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WORLD EMPLOYMENT PROGRAMME RESEARCH

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WORLD EMPLOYMENT PROGRAMME RESEARCH

Working Paper

BASIC NEEDS AND DEVELOPMENT PROGRAMME

Industrialisation, Employment and Basic Needs
in a Fast-Growing Agrarian State:
a study of the Indian Punjab

by

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Preface

This is the fourth in a series of country case studies aimed at assessing the role of industrialisation in creating employment and satisfying basic needs within the framework of over-all development strategy. Dr. Ajit Singh, the author of the current study, is no stranger to this project. In an earlier study in this working paper series (WP 15), he explained the role of industrialisation in the development process, arguing that there is no conflict between the basic needs approach and the Lima target for industrialisation. That exploratory piece of research helped lay the groundwork for carrying out the case studies which followed.

The present study is somewhat of a departure from the first three in the series, each of which looked at the industrialisation strategy of a particular country. The focus here is instead on a sub-national entity, in this case the Indian State of Punjab. The author's choice is an interesting one in that Punjab's prosperity is based on agriculture and modern small-scale industry. This provides an opportunity to examine the relationships between agricultural and industrial development, employment generation and basic needs satisfaction both within a particular state and between that state and other states. The relatively high degree of inter-state specialisation characterising economic development in Punjab and for India as a whole is among the illuminating findings to emerge from this well researched piece of work by Dr. Singh.

David Freedman.

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Industrialisation, employment and basic needs in a
fast-growing agrarian economy: a study of the Indian Punjab

Introduction

The present research is concerned with industrialisation, employment and basic needs in the Indian State of Punjab. On the face of it, the choice of Punjab in this context may seem peculiar. It is after all only a small State both in size and population. With 15 million people it comprises only 1.6 per cent of the total area of India and 2.5 per cent of the Indian population. It is also generally regarded as pre-eminently an agricultural State rather than an industrial one.

There are, however, several considerations which make the economic experience of Punjab particularly appropriate for an investigation of this kind. First, this is the State with the highest rate of growth of per capita income in the country, sustained over a very long period. Secondly, in Punjab it is not just agriculture but also modern small-scale industry which have played a leading role in economic development. The State, despite having only 2.5 per cent of the country's population, accounts for 10 per cent of India's small-scale manufacturing production; Punjab also has the highest rate of growth of modern small-scale industry in the country. In view of the overwhelming importance of small-scale industry in the State's industrial economy, one would expect to find more direct linkages between industry, employment and basic needs satisfaction in Punjab than elsewhere.

Thirdly, and most importantly, with respect to the broader theme of how industrialisation may aid employment and the achievement of basic needs in the Third World's agrarian economies (i.e., most of them), a central question is how industrialisation affects agriculture and vice versa. Punjab provides an excellent opportunity to study this question, since the State has led an extraordinarily high long-term rate of growth of agriculture - and particularly food production. It is not only the highest in India, but among the highest in the world; needless to say it has helped satisfaction of the most basic human need (food) in Punjab as well as in the country as a whole. In relation to industrialisation and basic needs, a major question is whether the kind of industrial development which has occurred in the State has aided this phenomenal agricultural growth, hindered it or not affected it at all, and how it has been affected in turn by agricultural growth.

Fourthly, there is a related but extremely important policy issue. We shall see later that Punjab not only has the highest per capita income in the country, but it has also made important strides in reducing poverty and meeting the basic needs of the people. Since Punjab's economy is based on agriculture and small-scale industry, does this mean that the development of these sectors provides the sure path to economic well-being? Should large-scale capital-intensive industry, therefore, be eschewed in the development programmes of Third World economies?

For all these reasons, a deeper and systematic analysis of Punjab's economic development during the last two decades should prove especially rewarding for a better understanding of the relationship between industrialisation, agriculture,

employment and basic needs satisfaction.¹ The study is organised as follows: Chapter I reviews, both in terms of economic theory and the historical experience of various economies, the whole complex of issues which are involved in analysing these inter-relationships. The next chapter examines the nature of structural transformation in Punjab's economy during the last two decades and how this has differed from that observed in other parts of the country and from the general pattern. Chapter III considers the role of agriculture in Punjab's economy and analyses the main factors responsible for its phenomenal growth. Chapter IV considers industrial development in the State, and Chapter V examines questions related to basic needs, poverty and employment. Chapter VI draws together the main strands of the analysis and discusses issues of economic policy. This chapter also considers the implication of Punjab's economic experience for other developing regions and countries.

¹ It was originally intended that this study should also include the State of Haryana (in addition to Punjab). However, it has been thought best to limit it to a case study of Punjab alone for the following reasons: (a) Haryana was a part of the State of Punjab until 1966; at that time, six of the 16 Hindi majority districts of Punjab were separated out to form the new State of Haryana. It is difficult to obtain adequate data for Haryana before the mid-1960s in order to carry out a long-term structural analysis of the State's economy. (b) More importantly, as Haryana was earlier a part of Punjab, its subsequent pattern of development has been broadly similar to that of Punjab. Haryana's economic experience is therefore unlikely to shed a significantly different light on the issues which are the focus of this study.

Chapter I

Industrialisation, employment and basic needs: a long-term structural view

In my original general paper (Singh, 1979) on the relationship between industrialisation and basic needs, which arose from the ILO's research programme on this subject, I put forward the following propositions:

- (i) To meet the "basic needs" of the poor in the Third World on a sustainable basis, it is necessary to transform its productive structures. In this transformation, modern industry (including in most cases an appropriate capital goods industry) must play a central role.
- (ii) A properly conceived basic needs strategy should in general positively aid industrialisation in the less developed countries; in the present state of world economy such a strategy is likely to be essential for fast industrial development in many of them.

I went on to suggest that accelerated industrialisation and a substantially redistributive fiscal policy (i.e., a more equitable distribution of gains from economic growth by fiscal means) must be the two pillars of any well conceived basic needs programme. These propositions were derived both from a theoretical analysis of the nature of structural change which an economy undergoes during the course of economic development, as well as the actual experience of a wide range of developed and developing countries.

On the face of it, these generalisations may appear counter-intuitive since it may be thought that modern industry, being capital-intensive, would hamper growth of employment and hence achievement of basic needs. However, the key link in the chain of argument is that the satisfaction of basic needs of the people on a sustainable basis requires economic growth in the sense of long-term development of the economy's productive potential. Although at any moment of time a redistribution of the national output may enable a society to better meet the basic needs of its people, such needs on a long-term basis can only be met if there is expansion of the national economy. Economic growth generates increased employment and household incomes; equally importantly it increases government revenues which may be spent on health, education, water supply and other basic needs of the people.

