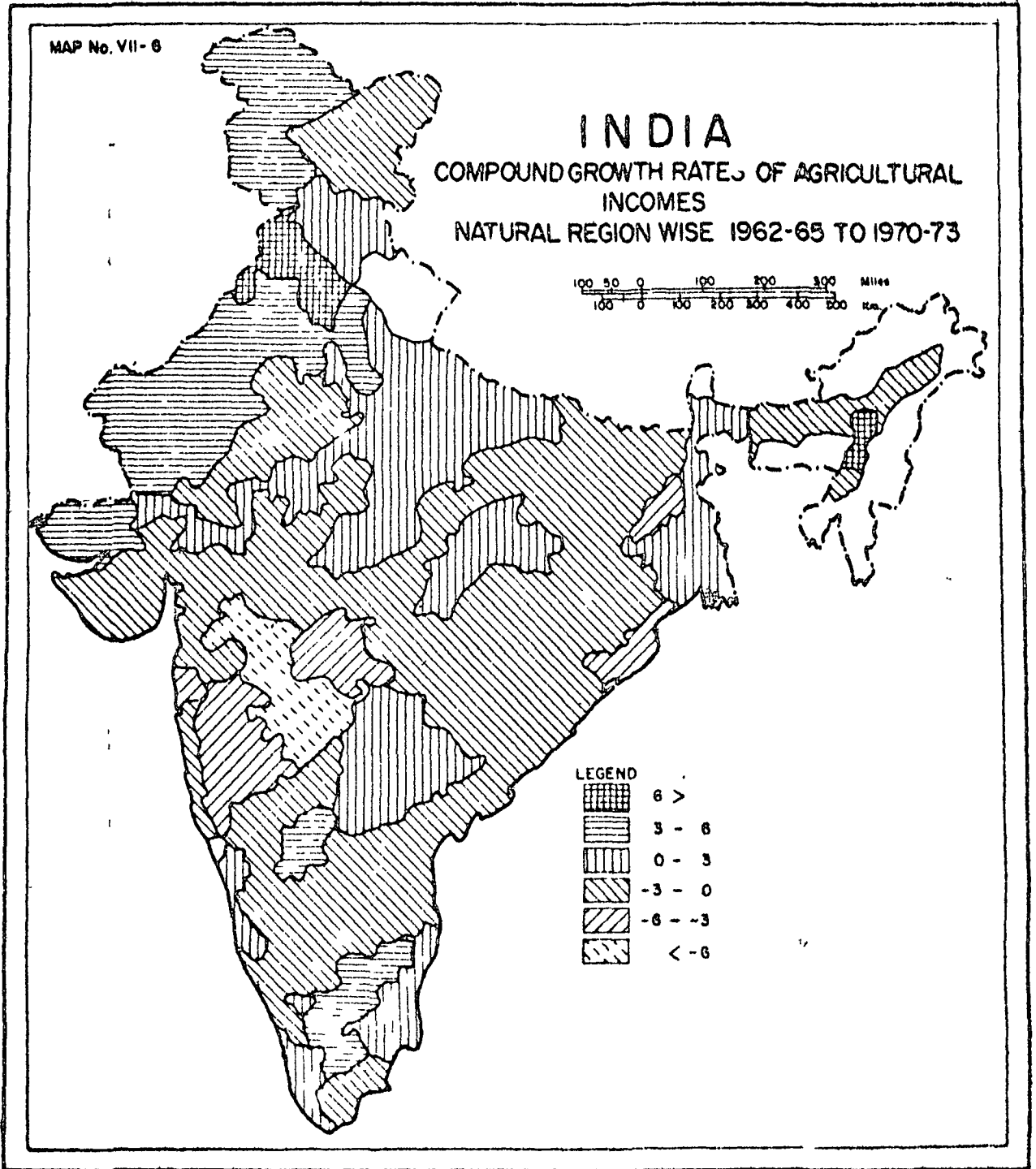
are also highly associated with the core areas of high development, i.e. the Ganga-Yamuna Doab, the Rohilakhand Plains, the Arravalli Annexie, stretching from Ganganagar in the north-west to the district Jalor in the southern Rajasthan, bordering on Gujarat and merging into the high income cores of the Kathiawar Peninsula. The other medium income divisions are the Central and north-western Madhya Pradesh, the coastal Andhra Pradesh stretching further south to Thanjavur, the northern Duars and Rarh of West Bengal and the Chhatishgarh region of Madhya Pradesh. The rest of the divisions of the country are categories in low and very low class of per capita incomes.

The regionwise growth rates of per capita incomes (Table-VII.8) shows that there are 3 regions (micro-units) with negative growth rates lower than -6 per cent per annum, 6 between -6 per cent and -3 per cent per annum. The divisions with either marginal rate of increase (0 to 3 per cent) or decrease (0 to -3 per cent) are 28 and 32 respectively. There are 13 divisions with significant positive growth rates (more than 3 per cent per annum) out of which 4 divisions register growth rates higher than 6 per cent or more per annum, of which three are located above in the plains

of Punjab. Significant negative growth rates are observed in the Marathwada region, the Vidarbha and in the southern Maharashtra in a clear belt and in the Rajmahal-Hazaribagh plateau region of Bihar (Map-VII.6). The rest of the country either register negative or positive growth rates only marginally. It is of interest to note that marginal to high negative growth rates of income are in areas of predominant rice cultivation (except for the Tamil Nadu coast), while marginal to high and very high positive growth rates are registered in areas of predominantly wheat cultivation or regions of transition from wheat to rice, the areas under that of the latter being continuously eroded in favouring the former.

Patterns of Regional Inequality:

Using districts as the smallest regional units of the study, unweighted (Vuw) and weighted (Vw) coefficients of variations have been estimated at four different levels of aggregation, in two segments, i.e. at the state level, at the country level, at the levels of natural divisions (82 units) and at the levels of natural regions (29 meso-units). In the following discussions a comparative picture of the two segments of inequality estimates have been analysed.



The unweighted variations (Table-VII.11) in 1962-65 period shows that they vary from the lowest of 0.1378 in the state of Assam to the highest of 0.7042 in the state of Jammu & Kashmir.¹⁵ Compared to this, the average inequality level for India as a whole¹⁶ was 0.3464 (or 34.64 per cent). The unweighted variations seem to have increased for the country as a whole, to 0.5205 at an annual compound growth rate of 5.21 per cent over the average eight year period. Out of the sixteen states,¹⁷ only 4 states, namely Haryana, Gujarat, Punjab and Madhya Pradesh, have registered a decline in the levels of inequality.

Since, weighted coefficient of variations are always a better measure of inequality, it is emphasized in the analysis with more care. The weighted coefficients (vw) in 1962-65 vary from 0.1308 in Assam to 0.4035 in Kerala, 0.3965 in Haryana and 0.3943 in Rajasthan (Table-VII.12).¹⁸ In 1970-73 the weighted variations

¹⁵This is because of the very small value for the district of Ladakh.

¹⁶This is estimated, between the states, compared to the values for the states, which have been estimated at the levels of the districts.

¹⁷For Himachal Pradesh the coefficient of variation could not be estimated because of aggregation of all the districts into only one regional unit.

¹⁸It can be observed that the vw for Jammu & Kashmir comes down drastically, because of the low population weight of Ladakh.

Table -VII.11
Unweighted Coefficient of Variations
of Per capita Agricultural Out-put
(1962-65 and 1970-73)*

Sl. No.	States	1962-65	1970-73	% ACGR
	(1)	(2)	(3)	(4)
1.	Andhra Pradesh	0.3280	0.3828	1.98
2.	Assam	0.1378	0.1856	3.79
3.	Bihar	0.2496	0.3029	2.45
4.	Gujarat	0.3913	0.3512	-1.34
5.	Haryana	0.4614	0.3477	-3.47
6.	Himachal Pradesh	-	-	-
7.	Jammu & Kashmir	0.7042	0.7843	1.36
8.	Karnataka	0.3003	0.4538	5.30
9.	Kerala	0.4229	0.4345	0.34
10.	Madhya Pradesh	0.3217	0.2385	-3.67
11.	Maharashtra	0.02202	0.2664	2.41
12.	Orissa	0.1959	0.2413	2.64
13.	Punjab	0.3728	0.3369	-1.48
14.	Rajasthan	0.4446	0.5279	2.17
15.	Tamil Nadu	0.4223	0.4415	0.56
16.	Uttar Pradesh	0.3412	0.4015	2.06
17.	West Bengal	0.3553	0.3699	0.50
	India	0.3464	0.5205	5.21
		0.3543	0.3792	0.85 **

* Based on Appendix - VII.A

** Average intra-regional inequality

Table -VII.12

Weighted Coefficient of Variations
of Per Capita Agricultural Out-put
(1962-65 and 1970-73)*

Sl. No.	States	Vw 1962-65	Vw 1970-73	% ACGR
	(1)	(2)	(3)	(4)
1.	Andhra Pradesh	0.2692	0.3086	1.72
2.	Assam	0.1308	0.2019	5.61
3.	Bihar	0.2616	0.3075	2.04
4.	Gujarat	0.3577	0.2978	-2.35
5.	Haryana	0.3965	0.3132	-2.90
6.	Himachal Pradesh	-	-	-
7.	Jammu & Kashmir	0.1580	0.2105	3.65
8.	Karnataka	0.2806	0.3440	2.58
9.	Kerala	0.4035	0.4268	0.70
10.	Madhya Pradesh	0.2304	0.2354	0.27
11.	Maharashtra	0.2367	0.2742	1.86
12.	Orissa	0.1775	0.2238	2.94
13.	Punjab	0.3585	0.3042	-2.03
14.	Rajasthan	0.3943	0.4816	2.53
15.	Tamil Nadu	0.2390	0.3021	2.97
16.	Uttar Pradesh	0.3258	0.3782	1.88
17.	West Bengal	0.2902	0.4061	4.29
	India	0.2945	0.3910	3.61**
		0.2819	0.3135	1.34

* Based on Appendix VII-A

** Average intra-regional inequality

range from 0.2019 for Assam to 0.4816 in Rajasthan. This is in comparison to the estimated values for the country (between states) which increases from 0.2945 in 1962-65 to 0.3910 in 1970-73, growing at a rate of 3.61 per cent per annum. It may be noted that there are only three states (Assam, Jammu & Kashmir and West Bengal) where the intra-state inequality has grown at a rate, higher than the rate of inter-state inequality. In general, the intra-state inequality has grown positively in majority of the states (13 out of 16 states). The three states, which register a decline in the intra-state levels of inequality in terms of per capita agricultural incomes are Haryana (-2.90 per cent), Gujarat (-2.35 per cent) and Punjab (-2.03 per cent). Significantly enough, they happen to be those few states where the Green Revolution had an appreciable impact.

A study of the natural regionwise (meso-regions) levels of inequality, reveals that the unweighted variations range from 0.0037 in the Malwa region to 0.8197 in Tamil Nadu. Hills and Uplands, in 1962-65 (Table-VII.13), compared to the intra-regional variation of 0.2036. In 1970-73 the intra-regional variations range from 0.0286 in Orissa Coastal Plains to 0.8515 in Tamil Nadu Hills

Table - VII.13

Natural Region-wise Unweighted
Coefficient of Variations of
Per Capita Agricultural Out-put
(1962-65 and 1970-73) *

Sl. No.	Codes	Region	1962-65	1970-73	%ACGR
	(1)	(2)	(3)	(4)	(5)
1.	(1.1)	Wn.Himalayas	0.4798	0.5402	1.49
2.	(1.2)	En. Himalayas	-	-	-
3.	(1.3)	N-En. Ranges	-	-	-
4.	(2.1)	Rajasthan Plains	0.3782	0.3538	-0.83
5.	(2.2)	Punjab Plains	0.1140	0.0595	-7.81
6.	(2.3)	U.P. Plains	0.2554	0.3357	3.48
7.	(2.4)	Bihar Plains	0.1495	0.1543	0.40
8.	(2.5)	W. B. Plains	0.1898	0.2052	0.98
9.	(2.6)	Assam Valley	0.0798	0.884	1.29
10.	(3.1)	Rajasthan Hills and Plateaus	0.1352	0.2778	9.42
11.	(3.2)	Bundelkhand	0.1494	0.1378	-1.01
12.	(3.3)	Malwa	0.0037	0.1045	51.83
13.	(3.4)	Vindhyan Ranges and Plateaus	0.1287	0.1856	4.68
14.	(3.5)	Cn. Madhya Pradesh	0.2272	0.1942	-1.94
15.	(3.6)	Orissa Hills and Plateaus	0.0275	0.0478	7.15
16.	(3.7)	Sn.Bihar Hills and Plateaus	0.2171	0.2610	2.33
17.	(3.8)	W.B. Uplands	0.1880	0.1722	-1.09
18.	(4.1)	Maharashtra Deccan	0.1671	0.1545	-0.98
19.	(4.2)	Andhra Deccan	0.1193	0.0541	-9.41
20.	(4.3)	Mysore Deccan	0.1425	0.3092	10.17
21.	(4.4)	T. N. Hills and Uplands	0.8197	0.8515	0.48
22.	(5.1)	Kutch & Kathiawar	0.3031	0.1999	-5.07
23.	(5.2)	Gujarat Plains and Dangs	0.3540	0.5689	6.11
24.	(5.3)	Konkan Coastal Lowland	0.1403	0.2687	8.46
25.	(5.4)	Konkan-Kerala Transition	0.0942	0.1181	2.87
26.	(5.5)	Kerala Coastal Plains & Ghats	0.0433	0.1080	12.10
27.	(6.1)	T.N. Coastal Plains	0.3464	0.3857	1.35
28.	(6.2)	Andhra Coastal Plains	0.2225	0.2263	0.04
29.	(6.3)	Orissa Coastal Plains	0.0219	0.0286	3.39
		India	0.3367	0.4210	2.83
			0.2036	0.2367	1.90 **

* Based on Appendix-VII.B

** Average intra-regional inequality

Table -VII.14

Natural Region-wise Weighted Coefficient
of Variations of Per Capita Agricultural
Out-put (1962-65 and 1970-73) *

Sl.No.	Codes	Regions	1962-65	1970-73	% AGR
	(1)	(2)	(3)	(4)	(5)
1.	(1.1)	Wn.Himalayas	0.2973	0.3402	1.70
2.	(1.2)	En. Himalayas	-	-	-
3.	(1.3)	N-En. Ranges	-	-	-
4.	(2.1)	Rajasthan Plains	0.3782	0.3538	-0.83
5.	(2.2)	Punjab Plains	0.1146	0.0529	-9.21
6.	(2.3)	U. P. Plains	0.2359	0.3131	3.60
7.	(2.4)	Bihar Plains	0.1495	0.1543	0.40
8.	(2.5)	W.B. Plains	0.1877	0.2041	1.05
9.	(2.6)	Assam Valleys	0.0798	0.0884	1.29
10.	(3.1)	Rajasthan Hills and Plateaus	0.1343	0.3103	11.04
11.	(3.2)	Bundelkhand	0.1280	0.1399	1.12
12.	(3.3)	Malwa	0.0037	0.1045	51.83
13.	(3.4)	Vindhyan Ranges and Plateaus	0.1188	0.1915	6.15
14.	(3.5)	Cn. Madhya Pradesh	0.2243	0.1934	-1.84
15.	(3.6)	Orissa Hills and Plateaus	0.0275	0.0478	7.15
16.	(3.7)	Sn.Bihar Hills and Plateaus	0.1972	0.2572	3.38
17.	(3.8)	W. B. Uplands	0.1880	0.1722	-1.09
18.	(4.1)	Maharashtra Deccan	0.1438	0.1547	0.92
19.	(4.2)	Andhra Deccan	0.1193	0.0541	-9.41
20.	(4.3)	Mysore Deccan	0.1366	0.2622	8.49
21.	(4.4)	T. N. Hills and Uplands	0.8197	0.8515	0.48
22.	(5.1)	Kutch & Kathiawar	0.3464	0.2376	-4.60
23.	(5.2)	Gujarat Plains and Dangs	0.3540	0.5689	6.11
24.	(5.3)	Konkan Coastal Lowland	0.1403	0.2687	8.46
25.	(5.4)	Konkan-Kerala Transition	0.0942	0.1181	2.87
26.	(5.5)	Kerala Coastal Plains & Ghats	0.0433	0.1080	12.10
27.	(6.1)	T.N. Coastal Plains	0.3548	0.4423	2.79
28.	(6.2)	Andhra Coastal Plains	0.2274	0.2354	0.43
29.	(6.3)	Orissa Coastal Plains	0.0219	0.0286	3.39
		India	0.2999	0.4157	4.17**
			0.1951	0.2316	2.17

* Based on Appendix VII.B

** Average intra-regional inequality

and Upland region, compared to the average inter-regional variation of 0.2367.¹⁹ It may also be noted that out of 26 natural regions (for which the values could be estimated), only in 8 regions the levels of unweighted inequality has declined, headed by Andhra Deccan (-9.41 per cent) and Punjab Plains (-7.81 per cent).

In case of the weighted inequality measure (Ww), it varies from as low as 0.0037 in Malwa to 0.8197 in the Tamil Nadu Hills and Upland region (same as the unweighted variations), in comparison to the level of inter-regional inequality of 0.2999, which in turn, has increased at the rate of 4.17 per cent per annum to 0.4157 in 1970-73. One would notice that in the case of 6 regions out of 26 regions (Rajasthan Plains, Punjab Plains, Central Madhya Pradesh, West Bengal Uplands, Andhra Deccan and Tamil Nadu Hills and Uplands) register a negative rate of change of intra-regional variations. Out of the rest of the 20 regions with positive growth in intra-regional variations, only 8 regions have a higher rate of growth compared to that of the national average (growth rate of inter-regional inequality). In other words, intra-regional inequality has

¹⁹Intra-regional variations signify the variations within a natural region (or between divisions), while inter-regional variation signify the V_{uw}/V_w between the natural regions at the aggregate level.

grown either slowly or negatively in case of 18 out of the 26 regions (roughly, 70 per cent) compared to the growth of inter-regional levels of inequality in terms of per capita agricultural output (income) in India. It may also, be noted that significant decline of intra-regional inequality has occurred in those regions (natural regions) where a significant impact of the agricultural development of the early seventies was felt, vindicating the position outlined earlier.

Findings :

+From the above analysis and discussions some very interesting conclusions can be drawn, which are summarised below :

- a) Firstly, it seems, contrary to claims, that there actually has been no appreciable increase in the agricultural sector in the Indian economy between the period just prior to the Green Revolution and in the early part of it, if the impact is considered in terms of per capita benefits in the regional perspective.
- b) Secondly, whether considered at the levels of states, districts or natural regions, it seems that the impact of the so called Green Revolution has been vastly uneven. In fact, only in certain pockets appreciable positive growth rates have been achieved, in a concentrated manner, while major parts of the country register a net decline in the per capita output in agriculture, between 1962-65 and 1970-73.

- c) Thirdly, from the analysis of the levels of regional inequalities, both intra-regionally (whether within states or natural regions) and inter-regionally, it seems that in majority of the cases the intra-regional inequalities have increased positively. Significantly enough, the intra-regional inequalities have however, increased at a relatively slower rate as compared to the rate of growth of inter-regional levels of inequality.
- d) Lastly, the analysis also reveals that the levels of intra-regional inequality have come down in the cases of states or natural regions, where the per capita agricultural incomes have remained at a very high level in the base year (1962-65) and where (on top of that), a very high rate of growth of agricultural income has been registered. In other words, intra-regional inequalities have declined in the states or regions, where more or less Green Revolution had some semblance of success. It may be further added that while the Green Revolution has led to the decline in the levels of intra-regional inequalities of per capita incomes at the micro-level, it has furthered the distance between the meso-order regions, in the sense that it has been instrumental in boosting the levels of inter-regional inequality, i.e. the rich regions have become richer and the poor regions have remained poorer.

Then this may lead to a question, that while the rich agricultural regions like Punjab, Haryana and Gujarat

have been successful in bringing down the intra-regional levels of inequality, are they responsible in the increases of the levels of inter-regional inequality? The subsequent chapters are likely to provide some answers to the problem raised in the present chapter.

GROWTH OF REGIONAL INEQUALITY : AN
AGRICULTURE ORIENTED HYPOTHESIS*

In the preceding three chapters a number of positions have been arrived at and a number of questions have been raised, which need explanations. In the current chapter, an attempt has been made to answer some of those questions, both from theoretical as well as from empirical point of view.

It has been shown that the growth of regional inequality in terms of per capita agricultural incomes has been particularly sharp in the early seventies, compared to the sixties. This coincides with an important event in the Indian economy, as the beginning of the so-called Green Revolution. On the other hand, it has been demonstrated that the inequalities within regions (whether states or natural regions) have grown slowly as compared to the coefficient of variations between the regions. Moreover, the levels of regional inequality has been reduced in the states of Punjab, Haryana and Gujarat

*A.C. Mohapatra (1978), "Some Aspects of Green Revolution and Concentration of Crop Output : Region-wise, Cropwise, Pricewise and Classwise", NEER, Vd.2 No.3, pp.194-202.

which have undergone substantial transformations during the Green Revolution period. Reduction in the levels of intra-regional inequality of agricultural incomes in these states need definite explanations.

The first part of the present chapter is devoted to the growth of regional inequality and 'divergence' of regions in India, to the analytical context of the 'back-wash effect' generated by the advanced agricultural regions of the country. In the second part, an attempt has been made to establish the 'modus operandi' of the process of concentration, related to the changing price structure of the agricultural products (particularly, some specific foodgrain items).

In the preceding chapters, it has been established that important strides in terms of per capita N.D.P. or per capita agricultural incomes have been made only in a few of the states and regions, while in the rest of the regions the economy has remained, more or less, stagnant. It can be mentioned that the states or regions of medium economic development are traditionally agricultural in nature and historically speaking, were even backward agriculturally. On the other hand, the traditionally advanced states like Maharashtra, West Bengal and Tamil Nadu (except, Gujarat) have remained stagnant, during the

period of study. In fact, there has been an overall decline in the levels of per capita agricultural output in the states of Maharashtra and West Bengal and marginal increases in case of Tamil Nadu.

In a study of the foodgrains output for the last two decades of the fifties and the sixties (particularly, between pre-1964-65 and post-1964-65 periods) Bansil¹ asserts that there has been a higher growth rate of output in the pre-1964-65 period compared to the post-1964-65 period, i.e. the growth rates being 3.5 per cent and 3.0 per cent respectively. The rate of foodgrain output in the latter period is marked by a phenomenal increase in the output of a single crop, i.e. wheat (14 per cent compared to 4 per cent in the preceding decade). Output of crops like pulses, cotton and jute have been actually, steadily declining in absolute terms during the post-1964-65 period by -0.94 per cent, -3.17 per cent and -1.96 per cent per annum, respectively. This growth in foodgrains production reached a peak of 111 million tonnes in 1971-72 and again a peak of 135 million tonnes in 1977-78. Large part of this increase has been accounted for by mainly four states of Punjab, Haryana, Uttar Pradesh and Rajasthan the former three accounting for as much as 56 per cent

¹P.C. Bansil (1972), pp.104-117.

of the additional output and thereby more than doubling the foodgrains output (in case of the former two states).² These increases are agreed to be not because of the net increases in area under specific food crops (as happened during the decade of the fifties), but due to increases in yield, transfer of area from inferior crops to superior foodgrains and changes in the intensity of farming.³

Contrary to this, the rest of the major states, i.e. Andhra Pradesh, Madhya Pradesh, Maharashtra, Bihar, Orissa and Assam, sharing nearly 48 per cent of the net sown area had a very insignificant growth rate of foodgrains output, by only 0.2 per cent per annum, during the six years after 1964-65.⁴ A clear distinction must be made between the group of former states which are predominantly wheat producing and the group of the latter states which are mainly rice producing. In a later study, Patnaik supports the above position.⁵ In his study Patnaik finds that the compound growth rates of output of wheat and rice crops between the decade preceding 1964-65 and there after to 1970-71 have been 1.1 per cent, 11.7 per cent and 3.9 and 3.0 per cent, respectively.

²Bansilal, Op.cit., p.108.

³Ibid., p.109.

⁴Ibid., p.115.

⁵P.K. Patnaik (1975), pp.22-42.

Deducting the net gains of the growth of output in terms of area, leaves the rate of growth of output of wheat somewhere, around 6.5 per cent per annum. This is in view of the fact, that there has been deceleration of growth rates of rice crop, as well as all crops from 3.9 to 3 per cent and from 3 to 2.3 per cent respectively (Table-VIII.1). This may lead one to hypothesise that a cropwise concentration of output has been evident during the Green Revolution period (post-1964-65).

A look at the statewise break up of growth rates of crop output highlights some interesting points (Table-VIII.2). Compared to the fifties, almost all the states of the country except Punjab (including Haryana) Rajasthan and West Bengal (the latter two only marginally) there has been a marked decelerations in the rates of growth of agricultural output in the sixties. Compared to all crops, foodgrains output has especially suffered a set-back. Roughly, one could make association between areas, which have specialised in wheat crop, observing a boom situation and areas predominantly devoted to rice crops suffering from acute recessionary conditions. Atleast, in case of about half a dozen states the growth rate of output of foodgrains have been well below that of the growth of population. This also, indicates a

TABLE-VIII.1

Growth Rates of Crop Output and Area
(1952-55 to 1970-71)*

Sl. No.	Crops	in percentage							
		Output		Area		Output		Area	
		1954-55 to 1964-65	1964-65 to 1970-71	1954-55 to 1964-65	1964-65 to 1970-71	1952-55 to 1959-62	1959-62 to 1969-72	1952-55 to 1959-62	1959-62 to 1969-72
1	2	3	4	5	6	7	8	9	
1.	Rice	3.9	1.1	1.6	0.5	3.4	2.1	1.5	0.9
2.	Wheat	3.0	11.7	1.8	5.2	4.2	7.7	3.3	3.0
3.	Pulses	0.7	-0.8	0.8	-0.9	1.5	0.5	2.1	-0.8
4.	All foodgrains	2.7	3.0	0.9	0.9	2.7	2.7	1.3	0.6
5.	All non-foodgrains	3.9	0.8	2.0	-0.3	4.2	2.3	2.6	0.7
6.	All crops	3.0	2.3	1.0	0.6	3.0	2.5	1.5	0.7

Source: P K Patnaik (1975), op.cit.

growing situation of regional deficits in terms of foodgrains requirements.

In a comparatively recent study, Krishnaji⁶ has shown that the new agricultural strategy of the HYV packages, in areas of assured irrigational facilities have a built in bias to accentuate inequality of output and productivity per capita, inter-regionally. This is an argument first putforth by Frankel⁷ about the Intensive Agriculture District Programme (IADP). This position is also, supported by the conclusions, already arrived at in Chapter-VII of this study. Rao has indicated the nature of class bias of the agrarian technology⁸. Although, his period of study does not provide for adequate explanation for the Green Revolution, his structure of analysis has definite bearings on the problem, albeit in a theoretical context. The basic logic has been that the few pockets, particularly, the North and North-West India which have witnessed a rapid development in agriculture, happen to be areas which first benefitted from the British Irrigation Policies in the early part of the century.⁹ Immediately after independence the public

⁶N. Krishnaji (1975), pp.1377-85.

⁷F.R. Frankel (1971), India's Green Revolution, Economic Gains and Political Cost, Oxford University Press, Bombay.

⁸S.K. Rao (1971), pp.1333-46.

⁹A.K. Bagchi (1972), pp. 93-116.

TABLE-VIII.2
Statewise Growth Rates of Crops
(1952-55 to 1969-72)

Sl. No.	States	1952-55 to 1959-62		1959-62 to 1969-72	
		All Crops	Foodgrains	All Crops	Foodgrains
	1	2	3	4	5
1.	Andhra Pradesh	2.2	3.1	1.4	1.1
2.	Assam	1.2	0.6	2.7	1.3
3.	Bihar	2.7	2.7	1.3	1.1
4.	Gujarat	3.9	-0.2	3.4	7.4
5.	Karnataka	3.6	3.1	1.9	2.9
6.	Kerala	2.7	4.4	1.4	1.8
7.	Madhya Pradesh	3.2	3.2	0.7	1.6
8.	Maharashtra	3.2	3.5	0.0	-1.2
9.	Orissa	1.5	1.6	3.1	1.0
10.	Punjab**	4.6	3.7	7.2	8.0
11.	Rajasthan	3.4	2.8	6.8	3.4
12.	Tamil Nadu	4.9	4.7	1.8	2.5
13.	Uttar Pradesh	1.6	1.3	2.8	2.8
14.	West Bengal	1.1	0.3	2.3	3.8

Source: S.K. Rao and P.K. Patnaik (1974), op.cit.

*Includes Haryana.

policy, which one has reasons to believe, favoured the rich repatriated farmers from the western Punjab (now, part of Pakistan) in easy land-leasing policy in the newly opened canal colonies that led a strong basis of availability of capital to invest in a process of rapid 'capital deepening' in this region. It is also, shown that the proportion of rich holdings to total holdings in the area of discussion has been substantially higher, laying the foundation for capitalist development in agriculture (Table-VIII.3). The average size of holdings in these areas are much more, i.e. Gujarat 11.98 acres, Punjab 11.17 acres, Rajasthan 13.79 acres, Maharashtra 13.06 acres and Madhya Pradesh 10.01 acres, compared to the all India average of 6.65 acres. On the other hand, the proportion of rich farmers (rural assets more than Rs.10,000/- in 1961-62) happens to be much more in these area, viz. Punjab 45.4 per cent, Gujarat 27.5 per cent, Karnataka 20.9 per cent and Andhra Pradesh 19.8 per cent, compared to all India average of only 6.1 per cent. Since this information pertains to 1961-62, it provides a base for the rich famers to build a still better foundation for investments in agriculture during the period of Green Revolution. The higher share of rich farmers also, provides a basis for a higher capacity to organise and

TABLE-VIII.3

Concentration of Land Holdings and Rich Farmers
in Early Sixties

Sl. No.	States	in percentage	
		Average size and holding 1950-60	Share of cultivators with assets more than Rs.10,000/- 1961-62
	1	2	3
1.	Andhra Pradesh	6.64	19.80
2.	Assam	4.13	6.10
3.	Gujarat	11.98	27.50
4.	Bihar	3.99	17.60
5.	Karnataka	9.65	20.90
6.	Kerala	1.96	15.30
7.	Madhya Pradesh	10.01	10.70
8.	Maharashtra	13.06	20.50
9.	Orissa	4.61	8.40
10.	Punjab*	11.17	45.40
11.	Rajasthan	13.79	14.90
12.	Tamil Nadu	3.89	18.90
13.	Uttar Pradesh	4.60	15.50
14.	West Bengal	3.88	12.80
	ALL INDIA	6.65	6.10

Source: Reserve Bank, Survey of Rural Assets, 1961-62, Bombay.