It has been argued that economic growth should not be an essential objective for the developing countries since it does not necessarily enable a nation to achieve "economic development". That is certainly true, but it would be a mistake to assume that somehow one can obtain "economic development" without "economic growth". Precisely because the benefits of economic growth may not trickle down automatically through the market to the disadvantaged groups in society, the State is obliged to intervene on their behalf through appropriate fiscal and other policies. However, the State's ability to do so depends on the growth of public revenues, which in turn is a function of the expansion of the economy, for otherwise the result will simply be inflation.

A large number of historical and cross-section studies indicate that there exists a close relationship between long-run economic growth and industrialisation. On the basis of the historical experience of today's developed countries, Kuznets (1971) in his classical study derived the following generalisations:

- (a) Long-term economic development is associated with a rise in the share of manufacturing in national output and a decline in that of agriculture.
- (b) The proportion of labour force employed in agriculture declines while that in manufacturing steadily increases until the country reaches a very high level of per capita income.
- (c) Both (a) and (b) are accompanied by an expanding market for industrial goods. Kuznets' hypotheses have found confirmation in more recent research. This research suggests that manufacturing industry plays a leading role in economic development in the specific sense that a 1 per cent increase in Gross Domestic Product is normally associated with a more than 1 per cent increase in value added in manufacturing.¹ Further, there is evidence that the growth elasticity of manufacturing is greater the lower a country's per capita income. Table 1 reports the results of a recent comprehensive UNIDO (1979) study based on data from nearly 100 developing and developed countries over the period 1960-75. The table gives pooled cross-section and time-series estimates of the growth elasticities of manufacturing for various groups of countries, distinguished by their size and certain other characteristics.² These estimates suggest that at the average levels of per capita incomes in the Third World countries, the value of this elasticity is about 1.5.³

On the basis of an analysis of economic growth in developed countries during the 1950s and 1960s, Kaldor (1967) put forward a related, but stronger proposition, namely that the "faster the overall rate of growth, the greater is the excess of the rate of growth of manufacturing production over the rate of growth of the economy as a whole". This proposition has been tested here for developing countries, using cross-section data from 15 semi-industrial economies covering successive sub-periods over the years 1950-78. The results are reported in table 2.⁴

¹ See, for example, Chenery (1960), Kaldor (1967), Chenery and Taylor (1968), Paige (1961), Kuznets (1971), Cripps and Tarling (1973), Chenery and Syrquin (1975), UNCTAD (1978b).

² The number of countries in the six country groups identified in table 1 is as follows:

L_H 11; L_P 13; S_1 18; S_{2P} 19; S_{2I} 28 and CP 9.

The stratification of the countries into the various groups was determined by means of cluster analysis using the following criteria: (a) size, (b) resource endowment and (c) production orientation towards primary or manufacturing development. The number of pooled time-series and cross-section observations for the period 1960-75 for the respective groups were 176, 208, 288, 304, 448 and 144. The regression equation given in table 1 provided a very satisfactory fit in each of the country groups, as measured by R^2 and the standard error of the estimates.

³ A broadly similar estimate of the growth elasticity for manufacturing for a typical developing country was obtained by UNCTAD (1978) in a cross-section study for 1970 of over 50 developing and developed market economy countries. The elasticities were estimated from the following regression equation.

$$\log v = \beta_0 + \beta_1 \log y + \beta_2 (\log y)^2 + \beta_3 \log N$$

where v is valued added per capita in manufacturing, y is per capita GDP and N is the size of the population. See further note 1, p. 8, Singh (1979).

⁴ I am extremely grateful to Mr. J. Ros of CIDE, Mexico City, for making these statistics available to me.

Table 1

Estimates^a of the elasticities of manufacturing value added with respect to GDP for six country groups
(based on pooled time-series for 1960-75)

Country ^b sample	Manufacturing elasticity			Per capita GDP (1970 US dollars)		
	Maximum	Minimum	Mean	Minimum	Maximum	Mean
L _h	1.59	0.99	1.23	467	5 349	1 990
L _l	2.13	1.47	1.81	58	670	192
S _l	1.85	1.31	1.59	42	1 326	221
S _{2P}	1.42	1.02	1.16	102	3 460	952
S _{2I}	1.66	1.14	1.35	159	4 517	1 142
CP	1.62	1.08	1.30	227	2 099	841

^a The estimates are based on the following regression equation:

$$\ln v_{it} = \alpha_i + \beta_1 \ln y_{it} + \beta_2 (\ln y_{it})^2 + U_{it}$$

where v is per capita manufacturing value added

y is per capita GDP

I is country subscript

t refers to the year

U represents the disturbance term.

- ^b L_h : large high income countries
 L_l : large low income
 S_l : small low income
 S_{2P} : small with primary orientation
 S_{2I} : small with industrial orientation
 CP : centrally planned economies.

For further details see note 2, p. 5.

Source: UNIDO (1979a).

Table 2

Regression Analysis⁽¹⁾ of the Relationship between the Growth of GDP and the Growth of Output in Various Sectors: (15 Semi-Industrial Countries. Successive Subperiods 1950-1978).

	α_0	α_1	R ²	No. of observations
Manufacturing	2.250 (.268)	0.436 (.032)	.791	52
Construction	4.183 (.299)	0.220 (.038)	.397	54
Electricity	1.572 (.674)	0.393 (.064)	.435	51
Agriculture	4.211	0.386 (.135)	.134	55
Minerals	5.057 (.436)	0.068 (.059)	.026	53
Transport	3.212 (.386)	0.309 (.046)	.514	45
Commerce	2.291 (.442)	0.528 (.070)	.566	45
Other Services	4.396 (.769)	0.195 (.129)	.065	35

(1) The following regression equation was fitted:

$$\dot{y} = \alpha_0 + \alpha_1 \dot{x}_i + U$$

where \dot{y} is the rate of growth of g.d.p. in constant prices

\dot{x}_i is the rate of growth of production in the 'i'th sector

U is the disturbance term

Table 2 provides striking support for Kaldor's proposition. The results of the regression analysis show that there is a much closer relationship between the rate of growth of GDP and that of manufacturing industry than that of any other sector. The relationship between GDP growth and growth of agriculture is very weak despite the fact that agriculture accounts for a large share of GDP in these economies (usually much larger than that of manufacturing). It is also remarkable that the relationship between manufacturing and GDP growth is stronger than that between the latter and the growth of commerce; expansion of commerce might have been expected to closely mirror the growth of production in the economy as a whole. Further, a regression coefficient of considerably less than unity (0.43) relating GDP growth to manufacturing growth bears out the view that the larger the value of the former, the greater needs to be the positive difference between the rate of growth of manufacturing and that of GDP.

Turning from statistical relationships to economic analysis, there is a systematic body of economic thought which not only explains why manufacturing industry should expand at a faster rate than the economy as a whole during the course of economic development, but would also assign strategic causal significance to manufacturing in raising the over-all rate of growth of productivity in the economy. Very briefly,¹ first, at the simplest level, as the income elasticity of demand for manufacturing is considerably greater than that for food and for agricultural products, manufacturing can be expected to grow relatively faster. Secondly, following the classic work of Allyn Young (1928) (and of course before that of Adam Smith and other classical economists), the economists with a structural approach to economic growth argue that manufacturing is subject to increasing returns, both in the static and, more importantly, in the dynamic sense of Kaldor. Because of these favourable demand elasticities and the dynamic economies of scale, manufacturing industry not only grows more quickly than other sectors, but its growth is normally associated with increased employment. In agriculture, on the other hand, where there is usually considerable disguised unemployment, expansion of productivity and output is normally connected with a reduction in the labour force employed. The expansion of manufacturing industry thus helps to raise the rate of growth of productivity in agriculture in two ways: (a) by absorbing redundant labour, and (b) by providing modern industrial inputs, which incidentally raise both land and labour productivity. Thirdly, it is argued that the expansion of manufacturing industry also increases the pace of technical change and helps raise productivity growth in sectors other than agriculture.

It is sometimes suggested that agricultural development is a precondition for industrialisation since agriculture must in some sense provide "surplus" for industrial expansion. However, both in a priori terms and in the light of results of recent empirical research with respect to Soviet Union (Ellman), China and Japan (Ishikawa) which at the very least casts serious doubt on these surplus theories, it does not seem to be a helpful approach to the relationship between agriculture and industrial development. The two are best regarded as being linked through a chain of cumulative and circular causation. The growth of agricultural

¹ In the context of this paper, this must necessarily be a brief outline of a vast subject. Apart from the references given earlier in the text, see further Gomulka (1971), Kaldor (1975), Rowthorn (1975a,b), Cornwall (1976).

productivity requires modern industrial inputs (e.g., fertilizers, electrification of the countryside, metalled roads). At the same time increased agricultural productivity makes possible higher farm incomes and greater demand for industrial products. Such a perspective is particularly important to a discussion of economic policy in Third World economies.

The structural approach to the process of economic growth not only stresses the key role of manufacturing but it also suggests that within manufacturing, capital goods industries need to grow at a faster rate than consumer goods industries. Again, both historical and cross-section studies of industrial development confirm that the growth elasticity of producer goods industries is usually considerably greater than that of consumer goods industries: i.e., an x per cent increase in GDP is associated with kx per cent, and $k'x$ per cent, increases in the production of capital goods and consumer good respectively where k is greater than k' ; the value of k normally tends to be well above 1.5. Table 3 reports cross-section estimates of the elasticities for various branches of manufacturing industry, based separately on data from two groups of "large" (population greater than 20 million) and small countries respectively. As in the case of table 1, both developed and developing economies are included in the two samples; the underlying regression equations are based on statistics for the year 1970.

The table shows that in general growth elasticities have a much greater value than the size elasticities. For large countries, the latter are in fact usually negative; for small countries, they are more often positive, but still relatively quite small.¹ However, for both large and small economies the growth elasticity for consumer products - food, drink, tobacco - is usually around 1, whilst for machinery, transport equipment, iron and steel, it is substantially higher.² The reasons for this phenomenon again lie partly in demand conditions and partly in production conditions, but, more importantly, in the inter-action of the two. It is argued that in capital goods industries such as engineering and machinery equipment, there is great scope for dynamic economies and technological change. Further, as Kaldor (1967) has observed: "The expansion of capacity in the investment goods sector feeds upon itself, by increasing the growth rate of demand for its own output, thereby providing both the incentives and the means for its own further expansion. The establishment of an investment goods sector thus provides for a built-in element of acceleration in the rate of growth of demand for manufactured goods." (p. 30)

¹ The results of other types of small economies - i.e., those with abundant resources - are not reported in table 3. Although the latter reveal somewhat different coefficients for the size elasticities, in general they also show substantially greater values of growth elasticities for producer goods than for the consumer goods industries. See further UNIDO (1979a).

² These elasticities reflect "average" experience (being derived from a regression equation). They therefore do not mean that every country has to develop its own steel industry; however, this analysis does suggest the importance of the development of capital goods industries for a country to achieve fast economic growth. A similar conclusion is reached by Leontieff (1977).

Table 3

Growth and size elasticities in selected individual manufacturing industries for two country groups^a

Branch	Large countries		Small countries with modest resources	
	Growth	Size	Growth	Size
Food products	1.07	-0.11	0.54	-0.45
Beverages	1.15	-0.62	0.53	-0.25
Tobacco	0.65	-0.12	1.38	0.29
Textiles	1.02	-0.04	0.99	0.63
Clothing	1.55	-0.59	1.05	-0.20
Leather and fur products	1.15	-0.28	0.96	0.43
Footwear	1.14	-0.57	0.70	-0.29
Industrial chemicals	1.67	0.18	1.44	-0.01
Iron and steel	1.81	0.27	2.09	-0.04
Non-ferrous metals	1.44	0.09	1.23	-0.07
Metal products excl. machinery	1.48	-0.15	1.36	0.20
Non-electrical machinery	2.05	0.40	1.98	0.44
Electrical machinery	1.77	0.11	2.28	0.10
Transport equipment	1.86	0.25	1.60	-0.52
Prof. and scientific equipment, photogr. and optic. goods	2.10	0.40	1.50	0.26

^a Elasticity estimates are based on the following regression equation fitted to data from individual countries:

$$\ln(v/N) = \beta_0 + \beta_1 \ln Y + \beta_2 \ln N$$

where v is valued added (in millions of 1970 US dollars),
y is per capita GDP and

N is population (in millions). Cross-section data for 1970 for 25 large and 34 small countries were used in the analysis.

Source: UNIDO (1979a).

The essential point of the foregoing analysis is that rapid industrial growth and increasing the share of manufacturing in value added (as well as structural changes within manufacturing industry itself) are necessary conditions for meeting the basic needs of the people in the developing countries on a long-term basis. There, however, remains the important question, will not industrial development, particularly in its modern, capital-intensive form, reduce employment opportunities? The answer is that if one considers both the direct and indirect effects of industrialisation on employment, and not only the immediate and temporary, but also the long-term and sustainable creation of employment opportunities, this need not be so.