* Includes Haryana.

maintain a 'bargain power', so far agricultural prices are concerned.¹⁰

It is important to visualise that after all, industrial expansion (and therefore, development) requires the agricultural sector to generate a higher surplus to be traded with the industrial sector, so that the expanding army of non-agricultural workers can be sustained (in terms of 'wage funds'). On the other hand, the expanding agricultural sector which generates a growing proportion of its output to trade with non-agricultural activities, also goes on getting an expanding share of the trade for reinvestment, in a classical analytical framework. Naturally, this brings in the question of size distribution¹¹ of the additional earnings. This in turn takes one to the problem of so as to, which class of farmers generate a higher share of the marketable surplus in agriculture (Table-VIII.4).¹²

In an interesting study Dharam Narain¹³ (on, 1950-51 data) established that the 'marketed surplus' from holding of the size of 0 to 10 acres is about 41.3 per cent

¹⁰A. Mitra (1975), pp.3-21.

¹¹Size distribution in terms of the problem of income distribution in the society. See, J.Pen, Op.cit.,

¹²U. Patnaik (1973), pp. 55-68.

¹³Dharam Narain (1961), Distribution of Marketable Surplus of Agricultural Produce by Six Levels of Holdings in India: 1950-51, Asia Pub. House, New Delhi.

TABLE-VIII.4

Marketed Surplus and Size of Holding
(1950-51 and 1960-61)

Sl. No.	Size-Class	1950-51			1960-61			
		Output	M.S.*	Output	M.S.**	Output	M.S.	% of total holdings
	1	2	3	4	5	6	7	8
1.	0 - 5	20.7	24.9	15.6	11.0	27.15	11.08	57.94
2.	5 - 10	14.1	16.4	22.0	16.2	22.76	15.31	20.32
3.	10 - 15	9.7	5.1	34.8	14.6	27.93	10.63	8.93
4.	15 - 20	18.2	7.5	34.1	9.9	47.57	15.46	4.24
5.	20 - 25	20.4	5.0	40.0	7.4	40.12	7.04	2.56
6.	25 - 30	28.9	6.1	42.6	6.3	45.66	6.26	1.68
7.	30 - 40	29.9	7.5	49.4	9.5	51.44	16.65	2.88
8.	40 - 50	38.0	6.3	51.9	6.3			
9.	50 and above	44.8	21.2	56.2	18.8	61.87	17.54	1.45

Source: Dharam Narain, op.cit., and U. Patnaik (1973) op.cit.,

* Estimations of Dharam Narain

**Estimations of Dharam Narain adjusted.

of the total marketable surplus (in agriculture), while the share of the 10 to 50 acre holdings generate 37.5 per cent of the marketed surplus, and the holdings above 50 acres contributing only 21.2 per cent. One is inclined to note that the actual number of holdings above the size of 10 acres are less but, the share of land as well as the share of output could be considerably higher than the holdings of less than 10 acres. It is, therefore, thought that the surplus generated in the smaller holdings is proportionately much more. But this is contrary to the simple logic that the smaller holdings cannot be nutritionally self-sufficient. This only could mean distress sale or sale under duress or obligations.¹⁴ This situation (what Dharam Nairain says) cannot be true if, the market purchases of the smaller holdings are taken into consideration. The curve of net surplus of sizes may not, ultimately, slope backward. Figures provided by Patnaik are quite opposite to those given by Narain, that the first group of holdings (from 0 to 5 acres) generates only 11 per cent of surplus while 5 - 10 acres holding generating 16.2 per cent (27.2 per cent in 0 - 10 acres holdings), of the marketable surplus. In fact, there is no appreciable

¹⁴ U. Patnaik, Op.cit.,

difference of marketable surplus classwise, except the 50 acre and above size holdings, the share being only 18.8 per cent (while the share of output is as much as 56.2 per cent).

In a study, Raj Krishna¹⁵ argues that marketed surplus has no size bias of holdings and are directly proportional to the size of output (except for either the too rich states or the too poor ones). One has to be careful in choosing the frequencies of the size of holdings themselves, because they themselves provide a strong regional bias. One cannot be sure enough to suggest whether a ten acre holding in Bihar or Madhya Pradesh can be equated with a ten acre holding of Punjab or Haryana, the latter possessing capability to generate a much larger share of output for sale, while the former may be deficit in terms of food requirements. An average size of holding between 10 - 20 acres in Punjab, Haryana, Uttar Pradesh (western part), Rajasthan and Gujarat are expected to generate a much larger share of marketed surplus than the scanty and often faulty data base provides for.

Mellor suggested that the marketed surplus of agriculture has grown at a rate of 2.9 per cent per annum (upto 1964-65) while the output of agriculture grew at a

¹⁵ R. Krishna (1965), pp.132-139.

slightly lower rate of 2.71 per cent per annum, during the same period.¹⁶ This provides for a picture of the magnitude of the shrinkage in the consumption pattern of the smaller holdings (not to talk of the landless labourers and destitutes). With a constant propensity of consumption (or a little higher), in the above subsistence class of farmers and real farm wage rates falling¹⁷ it is unlikely that the marketed surplus may actually grow (a rate higher than that of crop output) leading to the tightening of belt of one class of people and the accentuating concentration of benefits in hands of the few rural rich.

The geographical concentration of crop output can only become significant, when the relative prices of different crops are considered and the relative price movements over time are analysed. Tamarajaskhi¹⁸ in an important study of the analyses of inter-sectoral terms of trade in the Indian economy argues that, while in the early fifties prices of non-foodgrains with respect to foodgrains was higher, in the later fifties through early sixties, it started favouring the agricultural

¹⁶J.W. Mellor (1972), pp.107-122.

¹⁷A.C. Mahapatra (1976), p101.

¹⁸R. Tamarajaskhi (1969), pp. A91-A102.

commodities. The index of prices of non-foodgrains remained at 132.4 (Table-VIII.5) compared to that of 132.2 for all crops while that of the foodgrains increased to 141.6. To mention, the weightage of foodgrains is substantial in all crops, compared to that of non-foodgrains.

Economic Survey¹⁹ of 1974-75 provides indices of prices of agricultural commodities from 1965-66 to 1973-74 at 1961-62 prices (Appendix-VII.A). Although, there are wide methodological differences between the study by Tamarajaskhi and the Economic Survey (the latter is an official document), it is important to consider the tendencies of relative price movements over time. Indices in the latter show that prices which started favouring the agricultural sector in the early sixties, persisted favouring through the whole of sixties and the early half of the seventies. It is during this period (early seventies) that the inflationary spiral seems to have taken firm grips over the Indian economy, particularly, those of the agricultural products. The relative prices of agricultural commodities vis-a-vis the manufactured goods moved from 142, 118 in 1965-66 to 354 and 255 in December, 1974, respectively. The

¹⁹Govt. of India (1975), Economic Survey, 1974-75, New Delhi.

TABLE-VIII.5
Composite Price Indices of Agricultural and
 Industrial Goods

Sl. No.	Years	1960-61 = 100					
		Intermediate goods		Final goods		All Commodities	
		P(A)*	P(NA)**	P(A)	P(NA)	P(A)	P(NA)
1	2	3	4	5	6	7	
1.	1951-52	99.1	81.7	75.6	96.5	95.4	94.8
2.	1952-53	74.9	85.7	87.0	82.9	82.5	83.2
3.	1953-54	82.7	84.5	89.4	83.6	86.9	83.7
4.	1954-55	76.5	82.6	80.3	81.1	78.9	81.3
5.	1955-56	70.9	82.9	93.2	77.2	73.8	77.9
6.	1956-57	83.2	87.6	87.6	83.4	86.0	83.9
7.	1957-58	83.8	91.6	90.9	89.1	88.0	89.4
8.	1958-59	84.0	94.2	97.9	90.8	92.7	91.2
9.	1959-60	89.6	97.0	99.6	93.9	95.9	94.3
10.	1960-61	100.0	100.0	100.0	100.0	100.0	100.0
11.	1961-62	98.6	102.8	101.5	99.3	100.4	99.7
12.	1962-63	96.4	107.2	105.3	102.3	102.4	102.9
13.	1963-64	101.4	111.9	112.5	111.1	108.3	111.2
14.	1964-65	117.5	117.6	132.4	116.6	126.8	116.7
15.	1965-66	132.4	125.4	141.6	120.1	132.2	120.7

Source: R. Tamarajaskhi, op.cit.

* P(A) = Prices received by agricultural sector from non-agricultural sector on account of the sales of the latter.

**P(NA) = Prices received by the non-agricultural sector from agricultural sector, on account of the sales of the latter.

impact of the price rises seems to have been more in the foodgrains sector (from 145 to 369), while the indices for finished manufactured products increased from 116 to 243 during the same period.

In a two sector model of the economy (of agriculture and industry), where agriculture produces 'wage good' (for subsistence) and industrial sector which produces capital goods (except for a small quantity for internal demand of each sector), there is an inter-sectoral trading relationship, each sector selling its surplus to the other. For a growing industrial sector it is increasingly demanded of the agricultural sector to generate more and more of wage goods if such an expansion has to take place. The relative prices would be determined by their trade coefficients and the nature of production functions. Since, real wages in the industrial sector will depend upon the prices of wage goods, any 'unequivalent exchange' in the trade between the two sectors would affect the other, especially, if, the prices of foodgrains move rapidly, i.e. growing demand for higher money wages will dampen the rate of profit, which in turn would depress the investment climate, leading to stagnation in the industrial sector. This in turn would affect the agricultural

sector.²⁰ Tamarajaskhi²¹ (Table-VIII.6) concludes in her study, that (i) throughout the period between 1951-52 to 1965-66 (corresponding to the first three national plans) inter-sectoral terms of trade (barter terms) favoured the agricultural sector (all crops); (ii) with a break up of final and intermediate goods, the terms of trade favoured the intermediate goods of industrial sector²² and consumption goods in the agricultural sector and (iii) export prices of agriculture grew at a rate of 3.14 per cent per annum while import prices grew at a rate of 2.62 per cent. This leaves a margin of trade balance of 0.51 per cent and coupled with a rate of marketed surplus of 2.9 per cent per annum provides a net gain of 3.41 per cent for the trade of agricultural sector with the industrial sector. In a comparatively recent study Chakravarty²³ provides for the position of inter-sectoral terms of trade in the post-1964-65 period (Table-VIII.7). The study indicates that without any annual fluctuation the barter terms of trade has stabilised at a much higher index level (125.7 in 1969-70, compared to 108.71 in 1964-65).

²⁰E. Preobrazhensky (1967), New Economics, Oxford, London. (This is a much later translation of the original text in Russian of the mid-20s.)

²¹R. Tamarajaskhi, op.cit.,

²²Weightage of farm products, like cotton, jute, sugar cane is very high in industrial intermediate goods.

²³S. Chakravarty (1974), pp.24-44.

TABLE-VIII.6
Indices Terms of Trade
 (1951-52 to 1964-65)

Sl. No.	Years	Net Barter / P(A)		P(NA)	Income*
		Inputs	Outputs	All	
	1	2	3	4	5
1.	1951-52	212.4	96.6	100.7	67.1
2.	1952-53	87.5	105.0	99.1	72.4
3.	1953-54	97.9	106.9	103.7	88.4
4.	1954-55	99.7	98.0	97.0	86.0
5.	1955-56	85.6	97.8	94.8	88.2
6.	1956-57	95.0	105.1	102.5	100.7
7.	1957-58	91.2	102.1	98.5	92.2
8.	1958-59	89.1	107.9	101.7	98.0
9.	1959-60	92.4	106.1	101.7	94.4
10.	1960-61	100.0	100.0	100.0	100.0
11.	1961-62	95.9	102.2	100.7	107.0
12.	1962-63	90.0	102.9	99.1	104.7
13.	1963-64	90.4	101.3	97.4	106.0
14.	1964-65	100.0	113.6	108.7	124.3

Source: R. Tamarajaskhi, Op.cit.

* The first three columns indicate barter terms of trade while the fourth indicates the income terms of trade.

Within the agricultural sector prices of selected commodities especially of the foodgrains have increased substantially. The case of wheat is remarkable in this respect (Appendix-VIII.A), although in the later part of sixties the prices indices of rice moved at a faster rate, but the marketed surplus of rice is comparatively lower than that of the wheat (especially, during the Green Revolution).²⁴ The essence of the problem seems to lie in the domestic pricing policy of agricultural commodities. The continuous revision of the domestic 'procurement' prices seems to have created a 'ratcheting' effect by which the market mechanism is broken, and a monopsonic peasant lobby has succeeded in keeping the prices at an artificially higher level.²⁵

On the other hand, the gradual shrinkage in imports of foodgrains throughout the seventies, highlighted by a clear regional diversity of one region being clearly surplus and the others clearly deficit accentuates a pattern of inter-regional trade in which the surplus regions (wheat regions) benefit more due to an increasing price ratio, favouring the latter.²⁶

²⁴The increase in the international prices of wheat from \$140 to \$550 in 1974, has also affected the internal price structure.

²⁵A Mitra (1979): Terms of Trade and Class Relations: An Essay in Political Economy, Rupa & Co, Calcutta.

²⁶1970-71; which happened to be a brighter year of wheat production was one of the worst years of rice production and with the import level at a meagre 0.45 million tonnes, the position supports the statement.

TABLE -VIII.7

Indices of Terms of Trade
(1964-65 to 1972-73)

1960-61=100

Sl. No.	Years	Index values*
1	2	
1.	1964-65	108.7
2.	1965-66	114.5
3.	1966-67	123.1
4.	1967-68	125.0
5.	1968-69	116.3
6.	1969-70	125.7
7.	1970-71	127.3
8.	1971-72	119.4
9.	1972-73	119.6

Source: S Chakravarty, op.cit.,

*Indices are for income terms of trade.

Findings :

From the above discussions some definite conclusions do emerge.

- a) Firstly, it seems that from end^{of} sixties to the early seventies a pattern/production in agriculture has taken place which is highly crop-specific i.e. the 'wheat boom'.
- b) Secondly, the pattern of wheat production (except for pockets of increases in rice, as in Thanjavur or Burdwan or cotton crop and ground-nuts in Kathiawar) has been highly region-specific (hitherto explained) i.e. the north-western plains of Punjab, Uttar Pradesh and Rajasthan.
- c) Thirdly, the phenomenal increases in crop output are in areas which are traditionally the citadel of an organised group of rich peasantry.
- d) Lastly, the relative prices during this period has explicitly, favoured crops grown in areas already outlined,²⁷ viz., prices of wheat, gram and fodder crops have grown sharply. The price scissors seem to have continued widening.

In the debates on the price scissors (the 'scissors crisis'⁰) in the Nineteen Twenties (Russia), the importance

²⁷One can point out the case of raw jute (a product of the rice-regions), the index of prices have changed only marginally, from 127 in 1965-66 to 149 in Dec. 1974.

of a favourable terms of trade for the industrial goods have been well argued for by Preobrazhensky.²⁸ The Russian experience is well called for (in context of India) particularly, with the swirling price spirals (and an ever strengthening 'kulak' lobby) in context of stagflation and stagnating conditions of industrialisation, if the country has to be retrieved from the situation.

²⁸For a better assessment See, A Mitra, Op.cit., pp.44-68.

INTRA-REGIONAL INEQUALITY : A CASE
STUDY OF THE STATE OF MADHYA PRADESH
(1960-61 to 1972-73)*

In the previous four chapters i.e. V to VIII, attempts have been made to analyse the process of regional inequality in its various spatial manifestation, i.e. (i) at the sectoral level, (ii) at the level of per capita incomes (statewise), (iii) in terms of inequality of per capita agricultural output (incomes) in a fairly disaggregated, micro-regional level (districts) and (iv) finally, in terms of some of the broad spatial indicators in explaining the process of regional inequality occurring in the Indian economy. Clearly, it calls for an indepth study of the process of economic and social development and the emerging levels of regional inequality at the level of a meso-region, in its intra-regional context. The state of Madhya Pradesh has been considered as a suitable case for such a special study.¹

*A part of this study has since been published jointly (Shri Prakash and A.C. Mohapatra) in 1980, titled "Economic Development in Madhya Pradesh, India: Study of Inter-temporal, Inter-regional variations," Third World Planning Review, Vol. 2, No.1, Spring, 1980, pp. 91-106.

¹The reasons for the choice of Madhya Pradesh has already been discussed in Chapter-IV of the present study.

The state of Madhya Pradesh is a vast territory (area: 4428 thousand square kilometres), centrally located with a large diversity of physical and cultural milieus. Its population according to the Census of 1981 is 52.13 million constituting 7.62 per cent of the total population of the country.² In the present chapter an attempt has been made to measure the levels of regional development of Madhya Pradesh (districtwise) on the basis of 14 indicators of socio-economic development (in lieu of per capita income), for a continuous period of twelve years, from 1960-61 to 1972-73 and the levels of inequality thereof, to test some of the hypotheses, already generated in the context of the process of intra-regional inequality.

As pointed out earlier, the poverty of people and the backwardness of the regions in which they live are more or less inseparable from each other. Social inequalities are reflected not only in inter-personal and inter-group differentials but also, in the inter-regional inequalities.³ On the other hand, despite planned efforts, (atleast upto the early seventies), the actual results of socio-economic developments in India have

²Census of India (1981), Provisional Population Tables, New Delhi.

³S. Prakash (1977a), pp.172-195.

fallen, far short of the planner's objectives and the people's aspirations. The view is widely held that the plan programmes have themselves been responsible for the widening of inter-regional and even intra-regional disparities in various socio-economic fields. Official sources have also, often lent support to such views; for example, it is considered that in some vital sectors of the economy, such as large scale manufacturing industry, intensive and localised development is inevitable.⁴ It has been observed that in terms of regional development there has been a natural tendency for new enterprises and investments to gravitate towards the already overcrowded metropolitan areas because those areas are better endowed with economic and social infrastructures. Not enough has been done to restrain this process.⁵

For the redressal of such a situation and for a purposeful study of regional levels of welfare and living a single indicator like the per capita income alone is not adequate enough. The data available for the evaluation of the levels of living of the people, living at the district level is inadequate and unreliable.⁶ Mitra⁷

⁴Govt. of India, Planning Commission (1960), The Third Five Year Plan, Directorate of Pub., New Delhi.

⁵Govt. of India, Planning Commission (1969), Fourth Five Year Plan, Directorate of Pub., New Delhi, p.11.

⁶NCAER, Op.cit., The data provided by NCAER is admittedly inadequate and inaccurate enough for any purposeful use.

⁷A. Mitra, op.cit.,

Dasgupta⁸ and Pal⁹ have demonstrated the advantages of a broader format of indicators and the use of multivariate technique in evaluating the regional levels of development. But the inadequacies of such studies lie in the limitations of their temporal use, since no definite conclusions can be drawn about the process of changing levels of living and inequalities over time.¹⁰ The present study attempts to use such multivariate techniques, using a format of 14 indicators of development of Madhya Pradesh with an added advantages of the analysis of time series, because the continuous nature of the data from 1960-61 to 1972-73.¹¹

By means of composite indices of development derived from the factor analysis (on the basis of 'principal components'),¹² this chapter attempts to analyse the intra-regional development differentials and the temporal changes therein, that has occurred in the state of Madhya Pradesh. Another advantage of the study is the theoretical context, the analysis is designed, for example, to test the new well known theory

⁸B. Dasgupta, op.cit.

⁹M.N. Pal (1975), op.cit.

¹⁰The studies mentioned are of cross-sectional nature but are fairly broad based and comprehensive.

¹¹Methodology is dealt in details in Chapter-IV.

¹²M.G. Kendall (1939), "The Geographical Distribution of Crop Productivity in England", JRSS, vol. 102, No.21, pp. 21-62.

of 'divergence - convergence'. For this reason the factor analysis is used both in aspatial as well as spatial manner to measure at one hand, the patterns of regional development in the sense of the socio-economic parameters used and on the other, to measure the pattern and changes in the levels of inequality of the regions (districts) over the twelve year period.

Out of the original fifteen indicators, fourteen have been grouped into two blocks, i.e. into a group of 'traditional sectors' (Block-A)¹³ and the group of 'modern sectors' (Block-B),¹⁴ on the basis of the positions of inter-group correlation coefficients. It may be mentioned that the inter-group correlations are strongly negative, while the intra-group (block) correlations are positive. Therefore, factor analysis and compositing all the 15 original variables could not be done at a time, because of the non-negativity¹⁵ constraint (Appendix-IX.A).¹⁶

The current chapter is broadly divided into three

¹³ Here, traditional means, sectors which have a passive role in the process of development, e.g. the land.

¹⁴ Here, modern means the sectors with embodied dynamism, e.g. industries or the infrastructures like irrigation and power.

¹⁵ A. Kundu (1974), pp.21-29.

¹⁶ Sri Prakash and Mohapatra, *op.cit.*, p.96.

The residual hence, communality is defined by,

$$x_i = \sum_j a_{ij} \lambda_j + t_i$$

where, x_i is the i^{th} variable, a_{ij} is the coefficient of the j^{th} factor, λ_j is the i^{th} roof and t is the error term.

sections, i.e. the first section dealing with the analysis of factors and factor loadings; the second dealing with the analysis of the districtwise indices of development and the third section deals with the levels of regional inequality and the pattern of temporal changes.

Eigen Roots and Factor Loadings:

Appendix-IX.D tabulates eigen roots and proportion of total variations explained by them and the factor loadings corresponding to the largest root. The highest root explains 37.46 per cent of variations and the highest four roots explain as much as 75 per cent of the total variations. In view of this the original data could be represented in terms of four factors only and loadings are therefore, estimated for those factors.

The results reveal that λ_1 is most heavily loaded on variables x_1 and x_2 , λ_2 is heavily loaded on variables x_3 , but is negatively loaded on x_1 , λ_3 is most heavily loaded on x_4 , while λ_4 does not show any heavy loading on any one of the fifteen variables. Accordingly, x_1 , x_2 , x_3 and x_4 are the most important variables for analysing the developmental levels. Incidentally, all the four variables relate to agriculture. This could be

justified in view of the fact that the economy of Madhya Pradesh in general and that of many of the districts in particular, are predominantly dependent on agriculture both in terms of the proportion of output produced and of labour force employed. Further, the agricultural sector has been the leading one in the economic development of the state, so much so that the economy has performed well during year in which agricultural development has been satisfactory and has tended to decline whenever agriculture has performed poorly.¹⁷

However, Madhya Pradesh is one of those states of the Indian Union where very heavy investments in the public sector has been made under the developmental programmes of the national Five Year Plans. In addition, manufacturing output, both in absolute and relative terms has been expanding slowly but steadily over the years and along with industrialization, substantial progress has been recorded in such areas as urbanisation, health, education and power generation. Therefore, the other variables have been retained for further analysis by splitting them into two separate blocks as discussed earlier.

Table-IX.1 tabulates the blockwise highest eigen

¹⁷ Shri Prakash and P. Rajan (1977b), pp.203-238.

TABLE-IX.1

Highest Eigen values and Percentage of Explained variations:Block-A and Block-B(1960-61 to 1972-73)*

Sl. No.	Years	Block-A		Block-B	
		Eigen roots	% of variations explained	Eigen roots	% of variation explained
	1	2	3	4	5
1.	1960-61	2.366	33.80	2.766	39.51
2.	1961-62	2.101	30.01	2.698	38.54
3.	1962-63	2.442	34.89	3.068	43.83
4.	1963-64	2.451	35.01	2.901	41.44
5.	1964-65	2.401	34.30	3.304	47.20
6.	1965-66	2.456	36.37	2.917	41.67
7.	1966-67	2.704	38.63	3.094	44.42
8.	1967-68	2.485	35.50	3.236	46.23
9.	1968-69	2.452	35.03	3.481	49.73
10.	1969-70	2.495	35.69	3.248	46.40
11.	1970-71	2.278	32.54	3.174	45.34
12.	1971-72	2.343	33.47	2.309	32.99
13.	1972-73	2.264	32.34	2.617	37.39

*Based on Appendices IX.E & IX.F.

roots (λ_1) and the percentages of variations explained by them.¹⁸ It seems that for Block-A (the traditional sectors) the highest eigen value ranges from 2.704 of 1966-67 to the lowest of 2.264 of 1972-73, explaining maximum of 38.63 per cent and 32.34 per cent of variations in the composite indices, respectively. From 1960-61, the values of highest eigen roots gradually, increase till 1966-67 and then, decrease towards 1972-73. The increase in the values of the highest roots seems to be because of improvement in the inter-correlations of variables within the block. On the other hand, for Block-B (modern sectors) the highest eigen roots increase from 2.766 in 1960-61 to 3.481 in 1968-69 and then decrease to the lowest of 2.309 in 1971-72, explaining percentages of variations in the composite index by 39.51, 49.73 and 32.99 per cent, respectively.

An analysis of Appendix-IX.E will show that the first sector (λ_1) of Block-A is most heavily loaded on x_{13} in all the twelve years. Actually, its loading on x_{13} is always greater than unity. The factor is also heavily loaded on x_{12} , but this is only half of its

¹⁸ Appendices IX.B & IX.C tabulate the blockwise correlation matrices, which has been used in estimating eigen roots, percentage of variations explained and factor loadings of the highest eigen roots in Appendices IX.D, IX.E and IX.F.

loading on x_{13} ; x_7 is only the other variable in which it shows heavy loadings in 3 years. Therefore, the first factor could be taken to represent the development of health facilities. The second factor is most heavily loaded on the variable x_{10} in 8 out of 13 years; the other variable being x_2 on which it shows heavy loadings in four years. By and large, this factor (λ_2) could be considered as a positive measure of employment opportunities in the economy. Factor three is a blend of variables, x_1 , x_2 and x_{13} in some years and x_{10} in others. Overall, this factor may represent the development of agricultural infrastructure. Moreover, the first three factors represent, as mentioned earlier, development of agricultural and infrastructure for other social service sectors.

In Block-B (Appendix-IX.F), the highest root is most heavily and consistently loaded on x_{14} . Actually, its loading on this variable is greater than unity in ten out of 13 years, but also there is heavy loadings on the other three years. This factor is also, heavily and consistently loaded on variable x_{11} , for which the loading is greater than unity in 6 years. The factor has a consistently high loadings on x_8 and x_9 in all the years. Thus, this factor may be said to represent, the 'dynamic

components' of development, e.g. industrialisation (x_8 & x_9), power (x_{11}) and education (x_{14}), the latter representing the education of the population about to be entering into the work force (14 - 16 years age group).

Factor two (λ_2) is highly loaded on variable x_4 (irrigation) in eight out of 13 years, but is also, heavily loaded on x_9 in four years and on x_{11} and x_{14} , in three years each. Overall, one is inclined to call it the factor of irrigation development, which is a very vital dynamic factor for agricultural development. Factor three (λ_3) is very heavily loaded on the variable x_5 in 6 out of 13 years and negative loadings in four other years. The other variables loaded by this factor are x_9 , x_{11} and x_{14} . By and large, this factor may be called the factor of agricultural productivity.

Thus, two factors of industrialisation, two factors of agricultural development, education and power are the main ingredients of development in Block-B. Only, one factor emerges as insignificant in this group of variables. Considering the results of both the blocks together, it is found that the development of medical facilities, employment, education, industries power and irrigation account for most of the intra-regional and inter-temporal variations in the levels of development in the state of Madhya Pradesh.

Levels of Regional Development:

Appendices IX.G and IX.H tabulated composite scores of development for both the blocks of indicators under the traditional sectors (Block-A) and the modern sectors (Block-B), respectively, from 1960-61 to 1972-73 for the period of 13 years (the actual interval being twelve years). In 1960-61, the districtwise indices for Block-A shows that the values vary from 1.22 in Jabalpur to 4.00 in Shajapur, with the average score for the state of Madhya Pradesh being 2.42. It may be noted that since, the indices have been built on the basis of the first principal components (the highest factors), values of the composite indices would be influenced by the weightages on the principal variables, within the block, as in the case of the importance of the health-care variable and employment variable. Obviously, the districts with higher density of population and relatively scarce availability of public infrastructures would register lower composite scores. In 1966-67¹⁹ there seems to be a noticeable improvement of the indices of most of the districts in the bottom rung and the range has reduced to 1.40

¹⁹ 1966-67 has been used as a 'break point' of the time series on two accounts, i.e. (i) because of the generally high value of the first principal component and (ii) secondly, because of the fact that the break points used in other time series. Studies have normally been somewhere in the mid-sixties with the Green Revolution angle in mind. This year is also in the middle of the time-series.

(Jabalpur) and 3.99 (Vidisha). In the terminal year of 1972-73, the indices range from 1.59 (Jabalpur) to 4.35 (Raisen), with the average value for the state as 2.54.