As far as the direct effects are concerned, empirical evidence indicates that employment elasticity of manufacturing industry in developing countries is about 0.7, i.e., 1 per cent increase in manufacturing industry is associated on average with 0.7 increase in employment. Since over the period 1960-75, industry in the Third World countries grew at a rate of over 7 per cent per annum, industrial employment expanded by nearly 5 per cent per annum.¹ This is considerably greater than the rate of growth of population in these countries, although it is somewhat lower than the rate of urbanisation.

However, the more important point is that industry creates employment indirectly by helping to increase production in other sectors of the economy, e.g., agriculture and services. In fact in agriculture, where, as was noted earlier, there is normally disguised unemployment, the elasticity of employment with respect to output tends to be quite small, usually near zero. The values of these elasticities are much higher in service industries; however a sustainable growth of output and employment in many such industries, e.g., domestic transport and distribution, depends crucially on the expansion of primary and secondary sectors. As Neild (1979) rightly points out, "many services are best viewed as a social charge on the production of goods rather than an alternative form of wealth creation. A nation cannot live by producing only health services except to the extent that such services enhance the production of industrial and agricultural products or to the very limited extent that they can be exported". It is therefore difficult to see how sufficient employment opportunities in developing economies can be created on a sustainable basis by means other than rapid industrialisation.²

To sum up, this chapter has examined at a theoretical level and in terms of historical experience of developed and developing economies the complex inter-relationship between industrialisation, agriculture, basic needs and employment. The main conclusions may be summarised as follows:

1. The basic needs of the people in Third World countries on a sustainable basis can only be met by a continuing and long-term expansion of their productive base. The faster the long-run rate of economic growth, the earlier these countries will be able to satisfy their people's essential needs. However, the former is a necessary but not a sufficient condition for the satisfaction of basic needs.

¹ See further Singh (1981).

² See further the discussion of these issues in Chapters IV and VI.

2. The promotion of long-term economic growth requires industrialisation; the faster the expansion of industry in a country, the greater its long-run growth.
3. There is mutual inter-action between expansion of industry and agriculture: industry aids growth of agricultural productivity by provision of modern inputs; increased agricultural productivity helps industry by supplying cheaper food and raw materials as well as by expansion of markets for industrial goods. From the point of view of economic policy, the two are thus linked through a chain of circular and cumulative causation.
4. Industry creates employment directly and more importantly indirectly by facilitating the expansion of other sectors. During the course of economic development, the share of agriculture in output and employment falls whilst that of industry continues to increase until a very high level of per capita income is attained.
5. Finally, it should be emphasised that the conclusions 1-4 are valid only in the long run. At any moment of time, there are likely to be significant contradictions between various social and economic objectives. There will also be continuing changes in national and international economic environment. The transition path of an economy to higher sustainable long-term growth and to satisfaction of basic needs is therefore unlikely to be a smooth one; nor is it desirable that it should be so.

Chapter II

Structural change in Punjab's economy: 1961-78

II.1 Introduction

At the time of the country's independence in 1947, although the Indian Punjab had an above average income per capita, it was by no means the most prosperous State. It has borne the brunt of the human misery and the economic dislocation caused by the partition of the subcontinent. The undivided pre-independence Punjab had been a major food surplus area; however, the districts which comprised the Indian Punjab after the partition were deficit in food.

Notwithstanding the partition, the State's economy grew very fast following independence and at the time of the decennial census in 1961, Punjab ranked fourth in per capita income among the Indian States. By the late 1960s it had achieved the top rank, which it has since maintained. The latest figures show the State's per capita income in 1978-79 was Rs.2,088, compared with the Indian per capita income of Rs.1,249. More significantly from the point of view of the country as a whole, the enormous expansion of agriculture which has taken place in Punjab following the green revolution in the mid 1960s, has transformed the food deficit state into the country's granary. Punjab with less than 2 per cent of India's agricultural area, provides more than half of the country's total marketed surplus of food grains. The share of Punjab and other States in India's net domestic product, in population (working force) and in area, are summarised in table II.1. These data pertain to the year 1970-71, which is the latest census year for which state-wise working force estimates are available.¹

II.2 Sectoral distribution of economic activity: Punjab and India

Tables II.2 and II.3 give sectoral rates of growth of net domestic product at constant prices for Punjab and India respectively. The growth rate of total net domestic product of India fluctuated a great deal during the four subperiods shown in table II.3; these fluctuations are also reflected in Punjab's over-all economic growth (see last row of table II.2). However, in each of the subperiods, Punjab's rate of economic growth has been considerably greater than that of India's - during the 1960s it was half as much more, and during the 1970s which saw a trend declaration in the country's growth, Punjab's growth rate was nearly twice that of India's.

When statistics in tables II.2 and II.3 are supplemented with estimates of growth of population, per capita income in Punjab is seen to have risen at a compound rate of 2.8 per cent per annum during 1960-61 to 1975-76 compared with 1.2 per cent for India as a whole. It grew at a rate of 1.6 per cent in the period 1960-61 to 1965-66, 5.8 per cent during 1966-67 to 1970-71 and 2.1 per cent during the next five years. This is of course an outstanding record compared with other Indian States, but is by no means so creditable by the highest international standards (e.g., South Korea).

¹ The figures for the decennial census in 1980-81 are currently being processed and published. They could not be taken into account in this study.

Table II.1

SHARES OF 16 MAJOR STATES IN INDIA'S NET DOMESTIC PRODUCT*, WORKING FORCE, AND AREA :

1970-1971

	Share of SDP in NDP* (current prices)	Share of working force	Share of area
1. Andhra Pradesh	7.2	10.0	9.1
2. Assam	2.2	2.3	2.1
3. Bihar	6.8	9.7	5.8
4. Gujarat	6.0	4.7	5.4
5. Haryana	2.5	1.5	1.6
6. Jammu & Kashmir	0.7	0.8	1.6
7. Karnataka	4.5	5.6	6.8
8. Kerala	3.4	3.4	1.4
9. Madhya Pradesh	6.0	8.5	15.5
10. Maharashtra	11.5	10.2	10.9
11. Orissa	3.1	3.8	5.3
12. Punjab	3.8	2.2	1.8
13. Rajasthan	4.1	4.5	9.1
14. Tamil Nadu	6.9	8.2	4.5
15. Uttar Pradesh	12.8	15.1	10.3
16. West Bengal	9.4	6.9	3.1

Note: * Average of 3 years centered around 1970-71

Source: Reserve Bank of India Bulletin, April, 1978.