Table-IX.2, which tabulates the growth rates of the indices in Block-A shows that the average index for the state as a whole has grown by 1.01 per cent per annum, in the initial half of the period and has declined marginally by -0.20 per cent in the later half, giving an average compound growth rate of 0.40 per cent per annum over the entire period. There are 18 districts which have registered a negative rate of growth of the indices over the entire period, headed by Shahjapur (-2.21 per cent). The maximum positive growth rate has been registered in the district of Damoh (4.57 per cent), followed by Seoni (4.18 per cent). During the initial six years, some districts seem to have enjoyed a very high positive rate of growth, i.e. Damoh (8 per cent), while in the later six years (1966-67 to 1972-73), except Indore (7.81 per cent) and Chhatarpur (4.61 per cent) there seems to be no appreciable positive rate of growth.

In the group of variables under the modern sectors (Block-B) it seems that in 1960-61 the range of the indices is very high (0.56 of Vidisha to 8.44 of both

of both Jabalpur and Indore) in comparison to Block-A and this wide differences in the values of indices seem to persist throughout the entire period of study. On the other hand, one notices that there is a complete reversal of the relative positions of the districts in terms of indices in both the blocks, e.g. while Jabalpur has the lowest score in Block-A, gets the highest score in Block-B and the vice versa for Vidisha. This is understandable in light of the fact that when, the Block-A and Block-B groups of variables have negative inter-correlations between the blocks, consistently over the entire period. This also is justified on the basis that while, districts which are predominantly agricultural have low population density and high index scores in Block-A; while the districts which are more industrial are better electrified and have a higher share of population educated and therefore, register high index scores in Block-B. These two types of districts are not compatible.

While, the average index value for the state has gradually, increased from 2.38 (1960-61) to 2.43 (1966-67) and to 3.19 (1971-72), it has actually, decreased to only 2.25 in the terminal year, 1972-73. There also, does not appear any appreciable changes in the relative

TABLE-IX.2

Annual Compound Growth Rates of the Indices of the
Traditional Sectors(Block-A)*

Sl. No.	Districts	1960-61 to 1966-67	1966-67 to 1972-73	1960-61 to 1972-73
1		2	3	4
1.	Balaghat	3.09	-0.20	1.43
2.	Bastar	4.89	-3.98	0.36
3.	Betul	4.23	-0.16	2.01
4.	Bhind	-3.21	0.43	-1.41
5.	Bilaspur	-3.54	0.67	-1.46
6.	Chhatarpur	4.04	4.61	4.33
7.	Chhindwara	5.25	3.13	4.18
8.	Damoh	8.00	1.25	4.57
9.	Datia	-0.92	-0.19	-0.55
10.	Dewas	-1.49	0.72	-0.39
11.	Dhar	-2.98	-1.10	-2.04
12.	Durg	3.27	-1.56	0.82
13.	Guna	3.51	-4.50	-0.58
14.	Gwalior	-2.62	2.05	-0.31
15.	Hoshangabad	1.15	-0.35	0.40
16.	Indore	-5.08	7.81	1.16
17.	Jabalpur	2.32	2.14	2.23
18.	Jhabua	-0.32	-3.00	-1.67
19.	Khandwa	1.47	0.91	1.19
20.	Khargone	-0.34	-3.78	-2.07
21.	Mandsaur	1.85	-0.86	0.48
22.	Mandla	7.12	-1.36	2.79
23.	Morena	-1.17	-1.85	-1.51
24.	Narosimhapur	3.31	4.29	3.80
25.	Panna	5.72	-0.37	2.63
26.	Raigarh	4.35	-3.54	0.33
27.	Raipur	-0.10	0.75	0.33
28.	Raisen	0.17	1.79	0.98
29.	Rajgarh	-0.10	-0.98	-0.54
30.	Ratlam	-0.69	-0.77	-0.73

contd...

Table-IX.2 contd.

Sl. No.	1	2	3	4
31. Rewa		1.39	1.83	1.57
32. Sagar		6.35	0.32	2.29
33. Sarguja		1.78	-1.75	0.0
34. Satna		0.09	1.25	0.58
35. Sehore		-4.13	2.06	-1.08
36. Seoni		7.28	1.58	4.39
37. Shahdol		3.33	-3.69	-0.24
38. Shajapur		-2.48	-1.93	-2.21
39. Sidhi		5.94	-2.14	1.82
40. Shivpuri		2.60	-2.85	-0.16
41. Tikamgarh		4.64	-1.50	1.52
42. Ujjain		-1.79	-0.12	-0.95
43. Vidisha		1.64	-2.49	-0.45
44. Madhya Pradesh		1.01	-0.20	0.40

*Based on Appendix-IX.G.

positions of the districts in terms of the composite indices.

An analysis of the rates of growth of indices of Block-B (Table-IX.3) shows that the average index for the state as a whole has grown positively during the initial six years at a rate of 0.35 per cent per annum, while the decline is particularly sharp during the later six years (-1.27 per cent) leading to an overall decline by a rate of -0.47 per cent. It seems that there are twenty districts out of the forty three, which suffer from a negative growth rate with the maximum estimation of -7.43 per cent per annum in Jabalpur. In fact, the index values have continuously declined in Jabalpur, the decline in the values being -4.61 and -10.18 per cent per annum for both the halves of the period. The maximum positive growth rate of 10.27 per cent is observed in Datia, followed by Bhind (9.48 per cent) over the entire period of the twelve years.

Comparatively speaking indices for districts in the Bundelkhand region and the Malwa region have increased faster in terms of both the sectors. On the other hand, the districts lying in the eastern and southern Madhya Pradesh have no appreciable positive change

TABLE-IX.3

Annual Compound Growth Rates of Indices of
the Modern Sector(Block-B)*

Sl. No.	Districts	1960-61	1966-67	1960-61
		to 1966-67	to 1972-73	to 1972-73
	1	2	3	4
1.	Balaghat	-0.28	-4.80	-2.57
2.	Bastar	8.72	-6.48	0.83
3.	Betul	6.27	-6.93	-0.55
4.	Bhind	10.13	8.84	9.48
5.	Bilaspur	-1.45	-5.78	-3.64
6.	Chhatarpur	-0.10	1.37	0.63
7.	Chhindwara	-5.45	-4.01	-4.73
8.	Damoh	-0.48	0.16	-0.16
9.	Datia	10.29	10.25	10.27
10.	Dewas	1.57	1.70	1.63
11.	Dhar	-0.32	2.35	1.00
12.	Durg	4.23	-9.07	-2.65
13.	Guna	0.38	3.40	1.88
14.	Gwalior	2.07	1.39	1.73
15.	Hoshangabad	0.93	-0.84	0.04
16.	Indore	1.02	-2.09	-0.55
17.	Jabalpur	-4.61	-10.18	-7.43
18.	Jhabua	-5.42	5.39	-0.16
19.	Khandwa	-2.64	0.65	-0.01
20.	Khargone	-1.36	-4.35	-2.87
21.	Mandsaur	-0.22	9.71	4.63
22.	Mandla	-1.72	-2.60	-2.16
23.	Morena	10.31	2.42	6.29
24.	Narasimhapur	4.43	-4.14	0.05
25.	Panna	3.79	0.55	2.16
26.	Raigarh	1.68	-5.66	-2.06
27.	Raipur	-3.63	-9.77	-6.75
28.	Raisen	2.43	12.82	7.50
29.	Rajgarh	-1.15	5.84	2.28
30.	Ratlam	1.71	-1.91	-0.12

Contd...

Table-IX.3 contd.

Sl. No.	1	2	3	4
31. Rewa		0.83	3.40	2.11
32. Sagar		-1.06	-1.72	-1.39
33. Sarguja		4.08	0.92	2.49
34. Satna		-3.92	-1.44	-2.68
35. Sehore		6.17	-0.72	2.67
36. Seoni		0.62	0.83	0.72
37. Shahdol		-3.20	0.0	-1.61
38. Shajapur		1.73	9.60	5.59
39. Sidhi		-3.83	-1.44	-2.44
40. Shivpuri		2.34	2.40	2.37
41. Tikamgarh		1.00	2.17	1.59
42. Ujjain		0.31	-5.50	-2.64
43. Vidisha		6.56	3.87	5.21
44. Madhya Pradesh		0.35	-1.27	-0.47

*Based on Appendix-IX.H.

in terms of Block-A, while strong negative growth rates are registered in the Block-B. Besides, it seems that in districts where the index values have increased, grew particularly, faster in the later half of the sixties and early seventies. A similar picture emerges in the districts of Gwalior, Bhind, Marena and Datia, situated in the north-western parts of Madhya Pradesh.

The final indices (Block-I) of the levels of development for the state under study, have been provided in Table-IX.4.²⁰ It may be noted from Table-IX.4, that in 1960-61 the indices vary from 1.16 in Sarguja (Ambikapur) to 5.64 in Indore. The indices for Jabalpur and Raipur are 5.64 and 4.83 respectively. The three districts of Indore, Jabalpur and Raipur are relatively more industrialised. In 1966-67, the relative positions do not change appreciably, Jabalpur being pushed down to the number 3 position (Indore 5.52, Raipur 4.01 and Jabalpur 3.88), but there seems to be a marginal decline in the indices for the districts in the top bracket of development, while those in the bottom rung have succeeded only in slightly improving their positions. In the terminal year 1972-73 the highest index values are registered by Indore (5.58), Mandasaur (4.43), Gwalior (4.16) and Sehore (3.53).²¹

²⁰This index (I) is prepared by summing up Block-A and Block-B, with the weight of 0.5 each.

²¹This district (now, Bhopal) seems to be enjoying the favourable effects of the capital location in an otherwise backward region.

TABLE - IX.4

Final Composite Index of Levels of Development in Madhya Pradesh (Block-I) (1960-61 to 1972-73)*

Sl. No.	Districts	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Balaghat	2.49	2.79	2.45	2.88	3.07	2.18	2.60	2.67	2.70	2.44	2.68	2.13	2.14
2.	Bastar	1.35	1.49	1.46	1.67	2.14	1.72	1.94	1.85	2.02	1.71	1.78	1.20	1.44
3.	Betul	1.44	1.53	1.55	1.74	2.03	2.07	1.95	2.08	1.97	1.76	1.70	1.50	1.62
4.	Bhind	2.07	1.92	1.95	1.86	2.33	2.03	2.12	2.27	2.10	2.12	2.13	3.31	2.68
5.	Bilaspur	3.26	2.99	2.79	3.20	3.07	2.56	2.86	2.83	2.86	3.10	3.01	3.14	2.30
6.	Chhatarpur	1.71	2.00	1.84	1.92	2.08	1.69	1.93	2.11	2.07	1.95	2.16	2.45	1.23
7.	Chhindwara	2.35	2.19	2.21	2.24	2.50	2.28	2.19	2.18	2.10	1.88	1.93	1.76	2.16
8.	Damoh	1.31	1.59	2.00	1.60	1.93	1.68	1.74	1.78	1.75	1.68	1.84	2.13	1.85
9.	Datia	1.69	1.60	1.74	1.80	1.97	1.83	1.86	2.01	1.95	1.86	1.96	2.59	2.28
10.	Dewas	2.67	2.40	2.65	2.43	2.63	2.40	2.60	2.59	2.63	2.71	2.76	3.15	2.77
11.	Dhar	2.75	2.41	2.57	2.56	2.55	2.38	2.40	2.35	2.51	2.59	2.45	2.74	2.42
12.	Durg	3.56	4.19	4.23	4.58	4.40	4.44	4.50	4.42	4.40	4.34	4.37	3.35	2.91
13.	Guna	2.01	2.02	2.02	2.04	2.05	2.12	2.38	2.18	2.15	1.94	1.98	2.05	2.01
14.	Gwalior	3.75	3.24	3.45	3.71	3.92	3.80	3.82	3.89	3.81	4.04	3.76	5.06	4.16
15.	Noshangabad	2.17	1.92	2.22	1.98	2.15	2.19	2.31	2.13	2.22	2.00	1.96	2.65	2.24
16.	Indore	5.64	4.93	1.79	5.50	5.66	5.70	5.52	5.55	5.68	5.38	5.33	6.06	5.58
17.	Jabalpur	4.83	4.73	4.69	4.25	4.12	4.21	3.88	3.73	3.53	3.38	3.31	6.54	2.47
18.	Jhabua	2.06	1.97	1.88	2.04	1.96	1.74	1.89	1.77	1.72	1.70	1.74	1.98	1.77
19.	Khandwa	3.07	2.69	2.88	2.86	2.86	2.70	2.89	2.54	2.63	2.32	2.57	2.82	3.02
20.	Khargoul	3.22	2.94	3.02	2.98	3.04	2.86	3.07	2.84	2.79	2.76	2.72	2.71	2.42
21.	Mandsaur	3.22	3.15	3.28	3.41	3.28	3.36	3.39	3.26	3.08	3.15	3.32	4.79	4.43
22.	Mandle	1.67	1.30	1.32	1.43	1.53	1.52	1.49	1.55	1.65	1.53	1.56	1.60	1.35

Contd....

TABLE- IX.4 contd..

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
23. Morena	2.10	2.08	2.19	2.22	2.36	2.14	2.50	2.41	2.26	2.28	2.38	3.50	2.54	
24. Narsimhapur	1.73	1.69	1.85	1.67	2.15	2.00	2.17	2.30	2.21	1.95	2.05	2.500	2.25	
25. Panna	1.18	1.45	1.28	1.38	1.62	1.47	1.59	1.66	1.55	1.52	1.54	2.71	1.59	
26. Raigarh	1.66	1.72	1.68	1.94	1.89	1.84	1.97	1.81	1.89	1.59	1.66	1.69	1.49	
27. Raipur	4.80	4.72	4.48	4.64	4.89	3.71	4.01	4.14	4.15	4.30	4.71	3.15	2.61	
28. Raisen	2.35	2.23	2.28	2.57	2.67	2.60	2.44	2.45	2.43	2.20	2.32	3.02	3.18	
29. Rajgarh	2.34	2.31	2.32	2.20	2.29	2.04	2.29	2.18	2.34	2.30	2.27	2.87	2.42	
30. Ratlam	2.80	2.73	2.84	2.94	2.99	2.68	2.84	2.85	2.87	2.88	2.82	3.10	2.64	
31. Rewa	1.49	1.56	1.68	1.55	1.76	1.61	1.59	1.79	1.74	1.83	1.77	2.76	1.85	
32. Sagar	1.67	1.82	1.89	1.75	1.91	1.81	1.93	2.06	2.03	1.67	1.94	2.13	1.86	
33. Sarguja	1.16	1.37	1.27	1.40	1.43	1.29	1.34	1.37	1.51	1.32	1.36	1.02	1.28	
34. Satna	2.50	2.45	2.43	2.21	2.36	2.12	2.17	2.27	2.18	2.31	1.91	2.76	2.15	
35. Sehore	3.23	2.83	3.52	3.30	3.09	3.36	3.43	3.37	3.28	3.23	3.17	3.73	3.53	
36. Seoni	1.50	1.62	1.66	1.67	1.94	1.71	1.96	1.88	1.97	2.00	1.93	2.11	2.12	
37. Shahdol	1.49	1.41	1.45	1.42	1.73	1.60	1.58	1.59	1.54	1.39	1.44	1.38	1.36	
38. Shahjapur	2.83	2.39	2.60	2.45	2.73	2.45	2.64	2.54	2.52	2.52	2.63	3.57	3.13	
39. Sidhi	1.18	1.34	1.31	1.29	1.52	1.41	1.38	1.57	1.61	1.57	1.99	1.41	1.23	
40. Shivpuri	1.89	2.21	2.05	2.21	2.20	1.88	2.20	2.05	2.07	1.93	1.93	2.13	2.05	
41. Tikamgarh	1.77	2.01	1.82	2.16	2.21	1.66	2.10	2.14	2.25	2.14	2.18	2.41	2.13	
42. Ujjain	3.78	3.56	3.94	3.59	3.56	3.69	3.65	3.62	3.47	3.67	3.70	3.63	3.14	
43. Vidisha	2.09	2.20	2.17	2.36	2.40	2.33	2.40	2.13	2.20	1.99	2.09	2.28	2.23	
44. Madhya Pradesh	2.41	2.37	2.34	2.46	2.58	2.39	2.50	2.48	2.47	2.39	2.44	2.79	2.38	

*Based on Appendices, IX-G and IX-4.

**Values for the state as a whole are the arithmetic mean of the indices.

One can easily observe the reversal of the ranks in the top order districts by the early seventies, which favours the districts located in the western and north-western Madhya Pradesh, while the values of the districts in southern and eastern parts of the state have declined considerably, viz. Jabalpur 2.47 and Raipur 2.61.

The annual compound growth rate of the final indices of development (Table-IX.5) indicate, that although, the average indices for the state as a whole, enjoyed a positive growth rate in the initial six years period (0.61 per cent per annum); while it has registered a -0.82 per cent rate in the later half, as well as an overall decline by -0.10 per cent per annum. On the other hand, 18 districts (roughly 42 per cent) register a decline of the indices for the entire period, led by Jabalpur (-5.44 per cent) and Raipur (-4.95 per cent). The highest positive growth rate is registered by Damoh and Seoni being 2.92 per cent each, followed by the district of Mandasaur (2.69), Raisen (2.55), Datia (2.53), Panna (2.52) and Bhind (2.18) of which, except Mandasaur the rest of the districts have a relatively low base value of the indices. During the initial six years, it seems that while positive rates have been significant,

TABLE-IX.5

Annual Compound Growth Rates of Indices of the
Final Index of Levels of Development
in Madhya Pradesh(Block-I)*

Sl. No.	District	1960-61 to 1966-67	1966-67 to 1972-73	1960-61 to 1972-73
1		2	3	4
1.	Balaghat	0.72	-3.19	-1.25
2.	Bastar	6.23	-4.85	0.54
3.	Betul	5.18	-3.04	0.99
4.	Bhind	0.40	3.98	2.18
5.	Bilaspur	-2.16	-3.57	-2.86
6.	Chhatarpur	2.04	-7.23	-2.71
7.	Chhindwara	-1.17	-0.23	-0.70
8.	Damoh	4.84	1.03	2.92
9.	Datia	1.61	3.45	2.53
10.	Dewas	-0.44	1.06	0.31
11.	Dhar	-2.24	0.14	-1.06
12.	Durg	3.98	-7.01	-1.67
13.	Guna	2.86	-2.78	0.0
14.	Gwalior	0.31	1.43	0.87
15.	Hoshangabad	1.05	-0.51	0.26
16.	Indore	-0.36	0.18	-0.09
17.	Jabalpur	-3.58	-7.25	-5.44
18.	Jhabua	-1.43	-1.09	-1.26
19.	Khandwa	-1.00	0.74	-0.14
20.	Khargone	-0.79	-3.89	-2.35
21.	Mandsaur	0.86	4.56	2.69
22.	Mandla	-1.88	-1.63	-1.76
23.	Morena	2.95	0.26	1.60
24.	Narasimhapur	3.85	0.61	2.21
25.	Panna	5.10	0.0	2.52
26.	Raigarh	2.89	-4.55	-0.90
27.	Raipur	-2.95	-6.91	-4.95
28.	Raisen	0.63	4.51	2.55
29.	Rajgarh	-0.36	0.92	0.28
30.	Ratlam	0.24	-1.21	-0.49

*Based on Table-IX.4.

Contd....

Table-IX.5 contd.

Sl. No.	1	2	3	4
31. Rewa		1.09	2.56	1.82
32. Sagar		2.44	-0.61	0.90
33. Sarguja		2.43	-0.76	0.82
34. Satna		-2.33	-0.15	-1.25
35. Sehore		1.01	0.48	0.74
36. Seoni		4.56	1.32	2.92
37. Shahdol		0.98	-2.47	-0.76
38. Shajapur		-1.15	2.88	0.84
39. Sidhi		2.64	-1.90	0.35
40. Shivpuri		2.56	-1.17	0.68
41. Tikamgarh		2.89	0.24	1.55
42. Ujjain		-0.58	-2.48	-1.53
43. Vidisha		2.33	-1.22	0.54
44. Madhya Pradesh		0.61	-0.82	-0.10

the negative rates have been generally, low but in the later six years, there are a number of significant negative growth rates while the positive rates are only moderate.

Table-IX.6 tabulates three linear time series lagged regressions, i.e. (i) between the years 1960-61 to 1965-66 and 1966-67 (the latter as the explained variable), (ii) between the years of 1966-67 to 1971-72 and 1972-73 and (iii) 1960-61 to 1965-66 and 1972-73, indicate that all the three equations are significant at 38 degrees of freedom, at 99 per cent level of confidence; explaining total variations by 98, 71 and 77 per cents respectively (R_s^2 , .98, .71 and .77). In the first equation, the variations in the indices of 1966-67 are negatively contributed by the index positions in the initial two years (1960-61 and 1961-62), represented by negativity of β_1 and β_2 . In the second equation the index positions of 1972-73 are contributed negatively by the two years of 1967-68 and 1970-71, represented by β_2 and β_5 (-0.9701 and -0.1360 respectively) by being negative. In the third equation, the terminal year is also, negatively contributed by the index values of the initial two years ($\beta_1 = -0.0784$ and $\beta_2 = -1.8270$). This

TABLE - IX.6

Lagged Regressions of the Final Composite Index of Development in
Madhya Pradesh (1960-61 to 1972-73)*

Sl No	Years	α	β_1	β_2	β_3	β_4	β_5	β_6	S.E	M.C.C.	R ²	% of va- riations explained	
		$x_1=1960-61$	$x_2=1961-62$	$x_3=1962-63$	$x_4=1963-64$	$x_5=1964-65$	$x_6=1965-66$						
	1	2	3	4	5	6	7	8	9	10	11	12	
1.	1960-61 to 1966-67	0.1745	-.0321	-.1958	+.0312	0.4239	0.2118	0.5040	0.1168	0.9913	.98	98%	
2.	1966-67 to 1972-73		$x_1=1966-67$	$x_2=1967-68$	$x_3=1968-69$	$x_4=1969-70$	$x_5=1970-71$	$x_6=1981-72$					
		0.2716	0.4992	-.9701	0.8505	0.2139	-0.1360	0.3536	0.4720	0.8444	.78	71%	
3.	1960-61 to 1972-73		$x_1=1960-61$	$x_2=1961-62$	$x_3=1962-63$	$x_4=1963-64$	$x_5=1964-65$	$x_6=1965-66$					
		0.2066	-0.784	-1.8270	0.1757	1.5350	0.4516	0.5786	0.4410	0.8800	.77	77%	

*Based on Table-IX.4

TABLE-IX.7

Unweighted (Vuw) Coefficient of Variations of
Block-A, Block-B and Block-I*

Sl. No.	Years	(i) Vuw		
		Block-A	Block-B	Block-I
1.	1960-61	0.3719	.8487	.4315
2.	1961-62	0.2923	.8312	.3924
3.	1962-63	0.3130	.7892	.3717
4.	1963-64	0.2727	.8277	.3983
5.	1964-65	0.2713	.7364	.3565
6.	1965-66	0.0996	.9142	.3891
7.	1966-67	0.2645	.7736	.3560
8.	1967-68	0.2427	.7193	.3467
9.	1968-69	0.2375	.7137	.3441
10.	1969-70	0.2795	.7159	.3765
11.	1970-71	0.2645	.7075	.3606
12.	1971-72	0.2770	.5235	.4193
13.	1972-73	0.2598	.6355	.3697
		(ii) Rates of Growth in percentage		
14.	1960-61 to 1972-73**	-.47	-2.04	-.23
15.	1960-61 to 1966-67	-5.52	-1.53	-3.16
16.	1966-67 to 1972-73	-0.30	-3.22	0.63
17.	1960-61 to 1972-73	-2.95	-2.38	-1.28

*Based on Appendix-G, Appendix-H and Table-IX.4.

**Linear Trend rates; the rest in 15., 16., 17. are annual compound growth rates.

may indicate that the relative positions of districts in terms of the indices in years of 1960-61, 1961-62, 1967-68 and 1970-71 are different than those of the terminal year. Besides, the relative position of districts have changed significantly, from the initial years till 1966-67 and there after, have remained more or less unchanged.

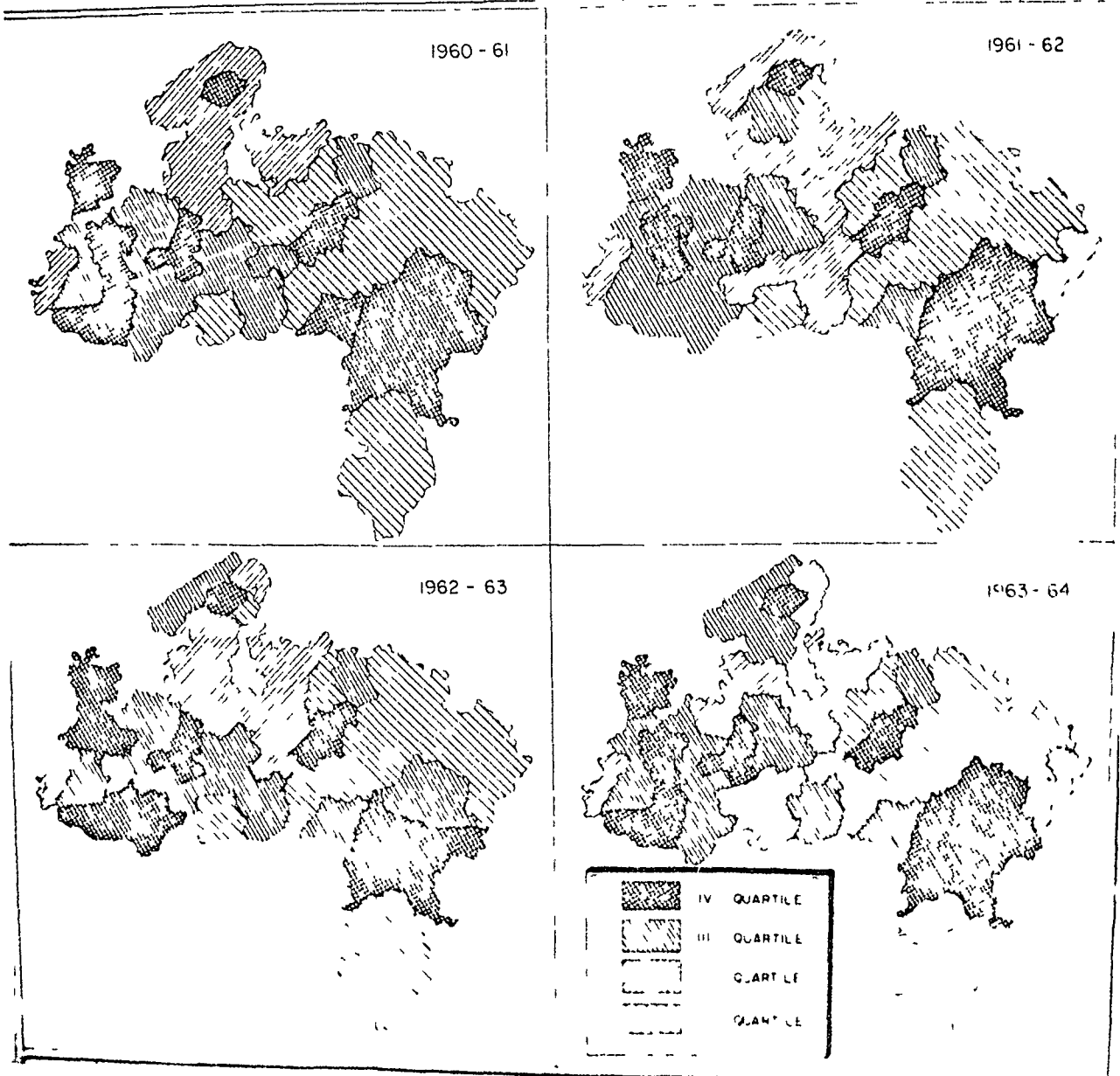
In maps IX.1, IX.2, IX.3 and IX.4, the patterns of regional development for the 13 years have been clearly demonstrated. The indices have been quartiled into (i) high development, (ii) medium development (iii) low development and (iv) very low development and have been thematically mapped. A study of these maps reveals a clear regional alignment of districts. The districts in the most developed category (iv) are concentrated in two clearly divergent regions, i.e. (i) the Malwa region including the district of Indore, Ujjain, Mandasaur, Ratlam, Dewas and Khargone and (ii) the Chhatishgarh region, including districts of Bilaspur, Raipur and Durg. There are two isolated pockets of development in the districts of Jabalpur and Gwalior. It will be interesting to note that the latter major region has a traditional advantage of rich mineral resource base, which helped in the location and development of specific industries.

MAP No IX - 1

MADHYA PRADESH

LEVELS OF REGIONAL DEVELOPMENT (DISTRICT - WISE)

0 10 20 30 40 50 60 70 80 90 100



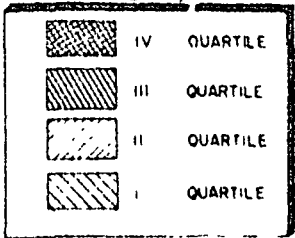
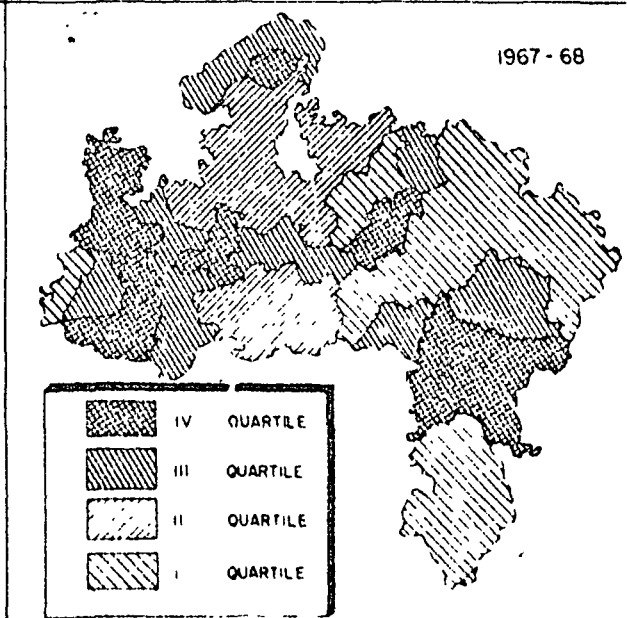
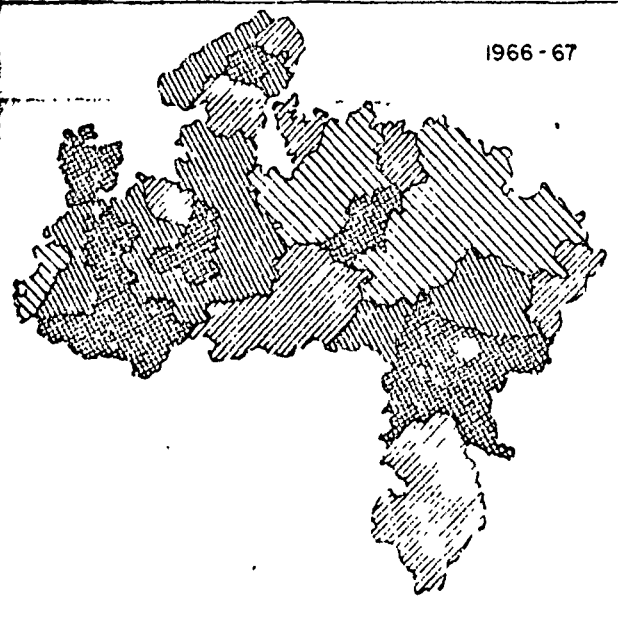
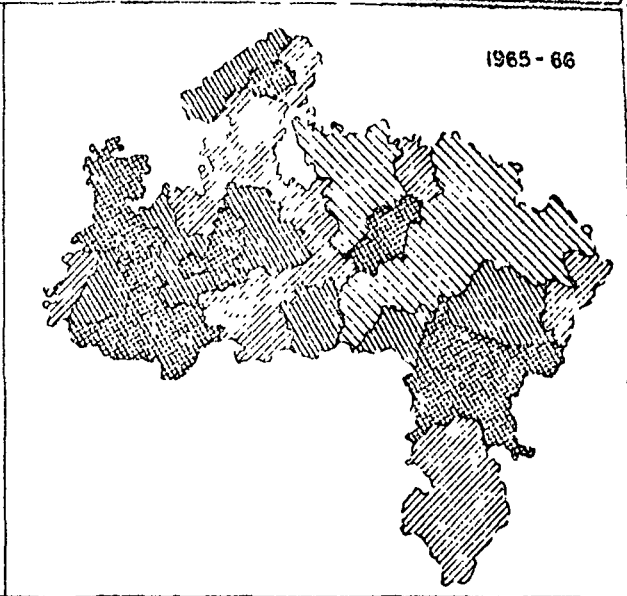
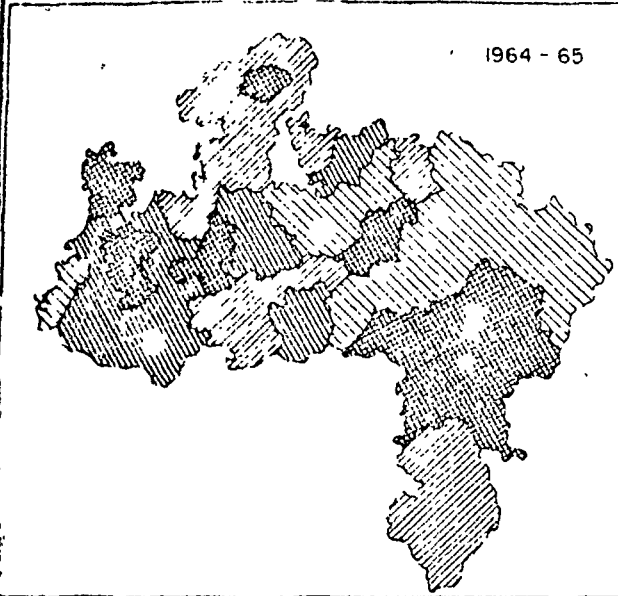
MAP No IX-2

MADHYA PRADESH

LEVELS OF REGIONAL DEVELOPMENT

(DISTRICT - WISE)

Scale: 1:1,000,000

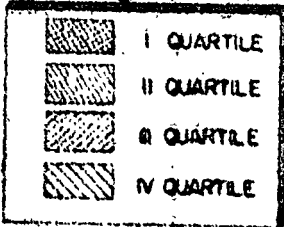
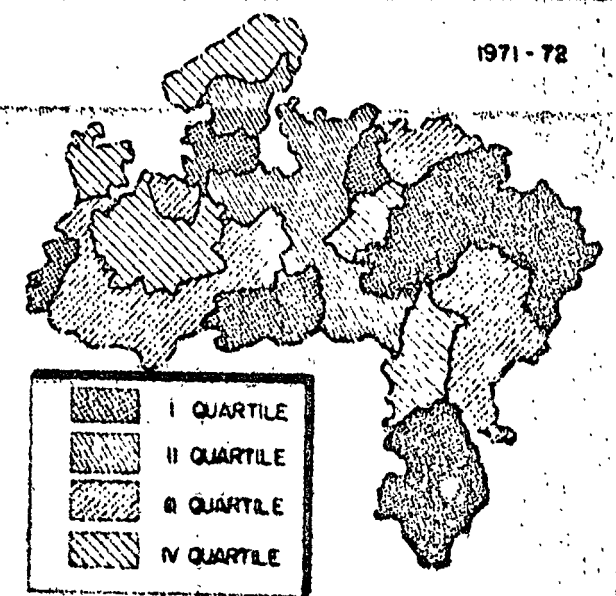
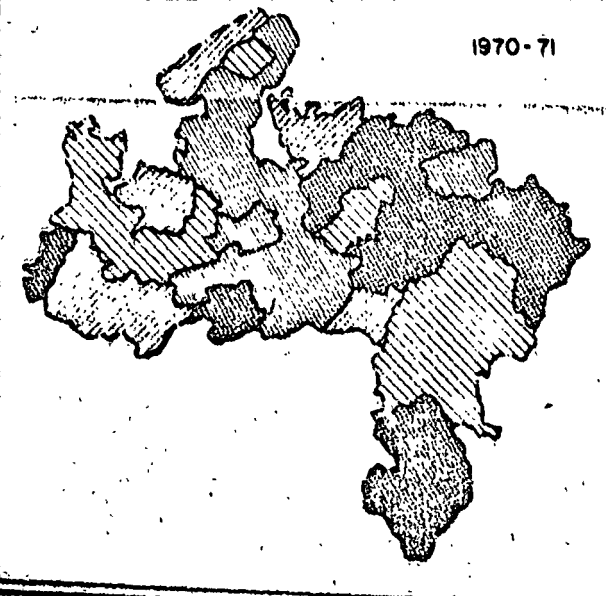
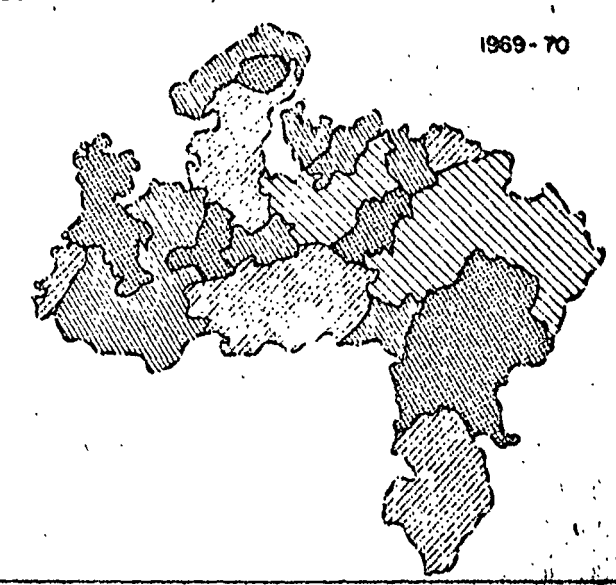
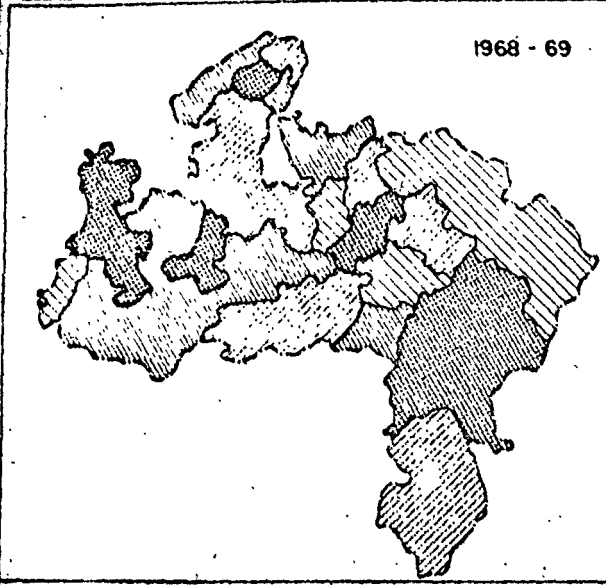


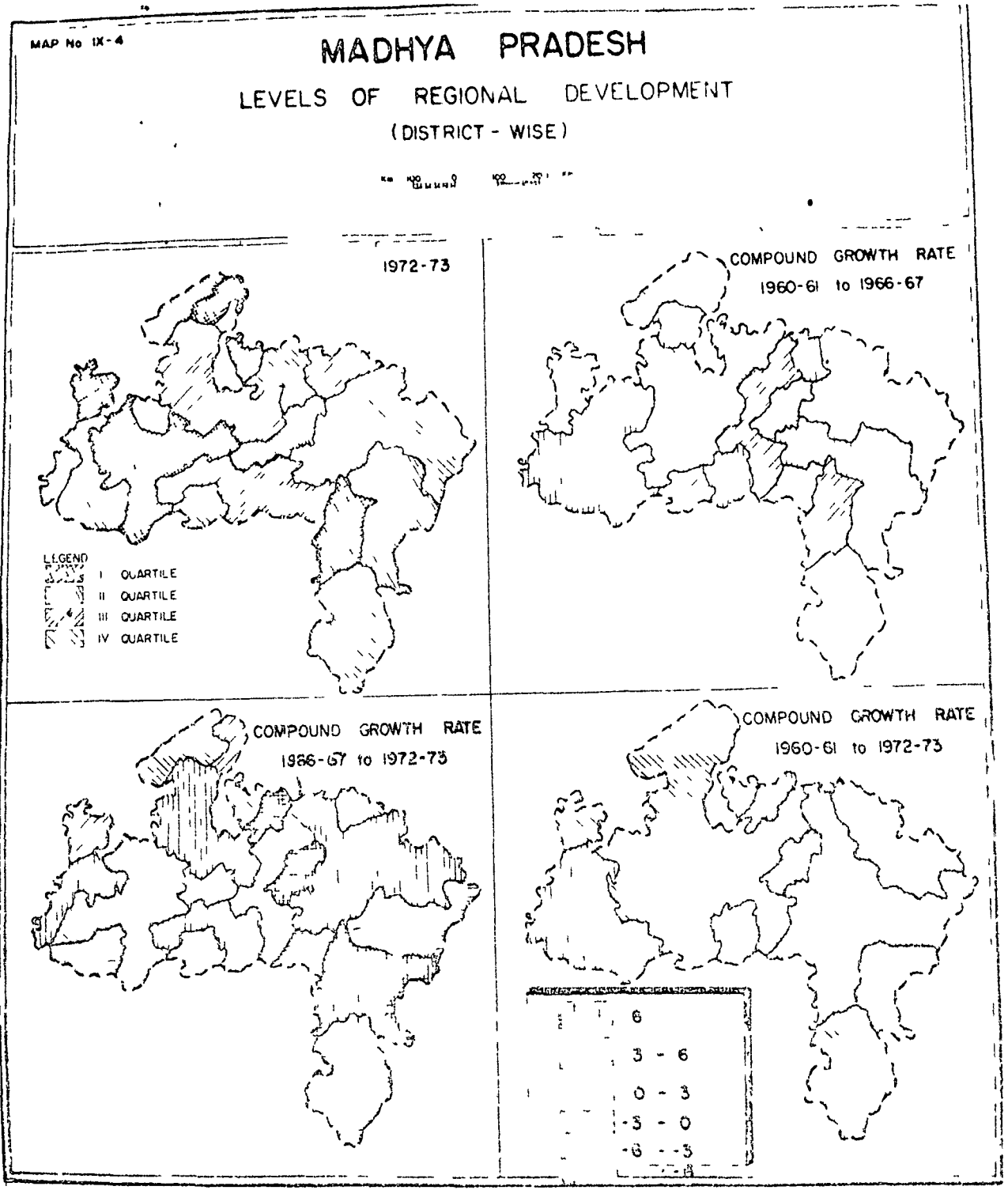
MAP No. IX - 5

MADHYA PRADESH

LEVELS OF REGIONAL DEVELOPMENT (DISTRICT - WISE)

Scale: 1:1,000,000





On the other hand, the former region has a moderate distribution of minerals for industrial development, but is rich in terms of agricultural development, remaining in the strong influences of the developmental corridor along the Bombay, Gujarat to Delhi and the north western Indian region of development. Districts in the medium (III) and low (II) development quartiles surrounded the Malwa developed region particularly, in the north and north west, first by the medium developed districts, followed by the low developed districts on the fringes of the vast backward and very lowly developed (I) districts of the eastern, east central and south eastern districts forming a single large region. Bastar remained as the only backward district outside the main region, as already described. It may also be noted, that the Chhatisgarh region of high development is invariably surrounded by districts of the first quartile, which also, high-lights the fact that the industrial and developmental modes of this region have not been able to transform the surrounding backward regions, as happens in the case of Malwa region.

Over the years, there seems to be very little changes in the position of districts between quartiles until the early seventies, when the districts in the

highest developed category are concentrated in the two main regions, i.e. (i) the Malwa region, now spreading eastwards, integrating Bhopal district (Sehore) and forming a major region and (ii) an emerging new region around the Gwalior district, including Bhind and Morena districts, in a context that the importance of Chhatisgarh region has consistently been eroded; the districts of Bilaspur and Raipur (except, Durg) fell into the third quartile. Along the Narmada valley there is a high concentration of medium developed districts, while in the districts of the Bundelkhand region (northern Madhya Pradesh) are concentrated in the second quartile.

Levels of Regional Inequality:

The levels of intra-regional inequality (unweighted coefficients of variation: V_{uw}) in the composite indices of the Block-A has been invariably much less (less than half) than the inequality level in the Block-B and this pattern seems to remain overtime (see, table-IX.7).²³ Linear trend rates indicate,²⁴ that the unweighted inequality indices have declined by -0.47 per cent in case of the Block-A, -2.04 per cent in case of the Block-B and -0.23

²³J.G. Williamson, op.cit.,

The measures provided by Williamson, V_{uw} and V_w have been applied here to all the three sets of composite indices. Intra-quartile and inter-quartile inequalities have been measured by coefficients of variation in case of former and coefficients of quartile deviation in case of the latter.

²⁴Secular Linear trend rates by least square method.

per cent only, for the final index of development. The rates estimated by compounded growth are however much higher for the whole period as compared to the secular trend rates (-2.95, -2.38 and -1.28 per cent per annum respectively). On the other hand, it seems that the unweighted variations in the Block-A declined faster in the pre-1966-67 period (-5.52 per cent per annum), while only by -0.30 per cent during the later six years. A reversal of this situation is observed in the case of the composite index of the modern sectors (Block-B), that the decline of the levels of inequality has been slower in the early sixties, while it is much more marked in the later period being -1.53 and -3.22 per cent per annum, respectively. Contrary to this, it seems that the inequality in the overall levels of development has declined sharply during the initial six years (1960-61 to 1966-67) by -3.16 per cent per annum, while it seems to have increased at a rate of 0.63 per cent per annum during the later sixties and the early seventies.

Table-IX.8 tabulates the weighted coefficient of variations (vw) of all the three sets of indices of development and changes thereof. For the index of development of the traditional sectors, there seems to be a positive secular trend rate of 0.47 per cent per annum, negative

TABLE-IX.8

Weighted Coefficient of variations (Vw) of Block-A,
Block-B and Block-I*

Sl. No.	Years	(i) Vw		
		Block-A	Block-B	Block-I
1.	1960-61	0.3484	0.9583	.4524
2.	1961-62	0.2934	0.9826	.4476
3.	1962-63	0.3142	0.9921	.4351
4.	1963-64	0.2607	0.9576	.4400
5.	1964-65	0.2689	0.8514	.3995
6.	1965-66	0.2623	0.9948	.3972
7.	1966-67	0.2695	0.8455	.3742
8.	1967-68	0.2465	0.8015	.3716
9.	1968-69	0.2388	0.7734	.3664
10.	1969-70	0.2881	0.8282	.4116
11.	1970-71	0.2821	0.8497	.4104
12.	1971-72	0.5928	0.4929	.4128
13.	1972-73	0.2624	0.5806	.3304
		(ii) Growth Rates in percentage		
14.	1960-61 to 1972-73**	0.47	-3.31	-0.65
15.	1960-61 to 1966-67	-4.19	-2.07	-3.11
16.	1966-67 to 1972-73	-.44	-6.07	-2.05
17.	1960-61 to 1972-73	-2.33	-4.09	-2.59

*Based on Appendices, IX-G and IX-H and Table-IX.4. The population weights are of only the rural population.

**Linear trend rates, the rest being (15, 16 and 17) annual compound growth rates.

trends are registered by both Block-B and the final index of development (-3.31 and -0.65 per cent per annum respectively). But, in the case of the compound rates of growth for the whole period, Block-A has declined by -2.33 per cent per annum, while Block-B and Block-I have declined by -4.09 and -2.59 per cent per annum. For the final index, the rate of decline during the pre-1966-67 period has been faster as compared to the later years, being -3.11 and -2.05 per cent, respectively. Similar to the unweighted variations, the weighted variations of Block-A decline significantly during the first six years, compared to the later years, while for Block-B just the opposite is true.

In the analysis of the intra-and inter-quartile deviations of the final indices of development (Table-IX.9) it seems that the coefficient of variations within the first quartile (very low development) and the fourth quartile (very high development) are relatively more than the medium two quartiles (II & III), particularly, the coefficients of variations within the fourth quartile are at least twice higher than the rest and this happens consistently over all the years (except, the terminal year). Deviations between the quartiles seem to be invariably more than within the quartiles, (except, in eight years,

TABLE-IX.9
Intra-quartile and Inter-quartile Deviations of Indices of Development in
Madhya Pradesh(Block-I)*

Sl. No.	Years	(i) Intra-Quartile Deviations				Inter-quartile Deviations
		Q.I	Q.II	Q.III	Q.IV	
1.	1960-61	.1220	.0948	.1004	.2207	0.2954
2.	1961-62	.0730	.0810	.0798	.2307	0.2653
3.	1962-63	.1156	.0677	.0759	.1910	0.2318
4.	1963-64	.0763	.0860	.0987	.2196	0.2755
5.	1964-65	.1098	.0473	.0298	.2271	0.2160
6.	1965-66	.0897	.0744	.0698	.2391	0.2065
7.	1966-67	.1180	.0536	.0682	.2091	0.1942
8.	1967-68	.0898	.0436	.0711	.2228	0.2017
9.	1968-69	.0887	.0388	.0740	.2318	0.1723
10.	1969-70	.0849	.0526	.0886	.2053	0.2576
11.	1970-71	-.1024	.0351	.0860	.2285	0.1770
12.	1971-72	.1717	.0829	.0659	.2240	0.1977
13.	1972-73	0.2514	.0489	.0518	.1937	0.1806
		(ii) Growth Rates in percentage				
14.	1960-61 to 1972-73**	0.66	- .30	- .20	- .09	- .76
15.	1960-61 to 1966-67	-.55	-9.07	-6.24	- .90	-6.75
16.	1966-67 to 1972-73	13.44	-1.52	-4.48	-6.06	-1.20
17.	1960-61 to 1972-73	6.21	-5.37	-5.37	-3.51	-4.02

*Based on Table-IX.4.

**Linear trend rates, the rest being (15, 16 and 17) annual compound growth rates.

when the interquartile deviations are only marginally lower than the deviations within the fourth quartile).

The estimates of secular trends indicate that during the entire period of study the intra-and inter-quartile deviations have declined except for the first quartile, in which case it has grown positively by 0.66 per cent per annum. On the other hand, the trend of decline of the inter-quartile deviations have been much more significant (-0.76) than the trend rates of intra-quartile deviations.

Estimates by compound growth rates show that over the entire period of study the levels of intra-quartile deviation in the I quartile class has grown at a significant rate of 6.21 per cent per annum compared to a decline of -0.55 per cent in the pre-1966-67 and a 13.44 per cent growth in the post 1966-67 period. The rest of the intra-quartile deviations indicate negative growth rates of -5.37 , -5.37 and -3.51 per cent respectively per annum for the last three quartiles. The rate of decline in case of the II and III quartiles in the pre-1966-67 period, seems to be more significant, compared to the IV quartile in which case the decline is more significant in the later period.

The inter-quartile deviations have declined at an annual compound rate of -4.92 per cent per annum, compared to a rate of -6.75 per cent in the initial years and -1.20 per cent in the later period.

Findings :

Out of the empirical analysis and discussions above, a number of significant conclusions have been arrived at which are put forth in a systematic summary below :

- (a) Firstly, out of the correlation analysis (and Matrices) of the fourteen variables used to arrive at a composite index of regional development in Madhya Pradesh, it is found that, variables which normally are potentials for development (Block-A) and traditional by nature have strong negative inter-correlations (community basis) with variables, which provide directly, dynamic attributes of development (as variables related to industries or agricultural productivity per unit area) or those providing infrastructure for dynamic development (as variables related to power irrigation and education).
- (b) Secondly while analysing the factors, it is found that the levels of intra-regional inequality in the state are explained significantly (over 70 per cent) due to the

variations in the levels of healthcare, employment levels (in Block-A), levels of industrialisation, power supplies, education and irrigation facilities (in Block-B).

- (c) Thirdly the spatial patterns of development, which remained more or less similar until late sixties i.e. the two core areas of high development in the Malwa and the Chhatisgharh regions as described earlier, have changed in a significant manner in the early seventies. Not only the Indore, Ujjain and Bhopal region of high development has been consolidated, a new core-region around Gwalior-Bhind-Morena has emerged particularly, in the context of the reduction in the importance of Bilaspur-Raipur-Durg region.
- (d) Fourthly, in the analysis of the levels of sectoral inequalities, it is found that the weighted variations in the dynamic block of variables is more than twice as large as that of the traditional block of variable. This is true in context of the point already made in this chapter earlier that dynamic sectors including variables like irrigation and power accrue to areas which are already developed.
- (e) Fifthly it is found that the weighted variations for the final index of development has declined sluggishly in the post 1966-67 period compared to the early sixties, while the level of inequality in the index of

traditional variables (mostly related to agriculture) has also come down sluggishly in the post 1966-67 period (In fact, the secular trend for the whole period is positive), while the reverse is true of the dynamic set of variables. This might be the case because of the recent public policies of rural electrification, newer irrigation projects (as in Hasangabad and Narasimhapur etc.) and the locational policy of industries in favour of backward regions.

- (f) Sixthly, it seems that within the final index of development, the deviations within the quartile classes are significantly lower than the deviations between the quartile classes. On the other hand, the deviations within the IV quartile (districts in the highest developed category) has been significantly higher than the other three quartiles.
- (g) Lastly, it seems that the levels of both intra- and inter-quartile inequalities of the indices of development had been declining, overall, although at a slower rate in the post 1966-67 period, compared to the pre-1966-67 period, leading one to hypothesize that overall, convergence has been the rule albeit, more slowly in the 1966-67 to 1972-73 period, compared to the 1960-61 to 1966-67 period.

CHAPTER - X

" Sarve bhabantu sukhino,
Sarve santu niramaya,
Sarve bhadrani pashyantū,
Makashchit dukhabhāḡ bhabet."

(Let all be happy, let all be sinless,
let all follow civilized pursuits, let
there never be sorrow on earth.'
Author's translation)

Bhagabat Gita

CONCLUSION

At the outset of the current study, it has been pointed out that the study of spatial inequalities has remained a neglected realm of the geographer, because of the prevalent approach to undermine the role of 'man' and the consequences of geographical researches being only peripherally related to the social processes. Besides, the studies in spatial inequalities from the point of view of other disciplines have been only partial, because of the lack of a clear perception of the 'space'. Even the academic consciousness regarding the issues of regional inequalities in terms of the people living therein, has been of a recent origin. Inter-personal inequalities of incomes and welfare standard, which reflect in aggregate terms at the level of the regions, whether internationally or inter-regionally (within a country) are questions of basic concern to the social scientist.⁵ The recent studies by Myrdal, Hirschman, Frank, Amin and Furtado etc. are eye openers to the academician and challenges to the politician and the bureaucrat.⁶

On the other hand, such attempts in explaining the regional ramifications of the planned programmes of the preceding three and half decades of independence in India, have been only incipient and a lot remains to be understood. Even, those studies which have taken a pioneering role, answer only a very few of the problems, e.g. the stubborn persistence of the backward regions to remain poor. The period from 1960-61 to 1978-79, the concern of the present study (which covers the third, the Fourth and Fifth Five Year Plans and the interregnum of the three year plan holiday, i.e. 1966-67 to 1968-69) is significantly, eventful for the Indian economy in terms of the theory of 'divergence - convergence'. The entire period can be broken up into two segments, i.e. (i) from the early sixties to the end of sixties (1968-69 is important due to the beginning of the Fourth Five Year Plan) and (ii) from end sixties onwards till the terminal year of the study, i.e. 1978-79 (end of the Fifth Five Year Plan). The first-period is marked by gross instabilities in the politico-economic atmosphere of the country, lack of proper directions to the economy and a series of natural calamities and international wars, leading to a very sluggish increase in the per capita incomes of the people and stagnation in the process of industrialisation (which got some momentum in the mid-fifties). Overall,

it was a period, in which all the rising aspirations of the common Indian has invariably, been belied. On the other hand, in the period of the later two plans, the performance of the economy has been much more satisfactory. During this period the agricultural output, yield and income originating in the same sector have increased at a much higher rate; as compared to the previous period. This happens despite, the periodic inflationary tendencies in the economy.

So far as the question of regional inequality of per capita income is concerned, it is found that the levels of inequality have overall, increased except for a few years in the mid-sixties, when it has marginally come down, e.g. between 1960-61 and 1978-79 the inequality has increased by 1.37 per cent per annum. Moreover, the rates of increase in the levels of inequality have been significantly higher in the late sixties and the seventies, e.g. between 1968-69 and 1978-79 the inequality was grown by 1.67 per cent per annum. Additionally, the traditional developed states like West Bengal, Tamil Nadu and Gujarat, have not shown any appreciable increase in the per capita incomes, while the group of agriculturally advanced states like Punjab, Haryana and Rajasthan have demonstrated a considerable increase in the levels of per capita Net Domestic Products. This is but natural, with the backgrou

of the predominant dependence of the economy on the agricultural sector, which has shown a great dynamism in the later decade, due to impact of the Green Revolution. This group of states seems to influence the pattern of distribution of the additional increases in the per capita income in the country. Ironically, it is observed that when the per capita income has increased sluggishly (e.g. the mid-sixties due to the continued failure of crops) the inter-state levels of inequality has either declined or has remained stationary. On the other hand, when the per capita income has grown at a relatively faster pace there is a tendency that the levels of inter-state inequalities have increased. Obviously, as has been witnessed, the national income and therefore, per capita income in the country increases or decreases like a mercury column, by the pressures generated in the agricultural sector, i.e. whether the performance of the sector is good or poor. Naturally, as it happens a greater increase in the per capita income leads, not to equality, but to greater inequality between regions. This is in conformity with the theory of 'divergence' *à la* Myrdal. The process of economic development is vitiated by the 'cummulative causation' of development for the developed region, and under-development for the backward region. But, with a difference. Here, (as in

India) even some of the advanced regions (in the traditional sense) have been proved to be the victims. This situation is also, in conformity with the well known experience in Indian planning that a higher rate of development (and growth) and an egalitarian distribution of the benefits of growth, are not compatible. Growth and socio-economic equality are anti-thesis to each other. In the process of planning the choice, therefore, has to be made between the paths of greater distribution or higher growth.

On the other hand, a study of the sectoral composition of national income and per capita incomes shows that the regional levels of inequalities in terms of per capita incomes originating in the non-agricultural sectors are very high compared to per capita income originating from the agricultural sector, e.g. in 1960-61 the weighted variations were 0.4311 and 0.1841 respectively, while the position in 1975-76 was, 0.3577 and 0.3292, for both the sectors, respectively (Table-VI.18). But while in the process of planned development the regional inequalities in non-agricultural incomes clearly shows tendencies of decline, in the agricultural sector, there is no such sign of decline of the levels of inequality, e.g. for the former sector the decline was by -1.24 per cent

per annum, while for the latter it was an increase by 3.95 per cent per annum. Therefore, as has been observed in Chapter-V, the responsibility of a group of agriculturally developed states in accentuating the process of inter-state inequalities of per capita incomes can not be ruled out. Besides, the significance of the so called Green Revolution in the process of increasing regional inequalities has to be duly realised.