Table II.2

Sectoral and Overall Growth Rates: NDP at Constant Factor Cost : *
Punjab 1960-61 to 1976-77, Various Subperiods (Per Cent Per Annum)

INDUSTRY \ YEARS	1960/1-65/6	1965/6-70/1	1970/1-74/5	1976/6-77/8
1. Agriculture	2.48	8.16	2.54	6.09
2. Forestry	5.75	8.16	-2.69	(33.3)
3. Fishing	4.0	3.3	7.14	(0)
4. Mining	-	(230)	(-20.0)	(0)
<u>Primary</u>	2.49	8.16	2.51	6.06
5. Manufacturing	7.17	6.40	5.27	8.01
6. Construction	4.84	10.83	4.48	13.85
7. Electricity, Gas, etc.	14.1	33.05	-0.89	5.56
<u>Secondary</u>	6.77	6.22	4.63	9.41
8. Transport, Storage, etc.	5.77	15.85	7.01	5.38
9. Trade, Hotels, etc.	5.46	16.0	4.15	7.83
<u>Transport, etc.</u>	5.55	8.13	5.0	7.27
10. Banking, Insurance, etc.	6.84	16.8	1.01	8.93
11. Real Estate, etc.	0.7	1.42	0.70	2.38
<u>Finance, etc.</u>	7.12	3.46	0.85	6.12
12. Public Admin.	9.82	11.07	4.18	6.76
13. Other Services	6.01	11.19	5.63	6.84
<u>Community Services</u>	7.23	6.46	5.03	6.82
14. Total NDP at factor cost	4.03	7.48	3.44	6.80

Note * 1960/61 to 1974/1975 at 1960/61 prices; 1975/76 to 1977/78 at 1970/71 prices.

Source: See Table 1.

Table II.3

Sectoral and Overall Growth Rates: NDP at Constant Factor Cost : *

India: 1960/61 to 1976/77, Various Subperiods (Per Cent, Per Annum)

INDUSTRY \ YEARS	1960/1-65/6	1965/6-70/1	1970/1-74/5	1974/5-76/7
1. Agriculture	-1.3	6.56	-1.43	2.17
2. Forestry	7.6	2.58	1.93	11.2
3. Fishing	3.6	3.96	3.21	0.36
4. Mining	8.1	2.02	4.59	9.22
<u>Primary</u>	-0.86	6.25	-1.12	2.54
5. Manufacturing	7.5	3.80	3.25	5.85
6. Construction	7.7	4.99	-0.19	15.80
7. Electricity, Gas, etc.	18.5	9.77	5.25	15.6
<u>Secondary</u>	7.88	4.31	2.48	10.53
8. Transport, etc.	7.36	4.92	3.03	8.69
9. Trade, Hotels, etc.	5.98	4.58	2.26	7.27
<u>Transport, etc.</u>	6.41	4.69	2.51	7.70
10. Banking and Insurance	7.88	7.71	3.16	20.96
11. Real Estate, Ownership	2.60	1.53	1.52	3.27
<u>Finance + Real Estate</u>	4.13	3.60	2.16	9.89
12. Public Admin., Defence	10.59	7.80	9.79	0.31
13. Other Services	4.53	3.35	2.86	2.50
<u>Community Services</u>	6.86	5.30	6.19	4.53
14. NDP at factor cost	2.85	5.31	1.29	5.26

Note * 1960/61 to 1974/75 at 1960/61 prices; 1974/75 to 1976/77 at 1970/71 prices.

Source: National Accounts Statistics, various issues.

Both agriculture and manufacturing industry in Punjab have grown at a much faster rate than in the country as a whole. Following the green revolution in the mid-1960s, agriculture in Punjab expanded at a phenomenal rate of over 8 per cent per annum over the five years 1965-66 to 1970-71. Although agricultural growth slowed down over the following four years, it accelerated again in the mid-1970s. Sectors other than agriculture and manufacturing industry which have expanded rapidly in Punjab have been transport and public utilities (mainly electricity).

Changes in sectoral distribution of economic activity during the 1960s and 1970s in Punjab and India are shown in tables II.4 and II.5 respectively. Table II.5 indicates that although the Indian economy has expanded at a relatively slow rate during these two decades, there has been considerable structural change in the economy which has broadly speaking conformed to the pattern outlined in the last chapter. Most notably, there has been a steady decline in the share of agriculture in total value added, by nearly 10 percentage points between 1960-61 and 1976-77. There has also been some increase in the share of manufacturing industry and of the secondary and the transport sectors. In sharp contrast table II.4 indicates that despite Punjab's much higher rate of economic growth, there has been hardly any structural change in Punjab's economy. Agriculture's share in fact went up slightly from 56.7 per cent in 1960-61 to 57.1 per cent in 1977-78. Although the latter figure for a single year may be an aberration as agricultural production typically fluctuates from year to year, there is certainly no evidence of a trend decline in agricultural's share in Punjab's economy. Similarly, there does not appear to be a long-term increase in the share of manufacturing industry in economic activity. The fact that Punjab's economy has undergone relatively small structural change at the broad sectoral level, despite a high rate of economic growth, is extremely unusual as the international cross-sectional and historical evidence outlined in the last chapter indicates. This phenomenon is studied further in the next section on the basis of evidence from other Indian States.

II.3 Association between per capita income and sectoral shares: Indian States

In a recent study (RBI, 1978) the Reserve Bank of India examined the relationship between per capita income and sectoral shares in state domestic product for the various Indian States. For this purpose (RBI, 1978) grouped 15 States into three classes of five States each, arranged in order of per capita SDP at current prices (average for three years centred around 1970-71). The first group includes Madhya Pradesh, Orissa, Uttar Pradesh, Assam and Karnataka; the second contains Jammu and Kashmir, Tamil Nadu, Andhra Pradesh, Kerala and Rajasthan; the third consists of West Bengal, Maharashtra, Gujarat, Haryana and Punjab. The average per capita state domestic product and the shares of the primary, secondary and tertiary sectors respectively in production and labour force for the three groups are shown in table II.6. The table suggests that there is in general a negative relationship between per capita income and the share of the primary sector, and a positive relationship between per capita income and the share of the secondary sector.¹

¹ See also Bhalla, G.S. (1978).

Table II.4

Sectoral Distribution of State Net Domestic Product at Constant Factor Cost*

Punjab: 1960-61 to 1977-78

INDUSTRY \ YEARS	1960/61	1965/66	1970/71	1974/75	1977/78
1. Agriculture	56.7	53.1	54.4	52.7	57.1
2. Forestry	0.21	0.22	0.23	0.19	0.26
3. Fishing	.03	0.03	0.02	0.02	0.0
4. Mining	0.0	0.0	0.04	0.0	0.0
<u>Primary</u>	56.94	53.35	54.69	52.91	57.36
5. Manufacturing	10.7	12.1	11.6	12.33	9.51
6. Construction	5.1	5.23	4.73	4.90	4.36
7. Electricity, Gas, etc.	0.74	1.06	1.20	1.01	1.05
<u>Secondary</u>	16.54	18.39	17.53	18.24	14.92
8. Transport, Storage, etc.	4.37	4.68	4.74	5.33	3.78
9. Trade, Hotels, etc.	10.32	10.94	11.25	11.53	13.2
<u>Transport, etc.</u>	14.69	15.62	15.99	16.86	16.98
10. Banking and Insurance	1.41	1.57	1.57	1.43	1.73
11. Real Estate, etc.	2.61	2.25	1.69	1.53	1.16
<u>Finance, etc.</u>	4.02	3.82	3.26	2.96	2.89
12. Public Admin.	2.51	3.12	3.52	3.61	2.21
13. Other Services	5.34	5.78	5.05	5.43	5.67
<u>Community Services</u>	7.85	8.9	8.57	9.04	7.88
14. Total NDP at factor cost	100.0	100.0	100.0	100.0	100.0

Note* 1960/61 to 1974/75 at 1960/61 prices; 1977/78 at 1970/71 prices.

Source: Bulletin of the Reserve Bank of India, various issues.

Table II.5

Sectoral Distribution of Net Domestic Product at Constant Factor Cost*

India: 1960-61 to 1976-77

INDUSTRY \ YEARS	1960/61	1965/66	1970/71	1974/75	1976/77
1. Agriculture	49.3	40.4	42.3	38.0	40.9
2. Forestry	1.3	1.6	1.4	1.4	1.4
3. Fishing	0.6	0.6	0.6	0.6	0.7
4. Mining	1.0	1.2	1.1	1.2	1.1
Sub-total: <u>Primary</u>	52.2	43.8	45.4	41.2	44.1
5. Manufacturing	13.9	16.8	15.8	17.0	15.4
6. Construction	4.7	5.7	5.6	5.3	5.5
7. Electricity, gas, etc.	0.5	0.8	1.0	1.1	1.3
Sub-total: <u>Secondary</u>	19.1	23.3	22.4	23.4	22.2
8. Transport, storage	4.3	5.1	5.1	5.5	5.5
9. Trade, hotels, etc.	9.7	11.1	10.7	11.1	12.1
Sub-total <u>Transport, etc.</u>	14.0	16.2	15.8	16.6	17.6
10. Banking + Insurance	1.2	1.5	1.6	1.7	2.4
11. Real Estate, ownership, etc.	3.0	2.9	2.5	2.5	3.1
Sub-total <u>Finance + real Estate</u>	4.2	4.4	4.1	4.2	5.5
12. Public Admin. + Defence	4.0	5.4	5.9	7.8	5.8
13. Other Services	6.5	6.9	6.4	6.8	4.8
Sub-total <u>Community Services</u>	10.5	12.3	12.3	14.6	10.6
14. Total NDP at factor cost	100.0	100.0	100.0	100.0	100.0

Note* 1960/61 to 1974/75 at 1960/61 prices; 1976/77 at 1970/71 prices

Source: National Accounts Statistics, various issues.

Table II.6

SHARES OF PRIMARY, SECONDARY AND TERTIARY SECTORS AND LEVELS OF PER CAPITA STATE

DOMESTIC PRODUCT 15 INDIAN STATES: 1970-71.

G R O U P	PER CAPITA SDP IN RS.	PERCENTAGE SHARE IN PRODUCTION			PERCENTAGE SHARE IN LABOUR FORCE		
		P	S	T	P	S	T
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group 1	505	62.2	13.7	24.1	78.2	7.5	14.3
Group 2	573	53.4	16.1	30.5	68.9	11.6	19.5
Group 3	801	49.3	21.5	29.2	65.5	13.4	21.1

Note: P: Primary; S: Secondary and T: Tertiary

Source: RBI (1978)

Thus, the case of Punjab, with relatively little structural change in the economy despite a high rate of long-run economic growth, is not only atypical in terms of the international evidence cited in Chapter I, but also in relation to the general experience of other Indian States and of the Indian economy itself. A word of caution is, however, in order here. Zero intersectoral change does not necessarily mean that there has been no change in the structure of the economy at all. It is obviously perfectly compatible with a great deal of intrasectoral structural change. There is evidence, which is presented below and in the following chapters, which indicates that Punjab's economy has experienced a high degree of structural change of this type both in output and employment.

II.4 Growth of output, employment and productivity in Punjab: 1961-71

Statistics on labour force and its distribution among various activities and occupations are only available for Punjab and other Indian States for the census years: 1961 and 1971. These data have been utilised in table II.7 to provide information on growth of employment and productivity in the various sectors in Punjab over the ten-year period 1961-71.

First, with respect to changes in the intersectoral distribution of labour force, row 4 shows that the percentage of workers employed in agriculture increased by nearly 7 percentage points between 1961 and 1971 (from 56.9 to 63.6 per cent). More startlingly, the share of labour force in manufacturing decreased from 15.6 to 11.3 per cent (while manufacturing's share in output showed a small increase (see row 2)). Both these structural changes in the distribution of labour force run contrary to the normal pattern of an increasing proportion of labour force in manufacturing and a decreasing proportion in agriculture during the process of economic growth, outlined in the last chapter. However, unlike the case of intersectoral changes in the distribution of output discussed earlier, these changes are in the same direction as for the country as a whole, as the following all-India figures for the proportion of male workers employed in the various sectors demonstrate.

	<u>1961</u>	<u>1971</u>
Primary	67.98	70.30
Secondary	12.67	11.33
Tertiary	19.35	18.29

The last row of table II.7 shows that the productivity per male worker in agriculture increased only by about 20 per cent during the decade 1961-71, despite the fact that agricultural production increased by more than 60 per cent over the same period. On the other hand, because of the fall in the number and proportion of male workers employed in manufacturing, productivity increased by over 200 per cent during the decade. Thus, whereas in 1961 the average levels of productivity in Punjab's agriculture and industry were much the same, by 1971, the latter was almost twice the size of the former notwithstanding the remarkable expansion in the State's agriculture brought about by the green revolution.