The results of the detailed and dis-aggregated study in Chapter-VII supports the point that the diffusion of the HYV technology has helped in removing the intra-regional inequalities in per capita incomes, e.g. in the states of Punjab, Haryana and Rajasthan. The highlights of the comparison of the per capita agricultural output (in value terms) at various regional levels (at two points of time, i.e. one prior to Green Revolution, 1962-65 and the other at a reasonable peak of it, 1970-73), demonstrates a clouded scenario of agricultural development for the traditional rice areas of the country, a large part of which in fact, suffer from a negative rate of growth of per capita incomes, viz. Maharashtra, Andhra Pradesh, Bihar, Orissa etc.. Contrary to this, in a contiguous zone in the north-western plains of Punjab, Haryana, western Uttar Pradesh and parts of

Rajasthan and Gujarat there has been a tremendous growth in the level of agricultural output and incomes. This region happens to be predominantly wheat producing, associated with a relatively, higher concentration of rich pleasantries and concentration^{of}/infrastructural facilities for agriculture, i.e. irrigation and power. Is this position related to the character of the Green Revolution, as has been stridently put forth by a host of economists and sociologists in the last decade, as the 'Capitalist development in Indian agriculture'? There are reasons to believe, that the very nature of capitalist development is responsible for accentuation of unequal spatial development, as happens in the case of localisation of industries (under free enterprise) i.e. the latter agglomerating in concentrated pockets. The process of development under such conditions would be the development in the core (the concentrated agglomeration pockets) and underdevelopment of the periphery. The regional ramifications of the capitalist agriculture calls for a re-evaluation of the 'core-periphery' principle. It is plausible as evident in the analysis carried out in the present study that the group of agriculturally advanced states have acted in manner of a core and have been proved instrumental in the underdevelopment of certain parts of the country, coinciding with the Green Revolution.

It also highlights the cardinal changes in the spatial structure of the national economy; the importance of the core areas around the port towns (the metropolitan enclaves, as argued by Chattopadhyay and Raza) has considerably diminished during this period and an agro-based core in the north-western agricultural belt of India has emerged with far reaching consequences. This calls for also, a re-evaluation of the location principles, particularly, the questions of agglomeration economics applicable to location of agricultural infrastructures, with special reference to 'public investments'.

So far as the per capita income is concerned, significantly enough, there seems to be an increase in the level of inter-regional inequality (as between states or meso-order regions), while the levels of intra-regional inequality (within regions) decline, viz. in case of Punjab, Haryana and Gujarat the weighted coefficient of variations grew negatively at rates of -2.03, -2.90 and -2.35 per cent per annum, respectively (Table-VII.12). On the other hand, these states act manifestly, as accelerators of inter-regional levels of inequality of per capita incomes. This is logically, explainable. When the income distance within a meso-order region is declining due to increase in the per capita incomes of the

component units at a faster rate, the distance between the regions increases leading to a positive trend of the inter-regional levels of inequality, viz. the inter-regional inequality grew at a rate of 3.61 per cent per annum, between 1962-65 and 1970-73. Some of these emergent features have been explained in Chapter-VIII, in terms of the 'concentration hypothesis'.

While analysing the problem of regional inequality in terms of a number of socio-economic indicators of Madhya Pradesh (as a case study), the positions since arrived at, are strongly vindicated. For example, this case study indicates that over the 12 years period (from 1960-61 to 1972-73, on a continuous basis) the intra-regional levels of inequality of the development parameters, reflected in the composite indices have come down at a rate of -2.59 per cent per annum, as shown in Table-IX.8 (the value is lower, -0.65 per cent, in case of the secular trend). It also, indicates that the overall variations in the development parameters of Madhya Pradesh (district-wise) are explained significantly, by indicators like irrigation, power, industries and even, health-care amenities, as derived from the factor loadings on these variables. Moreover the levels of regional inequality between the quartile classes of the indices are invariably,

more than the inequalities within the quartile classes, e.g. in 1960-61 the inter-quartile variation was 0.2954 compared to the intra-quartile variations, of 0.1220, 0.0948, 0.1004 and 0.2207 respectively from I quartile to the IV quartiles. This position has remained more or less similar over the entire period, except for a slightly higher value for the IV quartile in case of a few of the years. Besides, the changing alignments of regional development in the state and patterns of region formation have been highlighted. It indicates that the position of the highly developed districts in the southern Madhya Pradesh (viz. Bilaspur and Raipur) has cardinally changed in favour of a group of districts e.g. Gwalior, Bhind and Morena in the north-western part of the state, between 1960-61 to 1972-73.

The scenario of regional development, their inequality levels and changes which occurred, roughly during the period of green Revolution, seems to be completely compatible with the scenario at the national level; the relation of the 'microcosm' to the 'macrocosm'. For example, the decline of the importance of the traditional industrial states, particularly West Bengal and Tamil Nadu (even, Maharashtra, so far as agricultural income is concerned) are part of the problem of the south. Their

decline seems to have boosted, corollarily the development of the 'north', e.g. the group of agriculturally developed states. The situation in Madhya Pradesh, reflected in the decline of the traditional developed areas of the state in the 'south' and emergence of the group of agriculturally developed districts is very similar to the situation at the national level, as has been elucidated. The tussle seems to be eternal, between the 'north' and the 'south' or the 'core' and the 'periphery'.

Certainly, a process of 'peripheralisation' (in parlance of the Latin American school) can be easily discernible in the regional processes, during the Green Revolution. Many states/regions have either remained abjectly poor and backward (by any yardstick of welfare) or have undergone further underdevelopment. On the other hand, a concentrated few states/regions enjoyed a boom condition, cornering all the available benefits of the so called planned development of the country. Clearly enough, agricultural revolution, if at all, has shown indications towards a continued process of accentuated inter-regional inequality, in the levels of income and standard of living of the people.

The agricultural sector, on which still, the largest share of the Net Domestic Product of the country

hinges on, if, leads to acceleration of the levels of regional inequality (between states and regions) would, naturally, effect the overall levels of regional inequality in the country (which grows at the rate of 1.37 per cent per annum from 1960-61 to 1978-79). Therefore, the public policy measures, e.g. the Industrial Policy Resolution of 1956, or any such measures relating to the non-agricultural sectors could be successful in a limited manner, so far as the objective of reduction of regional inequalities is concerned. It calls for proper evaluation of the existing public policy measures as well as, implementation of the new measures, in relation to the agricultural sector. Particular emphasis is called for the public investment policies in agriculture, pricing of agricultural commodities (for a better balance of the inter-sectoral terms of trade) and issues regarding land reforms. Investments in agricultural research in location specific crops, like rice and extension service programmes are necessary for a desirable reversal in the process of accentuation of the levels of inter-regional inequalities of the country. How this can be achieved, needs further investigation and research at the meso- and micro-regional levels.

APPENDIX - V.A

Net State Domestic Product at Factor Cost
(at 1960-61 prices)

in Rs. crores

States	1960-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69
1. Andhra Pradesh	983	1058	1056	1112	1191	1083	1125	1195	1141
2. Assam	336	336	354	371	388	408	422	439	460
3. Bihar	993	1042	1061	1081	1087	1118	966	1060	1092
4. Gujarat	738	812	806	859	935	868	889	978	911
5. Haryana	245	213	236	259	281	275	304	362	331
6. Himachal Pradesh	67	71	76	80	85	89	91	101	106
7. Jammu & Kashmir	95	97	99	103	110	93	109	117	121
8. Karnataka	667	688	721	752	774	764	836	902	955
9. Kerala	444	450	467	480	492	503	529	505	528
10. Madhya Pradesh	924	933	905	954	1028	901	912	1116	1084
11. Maharashtra	1597	1596	1643	1712	1767	1704	1794	1888	2007
12. Orissa	365	394	432	483	497	449	492	494	521
13. Punjab	411	426	433	461	512	500	538	603	632
14. Rajasthan	627	670	675	657	718	713	744	825	812
15. Tamil Nadu	1111	1108	1138	1161	1201	1174	1213	1272	1294
16. Uttar Pradesh	1799	1839	1839	1836	2048	1997	1947	2114	2167
17. West Bengal	1107	1101	1142	1252	1332	1309	1317	1371	1410
18. Delhi (U.T.)	198	211	218	229	247	254	264	282	297
India (Total)	13,335	13,825	14,103	14,882	16,028	15,234	15,365	16,644	17,112
Vuv (in %)	70.32	69.47	68.20	67.31	67.25	67.95	66.03	65.52	66.60

Contd...

in Rs. crores

States	1969-70	70-71	71-72	72-73	73-74	74-75	75-76	76-77	77-78	78-79
1. Andhra Pradesh	1191	1335	1383	1296	1507	1566	1601	1499	1672	1800
2. Assam	471	479	500	518	529	532	585	591	640	648
3. Bihar	1123	1242	1276	1271	1249	1313	1399	1458	1516	1560
4. Gujarat	998	1117	1153	917	1125	958	1207	1255	1320	1410
5. Haryana	412	437	449	445	456	463	522	564	593	655
6. Himachal Pradesh	101	116	119	120	127	127	141	133	1215	149
7. Jammu & Kashmir	129	133	138	144	157	164	171	184	194	216
8. Karnataka	1001	1087	1105	1038	1212	1197	1231	1130	1319	1351
9. Kerala	554	589	619	633	637	651	659	646	675	692
10. Madhya Pradesh	1153	1233	1324	1273	1309	1297	1357	1299	1504	1424
11. Maharashtra	2064	2129	2197	2125	2390	2549	2697	2861	3028	3135
12. Orissa	530	575	529	569	613	557	653	574	680	715
13. Punjab	681	704	730	753	784	802	855	897	966	1039
14. Rajasthan	874	908	794	742	847	782	885	940	950	1004
15. Tamil Nadu	1351	1469	1542	1550	1621	1409	1583	1585	1765	1954
16. Uttar Pradesh	2311	2421	2282	2417	2306	2407	2620	2658	2835	2932
17. West Bengal	1467	1481	1535	1491	1541	1615	1716	1730	1847	1839
18. Delhi (U.T.)	313	304	330	346	348	369	399	411	431	452
India (Total)	18,202	19,282	19,486	19,235	20,281	20,281	21,998	22,201	23,932	24,890
Vuv (in %)	66.08	65.23	64.33	65.29	63.81	66.73	65.63	67.12	66.28	65.89

Source : C.S.O., Ministry of Planning, Govt. of India, General Compilation Series

APPENDIX - V.B

Percentage share of NSDP by States
(1960-61 to 1978-79)

in % (percentage)

States	1960-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70
1. Andhra Pradesh	7.37	7.65	7.49	7.47	7.43	7.11	7.32	7.18	6.67	6.54
2. Assam	2.52	2.43	2.51	2.49	2.42	2.68	2.75	2.64	2.69	2.59
3. Bihar	7.45	7.54	7.52	7.26	6.78	7.34	6.29	6.37	6.38	6.17
4. Gujarat	5.53	5.87	5.72	5.77	5.83	5.70	5.79	5.88	5.32	5.48
5. Haryana	1.84	1.54	1.67	1.74	1.73	1.81	1.98	2.18	1.93	2.26
6. Himachal Pradesh	0.50	0.51	0.54	0.54	0.53	0.58	0.59	0.61	0.62	0.55
7. Jammu & Kashmir	0.71	0.70	0.70	0.69	0.69	0.61	0.71	0.70	0.71	0.71
8. Karnataka	5.00	4.98	5.11	5.05	4.83	5.02	5.44	5.42	5.58	5.50
9. Kerala	3.33	3.25	3.21	3.23	3.07	3.30	3.44	3.03	3.09	3.04
10. Madhya Pradesh	6.93	6.75	6.42	6.41	6.41	5.91	5.94	6.71	6.33	6.33
11. Maharashtra	11.98	11.54	11.54	11.50	11.02	11.19	11.68	11.34	11.73	11.34
12. Orissa	2.74	2.85	3.06	3.25	3.10	2.95	3.20	2.97	3.04	2.91
13. Punjab	3.08	3.08	3.07	3.10	3.19	3.28	3.50	3.62	3.69	3.74
14. Rajasthan	4.70	4.85	4.79	4.41	4.48	4.68	4.84	4.96	4.75	4.80
15. Tamil Nadu	8.33	8.01	8.07	7.80	7.49	7.71	7.89	7.64	7.56	7.42
16. Uttar Pradesh	13.49	13.30	13.04	12.34	12.78	12.11	12.67	12.70	12.66	12.70
17. West Bengal	8.30	7.96	8.10	8.41	8.31	8.59	8.57	8.24	8.24	8.06
18. Delhi	1.48	1.53	1.55	1.54	1.54	1.67	1.72	1.69	1.74	1.72
India	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Contd..

in % (percentage)

States	1970-71	71-72	72-73	73-74	74-75	75-76	76-77	77-78	78-79
1. Andhra Pradesh	6.92	7.10	6.71	7.43	7.72	7.28	6.75	6.99	7.23
2. Assam	2.48	2.57	2.69	2.61	2.62	2.66	2.66	2.67	2.60
3. Bihar	6.44	6.55	6.61	6.16	6.47	6.36	6.57	6.33	6.27
4. Gujarat	5.79	5.92	4.77	5.55	4.72	5.49	5.65	5.52	5.66
5. Haryana	2.27	2.30	2.31	2.25	2.28	2.37	2.54	2.48	2.63
6. Himachal Pradesh	0.60	0.61	0.62	0.63	0.63	0.64	0.60	0.61	0.60
7. Jammu & Kashmir	0.69	0.71	0.75	0.77	0.81	0.78	0.83	0.81	0.87
8. Karnataka	5.64	5.67	5.40	5.98	5.90	5.60	5.09	5.51	5.43
9. Kerala	3.05	3.18	3.29	3.14	3.21	3.00	2.91	2.82	2.78
10. Madhya Pradesh	6.39	6.79	6.62	6.45	6.40	6.17	5.85	6.28	5.72
11. Maharashtra	11.04	11.27	11.05	11.78	12.57	12.26	12.89	12.65	12.60
12. Orissa	2.98	2.71	2.96	3.02	2.75	2.97	2.59	2.84	2.87
13. Punjab	3.65	3.75	3.91	3.87	3.95	3.89	4.04	4.04	4.17
14. Rajasthan	4.71	4.07	3.86	4.18	3.86	4.02	4.23	3.97	4.03
15. Tamil Nadu	7.62	7.91	8.06	7.99	6.95	7.20	7.14	7.38	7.85
16. Uttar Pradesh	12.56	11.71	12.57	11.37	11.87	11.91	11.97	11.85	11.78
17. West Bengal	7.68	7.88	7.75	7.60	7.96	7.80	7.79	7.72	7.39
18. Delhi	1.58	1.69	1.80	1.72	1.82	1.81	1.85	1.80	1.82
India	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source : Based on C.S.O. data of Appendix - V.A.

Per Capita Net State Domestic Product

(at 1960-61 prices)

In Rs. crores

States	1960-61	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70
1. Andhra Pradesh	275	291	285	294	309	276	281	295	276	283
2. Assam	315	320	322	324	326	330	330	332	340	339
3. Bihar	215	222	222	222	219	221	188	202	205	206
4. Gujarat	362	389	376	391	415	375	375	401	365	389
5. Haryana	327	311	322	333	345	319	343	397	352	427
6. Himachal Pradesh	359	381	342	355	361	326	289	314	331	331
7. Jammu & Kashmir	269	268	267	269	281	232	265	277	279	290
8. Karnataka	285	303	263	280	306	292	330	331	343	352
9. Kerala	265	263	266	267	268	268	275	257	262	269
10. Madhya Pradesh	288	284	270	277	291	241	246	292	277	287
11. Maharashtra	409	399	401	407	410	386	397	408	423	425
12. Orissa	211	222	238	260	261	230	247	243	250	250
13. Punjab	374	376	371	383	413	391	407	443	450	470
14. Rajasthan	318	331	327	311	330	323	331	356	343	359
15. Tamil Nadu	330	324	327	328	333	319	323	332	332	340
16. Uttar Pradesh	246	247	241	236	257	245	239	255	256	269
17. West Bengal	321	312	316	338	351	337	331	337	338	344
18. Delhi (U.T.)	759	773	767	772	798	789	785	803	810	820
India	105.60	309.20	308.20	318.30	335.10	311.00	307.40	325.40	327.40	340.60

Contd..

Contd.. APPENDIX - V.C

In Rs. crores

States	1970-71	71-72	72-73	73-74	74-75	75-76	76-77	78-78	78-79
1. Andhra Pradesh	302	311	285	326	331	332	305	333	351
2. Assam	333	331	333	330	321	343	336	353	346
3. Bihar	222	221	216	207	213	223	227	231	233
4. Gujarat	425	422	327	392	326	401	407	418	436
5. Haryana	437	436	422	422	418	460	485	497	536
6. Himachal Pradesh	337	337	333	345	339	368	340	364	366
7. Jammu & Kashmir	291	291	296	315	320	325	341	351	380
8. Karnataka	375	368	338	386	372	374	335	382	382
9. Kerala	279	285	286	283	284	283	273	280	282
10. Madhya Pradesh	299	311	292	294	285	291	273	309	286
11. Maharashtra	421	427	405	446	466	483	503	522	529
12. Orissa	265	237	250	265	236	272	235	273	282
13. Punjab	472	528	533	544	545	569	585	616	650
14. Rajasthan	410	322	290	320	285	311	318	310	316
15. Tamil Nadu	363	368	364	375	321	355	350	383	418
16. Uttar Pradesh	276	253	261	244	249	265	263	274	277
17. West Bengal	339	339	323	327	336	349	345	361	352
18. Delhi(U.T.)	837	778	786	753	766	795	784	789	793
India	353.00	349.00	337.00	349.10	343.20	366.63	362.17	382.91	390

Source : C.S.O. based on Appendix - V.A.

Net Domestic Product at Factor Cost
at 1960-61 prices

IN Rs. crores

States	1962-63	1963-64	1964-65	1967-68	1968-69	1969-70	1970-71
1. Andhra Pradesh	1181	1209	1331	1277	1217	1274	1350
2. Assam*	437	459	523	615	572	583	558
3. Bihar	1063	1103	1223	1143	1176	1134	1192
4. Gujarat	855	941	999	1011	942	1006	1173
5. Haryana	271	306	323	399	375	467	482
6. Jammu & Kashmir	96	95	108	108	110	120	140
7. Karnataka	777	803	860	1011	1071	1171	1193
8. Kerala	489	518	537	536	562	609	652
9. Madhya Pradesh	827	906	978	1173	1085	1194	1157
10. Maharashtra	1604	1695	1779	1851	1922	1975	2468
11. Orissa	408	478	510	519	568	583	638
12. Punjab	447	478	529	600	621	646	702
13. Rajasthan	598	614	685	860	774	831	1020
14. Tamil Nadu	1225	1305	1326	1379	1422	1269	1483
15. Uttar Pradesh	1988	1836	2073	2043	2066	2197	2371
16. West Bengal	1431	1589	1652	1808	1884	1932	1691
India (Total)							

* Includes Meghalaya

Contd...

States	In Rs. crores				
	1971-72	1972-73	1973-74	1974-75	1975-76
1. Andhra Pradesh	1374	1302	1543	1564	1542
2. Assam*	553	623	606	602	696
3. Bihar	1214	1326	1219	1356	1423
4. Gujarat	1213	922	1097	981	1232
5. Haryana	487	487	489	528	607
6. Jammu & Kashmir	137	157	157	175	160
7. Karnataka	1231	1189	1342	1314	1361
8. Kerala	680	694	707	712	718
9. Madhya Pradesh	1246	1220	1215	1256	1329
10. Maharashtra	2235	2120	2468	2652	2818
11. Orissa	574	618	667	615	754
12. Punjab	719	745	779	802	868
13. Rajasthan	760	711	815	773	878
14. Tamil Nadu	1564	1558	1659	1531	1843
15. Uttar Pradesh	2248	2428	2268	2301	2554
16. West Bengal	1724	1674	1681	1782	1886
India (Total)					

* Source; is the C.S.O., Ministry of Planning, Govt. of India. The above data is strictly comparable, being prepared by CSO from their own sources for the 5th, 6th & the 7th Finance Commissions. Data from 1962-63 to 1964-65 was prepared for the 5th Finance Commission, from 1967-68 to 1969-70 for the 6th Finance Commission and 1970-71 to 1975-76 for the 7th Finance Commission respectively. It may be noted that the general series published by CSO and the present series are same for 1970-71 to 1975-76 and onwards.

APPENDIX - V.E

Population Composition of Indian States and
Union Territories (1961, 1971, 1981)

States/ Union Territories	In Million		
	1961	1971	1981
1. Andhra Pradesh	35.98	43.50	58.40
2. Assam	11.11	14.63	19.90*
3. Bihar	46.45	56.53	69.82
4. Gujarat	20.63	26.70	33.96
5. Haryana	7.59	10.04	12.85
6. Himāchal Pradesh	2.81	3.46	4.24
7. Jammu & Kashmir	3.55	4.62	5.98*
8. Karnataka	23.59	29.30	37.04
9. Kerala	16.90	21.35	25.40
10. Madhya Pradesh	32.36	41.65	52.13
11. Maharashtra	39.54	50.41	62.69
12. Manipur	0.78	1.07	1.43
13. Meghalaya	0.77	1.01	1.33
14. Nagaland	0.37	0.52	0.77
15. Orissa	17.55	21.94	26.27
16. Punjab	11.13	13.55	16.67
17. Rajasthan	20.16	23.77	34.10
18. Sikkim	0.16	-	0.32
19. Tamil Nadu	33.69	41.20	48.30
20. Tripura	1.14	1.56	2.06
21. Uttar Pradesh	73.74	88.34	110.86
22. West Bengal	34.92	44.31	54.49
<u>Union Territories</u>			
23. Arunachal Pradesh	0.34	0.47	0.63
24. Andaman Is.	0.06	0.12	0.19
25. Chandigarh	0.09	0.26	0.45
26. Delhi	2.66	4.07	6.20
27. Mizoram	0.27	0.33	0.49
India (Total)	439.24	547.95	683.81

* Estimated population

Source : Census of India, (1961, 1971 and 1981) Final population tables and the provisional tables respectively

APPENDIX-VII.A

Per Capita Agricultural Incomes, District-wise (1962-65
and 1970-73)

Sl. No.	Districts/ states	PCAI 1962-65 in Rs.	P+CAI 1970-73 in Rs.	A.C.G.R. of 1 & 2 in per cent	C.G.R. of R.P. in per cent	C.G.R. of G.A.O. in per cent
	1	2	3	4	5	6
A.1.	Adilabad	263.96	215.74	-2.49	2.42	-0.13
2.	Anantpur	363.99	290.63	-2.77	1.77	-1.06
3.	Chittor	375.48	390.08	1.09	1.56	2.94
4.	Cudappah	267.14	216.90	-2.57	1.52	-1.10
5.	E. Godavari	364.86	305.70	-2.18	1.61	-0.61
6.	Hyderabad	204.93	103.98	-8.13	2.02	-6.28
7.	Karimnagar	199.90	170.96	-1.93	1.53	-0.44
8.	Khammam	261.07	218.41	-2.20	2.45	0.19
9.	Krishna	485.66	458.95	-0.70	1.33	0.62
10.	Mehboobnagar	274.38	205.40	-3.55	2.08	-1.54
11.	Medak	267.59	163.86	-5.94	1.72	-4.33
12.	Nalgenda	284.39	277.04	-0.32	1.74	1.41
13.	Nizamabad	524.97	304.73	-6.57	2.37	-4.36
14.	Warangal	211.83	186.99	-1.54	2.01	0.43
15.	W. Godavari	548.19	498.81	-0.11	1.62	5.79
16.	Ongole + Nellore +Kurnool + Guntur	330.96	351.22	0.74	1.68	2.44
17.	Srikakulam+Visakhapatnam	313.31	279.65	-1.41	1.14	-0.29
	ANDHRA PRADESH	338.23	294.59	-1.71	1.68	-0.06

Contd..

NB:

PCAI = Per Capita Agricultural Income
ACGR = Annual Compound Growth Rate
RP = Rural Population
GAO = Gross Agricultural output

APPENDIX-VII.A Contd..

	1	2	3	4	5	6
B.1. Cachar	197.01	184.72	-0.80	2.10	1.29	
2. Darrang	264.07	239.87	-1.19	2.80	1.57	
3. Goalpara	233.76	218.85	-0.82	3.60	2.74	
4. Kamrup	226.23	214.11	-0.69	3.17	2.47	
5. Nowgong	258.85	224.24	-1.78	3.30	1.45	
6. Sibsagar	241.21	237.54	-0.19	1.62	1.43	
7. Mikir & North Cachar Hills	190.70	331.72	+ 7.16	4.75	12.27	
8. Lakhimpur + Dibrugarh	173.70	195.65	1.50	2.84	4.39	
ASSAM	225.69	265.05	2.03	0.50	2.54	
C.1. Bhagalpur	175.44	187.56	0.84	2.06	2.91	
2. Champaran	218.12	247.96	1.62	1.61	3.26	
3. Darbhanga	133.04	120.82	-1.20	1.70	1.39	
4. Gaya	212.50	169.64	-2.78	1.99	-0.84	
5. Muzaffarpur	114.07	108.48	-0.63	1.55	0.92	
6. Palamau	142.73	117.07	-2.45	2.40	-0.11	
7. Patna	188.76	179.27	-0.64	1.58	0.92	
8. Purnea	237.69	163.29	-4.58	2.43	-2.27	
9. Ranchi	194.55	194.94	0.03	1.58	1.61	
10. Santhal-Pargana	239.84	169.27	-4.01	1.72	-2.35	
11. Saran	147.21	172.80	2.02	1.79	3.84	
12. Shahabad	255.28	270.82	0.74	1.92	2.69	
13. Singbhum	236.05	207.43	-1.60	1.11	-0.50	
14. Dhanbad+Hazaribagh	138.40	93.00	-4.85	1.22	-3.69	
15. Monghyr + Saharsa	142.56	118.24	-2.31	1.98	-0.39	
BIHAR	179.40	162.66	-1.22	1.78	0.54	

Contd....

APPENDIX-VII.A contd

Sl. No.	1	2	3	4	5	6
D.1.	Ahmedabad	465.1	457.10	-0.22	1.07	0.09
2.	Amreli	714.71	597.85	-2.21	2.61	0.03
3.	Banaskantha	244.45	294.20	2.34	2.15	4.55
4.	Bhabnagar	414.41	395.27	-0.58	2.22	1.62
5.	Bharuch	586.35	377.54	-5.35	1.91	2.26
6.	Jamnagar	529.86	637.70	2.34	3.00	5.41
7.	Junagarh	594.25	614.05	0.41	2.73	3.15
8.	Kheda	398.79	445.69	1.39	2.10	3.53
9.	Kutch	241.62	316.82	3.44	1.24	4.73
10.	Mahesana	275.73	342.96	2.76	2.05	4.88
11.	Panch-mahal	289.90	255.03	-1.58	2.25	-1.30
12.	Rajkot	677.53	578.14	-1.96	3.05	1.03
13.	Sabarkantha	438.77	444.00	0.01	2.36	2.52
14.	Surat	200.28	273.27	3.96	1.12	5.06
15.	Surendranagar	579.77	529.62	-1.01	2.59	1.55
16.	The Dangs	189.97	102.58	-7.41	2.78	-4.83
17.	Vadodara	468.29	400.78	-1.92	1.99	-3.33
	GUJARAT	406.29	395.69	-0.33	2.286	1.95
E.1.	Ambala	259.81	515.03	8.90	-2.12	6.60
2.	Gurgaon	283.51	349.12	2.60	3.00	5.70
3.	Hissar	693.82	748.29	0.90	3.20	4.20
4.	Jind	627.46	638.42	0.20	3.10	3.30
5.	Karnal	553.62	851.72	5.50	3.00	8.60
6.	Mahendergarh	247.25	320.69	3.30	2.30	5.70
7.	Rohtak	288.1	529.18	7.90	2.00	10.10
	HARYANA	461.15	602.07	3.39	2.27	5.73

Contd....

APPENDIX-VII.A contd

Sl. No.	1	2	3	4	5	6
F.1.	Jammu	214.64	318.01	5.04	0.76	5.80
2.	Kashmir	188.75	245.39	3.30	2.19	5.60
3.	Ladakh	27.82	23.50	-2.00	1.38	-0.74
	JAMMU & KASHMIR	193.71	264.64	3.98	1.63	5.67
G.1.	Bangalore	225.69	199.77	-1.51	2.71	1.16
2.	Belgaum	399.80	378.03	-0.69	1.70	0.03
3.	Bellary	504.95	545.68	0.97	1.44	2.43
4.	Bidar	307.68	260.77	-2.04	1.93	-0.02
5.	Bijapur	345.97	268.85	-3.10	1.50	-1.64
6.	Chikmagalur	254.43	276.33	1.03	2.04	3.10
7.	Chitradurga	247.66	357.79	4.70	2.11	6.91
8.	Coorg	398.98	319.05	-2.75	1.32	0.04
9.	Dharwar	424.38	400.15	-0.73	1.18	0.04
10.	Gulburga	337.62	276.94	-2.44	2.00	-0.05
11.	Hassan	246.05	235.79	-0.50	0.70	0.17
12.	Kolar	241.73	229.03	-0.67	1.90	1.21
13.	Mandya	524.74	426.75	2.55	2.22	-0.04
14.	Mysore	269.00	313.50	1.93	2.10	4.17
15.	N. Canara	265.13	220.28	-2.28	2.07	-0.03
16.	Raichur	372.80	565.86	5.35	1.42	6.85
17.	S. Canara	219.50	173.73	-2.88	1.87	-1.10
18.	Shimoga	399.73	501.33	2.87	2.76	5.71
19.	Tumkur	191.77	243.07	3.00	1.58	4.63
	KARNATAKA	361.34	322.98	-1.39	1.82	2.08

contd....

APPENDIX-VII.A contd.