Table II.7

SECTORIAL OUTPUT (INCOME), EMPLOYMENT AND PRODUCTIVITY IN PUNJAB: 1961-71

Sector	Agriculture		Total primary		Manufacturing		Total secondary		Total tertiary		Grand total	
	1961	1971	1961	1971	1961	1971	1961	1971	1961	1971	1961	1971
SDP (Rs. in lakhs)	19 630	31 933	22 940	38 696	4 862	9 536	7 186	13 607	10 981	18 138	41 107	70 441
Percentage share of SDP	47.75	45.33	55.81	54.93	11.83	13.54	17.48	19.32	26.71	25.75	100.00	100.00
Workers employed	1 975 469	2 489 210	1 975 469	2 489 745	540 695	442 070	619 574	519 426	871 226	903 421	3 466 269	3 912 592
Percentage of workers employed	56.99	63.62	56.99	63.63	15.60	11.30	17.87	13.28	25.14	23.09	100.00	100.00
Male workers employed	1 825 154	2 476 488	1 825 154	2 477 016	471 991	429 912	549 308	506 668	809 872	854 835	3 184 334	3 838 517
Percentage of male workers employed	57.32	64.52	57.32	64.53	14.82	11.20	17.25	13.20	29.43	22.27	100.00	100.00
Income per male worker (Rs.)	1 075.52	1 289.45	1 256.80	1 562.20	1 030.10	2 218.13	1 308.19	2 685.60	1 355.89	2 121.81	1 290.91	1 835.11
Growth of productivity (male worker)		19.9		24.2		215.3		205.3		156.5		142.1

Source: Bhalla, G.S. (1979).

The main reason for this phenomenon is that rapid growth of agriculture has tended to "suck in" labour at a very high rate.¹ Agricultural production in Punjab increased at a rate of well over 6 per cent per annum between 1961 and 1971 compared with an all-India growth rate of less than 2.5 per cent. During this period, male agricultural labour force in Punjab grew at a rate of 3.1 per cent compared with a national growth rate of 1.95 per cent.

Bhalla (1979) has provided for the decade 1961 to 1971 a district-wise breakdown of the growth of agricultural output and of male agricultural labour force. (See table II.8.) The table shows that during this decade all districts in Punjab experienced both rapid growth of agricultural production and large increase in the male labour force. In order to estimate the employment elasticity in agriculture, a cross-section regression equation was fitted to the data in table II.8. The estimated equation is given below.²

$$y = -.469 + .574x$$

$$R^2 = .365$$

y is the rate of growth of male labour force

x is the growth rate of agricultural production.

The observed employment elasticity of .574 in Punjab's agriculture is very high by international standards - as mentioned in Chapter I, it usually tends to be near 0 or less than 0. Normally an elasticity value of this magnitude is observed for the manufacturing sector in the developing countries rather than in agriculture. Although the corresponding district-wise data for the growth of labour force and production in manufacturing are not available, the figures in table II.7 suggest that the elasticity of employment in the manufacturing sector as a whole in Punjab during 1961-71 would in fact be negative.

Detailed studies of the "suction mechanism" reveal that the increase in agricultural labour force occurred both because of shifts in the occupational structure within the districts as well as inter-district and inter-state migration, with the former being more important of the two.³ Census data show that the proportion of male agricultural workers among total male workers rose in each district. The proportion of cultivators did not change very much, but that of agricultural labourers recorded a large increase and nearly doubled in every district. At the same time, the proportion of workers in household industries and in the tertiary sector declined significantly. Thus, it appears that the large numbers of "disguised unemployed" who were formerly engaged at near subsistence level in low productivity household industries and in traditional services in the tertiary sector shifted to the more remunerative agriculture. They were unable to shift to high productivity organised manufacturing industry because despite its rapid expansion, that sector did not create sufficient employment opportunities. Nevertheless, there is evidence that if one considered the organised manufacturing sector alone,

¹ For a discussion of this "suction-mechanism" elsewhere in the country, see Alagh, Bahaduri and Bhalla (1978).

² See further Alagh, Bhalla and Bahaduri (1978).

³ Pioneering work in this area has been done by Professor G.S. Bhalla and Professor S. Bhalla. This account is based on their studies. See, for example, G.S. Bhalla (1979) and S. Bhalla (1979).

Table II.8

GROWTH OF AGRICULTURAL PRODUCTION AND OF MALE AGRICULTURAL
WORKERS IN DISTRICTS OF PUNJAB, 1961-71 (PER CENT PER ANNUM)

S. No.	District	Annual compound growth rate	
		Output	Male agricultural workers
1.	Gurdaspur	8.65	4.08
2.	Hoshiarpur	7.46	3.23
3.	Sangrur	6.91	3.04
4.	Ferozpur	7.54	3.69
5.	Patiala	7.64	3.85
6.	Ropar	6.11	2.40
7.	Amritsar	8.11	4.59
8.	Kapurthala	7.15	4.22
9.	Jullundur	6.88	4.12
10.	Bhatinda	7.03	4.27
11.	Ludhiana	6.80	7.51

Source: Bhalla, G.S. (1979).

it recorded an appreciable increase in employment. However, employment declined in manufacturing sector as a whole because of the shift in labour force from the low productivity household industries to the higher paid agriculture.¹

II.5 Summary

This chapter analysed changes in the sectoral distribution of output and employment in Punjab during the 1960s and 1970s. The following important points emerge from this analysis.

First, although Punjab recorded a high rate of long-run economic growth, this was accompanied by relatively little change in the broad sectoral distribution of production. This makes Punjab extremely unusual not only in terms of the general pattern observed in other developing and developed economies, but also in terms of the experience of other Indian States and the Indian economy itself.

Second, the process of economic growth in Punjab has been accompanied by an appreciable increase in the proportion of labour force employed in agriculture and a decline in that employed in manufacturing.

Third, despite the remarkable expansion of Punjab's agriculture on account of the green revolution, the difference in levels of productivity between industry and agriculture became much wider during the decade 1961-71.

Fourth, the value of employment elasticity - i.e., proportionate increase in employment for a given proportionate increase in output - was about 0.5 in Punjab's agriculture during 1961-71.

Fifth, the main reason for these observed structural relationships which run contrary to the normal pattern is that rapidly growing agriculture "suck in" labour both from outside the State as well as from the pool of "disguised unemployed" within the State itself. There was in particular a significant decline in employment in household industries and in traditional service industries. Although output and employment in the organised manufacturing industry expanded very fast, it was inadequate to absorb this increased supply of workers.

¹ This issue is discussed further in Chapter V.

Chapter III

The transformation of Punjab's agriculture:
science, technology, industrial inputs
and the role of the state¹

III.1 Production and yields in Punjab's
agriculture, 1960-80: the main facts

Table III.1 and chart I give the basic statistical data on the transformation of Punjab's agriculture during the 1960s and 1970s under the impact of the so-called green revolution. The index of agricultural output in Punjab increased from 100 in 1960-61 to 258.4 in 1974-75, compared with an all-India index of 148.6 in the latter year. Thus, over this long period, Punjab's agriculture expanded at a rate of nearly 7 per cent per annum, compared with an all-India average of a little over 2 per cent. Moreover, Punjab's rate of agricultural growth sustained over such a long period must be among the highest in the world.