Sl.No	1	2	3	4	5	6
H.1.	Allepy	104.20	110.36	0.72	1.64	2.37
2.	Cannanore	88.24	73.33	-2.28	3.26	0.89
3.	Quilon	44.77	41.66	-0.89	2.15	1.24
4.	Trichur	108.93	100.00	-1.06	2.60	1.51
5.	Trivendrum	47.49	42.56	-1.36	2.30	0.90
6.	Ernakulam + Kottayam +Iddiki	62.62	72.92	1.92	1.73	3.68
7.	Kozhikode + Malappuram + Palghat	143.26	139.67	-0.31	2.28	1.96
	KERALA	92.06	80.59	-0.20	2.23	2.02
I.1.	Balaghat	312.67	318.99	0.30	1.81	2.06
2.	Bastar	331.68	297.67	-1.30	2.49	1.12
3.	Betul	317.63	251.63	-2.90	2.68	-0.28
4.	Bhind	330.26	356.04	0.90	2.00	2.92
5.	Bilaspur	319.91	332.66	0.50	1.62	2.12
6.	Chhatarpur	268.83	264.94	-0.20	1.76	1.58
7.	Chhindwara	293.63	256.12	-1.70	1.83	1.08
8.	Damoh	295.37	280.83	-0.60	2.60	1.95
9.	Datia	312.48	310.90	-1.00	2.45	0.38
10.	Dewas	445.54	381.46	-1.90	2.78	0.81
11.	Dhar	407.35	312.42	-3.30	2.74	-0.61
12.	Durg	334.95	300.19	-1.40	2.27	0.88
13.	Guna	360.30	349.48	-0.40	2.75	2.36
14.	Gwalior	504.82	399.61	-2.96	2.20	-0.73
15.	Hoshangabad	354.00	321.87	-1.20	2.36	1.15
16.	Indore	335.46	390.25	1.90	2.40	4.36
17.	Jabalpur	283.60	256.94	-1.20	2.27	1.01
18.	Jhabua	325.76	164.68	-8.20	2.60	-5.78
19.	Khandwa	273.89	211.08	-3.20	2.60	-0.69
20.	Khargone	481.53	475.63	-0.12	2.40	2.25

Contd.....

APPENDIX-VII.A contd..

Sl.No.	1	2	3	4	5	6
I.21. Mandsaur		367.95	374.44	0.20	2.61	2.77
22. Mandla		213.33	215.96	0.20	2.39	2.55
23. Morena		294.55	353.17	2.30	1.14	3.46
24. Narsimhapur		372.61	341.30	-1.10	2.20	1.09
25. Panna		277.46	269.41	-0.41	2.40	2.02
26. Raigarh		302.09	262.40	-1.80	2.06	0.27
27. Raipur		409.00	394.63	-0.40	2.58	2.20
28. Raisen		365.17	322.31	-1.60	2.97	1.38
29. Rajgarh		325.18	288.07	-1.50	2.22	0.68
30. Ratlam		359.27	304.12	-2.10	2.58	-0.36
31. Rewa		192.06	200.09	0.51	2.22	2.75
32. Sagar		218.18	292.62	2.92	2.68	3.39
33. Sarguja		262.28	238.37	-1.20	1.23	1.01
34. Satna		213.15	217.83	0.30	2.64	2.92
35. Sehore		388.25	340.48	-1.60	2.79	1.11
36. Seoni		293.74	281.75	0.50	2.39	1.86
37. Shahadol		223.52	241.51	1.00	1.64	2.63
38. Shajapur		411.45	408.45	-0.09	2.41	2.32
39. Sidhi		158.22	172.57	1.10	2.93	4.05
40. Sivpuri		307.70	269.71	-1.60	1.55	-0.11
41. Tikamgarh		215.49	245.78	1.70	2.20	3.89
42. Ujjain		433.35	460.88	0.80	2.20	2.99
43. Vidisha		456.52	421.67	-1.00	2.90	1.88
MADHYA PRADESH		326.76	304.49	-0.88	2.29	1.39

Contd.....

APPENDIX-VII.A. Contd..

Sl.No.	1	2	3	4	5	6
J.1.	Ahmednagar	459.57	248.52	-7.39	2.41	-5.15
2.	Akola	360.81	231.95	-5.37	2.16	-3.32
3.	Amravati	415.23	233.06	-6.96	2.06	-5.04
4.	Aurangabad	370.39	147.86	-10.80	2.23	-8.84
5.	Bhandara	278.93	237.34	-1.99	2.18	0.01
6.	Bhir	321.40	126.75	-10.97	2.33	-8.84
7.	Buldhana	353.05	162.56	-9.23	2.30	-7.14
8.	Chandrapur	295.27	232.57	-2.93	2.57	-0.04
9.	Dhulia	338.84	166.40	-8.50	1.92	-0.24
10.	Jalgaon	279.98	170.65	-6.00	1.71	-4.39
11.	Kolaba	240.53	254.32	0.69	1.54	2.25
12.	Kolhapur	348.61	359.56	-0.38	2.23	2.63
13.	Nagpur	289.37	226.57	-2.20	1.96	-0.02
14.	Nanded	321.23	179.09	-7.04	2.38	-3.29
15.	Nasik	217.05	185.47	-1.94	2.04	-1.03
16.	Osmanabad	353.65	162.56	-9.23	2.30	-7.14
17.	Parbhani	323.93	211.71	-5.17	1.98	-3.29
18.	Poona	272.08	156.13	-6.79	1.92	-4.90
19.	Ratnagiri	115.58	119.83	0.45	0.82	1.28
20.	Sangli	386.88	29.49	-6.85	1.89	-5.07
21.	Satara	363.60	209.01	-6.68	1.66	-5.13
22.	Sholapur	369.21	159.46	-9.96	2.02	-8.14
23.	Thana	238.44	161.87	-4.72	2.34	-2.48
24.	Wardha	337.87	282.57	-2.20	1.96	-0.02
25.	Yeotmal	361.79	285.59	-2.91	2.51	-0.48
	MAHARASHTRA	324.96	203.49	-5.68	2.03	-3.77

Contd.....

APPENDIX-VII.A contd.

Sl.No.	1	2	3	4	5	6
K.1.	Balasure	285.07	222.13	-3.10	2.71	-0.46
2.	Boudh-Kandhmal	217.26	182.47	-2.16	1.71	-0.49
3.	Bolangir	350.14	290.89	-2.29	1.45	-0.87
4.	Dhenkanal	370.13	319.11	-1.84	2.38	0.50
5.	Ganjam	272.43	246.10	-1.26	1.71	-0.43
6.	Keonjhar	284.80	224.24	-2.94	2.24	-0.77
7.	Mayurbhanj	294.68	229.66	-3.07	1.72	-1.40
8.	Sambalpur	441.65	407.27	-1.01	1.53	0.52
9.	Sundargarh	326.76	255.11	-3.05	2.42	-0.72
10.	Cuttack + Puri	272.83	209.78	-3.23	2.08	-1.20
11.	Kalahandi + Koraput	366.72	300.62	-2.45	2.19	-0.32
	ORISSA	314.67	261.58	-2.28	2.03	-0.23
L.1.	Amritsar	408.82	662.65	6.20	2.00	8.30
2.	Bhatinda	747.50	1070.80	4.60	2.40	7.10
3.	Ferozpur	694.42	1076.54	5.60	1.60	7.40
4.	Gurdaspur	320.36	551.55	7.00	2.10	9.38
5.	Hoshiarpur	205.03	422.12	9.50	-1.60	7.70
6.	Jullunder	376.20	595.93	6.00	1.50	7.50
7.	Kapurthala	421.32	745.48	7.40	2.20	9.80
8.	Ludhiana	658.47	1001.45	5.40	2.72	8.30
9.	Patiala	513.21	890.72	7.10	1.30	8.50
10.	Rupar	294.07	445.37	5.30	1.80	7.10
11.	Sangrur	497.60	1069.90	10.50	-2.50	7.70
	PUNJAB	479.85	806.76	6.71	1.12	7.91

Contd....

APPENDIX-VII.A contd.

Sl.No.	1	2	3	4	5	6
M.1.	Ajmer	205.49	223.33	1.10	1.59	2.66
2.	Alwar	258.49	387.42	5.20	2.35	7.66
3.	Banswara	334.22	296.37	-1.50	3.27	1.73
4.	Barmer	170.36	265.94	5.70	1.65	7.47
5.	Bharatpur	318.23	425.06	3.70	2.61	6.37
6.	Bhilwara	213.86	253.07	2.10	1.58	3.74
7.	Bikaner	67.29	46.53	-4.50	2.74	-1.89
8.	Bundi	375.10	485.99	3.30	2.97	6.35
9.	Chittaurgarh	278.48	351.54	3.00	2.80	5.84
10.	Churu	133.26	133.02	-0.01	3.16	3.14
11.	Dungarpur	228.36	193.03	-2.10	2.61	0.48
12.	Ganganagar	452.61	705.44	5.70	2.75	8.61
13.	Jaipur	211.51	259.76	2.60	2.16	4.82
14.	Jaisalmer	110.41	45.58	-10.50	1.18	-9.42
15.	Jalor	182.60	334.64	7.90	2.00	10.10
16.	Jhalawar	313.47	289.14	-1.00	2.20	1.17
17.	Jhunjhunu	94.87	97.02	0.30	2.62	2.96
18.	Jodhpur	114.94	225.68	8.80	2.37	11.38
19.	Kota	334.83	396.59	2.10	2.36	4.55
20.	Nagaur	157.73	152.70	-0.40	3.12	2.70
21.	Pali	161.11	242.13	5.20	1.69	7.00
22.	Sawaimadhopur	291.49	334.61	1.70	2.18	3.96
23.	Sikar	127.93	130.65	0.30	2.49	2.76
24.	Sirohi	178.62	225.90	3.00	1.68	4.71
25.	Tonk	405.55	375.38	-1.00	1.99	1.01
26.	Udaipur	208.91	203.94	-0.30	1.95	1.64
	RAJASTHAN	235.09	291.32	2.72	2.32	5.10

Contd....

APPENDIX-VII.A contd.

Sl.No.	1	2	3	4	5	6
N.1.	Chingleput	350.62	436.02	2.76	0.01	2.85
2.	Coimbatore	425.89	400.81	-0.75	1.10	0.35
3.	Kanyakumari	146.29	174.75	2.24	1.86	4.15
4.	Madurai	312.54	322.30	0.38	1.76	2.15
5.	Nilgiris	24.41	26.29	0.93	1.01	1.83
6.	North-Arcot	389.19	378.09	-0.35	1.69	1.32
7.	Ramanathpuram	262.02	249.70	-0.60	1.49	0.88
8.	South Arcot	341.52	450.14	3.51	1.57	5.14
9.	Thanjavur	440.30	558.58	3.02	1.78	4.75
10.	Thiruchirapalli	328.53	332.91	0.16	1.76	1.93
11.	Tirunvelli	271.07	270.11	-0.04	1.44	1.30
12.	Salem + Dharampuri	246.16	236.75	-0.48	1.59	1.10
	TAMIL NADU	329.51	354.94	0.94	1.53	2.47
O.1.	Agra	229.04	231.56	0.41	2.05	2.10
2.	Aligarh	237.55	350.75	4.99	1.60	6.60
3.	Allahabad	190.05	188.61	-0.10	1.85	1.70
4.	Azamgarh	179.16	167.95	-0.80	1.68	0.87
5.	Badaun	280.25	296.47	0.70	1.45	2.10
6.	Bahriach	203.89	212.47	0.52	1.35	1.90
7.	Ballia	159.00	162.21	0.25	1.66	1.90
8.	Banda	349.32	372.37	0.80	2.00	2.80
9.	BaraBanki	256.75	231.79	-1.27	1.90	0.10
10.	Bareilly	317.79	309.18	-0.34	1.85	1.49
11.	Basti	161.33	224.48	4.22	1.21	5.40
12.	Bijnor	430.54	519.61	2.38	2.06	4.40
13.	Bulandsahar	304.99	390.64	3.15	1.70	4.90
14.	Dehradun	231.85	245.20	0.69	2.82	3.50
15.	Deoria	227.88	239.36	0.62	1.65	2.30
16.	Etah	258.30	275.40	0.80	1.90	2.70
17.	Etawah	258.01	282.58	1.15	1.97	3.10

Contd....

APPENDIX-VII.A contd..

Sl.No.	1	2	3	4	5	6
0.18. Faizabad	200.64	199.65	-0.56	1.60	1.50	
19. Farrukabad	275.39	315.61	1.72	0.37	1.30	
20. Fatehpur	249.62	255.76	0.31	1.60	1.90	
21. Ghazipur	169.88	202.38	2.21	1.37	3.60	
22. Gonda	209.41	214.78	0.32	0.97	1.30	
23. Gorakhpur	184.91	201.35	1.07	1.64	2.70	
24. Hamirpur	354.48	405.58	1.69	2.03	3.70	
25. Hardoi	252.18	280.58	1.34	1.56	2.90	
26. Jalāun	385.57	359.02	-0.89	1.95	1.00	
27. Jaunpur	175.64	171.88	-0.27	1.41	1.10	
28. Jhansi	286.49	300.36	0.59	1.75	2.30	
29. Kanpur	273.82	296.27	0.99	2.00	3.00	
30. Kheri	441.97	406.37	-1.04	1.61	0.54	
31. Lucknow	170.88	173.02	0.16	1.63	1.80	
32. Mainpuri	233.31	243.20	0.52	1.93	2.40	
33. Mathura	292.22	364.95	2.82	1.90	4.70	
34. Meerut	354.99	461.91	3.35	1.70	5.10	
35. Mirzapur	231.05	204.09	-1.54	2.10	0.50	
36. Moradabad	371.84	372.78	2.01	1.89	3.90	
37. Muzaffarnagar	479.31	627.12	3.44	2.60	5.60	
38. Nainital	477.72	639.79	3.72	2.90	6.70	
39. pitbhit	455.15	492.19	0.97	2.01	3.00	
40. Pratapgarh	154.58	145.30	-0.77	1.26	0.50	
41. Rai Bareilly	168.61	198.81	2.08	1.36	3.50	
42. Rampur	395.51	375.10	-0.66	2.70	2.00	
43. Saharanpur	439.69	475.60	1.51	2.37	3.90	
44. Shahajahanpur	331.13	285.93	-1.82	1.15	3.00	
45. Sitapur	287.42	266.14	-0.96	1.61	0.60	
46. Sultanpur	187.83	188.53	0.39	1.51	1.60	
47. Unnao	192.66	235.68	2.55	1.91	4.50	
48. Varanasi	184.86	151.29	-2.48	1.67	-0.50	
UTTAR PRADESH	263.05	294.73	1.52	1.41	2.94	

Contd...

APPENDIX-VII.A contd..

Sl.No.	1	2	3	4	5	6
P.1.	Bankura	324.49	382.87	2.09	1.99	4.13
2.	Birbhum	371.32	435.30	2.01	2.07	4.12
3.	Burdwan	318.09	323.19	0.02	1.83	2.04
4.	Cooch Behar	395.74	468.51	2.13	3.34	5.55
5.	Darjeeling	120.87	140.63	1.91	2.28	4.24
6.	Hooghly	224.71	311.21	4.15	2.49	6.74
7.	Howrah	109.21	116.59	0.82	1.47	2.30
8.	Jalpaiguri	268.15	342.95	3.12	2.50	5.71
9.	Malda	231.29	270.90	2.00	2.75	4.81
10.	Midnapore	261.23	273.82	0.59	2.42	2.95
11.	Murshidabad	260.13	353.08	3.89	2.54	6.69
12.	Nadia	323.54	432.58	3.70	2.62	6.62
13.	Purulia	227.75	260.32	1.68	1.50	3.21
14.	24-Parganas	203.18	193.33	-1.62	2.49	1.86
15.	W.Dinajpur	471.89	540.72	1.72	3.35	5.02
	WEST BENGAL	270.28	271.12	0.04	2.38	2.48

APPENDIX-VII.B

Divisionwise Per Capita Agricultural Output (Income)
(1962-65 and 1970-73)

Sl. No.	Micro Natural Regions (Divisions)	in Rs. in 1970-73 prices		PACGR in per cent
		PCAI 1962-65	PCAI 1970-73	
1		2	3	4
1.	Jammu	214.64	318.01	5.04
2.	Kashmir valley	188.75	245.39	3.33
3.	Outer Himalaya (Ladakh)	27.82	23.50	-2.09
4.	Himachal	204.55	220.24	0.93
5.	Darjeeling Himalaya	120.87	140.63	1.91
6.	Assam Hills	190.82	331.72	7.16
7.	Rajasthan Desert	102.10	157.64	5.58
8.	Rajasthan Dry Area	226.28	330.28	4.84
9.	North Punjab Plains	497.04	795.74	6.06
10.	Bisht-Doab	388.81	672.24	7.08
11.	East Punjab Plains	437.23	744.54	6.88
12.	S-W Punjab Plains	524.33	743.68	4.47
13.	Upper Ganga Yamuna Doab	356.26	457.28	3.17
14.	Lower G-Y Doab	246.33	264.76	0.91
15.	V.P. Tarai	236.74	251.68	0.77
16.	Rohilakhand Plains	336.47	364.30	1.00
17.	Oudh	206.90	219.54	0.74
18.	Tirhut Plains (U.P)	172.55	166.31	-0.46
19.	Nr, Bihar Plains	158.37	150.11	-0.67
20.	Magadh Plains	214.03	204.81	-0.55
21.	Duar Plains	324.11	400.04	2.67
22.	Barind Plains	354.08	411.73	1.90
23.	Ganga Delta	240.12	279.91	1.94
24.	Damodar Delta	226.03	257.38	1.64
25.	Brahmaputra valley	231.14	220.52	-0.59
26.	Surma valley	196.99	184.69	-0.80
27.	Arravallis	234.72	188.71	-2.69
28.	Arravalli outlier	283.51	349.12	2.64
29.	Mewar & Bagar	232.03	223.51	-0.47
30.	En. Rajasthan Hills	318.15	372.40	1.99
31.	Chambal Ravines	345.12	358.57	0.48
32.	Trans-Yamuna Arravalli	340.32	420.06	2.67

Contd...

APPENDIX-VII.B contd.

Sl.No.	1	2	3	4
33. N-C Madhya Pradesh		244.56	298.81	2.54
34. Nr-Malwa Uplands		370.99	402.94	1.04
35. Malwa Plateau		373.78	326.71	-1.67
36. Vindhyas		312.55	320.96	0.33
37. Rewa Plateau		302.55	251.04	-2.31
38. Kaimur Hills		231.05	204.09	-1.54
39. Narmada Valley		324.82	294.87	-1.20
40. Wn.Satpuras		404.07	374.99	-0.93
41. Cn. Satpuras		327.07	270.98	-2.32
42. Fn.Satpuras		266.52	269.93	0.16
43. Baghalkhand Plateau		163.46	177.59	1.04
44. Chhatishgarh		343.58	331.41	-0.45
45. Dandakaranya		331.68	297.67	-1.34
46. W-W Orissa Hills		321.76	272.14	-2.07
47. N-E Orissa Hills		339.93	299.47	-1.57
48. Chhotanagpur Plateau		195.94	178.67	-1.15
49. Gondwana Trough		138.39	93.00	-4.85
50. Rajmahal Hills		239.85	169.28	-4.26
51. Ranchi Penepplain		227.76	260.30	1.68
52. Rarh		333.19	368.86	1.27
53. Khandosh		306.74	168.71	-7.20
54. Nasik Basin		217.06	185.45	-1.20
55. Vidarbha		372.86	236.74	-5.52
56. Mahakosala		294.61	239.62	-2.55
57. Marathawada		341.32	164.98	-8.69
58. Wn. Ghat		366.93	226.10	-5.87
59. Telengana Plateau		269.45	277.95	0.39
60. Raelsuma Plateau		342.44	309.73	-1.25
61. Inland Karnataka		411.22	388.08	-0.72
62. Nn-Maidan		335.61	270.40	-2.66
63. Cn-Maidan		426.42	557.66	3.41
64. Sn-Maidan		332.25	279.30	-2.15
65. Malnad		291.29	281.90	-0.41
66. Nilgiris		224.41	26.29	0.93
67. Coimbatore Plateau		246.33	327.87	3.64
68. Katih		241.62	316.82	3.45
69. Kanthadesh		338.10	367.00	1.03
70. Kathiawar		507.35	504.11	-0.08
71. Gujarat Plains		398.18	373.37	-0.80
72. The Dangs		189.97	102.58	-7.41

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APPENDIX-VII.B contd.

Sl.No.	2	3	4
73. Nn-Konkan	238.44	161.87	-4.73
74. Sn-Konkan	179.77	170.81	-0.64
75. Canara Coast	248.31	291.44	2.02
76. Malabar Coast	55.24	49.72	-1.31
77. Kerala Coastal Plains	60.24	61.76	0.31
78. Nagarcoil valley	146.29	174.75	2.25
79. Dry S-E Tamil Nadu	266.63	260.03	-0.31
80. Coromandel coast	366.36	445.97	2.49
81. Andhra coast	357.87	347.19	-0.38
82. Orissa Coast	275.60	212.67	-3.19

Sources: Ministry of Agriculture, Govt. of India and
 Courtesy G.S. Bhalla, op.cit., recasted on
 the classification of A Mitra, op.cit.

APPENDIX-VII.C

Unweighted and Weighted Coefficient of Variations of Per Capita Agricultural Output (Incomes) (1962-65 and 1970-73)*

Natural Divisionwise

Sl. No.	Divisions	Vuw			Vw		
		1962-65	1970-73	%ACGR	1962-65	1970-73	% ACGR
	1	2	3	4	5	6	7 **
1.	Jammu Uplands	-	-	-	-	-	-
2.	Kashmir valley	-	-	-	-	-	-
3.	Outer Himalayas (Ladakh)	-	-	-	-	-	-
4.	Himachal Himalayas	-	-	-	-	-	-
5.	Darjeeling Himalayas	-	-	-	-	-	-
6.	Assam Hills	-	-	-	-	-	-
7.	Rajasthan Deserts	0.2201	0.7994	17.49	0.2159	0.9562	20.44
8.	Rajasthan Dry Areas	0.5233	0.6258	2.26	0.5864	0.7029	2.29
9.	North Punjab Plains	0.3038	0.2579	-2.03	0.3505	0.2956	-2.11
10.	Bisht-Doab	0.4524	0.3606	-2.80	0.3322	0.3554	0.85
11.	East Punjab Plains	0.3199	0.2923	-1.10	0.3327	0.2821	-2.04
12.	S-W Punjab Plains	0.3722	0.3747	0.08	0.3663	0.3402	-0.92
13.	Upper Ganga Yamuna Doab	0.2418	0.2055	-2.01	0.2282	0.1933	-2.05
14.	Lower G-Y Doab	0.1144	0.1769	5.60	0.1277	0.1847	4.72
15.	U.P. Tarai	0.3971	0.3564	-1.34	0.2959	0.2819	-0.60
16.	Rohilakhand Plains	0.1482	0.2220	5.18	0.1453	0.2176	5.18
17.	Oudh	0.0679	0.1566	11.01	0.1668	0.1546	-0.94
18.	Tirhut Plains(U.P)	0.6306	0.1099	-19.62	0.6214	0.1001	-20.41
19.	Nn.Bihar Plains	0.2763	0.3079	1.36	0.2627	0.2915	1.31
20.	Magadh Plains	0.1459	0.1999	4.01	0.1444	0.2150	5.10
21.	Duar Plains	0.1922	0.1547	-2.68	0.1922	0.1547	-2.68
22.	Barind Plains	0.3422	0.3324	-0.36	0.3422	0.3324	-0.36

contd....

APPENDIX-VII .C contd.

Sl.No.	1	2	3	4	5	6	7
23. Ganga Delta	0.1874	0.3049	6.27	0.1944	0.3350	7.04	
24. Damodar Delta	0.3266	0.3606	1.25	0.3131	0.2917	-0.88	
25. Brahmaputra valley	0.1271	0.0672	-7.66	0.1241	0.0657	-7.64	
26. Surma Valley	-	-	-	-	-	-	
27. Arravallis	0.3802	0.3904	0.33	0.3270	0.3069	-0.79	
28. Mewar & Bagar	-	-	-	-	-	-	
29. Arravalli Outlier	0.2466	0.1750	-4.20	0.2159	0.1670	-3.16	
30. En.Rajasthan Hills	0.1076	0.1883	7.25	0.1016	0.1602	5.86	
31. Chambal Ravines	0.2337	0.0884	-11.44	0.2154	0.0608	-13.61	
32. Trans.Yamuna Arravallis	0.1046	0.1058	0.14	0.1035	0.1080	0.53	
33. N-C Madhya Pradesh	0.1101	0.0375	-12.60	0.1101	0.0375	-12.60	
34. Nn.Malwa Upland	0.0787	0.1288	6.35	0.0787	0.1288	6.35	
35. Malwa Plateau	0.1159	0.2385	9.44	0.1130	0.2397	9.86	
36. Vindhya	0.2366	0.1500	-5.54	0.2509	0.1475	-6.42	
37. Rewa Plateau	0.1596	0.1283	-2.69	0.1453	0.1149	-2.89	
38. Kaimar Hills	-	-	-	-	-	-	
39. Narmada valley	0.1138	0.1176	-0.41	0.1229	0.1271	0.42	
40. Wn.Satpuras	0.2749	0.3852	4.31	0.2749	0.3852	4.31	
41. Sn.Satpuras	0.3743	0.0504	-22.17	0.3666	0.0491	-22.22	
42. En.Satpuras	0.1889	0.1926	0.24	0.1889	0.1926	0.24	
43. Baghelkhand Plateau	0.2000	0.1461	-3.85	0.1975	0.1418	-4.06	
44. Chhatiahar	0.1191	0.1505	2.97	0.1206	0.1476	2.56	
45. Dandakaranya	-	-	-	-	-	-	
46. N-W Orissa Hills	0.2000	0.1830	-1.10	0.1855	0.1581	-1.98	
47. N-E Orissa Hills	0.1669	0.2400	4.65	0.1798	0.2621	4.82	
48. Chhotanagpur Plateau	0.1998	0.2309	1.82	0.1865	0.2213	2.16	
49. Gondwana Trough	-	-	-	-	-	-	
50. Rajmahal Hills	-	-	-	-	-	-	
51. Ranchi Penneplain	-	-	-	-	-	-	

contd...

APPENDIX-VII.C contd.

Sl.No.	1	2	3	4	5	6	7
52. Rarh	0.0702	0.1204	6.98	0.0670	0.1253	8.14	
53. Khandesh	0.0951	0.0126	-22.33	0.0951	0.0126	-22.33	
54. Nasik Basin	-	-	-	-	-	-	
55. Vidarbha	0.0665	0.1914	14.13	0.0662	0.1905	14.12	
56. Mahakosala	0.0747	0.0905	2.43	0.0646	0.0741	1.73	
57. Marathawada	0.0599	0.1738	14.24	0.0619	0.1653	13.06	
58. Wn.Ghats	0.1507	0.3006	9.01	0.1617	0.3023	8.13	
59. Telengana Plateau	0.3349	0.2757	-2.40	0.3052	0.2566	-2.14	
60. Raelseema Plateau	0.1448	0.2372	6.36	0.1384	0.2376	6.99	
61. Inland Karnataka	0.0298	0.0284	-0.60	0.0298	0.0284	-0.60	
62. Nn.Maidan	0.0498	0.0246	-8.44	0.0450	0.0229	-8.10	
63. Cn. Maidan	0.1506	0.0182	-23.21	0.1506	0.0182	-23.21	
64. Sn.Maidan	0.4218	0.2967	-4.30	0.4351	0.2873	-5.06	
65. Malnad	0.2244	0.2767	2.65	0.2251	0.2883	3.14	
66. Nilgiris	-	-	-	-	-	-	
67. Coimbatore Plateau	0.2023	0.1891	-0.84	0.2107	0.1995	-0.68	
68. Kutch	-	-	-	-	-	-	
69. Kanthadesh	0.2844	0.2029	-4.13	0.2844	0.2029	-4.13	
70. Kathiawar	0.2612	0.2008	-3.23	0.2971	0.2270	-3.31	
71. Gujarat Plains	0.3145	0.2129	-4.76	0.2870	0.2076	-3.97	
72. The Dangs	-	-	-	-	-	-	
73. Nn. Konkan	-	-	-	-	-	-	
74. Sn.Konkan	0.3508	0.3595	0.31	0.3508	0.3595	0.31	
75. Canara Coast	0.0942	0.1181	2.87	0.0942	0.1181	2.87	
76. Malabar coast	0.2377	0.3115	3.44	0.2377	0.3115	3.44	
77. Kerala Coastal plains	0.3754	0.3864	0.36	0.3488	0.3546	0.21	
78. Nagarcoil valley	-	-	-	-	-	-	
79. Dry S-E Tamil Nadu	0.0170	0.0393	11.04	0.0170	0.0393	11.04	
80. Coromandel coast	0.1206	0.1799	5.13	0.1244	0.1883	5.32	
81. Andhra coast	0.2255	0.2263	0.04	0.2274	0.2354	0.43	
82. Orissa coast	0.0219	0.286	3.39	0.0299	0.0286	3.39	

*Based on Appendix VII.B.

**Divisions with blank space indicate that the divisions contain only one dist. and therefore, coefficients of variations cannot be estimated.

APPENDIX-D(1)

Statewise Projected Rural Population and Share in
India's Population(1962-65 and 1970-73)*

Sl. No.	States	in million			
		Population 1962-65	% share	Population 1970-73	% share
1		2	3	4	5
1.	Andhra Pradesh	30.92	8.10	35.33	8.00
2.	Assam	13.12	3.44	13.66	3.09
3.	Bihar	44.33	11.61	51.05	11.55
4.	Gujarat	16.14	4.23	19.34	4.38
5.	Haryana	6.95	1.82	8.32	1.88
6.	Himachal Pradesh	2.72	0.71	3.24	0.73
7.	Jammu & Kashmir	3.32	0.87	3.78	0.86
8.	Karnataka	19.33	5.06	22.32	5.05
9.	Kerala	15.11	3.96	18.02	4.08
10.	Madhya Pradesh	29.30	7.67	35.12	7.95
11.	Maharashtra	29.78	7.79	34.93	7.91
12.	Orissa	17.24	4.51	20.24	4.58
13.	Punjab	95.02	2.49	10.39	2.35
14.	Rajasthan	17.80	4.66	21.39	4.84
15.	Tamil Nadu	25.58	6.70	28.88	6.54
16.	Uttar Pradesh	68.30	17.89	76.39	17.29
17.	West Bengal	27.85	7.29	33.62	7.61
18.	INDIA (Total)	381.84	100.00	441.80	100.00

Source: Final Population Tables, 1961 and 1971,
Census of India, Govt. of India, New Delhi.

* Rural Population figures have been projected by annual compound growth rates to the mid-years of the trienniums, 1962-65 and 1970-73.

APPENDIX-D(ii)

Regionwise Projected Rural Population and Share in India's Population
(1962-65 and 1970-73)*

Sl. No.	Code	Natural regions	Population 1962-65	% share	Population 1970-73	% share
1	2		3	4	5	6
1.	(1.1)	Western Himalayas	6.11	1.60	7.03	1.59
2.	(1.2)	Eastern Himalayas	0.51	0.13	0.61	0.14
3.	(1.3)	North Eastern Ranges	0.32	0.08	0.46	0.10
4.	(2.1)	Rajasthan Plains	5.30	1.39	6.41	1.45
5.	(2.2)	Punjab Plains	15.33	4.02	17.28	3.91
6.	(2.3)	Uttar Pradesh Plains	69.02	15.72	68.43	15.49
7.	(2.4)	Bihar Plains	33.70	8.83	39.03	8.83
8.	(2.5)	West Bengal Plains	20.37	5.33	24.90	5.64
9.	(2.6)	Assam valleys	10.41	2.73	13.00	2.94
10.	(3.1)	Rajasthan Hills and Plateaus	13.51	3.54	20.95	4.74
11.	(3.2)	Bundelkhand	6.14	1.61	7.11	1.61
12.	(3.3)	Malwa	5.40	1.42	6.53	1.48
13.	(3.4)	Vindhyan Ranges - and Plateaus	5.37	1.41	6.68	1.51
14.	(3.5)	Central Madhya Pradesh	16.79	4.40	19.80	4.48
15.	(3.6)	Orissa Hills & Plateaus	11.23	2.94	12.82	2.90
16.	(3.7)	South Bihar Hills & Plateaus	10.64	2.79	12.02	2.72
17.	(3.8)	West Bengal Uplands	6.97	1.83	8.08	1.83
18.	(4.1)	Maharashtra Deccan	25.80	6.76	30.55	6.91

contd....

APPENDIX-D(ii) contd.

Sl.No.	1	2	3	4	5	6
19.	(4.2)	Andhra Deccan	15.23	3.99	17.68	4.00
20.	(4.3)	Mysore Deccan	16.39	4.29	20.06	4.54
21.	(4.4)	Tamil Nadu Hills & Uplands	11.05	2.89	12.45	2.82
22.	(5.1)	Kutch & Kathiawar	8.00	2.09	9.79	2.21
23.	(5.2)	Gujarat Plains & Dangs	8.10	2.12	9.37	2.12
24.	(5.3)	Konkan Coastal Lowlands	3.92	1.03	4.41	1.00
25.	(5.4)	Konkan-Kerala - Transition	1.94	0.51	2.26	0.51
26.	(5.5)	Kerala Coastal Plains - and Ghats	15.11	3.96	18.02	4.08
27.	(6.1)	Tamil Nadu Coastal Plains	14.66	3.84	16.43	3.72
28.	(6.2)	Andhra Coastal Plains	14.03	3.67	15.81	3.58
29.	(6.3)	Orissa Coastal Plains	6.22	1.63	7.42	1.68
30.		INDIA	381.84	100.00	441.80	100.00

Source: Same as in Appendix-D(i).

* Rural population figures are projected by compound growth rates to mid-years of 1962-65 and 1970-73 and aggregated from district levels.

APPENDIX-VIII.A

Index Numbers Whole-sale Prices
(1965-66 to 1973-74)

1961-62 = 100

Sl. No.	Years	Agri.	Food Articles		Manufacturing		All Commodities	Selected Commodities					
		Commo- dities	Total	Food grains	Total	Inputs		Finished goods	Rice	Wheat	Coal	Raw jute	Iron & Steel
	1	2	3	4	5	6	7	8	9	10	11	12	13
1.	1965-66	142	145	154	118	125	116	131.6	137	149	122	127	121
2.	1966-67	167	171	183	128	140	124	149.9	169	178	128	141	126
3.	1967-68	188	208	228	131	147	127	167.3	200	214	148	102	137
4.	1968-69	179	197	201	134	145	132	165.4	196	204	161	157	145
5.	1969-70	195	197	208	144	160	140	171.6	196	215	161	139	151
6.	1970-71	201	204	207	155	179	149	181.1	201	209	168	141	164
7.	1971-72	200	210	215	167	197	160	188.4	204	208	171	131	174
8.	1972-73	220	240	248	177	212	168	207.1	231	222	178	147	198
9.	1973-74	281	296	296	206	268	190	254.0	283	226	190	134	227
10.	Dec.1974	354	369	409	255	303	243	316.9	343	402	263	149	282

Source: Ministry of Finance, Govt. of India,
Economic Survey 1974-75, New Delhi.

APPENDIX-IX.A

Correlation Matrix of Original 14 Variables(1968-69)*

in Symmetry

Sl.No. Variables

1.	x_1	1.00																
2.	x_2	0.82	1.00															
3.	x_3	-0.55	-0.40	1.00														
4.	x_4	-0.48	-0.36	0.59	1.00													
5.	x_5	-0.28	-0.45	0.23	0.61	1.00												
6.	x_6	0.16	-0.14	-0.19	0.15	0.68	1.00											
7.	x_7	0.06	-0.15	-0.21	0.16	0.33	0.72	1.00										
8.	x_8	-0.48	-0.60	0.22	0.14	0.40	0.49	0.04	1.00									
9.	x_9	-0.41	-0.55	0.10	0.10	0.34	0.61	0.53	0.86	1.00								
10.	x_{10}	0.18	0.23	0.04	-0.15	-0.09	0.08	-0.26	-0.15	-0.11	1.00							
11.	x_{11}	-0.31	-0.48	0.33	0.10	0.28	0.36	0.25	0.68	0.60	-0.17	1.00						
12.	x_{12}	0.36	0.16	-0.38	-0.20	-0.04	0.35	0.26	0.17	0.24	0.08	0.00	1.00					
13.	x_{13}	0.39	0.34	-0.35	-0.09	-0.33	0.12	0.29	-0.32	-0.25	-0.22	-0.33	0.25	1.00				
14.	x_{14}	-0.36	-0.56	0.00	0.19	0.43	0.50	0.43	0.58	0.58	-0.46	0.63	-0.05	-0.19	1.00			

*Based on original variables supplied by the
Directorate of Economics and Statistics, Govt.
of Madhya Pradesh, op.cit.

APPENDIX-IX.B

Correlation Matrix of the Traditional Sector : Block-A
(1960-61 to 1972-73)

in Symmetry

Sl. No.	Variables									
		<u>1960-61</u>								
1.	x ₁	1.00								
2.	x ₂	0.61	1.00							
3.	x ₆	0.22	-0.14	1.00						
4.	x ₇	0.22	-0.15	0.37	1.00					
5.	x ₁₀	0.16	0.14	0.11	-0.12	1.00				
6.	x ₁₂	0.23	0.00	0.34	0.27	0.22	1.00			
7.	x ₁₃	0.23	0.64	0.38	0.54	0.01	0.45	1.00		
		<u>1961-62</u>								
1.	x ₁	1.00								
2.	x ₂	0.71	1.00							
3.	x ₆	0.08	-0.14	1.00						
4.	x ₇	0.20	-0.10	0.29	1.00					
5.	x ₁₀	0.18	0.19	-0.01	0.32	1.00				
6.	x ₁₂	0.20	0.05	0.11	0.20	0.22	1.00			
7.	x ₁₃	0.27	0.21	-0.20	0.43	-0.17	0.43	1.00		
		<u>1962-63</u>								
1.	x ₁	1.00								
2.	x ₂	0.70	1.00							
3.	x ₆	0.28	-0.05	1.00						
4.	x ₇	0.25	-0.14	0.40	1.00					
5.	x ₁₀	0.14	0.21	0.02	-0.23	1.00				
6.	x ₁₂	0.22	0.01	0.46	0.27	0.19	1.00			
7.	x ₁₃	0.32	0.21	0.37	0.43	-0.12	0.40	1.00		

Contd....

Sl.

No. variables

		<u>1963-64</u>							
1.	x_1	1.00							
2.	x_2	0.72	1.00						
3.	x_6	0.33	0.04	1.00					
4.	x_7	0.26	-0.10	0.44	1.00				
5.	x_{10}	0.21	0.07	0.30	-0.25	1.00			
6.	x_{12}	0.28	0.06	0.36	0.37	0.19	1.00		
7.	x_{13}	0.31	0.25	0.13	0.46	-0.13	0.28	1.00	
		<u>1964-65</u>							
1.	x_1	1.00							
2.	x_2	0.77	1.00						
3.	x_6	0.11	-0.18	1.00					
4.	x_7	0.30	-0.03	0.42	1.00				
5.	x_{10}	0.14	0.04	0.21	0.01	1.00			
6.	x_{12}	0.28	0.06	0.32	0.37	0.30	1.00		
7.	x_{13}	0.30	0.25	0.14	0.43	0.02	0.31	1.00	
		<u>1965-66</u>							
1.	x_1	1.00							
2.	x_2	0.70	1.00						
3.	x_6	0.26	0.04	1.00					
4.	x_7	0.25	-0.04	0.47	1.00				
5.	x_{10}	0.27	0.32	0.05	-0.04	1.00			
6.	x_{12}	0.31	0.06	0.42	0.25	0.25	1.00		
7.	x_{13}	0.25	0.28	0.23	0.37	0.19	0.28	1.00	

Contd.....

Sl. No. variables		<u>1966-67</u>							
1.	x ₁	1.00							
2.	x ₂	0.79	1.00						
3.	x ₆	0.40	0.16	1.00					
4.	x ₇	0.25	0.11	0.29	1.00				
5.	x ₁₀	0.22	0.36	0.01	-0.15	1.00			
6.	x ₁₂	0.31	0.13	0.42	0.11	0.23	1.00		
7.	x ₁₃	0.34	0.33	0.36	0.35	0.17	0.34	1.00	
		<u>1967-68</u>							
1.	x ₁	1.00							
2.	x ₂	0.81	1.00						
3.	x ₆	0.37	0.09	1.00					
4.	x ₇	0.11	-0.14	0.26	1.00				
5.	x ₁₀	0.13	0.30	-0.05	-0.24	1.00			
6.	x ₁₂	0.37	0.12	0.42	0.19	0.10	1.00		
7.	x ₁₃	0.39	0.34	0.22	0.34	-0.13	0.26	1.00	
		<u>1968-69</u>							
1.	x ₁	1.00							
2.	x ₂	0.82	1.00						
3.	x ₆	0.39	0.10	1.00					
4.	x ₇	0.07	-0.15	0.15	1.00				
5.	x ₁₀	0.18	0.23	0.08	-0.26	1.00			
6.	x ₁₂	0.36	0.16	0.35	0.26	0.11	1.00		
7.	x ₁₃	0.39	0.34	0.12	0.29	-0.21	0.27	1.00	

Contd.....

Sl.No. variables

		<u>1969-70</u>							
1.	x ₁	1.00							
2.	x ₂	0.83	1.00						
3.	x ₆	0.37	0.09	1.00					
4.	x ₇	0.08	-0.20	0.21	1.00				
5.	x ₁₀	-0.02	0.06	0.01	-0.31	1.00			
6.	x ₁₂	0.34	0.15	0.42	0.26	0.01	1.00		
7.	x ₁₃	0.40	0.31	0.26	0.27	-0.36	0.27	1.00	
		<u>1970-71</u>							
1.	x ₁	1.00							
2.	x ₂	0.83	1.00						
3.	x ₆	-0.10	-0.33	1.00					
4.	x ₇	0.15	-0.16	0.71	1.00				
5.	x ₁₀	0.01	0.08	-0.20	-0.22	1.00			
6.	x ₁₂	0.38	0.16	0.28	0.31	0.02	1.00		
7.	x ₁₃	0.40	0.32	-0.09	0.22	-0.36	0.23	1.00	
		<u>1971-72</u>							
1.	x ₁	1.00							
2.	x ₂	0.52	1.00						
3.	x ₆	0.28	0.01	1.00					
4.	x ₇	0.22	-0.20	0.40	1.00				
5.	x ₁₀	-0.06	0.13	-0.24	-0.24	1.00			
6.	x ₁₂	0.16	0.15	0.35	0.21	-0.02	1.00		
7.	x ₁₃	0.36	0.31	0.29	0.24	-0.35	0.30	1.00	
		<u>1972-73</u>							
1.	x ₁	1.00							
2.	x ₂	0.69	1.00						
3.	x ₈	0.26	0.18	1.00					
4.	x ₇	0.02	-0.12	0.68	1.00				
5.	x ₁₀	0.30	0.31	-0.44	-0.41	1.00			
6.	x ₁₂	0.33	0.27	0.33	0.18	0.18	1.00		
7.	x ₁₃	0.19	0.11	0.18	0.20	-0.10	0.13	1.00	

APPENDIX-IX.C

Correlation Matrices of the Modern Sectors : Block - B.
(1960-61 to 1972-73)

in Symmetry

Sl.No. Variables

		<u>1960-61</u>							
1.	x ₃	1.00							
2.	x ₄	0.51	1.00						
3.	x ₅	0.02	0.62	1.00					
4.	x ₈	0.25	0.11	0.14	1.00				
5.	x ₉	-0.03	0.06	0.21	0.83	1.00			
6.	x ₁₁	0.32	0.08	0.00	0.73	0.52	1.00		
7.	x ₁₄	0.10	-0.02	-0.34	0.35	0.40	0.39	1.00	
		<u>1961-62</u>							
1.	x ₃	1.00							
2.	x ₄	0.50	1.00						
3.	x ₅	0.33	0.58	1.00					
4.	x ₈	0.25	0.11	0.25	1.00				
5.	x ₉	0.05	0.07	0.16	0.85	1.00			
6.	x ₁₁	0.33	0.08	0.21	0.74	0.56	1.00		
7.	x ₁₄	0.13	-0.01	-0.06	0.48	0.48	0.50	1.00	
		<u>1962-63</u>							
1.	x ₃	1.00							
2.	x ₄	0.64	1.00						
3.	x ₅	-0.20	0.15	1.00					
4.	x ₈	0.25	0.13	0.21	1.00				
5.	x ₉	0.02	-0.03	0.23	0.85	1.00			
6.	x ₁₁	0.34	0.14	0.18	0.77	0.59	1.00		
7.	x ₁₄	0.17	0.03	0.05	0.53	0.46	0.55	1.00	

Contd....

APPENDIX-IX.C contd.

in Symmetry

Sl.No. variables

		<u>1963-64</u>							
1.	x ₃	1.00							
2.	x ₄	0.58	1.00						
3.	x ₅	0.17	0.53	1.00					
4.	x ₈	0.24	0.12	0.37	1.00				
5.	x ₉	0.03	0.03	0.25	0.87	1.00			
6.	x ₁₁	0.34	0.12	0.25	0.77	0.61	1.00		
7.	x ₁₄	0.09	0.06	0.03	0.55	0.48	0.58	1.00	
		<u>1964-65</u>							
1.	x ₃	1.00							
2.	x ₄	0.52	1.00						
3.	x ₅	0.28	0.68	1.00					
4.	x ₈	0.26	0.15	0.42	1.00				
5.	x ₉	0.04	0.04	0.23	0.81	1.00			
6.	x ₁₁	0.37	0.10	0.33	0.72	0.59	1.00		
7.	x ₁₄	0.14	0.13	0.37	0.54	0.44	0.56	1.00	
		<u>1965-66</u>							
1.	x ₃	1.00							
2.	x ₄	0.59	1.00						
3.	x ₅	-0.23	0.29	1.00					
4.	x ₈	0.03	0.07	-0.04	1.00				
5.	x ₉	-0.02	0.05	0.07	0.84	1.00			
6.	x ₁₁	0.22	0.09	-0.10	0.66	0.59	1.00		
7.	x ₁₄	-0.08	0.13	0.08	0.60	0.48	0.60	1.00	

Contd.....

Sl.No. Variables

				<u>1966-67</u>					
1.	x ₃	1.00							
2.	x ₄	0.66	1.00						
3.	x ₅	-0.01	0.41	1.00					
4.	x ₈	0.08	0.14	0.29	1.00				
5.	x ₉	-0.08	0.05	0.18	0.87	1.00			
6.	x ₁₁	0.18	0.09	0.18	0.68	0.58	1.00		
7.	x ₁₄	0.12	0.17	0.22	0.59	0.48	0.63	1.00	
				<u>1967-68</u>					
1.	x ₃	1.00							
2.	x ₄	0.59	1.00						
3.	x ₅	0.22	0.58	1.00					
4.	x ₈	0.17	0.10	0.32	1.00				
5.	x ₉	0.03	0.04	0.24	0.87	1.00			
6.	x ₁₁	0.28	0.07	0.21	0.70	0.60	1.00		
7.	x ₁₄	0.09	0.18	0.38	0.59	0.43	0.64	1.00	
				<u>1968-69</u>					
1.	x ₃	1.00							
2.	x ₄	0.59	1.00						
3.	x ₅	0.23	0.61	1.00					
4.	x ₈	0.21	0.14	0.40	1.00				
5.	x ₉	0.10	0.10	0.34	0.88	1.00			
6.	x ₁₁	0.33	0.10	0.28	0.71	0.60	1.00		
7.	x ₁₄	0.00	0.19	0.43	0.67	0.62	0.64	1.00	
				<u>1969-70</u>					
1.	x ₃	1.00							
2.	x ₄	0.51	1.00						
3.	x ₅	0.23	0.53	1.00					
4.	x ₈	0.21	0.23	0.52	1.00				
5.	x ₉	0.06	0.10	0.32	0.85	1.00			
6.	x ₁₁	0.42	0.18	0.39	0.66	0.47	1.00		
7.	x ₁₄	-0.08	0.08	0.38	0.46	0.53	0.37	1.00	

contd.....

Sl.No. Variables

		<u>1970-71</u>						
1.	x ₃	1.00						
2.	x ₄	0.48	1.00					
3.	x ₅	0.45	0.52	1.00				
4.	x ₈	0.31	0.18	0.56	1.00			
5.	x ₉	0.11	0.10	0.38	0.85	1.00		
6.	x ₁₁	0.40	0.09	0.19	0.36	0.36	1.00	
7.	x ₁₄	0.06	0.23	0.41	0.63	0.50	0.09	1.00
		<u>1971-72</u>						
1.	x ₃	1.00						
2.	x ₄	0.40	1.00					
3.	x ₅	-0.02	0.49	1.00				
4.	x ₈	-0.04	0.11	0.50	1.00			
5.	x ₉	0.03	0.11	0.37	0.70	1.00		
6.	x ₁₁	0.08	0.01	0.03	0.06	0.03	1.00	
7.	x ₁₄	0.00	0.05	0.10	0.13	0.09	0.97	1.00
		<u>1972-73</u>						
1.	x ₃	1.00						
2.	x ₄	0.03	1.00					
3.	x ₅	-0.04	0.49	1.00				
4.	x ₈	-0.19	0.06	0.34	1.00			
5.	x ₉	-0.15	0.08	0.35	0.71	1.00		
6.	x ₁₁	0.09	0.14	0.09	0.26	0.20	1.00	
7.	x ₁₄	0.14	0.28	0.50	0.52	0.38	0.09	1.00

APPENDIX-IX.D

Eigen Roots and their Factor Loadings of Original Fifteen Variables (1968-69)

Sl. No.	variables	Eigen roots	Population of variation explained %	Factor Loadings			
				I	II	III	IV
1.	x ₁	5.619	37.46	0.6384	-0.7935	0.1205	-0.2797
2.	x ₂	2.623	17.49	0.5426	0.2510	-0.0356	-0.0745
3.	x ₃	1.556	10.44	-0.1952	0.5506	0.2052	-0.1039
4.	x ₄	1.427	9.51	-0.2043	0.3106	0.6773	0.1481
5.	x ₅	0.845	5.63	-0.2280	0.0200	0.4523	-0.1416
6.	x ₆	0.668	4.59	0.0365	-0.2115	0.3898	-0.2770
7.	x ₇	0.663	4.42	0.1523	-0.3265	0.1694	0.3637
8.	x ₈	0.478	3.18	-0.2593	-0.1002	-0.0926	-0.0774
9.	x ₉	0.370	2.46	-0.2111	-0.1296	-0.0620	-0.0864
10.	x ₁₀	0.216	1.44	0.0572	0.0353	-0.0270	-0.3002
11.	x ₁₁	0.179	1.19	-0.1333	-0.0186	-0.0766	-0.0364
12.	x ₁₂	0.139	0.93	0.0201	-0.1499	0.0451	-0.0802
13.	x ₁₃	0.099	0.66	0.570	-0.0821	0.0592	0.1463
14.	x ₁₄	0.048	0.32	-0.0741	-0.0311	-0.0186	0.0513
15.	x ₁₅	0.041	0.27	-0.0735	-0.0415	-0.0283	-0.0215

Source: Processed results of data provided by DES, Madhya Pradesh, Bhopal.

APPENDIX-IX.E

Eigen Roots and Factor Loadings (Block - A)
(1960-61 to 1972-73)

Sl. No.	Variables	Eigen Roots	Proportion of variation explained	Factors Loading		
				I	II	III
	1	2	3	4	5	6
<u>1960-61</u>						
1.	x ₁	2.366	33.80	0.2358	0.3429	-0.1519
2.	x ₂	1.613	23.04	0.0827	0.5467	-0.2061
3.	x ₆	1.082	15.46	0.4160	-0.1857	0.1739
4.	x ₇	0.680	9.71	0.5363	-0.3642	-0.3869
5.	x ₁₀	0.567	8.10	0.1645	0.4022	1.0287
6.	x ₁₂	0.458	6.54	0.6604	-0.0479	0.5125
7.	x ₁₃	0.234	3.34	1.0531	-0.2876	-0.3079
<u>1961-62</u>						
1.	x ₁	2.101	30.01	0.3761	0.1912	0.0878
2.	x ₂	1.691	24.16	0.3294	0.3609	0.2295
3.	x ₆	1.131	16.16	0.1012	-0.2859	-0.4506
4.	x ₇	1.010	14.43	0.3318	-0.5369	0.0764
5.	x ₁₀	0.478	6.83	0.0908	0.7061	-0.8751
6.	x ₁₂	0.385	5.58	0.6285	-0.1662	-0.8414
7.	x ₁₃	0.203	2.90	1.0880	-0.5886	0.3185
<u>1962-63</u>						
1.	x ₁	2.442	34.89	0.2827	0.2741	0.1495
2.	x ₂	1.658	23.69	0.3666	0.5003	0.2086
3.	x ₆	1.117	15.96	0.3420	-0.1814	-0.2000
4.	x ₇	0.630	9.00	0.4915	-0.4810	0.2823
5.	x ₁₀	0.538	7.69	0.0477	0.5223	-0.8687
6.	x ₁₂	0.436	6.23	0.6341	-0.1862	-0.7496
7.	x ₁₃	0.178	2.54	1.1263	-0.2823	0.4525

Contd.....

APPENDIX-IX.E contd..

Sl.No.	1	2	3	4	5	6
<u>1963-64</u>						
1.	x ₁	2.451	35.01	0.3192	0.2376	0.1056
2.	x ₂	1.510	21.57	0.2629	0.4414	0.3253
3.	x ₆	1.322	18.89	0.3508	-0.0931	0.4011
4.	x ₇	0.645	9.93	0.5738	-0.6505	0.0666
5.	x ₁₀	0.551	7.87	0.1627	0.5730	-0.8269
6.	x ₁₂	0.327	4.67	0.7028	-0.2875	-0.5080
7.	x ₁₃	0.144	2.06	1.0243	-0.6058	0.9713
<u>1964-65</u>						
1.	x ₁	2.401	34.30	0.3111	0.2704	-0.0519
2.	x ₂	1.632	23.31	0.2485	0.5004	-0.0658
3.	x ₆	1.093	15.61	0.2820	-0.4695	-0.0512
4.	x ₇	0.721	10.30	0.5043	-0.3518	0.4659
5.	x ₁₀	0.567	8.10	0.2673	0.2049	1.0600
6.	x ₁₂	0.445	6.36	0.6364	-0.3739	-0.3112
7.	x ₁₃	0.141	2.01	1.1164	0.0301	1.0205
<u>1965-66</u>						
1.	x ₁	2.456	36.37	0.3095	0.1931	0.1748
2.	x ₂	1.539	21.99	0.3133	0.4400	0.2380
3.	x ₆	0.939	13.41	0.3718	-0.4565	-0.0199
4.	x ₇	0.794	11.34	0.3637	-0.5512	0.3534
5.	x ₁₀	0.580	8.29	0.3635	0.4166	-0.8884
6.	x ₁₂	0.766	6.66	0.5575	-0.3504	-0.7553
7.	x ₁₃	0.137	1.96	1.0421	-0.2958	0.2588

Contd.....

APPENDIX-IX.E contd.

Sl.No.	1	2	3	4	5	6
<u>1966-67</u>						
1.	x ₁	2.704	38.63	0.3073	0.1094	-0.1878
2.	x ₁	1.356	19.37	0.3782	0.3591	-0.3344
3.	x ₂	1.026	14.66	0.3744	-0.3748	0.2305
4.	x ₆	0.749	10.70	0.2959	-0.6054	0.4394
5.	x ₇	0.529	7.56	0.3101	0.7772	0.4967
6.	x ₁₀	0.494	7.06	0.4961	-0.1814	0.9201
7.	x ₁₂	0.143	2.04	0.0804	-0.5164	0.1893
	x ₁₃					
<u>1967-68</u>						
1.	x ₁	2.485	35.50	0.3546	0.1287	0.0838
2.	x ₁	1.609	22.99	0.3548	0.3582	0.2400
3.	x ₂	1.025	14.59	0.2599	-0.2808	-0.4485
4.	x ₆	0.594	10.11	0.2472	-0.7315	0.1434
5.	x ₇	0.708	8.49	0.1002	0.6273	-0.5094
6.	x ₁₀	0.477	6.86	0.5505	-0.2393	-0.7920
7.	x ₁₂	0.105	1.50	0.2538	-0.6773	1.3430
	x ₁₃					
<u>1968-69</u>						
1.	x ₁	2.452	35.03	0.3707	0.1033	0.0792
2.	x ₁	1.564	22.34	0.3889	0.2794	0.2901
3.	x ₂	1.120	16.00	0.3413	-0.1092	-0.5199
4.	x ₆	0.717	10.24	0.1554	-0.7366	-0.1151
5.	x ₇	0.570	8.14	0.1567	0.7162	-0.5558
6.	x ₁₀	0.483	6.90	0.5424	-0.3166	-0.6213
7.	x ₁₂	0.106	1.51	1.1591	1.0115	1.2987
	x ₁₃					

contd.....

APPENDIX-IX.E contd..

Sl.No.	1	2	3	4	5	6
<u>1969-70</u>						
1.	x ₁	2.495	35.69	0.3449	0.1889	-0.0595
2.	x ₂	1.588	22.69	0.3342	0.4006	-0.2152
3.	x ₆	1.156	16.51	0.3452	-0.1228	0.4573
4.	x ₇	0.623	8.90	0.2509	-0.7417	0.0989
5.	x ₁₀	0.558	7.97	-0.1739	0.6400	0.7664
6.	x ₁₂	0.489	6.99	0.5460	-0.2057	0.6903
7.	x ₁₃	0.092	1.31	1.4228	-0.7119	-1.0885
<u>1970-71</u>						
1.	x ₁	2.278	32.54	0.5822	0.2494	0.0176
2.	x ₂	1.946	27.80	0.4670	0.4499	0.1108
3.	x ₈	0.995	14.21	0.0796	-0.6211	-0.2343
4.	x ₇	0.553	7.90	0.4021	-0.1554	0.1658
5.	x ₁₀	0.528	7.54	-0.0933	0.3061	-0.8280
6.	x ₁₂	0.120	1.71	0.4184	-0.1960	-0.4676
7.	x ₁₃	-0.980	-14.00	0.3020	-0.4397	0.0278
<u>1971-72</u>						
1.	x ₁	2.343	33.47	0.4283	0.3772	-0.0836
2.	x ₂	1.521	21.73	0.2413	0.6795	-0.0944
3.	x ₆	0.985	14.07	0.4435	-0.2437	0.2699
4.	x ₇	0.801	11.44	0.3569	-0.4282	0.1611
5.	x ₁₀	0.583	8.33	-0.2696	0.3838	0.6575
6.	x ₁₂	0.448	6.40	0.3609	0.0005	0.5912
7.	x ₁₃	0.320	4.57	0.4810	0.0771	-0.3218

APPENDIX-IX.E contd..

Sl.No.	1	2	3	4	5	6
			<u>1972-73</u>			
1.	x_1	2.264	32.34	0.4535	0.3801	-0.0390
2.	x_2	2.072	29.60	0.3817	0.4331	-0.0024
3.	x_6	0.904	12.91	0.5141	-0.3297	0.2102
4.	x_7	0.786	11.23	0.3697	-0.4585	0.1195
5.	x_{10}	0.475	6.79	-0.0618	0.5712	0.0654
6.	x_{12}	0.289	4.13	0.4068	0.1355	0.3114
7.	x_{13}	0.209	2.99	0.2798	-0.0660	-0.9158

APPENDIX-IX.F

Eigen Roots and Factor Loadings (Block-B)
(1960-61 to 1972-73)

Sl. No.	Variables	Eigen Roots	Proportion of variation explained	Factors Loadings		
				I	II	III
	1	2	3	4	5	6
<u>1960-61</u>						
1.	x ₃	2.766	39.51	0.1391	0.2718	-0.4170
2.	x ₄	1.821	26.01	0.1301	0.4677	-0.1298
3.	x ₅	1.169	16.70	0.0974	0.5837	0.4206
4.	x ₈	0.661	9.44	0.6837	-0.7139	0.1943
5.	x ₉	0.351	5.01	0.8345	-0.1769	0.6907
6.	x ₁₁	0.145	2.07	1.3054	-0.2582	-0.3078
7.	x ₁₄	0.088	1.26	1.0877	-1.1818	-0.9259
<u>1961-62</u>						
1.	x ₃	2.698	38.54	0.2004	0.2429	0.4374
2.	x ₄	1.735	24.78	0.1953	0.4547	0.1080
3.	x ₅	1.700	24.29	0.2331	0.3604	0.4215
4.	x ₈	0.438	6.26	0.7844	0.4933	-0.6926
5.	x ₉	0.294	4.20	0.8504	0.6141	0.6339
6.	x ₁₁	0.294	1.91	1.3687	0.5733	-0.5556
7.	x ₁₄					
<u>1962-63</u>						
1.	x ₃	3.068	43.83	0.1238	-0.3879	0.0712
2.	x ₄	1.562	22.74	0.1249	-0.5033	0.3116
3.	x ₅	1.057	15.10	0.1447	-0.2153	-0.8385
4.	x ₈	0.580	8.29	0.6971	0.1388	0.0371
5.	x ₉	0.404	5.77	0.7388	0.4074	-0.0151
6.	x ₁₁	0.203	2.90	1.1027	0.5816	1.8481
7.	x ₁₄	0.095	1.36	1.2847	0.2809	0.9115

APPENDIX-IX.F contd.

Sl.No.	1	2	3	4	5	6
<u>1963-64</u>						
1.	x ₃	2.901	41.44	0.1686	0.2841	-0.3731
2.	x ₄	1.586	22.66	0.2125	0.5046	0.1089
3.	x ₅	0.925	18.79	0.3731	0.3067	0.7274
4.	x ₈	0.582	8.31	0.6871	-0.3768	-0.0224
5.	x ₉	0.220	3.14	0.9658	-0.8670	0.1998
6.	x ₁₁	0.086	1.26	1.6606	-0.5599	-0.9573
7.	x ₁₄					
<u>1964-65</u>						
1.	x ₃	3.304	47.20	0.1411	-0.2377	-0.4103
2.	x ₄	1.642	23.46	0.1900	-0.4960	0.1532
3.	x ₅	0.794	11.34	0.3980	-0.4489	0.5799
4.	x ₈	0.604	8.63	0.6221	0.2936	-0.0173
5.	x ₉	0.340	4.86	0.6942	0.6283	0.2001
6.	x ₁₁	0.206	2.94	0.9983	0.4067	-0.6913
7.	x ₁₄	0.111	1.59	1.1483	0.5115	0.4838
<u>1965-66</u>						
1.	x ₃	2.917	41.67	0.0439	0.4088	0.1890
2.	x ₄	1.589	22.70	0.0896	0.5475	-0.2355
3.	x ₅	1.226	15.71	0.0677	0.0448	-0.7825
4.	x ₈	0.584	8.34	0.7006	-0.1262	0.0529
5.	x ₉	0.372	5.31	0.8219	-0.2032	-0.0828
6.	x ₁₁	0.180	2.57	1.1581	0.1017	0.4153
7.	x ₁₄	0.132	1.89	1.2375	-0.2335	-0.4052
<u>1966-67</u>						
1.	x ₃	3.094	44.42	0.0717	0.3569	-0.2644
2.	x ₄	1.686	24.09	0.1443	0.5189	0.0846
3.	x ₅	0.982	14.03	0.2338	0.2318	0.8474
4.	x ₈	0.580	8.29	0.6796	-0.1938	-0.0016
5.	x ₉	0.370	5.29	0.7623	-0.4250	0.0098
6.	x ₁₁	0.191	2.73	1.0709	-0.2122	-0.5270
7.	x ₁₄	0.096	1.37	1.4191	-0.1401	-0.3734

contd...

APPENDIX-IX.F contd.

Sl.No.	1	2	3	4	5	6
<u>1967-68</u>						
1.	x ₃	3.236	46.23	0.1136	0.2822	-0.3717
2.	x ₄	1.706	24.37	0.1632	0.4950	0.0568
3.	x ₅	0.835	11.93	0.3393	0.4197	0.6913
4.	x ₈	0.620	8.86	0.6263	-0.2848	-0.0812
5.	x ₉	0.292	4.17	0.8045	-0.5392	-0.0328
6.	x ₁₁	0.213	3.04	0.8927	-0.3873	-0.6452
7.	x ₁₄	0.097	1.39	1.3578	-0.3203	0.7540
<u>1968-69</u>						
1.	x ₃	3.481	49.73	0.1083	0.2869	-0.3414
2.	x ₄	1.634	23.29	0.1774	0.5074	0.1317
3.	x ₅	0.857	12.24	0.3633	0.3667	0.6339
4.	x ₈	0.462	6.60	0.7079	-0.3073	-0.1542
5.	x ₉	0.308	4.40	0.8005	-0.4790	-0.0419
6.	x ₁₁	0.154	2.27	1.0765	-0.3872	-0.9341
7.	x ₁₄	0.093	1.33	1.3970	-0.6505	0.8758
<u>1969-70</u>						
1.	x ₃	3.288	46.40	0.1249	-0.3274	0.2462
2.	x ₄	1.525	21.79	0.2109	-0.4626	-0.3137
3.	x ₅	0.876	12.51	0.4192	-0.2113	-0.5581
4.	x ₈	0.546	7.80	0.6720	0.2444	0.2085
5.	x ₉	0.464	6.63	0.6344	0.5126	0.1810
6.	x ₁₁	0.256	3.66	0.8350	-0.0223	0.9185
7.	x ₁₄	0.083	1.19	1.1803	1.2598	-1.2283
<u>1970-71</u>						
1.	x ₃	3.174	45.34	0.3039	0.5551	-0.2492
2.	x ₄	1.424	20.34	0.2811	0.5336	0.3580
3.	x ₅	1.055	15.07	0.4276	0.2262	0.2698
4.	x ₈	0.472	6.74	0.4978	-0.2898	-0.0410
5.	x ₉	0.413	5.90	0.4288	-0.4106	-0.1258
6.	x ₁₁	0.372	5.31	0.2738	0.0775	-0.7583
7.	x ₁₄	0.091	1.30	0.3730	0.3119	0.3799

contd...

APPENDIX-IX.F contd.

Sl.No.	1	2	3	4	5	6
<u>1971-72</u>						
1.	x ₃	2.309	32.99	0.0995	-0.0175	0.6612
2.	x ₄	1.867	26.67	0.2993	-0.1838	0.6177
3.	x ₅	1.380	19.71	0.4621	-0.2698	0.0741
4.	x ₈	0.828	11.83	0.4924	-0.2541	-0.3123
5.	x ₉	0.339	4.84	0.4538	-0.2600	-0.2778
6.	x ₁₁	0.286	3.66	0.3233	0.6325	0.0169
7.	x ₁₄	0.022	0.31	0.3663	0.6008	-0.0286
<u>1972-73</u>						
1.	x ₃	2.617	37.39	-0.0563	-0.5132	0.6174
2.	x ₄	1.306	18.66	0.2735	-0.5692	-0.2787
3.	x ₅	1.057	15.10	0.4448	-0.3205	-0.3059
4.	x ₈	0.905	12.93	0.4980	0.3743	0.1135
5.	x ₉	0.467	6.67	0.4681	0.3661	0.0761
6.	x ₁₁	0.415	5.93	0.2090	-0.0041	0.6537
7.	x ₁₄	0.233	3.33	0.4619	-0.1896	0.0394

APPENDIX-IX.G

Composite Index of the Traditional Sectors
Block-A (1960-61 to 1972-73)

Sl. No.	Districts	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Balaghat	1.40	1.22	1.43	1.58	1.50	1.68	1.68	1.58	1.52	1.15	1.40	0.34	1.66
2.	Bastar	1.84	1.96	1.98	2.18	3.10	2.51	2.45	2.34	2.52	1.99	2.06	0.96	1.92
3.	Betul	1.63	1.93	1.91	2.24	2.16	2.34	2.09	2.10	2.21	1.94	1.90	0.86	2.07
4.	Bhind	3.26	2.73	2.85	2.69	2.84	2.90	2.68	2.66	2.28	2.36	2.49	2.53	2.75
5.	Bilaspur	2.11	1.46	1.48	1.92	1.93	1.71	1.70	1.71	1.62	1.43	1.52	1.76	1.72
6.	Chhatarpur	1.75	2.02	1.97	1.94	2.14	2.08	2.22	2.38	2.36	2.15	2.50	2.29	2.91
7.	Chhindwara	1.56	1.73	1.76	2.05	2.31	2.36	2.12	2.15	2.24	1.65	1.81	0.77	2.55
8.	Damoh	1.53	1.98	2.72	2.14	2.22	2.26	2.46	2.32	2.22	2.08	2.45	2.45	2.65
9.	Datia	2.79	2.64	2.70	2.93	2.93	2.96	2.64	2.84	2.65	2.58	2.59	2.38	2.61
10.	Dewas	3.72	3.29	3.53	3.33	3.39	3.31	3.40	3.22	3.13	3.25	3.45	3.57	3.55
11.	Dhar	3.92	3.32	3.65	3.49	3.43	3.11	3.27	3.02	3.16	3.21	2.99	2.97	3.06
12.	Durg	1.74	1.83	1.88	2.34	2.34	2.02	2.11	1.91	2.06	1.48	1.68	1.42	1.92
13.	Guna	3.13	3.20	3.21	3.24	3.20	3.61	3.85	3.40	3.34	2.98	3.00	2.47	2.92
14.	Gwalior	2.99	2.54	2.73	2.84	2.92	3.11	2.55	2.61	2.41	2.34	2.26	3.09	2.88
15.	Hashangabad	2.25	2.15	2.20	2.38	2.20	2.44	2.41	2.14	2.19	2.00	2.01	1.94	2.36
16.	Indore	2.83	2.22	2.69	2.59	2.50	2.39	2.07	2.27	2.05	2.25	2.53	2.57	3.25
17.	Jabalpur	1.22	1.27	1.41	1.46	1.44	1.64	1.40	1.40	1.43	1.32	1.35	1.50	1.59
18.	Jhabua	3.11	2.89	3.01	3.02	2.97	2.95	3.05	2.64	2.67	2.35	2.36	2.54	2.54
19.	Khandwa	2.29	2.17	2.53	2.80	2.66	2.42	2.50	2.09	2.04	1.70	2.27	1.54	2.64
20.	Khargone	3.51	3.17	3.36	3.22	3.43	3.23	3.44	2.91	2.81	2.79	2.82	2.69	2.73
21.	Manasaur	3.36	3.23	3.45	3.23	3.59	4.01	3.75	3.37	3.28	3.18	3.68	3.25	3.56
22.	Mandla	1.43	1.64	1.74	1.96	1.93	2.30	2.16	1.96	2.05	1.82	1.78	1.69	1.99

Contd...

APPENDIX-IX.G contd.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
23. Morena	2.94	2.57	2.81	2.60	2.59	2.75	2.74	2.37	2.20	2.22	2.36	3.89	2.45	
24. Narasimhapur	1.81	2.11	2.10	2.20	2.28	2.30	2.20	2.44	2.42	2.25	2.52	2.26	2.83	
25. Panna	1.64	2.07	1.79	1.95	2.06	2.26	2.29	2.17	2.02	1.89	1.94	1.79	2.24	
26. Raigarh	1.51	1.57	1.49	1.89	1.86	1.95	1.95	1.74	1.85	1.42	1.54	1.25	1.57	
27. Raipur	1.75	1.71	1.51	1.78	1.83	1.80	1.74	1.67	1.67	1.49	1.80	1.52	1.82	
28. Raisen	3.87	3.64	3.73	4.26	4.31	4.37	3.91	3.92	3.91	3.46	3.74	3.31	4.35	
29. Rajgarh	3.49	3.36	3.43	3.17	3.23	3.24	3.47	3.20	3.21	3.13	3.11	3.59	3.27	
30. Ratlam	3.44	3.02	3.26	3.38	3.67	3.33	3.30	3.14	3.11	2.91	2.97	3.07	3.15	
31. Rewa	1.61	1.86	1.85	1.92	1.84	1.81	1.74	1.88	1.81	1.81	1.67	1.82	1.94	
32. Sagar	1.41	1.50	1.51	1.72	1.81	1.88	2.04	1.97	1.97	1.93	2.28	1.81	2.08	
33. Sarguja	1.61	1.88	1.68	1.95	1.92	1.97	1.79	1.73	1.81	1.37	1.42	0.50	1.61	
34. Satna	1.95	2.17	2.06	2.08	2.04	2.07	1.94	2.00	1.92	1.97	1.81	2.13	2.09	
35. Sehore	3.67	2.98	3.45	3.16	2.89	2.87	2.85	2.73	2.60	2.57	2.79	2.73	3.22	
36. Seoni	1.66	2.03	2.07	2.20	2.25	2.35	2.53	2.41	2.50	2.22	2.19	2.07	2.78	
37. Shahdol	1.75	1.92	1.70	1.93	2.05	2.19	2.13	2.03	1.97	1.53	1.65	1.08	1.70	
38. Shajapur	4.00	3.28	3.45	3.31	3.59	3.55	3.44	3.19	3.01	2.96	3.29	3.23	3.06	
39. Sidhi	1.45	1.70	1.66	1.73	1.92	2.23	2.05	2.09	2.14	1.81	1.67	1.47	1.80	
40. Shivpuri	2.64	3.03	2.97	2.95	2.87	2.84	3.08	2.72	2.62	2.38	2.31	2.05	2.59	
41. Tikamgarh	1.76	1.79	1.85	1.94	7.93	2.08	2.31	1.81	2.13	1.84	1.27	1.79	2.11	
42. Ujjain	3.22	2.86	3.32	3.11	2.96	2.92	2.89	2.87	2.81	2.97	3.17	3.25	2.87	
43. Vidisha	3.62	3.76	3.69	4.10	4.01	4.12	3.99	3.44	3.43	3.23	3.40	3.02	3.43	
44. Madhya Pradesh	2.42	2.36	2.46	2.53	2.58	2.61	2.57	2.43	2.40	2.22	2.31	2.33	2.54	

APPENDIX-IX.H

Composite Index of the Modern Sectors:
Block-B (1960-61 to 1972-73)

S.l. No.	Districts	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Balaghat	3.58	4.35	3.47	4.19	4.55	2.68	3.52	3.75	3.88	3.73	3.95	3.91	2.62
2.	Bastar	0.86	1.01	0.93	1.17	1.19	0.94	1.42	1.37	1.51	1.42	1.50	1.44	0.95
3.	Betal	1.25	1.14	1.19	1.24	1.91	1.81	1.80	1.96	1.73	1.57	1.49	2.13	1.17
4.	Bhind	0.88	1.10	1.04	1.04	1.82	1.16	1.57	1.89	1.91	1.88	1.78	4.06	2.61
5.	Bilaspur	4.40	4.52	4.10	4.48	4.20	3.41	4.03	3.96	4.10	4.78	4.50	4.51	2.82
6.	Chhatarpur	1.66	1.90	1.71	1.90	2.02	1.30	1.65	1.83	1.78	1.75	1.82	2.60	1.79
7.	Chhindwara	3.15	2.65	2.66	2.43	2.70	2.19	2.25	2.21	1.96	2.12	2.04	2.74	1.76
8.	Damoh	1.06	1.19	1.28	1.07	1.65	1.11	1.03	1.25	1.27	1.29	1.22	1.80	1.04
9.	Datia	0.60	0.55	0.77	0.67	1.01	0.70	1.08	1.18	1.24	1.14	1.33	2.79	1.94
10.	Dewas	1.63	1.51	1.77	1.54	1.87	1.50	1.79	1.96	2.12	2.17	2.06	2.73	1.98
11.	Dhar	1.57	1.51	1.50	1.63	1.67	1.65	1.54	1.68	1.87	1.97	1.90	2.50	1.77
12.	Durg	5.38	6.55	6.58	6.83	6.46	6.86	6.90	6.93	6.73	7.20	7.06	5.28	3.90
13.	Guna	0.88	0.84	0.83	0.86	0.91	0.64	0.90	0.95	0.97	0.89	0.97	1.62	1.10
14.	Gwalior	4.51	3.95	4.21	4.59	4.93	4.49	5.1	5.17	5.21	5.74	5.26	7.03	5.54
15.	Hashangabad	2.10	1.68	2.25	1.57	2.10	1.94	2.22	2.13	2.25	2.03	1.92	3.35	2.11
16.	Indore	8.44	7.63	0.90	8.41	8.82	9.01	8.97	8.84	9.31	8.51	8.13	9.54	7.90
17.	Jabalpur	8.44	8.19	7.98	7.05	6.79	6.78	6.36	6.06	5.63	5.44	5.36	4.71	3.34
18.	Jhabua	1.02	1.04	0.74	1.05	0.94	0.52	0.73	0.89	0.78	1.05	1.12	1.42	1.00
19.	Khandwa	3.84	3.22	3.22	2.92	3.06	2.98	3.27	3.00	3.22	2.94	2.87	4.10	3.40
20.	Khargone	2.92	2.71	2.68	2.74	2.65	2.48	2.69	2.76	2.78	2.72	2.62	2.73	2.06
21.	Nandsaur	3.08	3.07	3.10	3.59	2.97	2.71	3.04	3.15	2.89	3.13	2.96	6.32	5.30
22.	Mandla	0.91	0.97	0.90	0.90	1.12	0.73	0.82	1.14	1.26	1.24	1.34	1.50	0.70

Contd...

APPENDIX- IX.H contd.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
23. Morena	1.26	1.59	1.57	1.84	2.13	1.53	2.27	2.45	2.31	2.35	2.40	3.71	2.62	
24. Nargsimhpur	1.65	1.26	1.61	1.14	2.01	1.70	2.14	2.16	2.01	1.65	1.57	2.73	1.66	
25. Panna	0.72	0.83	0.76	0.81	1.18	0.69	0.90	1.14	1.08	1.15	1.13	1.63	0.93	
26. Raigarh	1.81	1.88	1.87	1.98	1.92	1.73	2.00	1.88	1.94	1.76	1.79	2.12	1.41	
27. Raipur	7.84	7.72	7.44	7.49	7.96	5.62	6.28	6.61	6.64	7.10	7.61	4.78	3.39	
28. Raisen	0.84	0.83	0.83	0.87	1.04	0.81	0.97	0.97	0.94	0.94	0.90	2.73	2.00	
29. Rajgarh	1.19	1.25	1.22	1.22	1.36	0.85	1.11	1.16	1.47	1.46	1.43	2.14	1.56	
30. Ratlam	2.15	2.44	2.42	2.51	2.31	2.04	2.38	2.55	2.63	2.84	2.66	3.13	2.12	
31. Rewa	1.37	1.27	1.52	1.19	1.68	1.40	1.44	1.69	1.68	1.85	1.86	3.59	1.76	
32. Sagar	1.94	2.15	2.26	1.78	2.01	1.73	1.82	2.16	2.09	1.42	1.60	2.44	1.64	
33. Sarguja	0.70	0.85	0.86	0.86	0.93	0.61	0.89	1.01	1.22	1.26	1.30	1.54	0.94	
34. Satna	3.05	2.73	2.80	2.33	2.69	2.17	2.40	2.53	2.44	2.65	2.60	3.38	2.20	
35. Sehore	2.80	2.68	3.58	3.36	3.28	3.84	4.01	4.00	3.96	3.89	3.55	4.72	3.84	
36. Seoni	1.33	1.22	1.25	1.14	1.62	1.07	1.38	1.36	1.43	1.79	1.67	2.14	1.45	
37. Shahadol	1.24	0.91	1.21	0.91	1.41	1.02	1.02	1.15	1.12	1.22	1.22	1.67	1.02	
38. Shajapur	1.66	1.50	1.75	1.60	1.87	1.36	1.84	1.90	2.03	2.08	1.98	3.94	3.19	
39. Sidhi	0.91	0.98	0.97	0.86	1.12	0.59	0.72	1.04	1.08	1.32	1.30	1.35	0.66	
40. Shivpuri	1.14	1.40	1.14	1.47	1.53	1.92	1.31	1.39	1.52	1.48	1.54	2.21	1.51	
41. Tikamgarh	1.78	2.24	1.79	2.38	2.49	1.24	1.89	2.48	2.38	2.44	2.59	3.02	2.15	
42. Ujjain	4.33	4.26	4.56	4.04	4.21	4.46	4.41	4.37	4.13	4.37	4.22	4.00	3.14	
43. Vidisha	0.56	0.64	0.65	0.62	0.80	0.54	0.82	0.83	0.97	0.75	0.79	1.54	1.03	
44. Madhya Pradesh	2.38	2.37	2.23	2.38	2.58	2.10	2.43	2.53	2.55	2.57	2.53	3.19	2.25	

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GLOSSARY

Journals

A.E.R.	American Economic Review
AEA & RES	American Economic Association and Royal Economic Society
A.G.S.	Australian Geographical Studies
A.R.S.	Annals of Regional Science
A.V.	Artha Vijnana
E.D.C.C.	Economic Development and Cultural Change
E.J.	Economic Journal
E.P.W.	Economic and Political Weekly
E.W.	Economic Weekly.
G.R.I.	Geographical Review of India
I.E.R.	International Economic Review
I.J.A.E.	Indian Journal of Agricultural Economics
I.J.E.	Indian Journal of Economics
I.J.R.S.	Indian Journal of Regional Science
I.L.R.	Indian Left Review.
J.A.S.A.	Journal of American Statistical Association
J.A.S.A.S.	Journal of Indian Society of Agricultural Statistics
J.D.S.	Journal of Development Studies.
J.E.H.	Journal of Economic History
J.P.E.	Journal of Political Economy
J.R.S.	Journal of Regional Science
J.R.S.S.	Journal of Royal Statistical Society
N.E.E.R.	North Eastern Economic Review
Q.J.E.	Quarterly Journal of Economics.
R.U.E.	Regional and Urban Economics
S.E.	Southern Economist
S.E.J.	Southern Economic Journal
S.S.	Social Scientist
T.W.P.R.	Third World Planning Review

Others

C.S.O.	Central Statistical Organisation
D.E.S.	Directorate of Economics and Statistics
I.A.R.N.I.	Indian Association for Research in National Income
I.C.S.S.R.	Indian Council of Social Science Research
I.I.P.A.	Indian Institute of Public Administration
I.I.P.O.	Indian Institute of Public Opinion
N.C.A.E.R.	National Council for Applied Economic Research
N.D.N.E.R.	(Seminar on) Rural Development in North Eastern Region
S.S.B.	State Statistical Bureau
U.N.R.S.D.	United Nations Research Institute for Social Development
W.G.I.B.A.	Working Group for Identification of Backward Areas

ADDENDUM - A

Fortran-4 Program for Factor Analysis (On the Basis of
Principal Components)

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PROGRAM TEST
DIMENSION A(43,15),B(43,15),C(15,43),S(15,15),SK(3,15),R(43)
DIMENSION NEXT (80)
READ (7,201) NUMV,NOB
201 . . . . . FORMAT (212)
      . . . . . READ(7,1)(NEXT(I), I=1,80)
1      . . . . . FORMAT(80A1)
      . . . . . WRITE (8,3) (NEXT(I), I=1,80)
3      . . . . . FORMAT(/5X,80A1/)
      . . . . . DO 15 I=1,NUMV
      . . . . . READ(7,1)WASTE
      . . . . . READ(7,2)(A(J,I), J=1,NOB)
2      . . . . . FORMAT (8F10.0)
15     . . . . . CONTINUE
      . . . . . DO 230 J=1,NUMV
      . . . . . ABAR=0.0
      . . . . . DO 215 K=1,NOB
215    . . . . . ABAR=ABAR+A(K,J)
      . . . . . ABAR=ABAR/NOB
      . . . . . SDEV=0.0
      . . . . . DO 220 K=1,NOB
220    . . . . . SDEV=SDEV+(A(K,J)-ABAR)**2
      . . . . . SDEV=(SDEV/NOB)**0.5
      . . . . . DO 225 K=1,NOB
      . . . . . B(K,J)=(A(K,J)-ABAR)/SDEV
225    . . . . . A(K,J)=A(K,J)/ABAR
230    . . . . . CONTINUE
      . . . . . WRITE (8,121)((A(I,J), J=1,NUMV), I=1,NOB)
121    . . . . . FORMAT(/IX,7E18.6)
      . . . . . DO 240 I=1,NUMV
      . . . . . DO 240 J=1,NOB
240    . . . . . C(I,J)=B(J,I)
      . . . . . DO 155 I=1,NUMV
      . . . . . DO 155 J=1,NUMV
      . . . . . S(K,J) =0.0
      . . . . . DO 250 K=1,NOB
250    . . . . . S(K,J)=C(I,K)*B(K,J)+S(I,J)
155    . . . . . S(K,J)=S(I,J)/NOB
      . . . . . WRITE (8,42)((S(K,J), J=1,NUMV), I=1,NUMV)
42     . . . . . FORMAT(/IX,7E16.6)
31     . . . . . FORMAT(//)
      . . . . . CALL EIGEN (S,S,K2 NUMV)
      . . . . . DO 260 I=1,NUMV
      . . . . . DO 260 J=1,NOB

```

```

260   C(I,J)=A(J,I)
      DO 300 IMI=1,3
      DO 270 I=1,NOB
      R(I)=0.0
      DO 270 J=1,NUMV
270   R(I)=R(I)+S K(IMI,J)*C(J,I)
      WRITE(8,301)(I,R(I),I=1,NOB)
301   FORMAT(/1X,5(12,E20.6,3X))
300   CONTINUE
      STOP
      END

```

COMPILETIME ERRORS:NIL

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      SUBROUTINE EIGEN (A,S,K,N)
      DIMENSION P(15),MM(15),S1(15,15),S3(15,15),A(15,15),V(15,15),
1     IS K(3,15),ICC(15)
      DO 3 I=1,N
      DO 3 J=1,N
      IF(I.NE.J)GO TO 4
      V(I,J)=1.0
      GO TO 3
4     V(I,U)=0.0
3     CONTINUE
2     NR=0
5     MI=N-1
      DO 6 I=1,MI
      P(I)=0.0
      MJ=I+1
      DO 6 J=MJ,N
      IF(P(I).GT.ABS(A(I,J)))GO TO 6
      P(I)=ABS(A(I,J))
      MM(I)=J
6     CONTINUE
7     DO 8 I=1,MI
      IF(I.LE.1)GO TO 10
      IF(PMAX.GT.P(I))GO TO 8
10    PMAX=P(I)
      IP=I
      JP=MM(I)
8     CONTINUE
      IF(PMAX.LE.0.001)GO TO 12
      NR=NR+1
      STAN=-2.0*A(IP,JP)/(ABS(A(IP,IP)-A(JP,JP))+SQRT((A(IP,IP)-A(JP,JP)
14    1)**2+4.0*A(IP,JP)**2))
      SCOS=1.0/SQRT((1.0+STAN**2))
      SSIN=STAN*SCOS
      DO 301 I=1,N
      DO 301 J=1,N
      IF(I.EQ.J)GO TO 304
      SI(I,J)=0.0
      GO TO 301

```

```

304   S1(I,J)=1.0
301   CONTINUE
      S1(IP,IP)=SCOS
      S1(JP,JP)=SCOS
      S1(IP,JP)=SSIN
      S1(JP,IP)=-SSIN
      DO 310 I=1,N
      DO 310 J=1,N
      S3(I,J)=0.0
      DO 310 K=1,N
310   S3(I,J)=V(K,K)*S1(K,J)+S3(I,J)
      DO 315 I=1,N
      DO 315 J=1,N
315   V(I,J)=S3(I,J)
      DO 325 I=1,N
      DO 325 J=1,N
      Se(I,J)=0.0
      DO 325 K=1,N
325   S3(I,J)=S3(I,J)+A(I,K)*SI(K,J)
      S1(IP,JP)=-SSIN
      S1(JP,IP)=SSIN
      DO 340 I=1,N
      DO 340 J=1,N
      A(I,J)=0.0
      DO 340 K=1,N
340   A(I,J)=A(I,J)+S1(I,K)*S3(K,J)
      WRITE(8,344)NR,PMAX
      FORMAT(5X,'NR=',13,5X,'PMAX=',E11.4)
      GO TO 5

```

```

12   WRITE(8,31)
      WRITE(8,42)((A(I,J),J=1,N),I=1,N)
42   FORMAT(/IX,7E16.6)
      WRITE(8,31)
      WRITE(8,31)
      WRITE(8,42)((V(I,J),J=1,N),I=1,N)
      WRITE(8,31)
31   FORMAT(//)
      J=N
      DO 530 I=1,N
530  ICC(I)=1
615  PPMAX=A(1,1)
      I=2
620  IF(PPMAX.GT.A(I,I)) GO TO 630
      PPMAX=A(I,I)
      GO TO 640
630  A(i-I,I-I)=A(I,I)
      A(I,I)=PPMAX
      IDUM=ICC(I)
      ICC(I)=ICC(I-I)
      ICC(I-I)=1/DUM
640  IF(I=1) GO TO 645,650,650
645  I=I+1
      GO TO 620

```

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