The increase in output has been most marked in foodgrains, and particularly in wheat, rice and maize.² The "green revolution" had come to India in 1966, in the shape of Brolaug wheat seeds. During the 1960s and early 1970s, the Indian green revolution was essentially a wheat revolution. What is more it was essentially a Punjab revolution. The wheat crop of Punjab in the mid-1960s hovered around the 2 million ton mark. Over the next five years, as the new seeds spread in the State, production increased at an extraordinary pace. By 1970, it was more than 5 million tons. Wheat production then slowed down and between 1970 and 1975, it fluctuated around 5.5 million tons. Many economists felt that perhaps Punjab's green revolution had come to an end, with wheat yields having reached a plateau.

This, however, proved to be a false alarm. Production started to accelerate again in the mid-1970s and by 1978-79, Punjab's production had reached 7.5 million tons. The story of rice is even more breath-taking. Punjab is traditionally not a rice-producing or rice-consuming area, and the State only produced about a third of a million tons of rice in the mid-1960s. Production just surpassed the 1 million ton mark in 1974; in 1977 it increased to 1.75 million tons, in 1978 to 2.5 million tons and in 1979 it exceeded 3 million tons. Thus, a state which was deficit by 35,000 tons of its foodgrain needs in 1947 has become the nation's bread-basket today. Statistics indicate that in 1977-78, procurement from Punjab accounted for over 60 per cent of the Central Government's total wheat pool and 56 per cent of its rice pool (Gill 1981).

Although most of Punjab's cultivated area is under foodgrains, there has also been an impressive increase in production and yields in cash crops, particularly cotton, potatoes and sugar cane. However, output shows marked fluctuations because of its sensitivity to price variations. Unlike the case of foodgrain prices which

¹ In writing this chapter, I have benefited greatly from discussions with Dr. Kalkat and Mr. M.S. Gill, both now with the World Bank. Dr. Kalkat was the Director of Agriculture in Punjab during the crucial early years of the green revolution. Mr. Gill was the Registrar of the Co-operative Sciences in those years, and has recently been Development Commissioner in Punjab.

² Unless otherwise indicated, the statistics cited in the text come either from the tables given in this chapter or from the Statistical Abstract of Punjab.

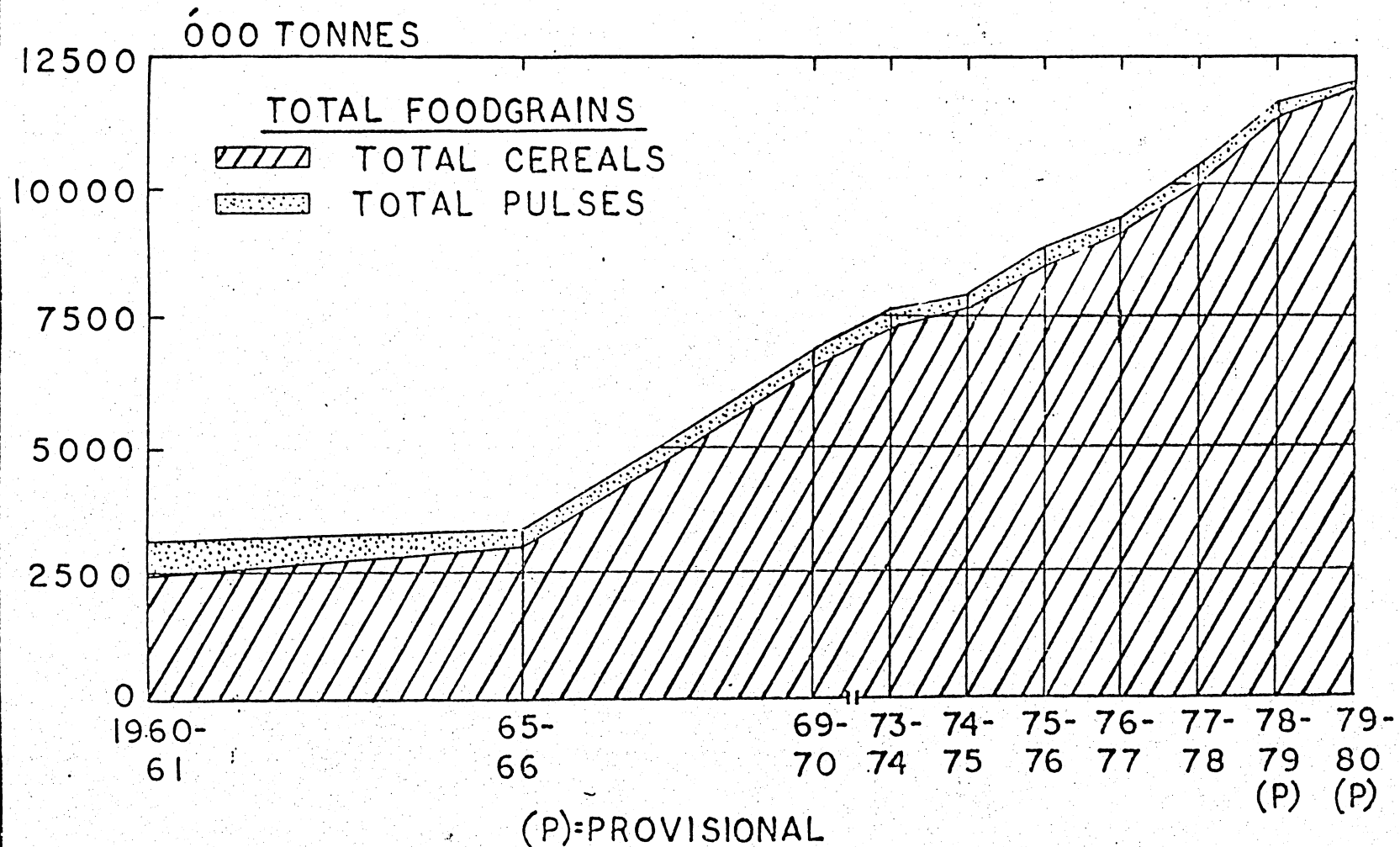
TABLE III.1: LEVELS AND GROWTH OF OUTPUT OF MAIN CROPS IN PUNJAB, INDICES OF AGRICULTURAL PRODUCTION IN PUNJAB AND INDIA, 1960-61 TO 1976-77

Year	Index of agl. produc- tion in Punjab	Index of agl. produc- tion in India	Rice			Wheat			Maize		
			Area 1 000 hect.	Output 1 000 tonnes	Yield kg per hect.	Area 1 000 hect.	Output 1 000 tonnes	Yield kg per hect.	Area 1 000 hect.	Output 1 000 tonnes	Yield kg per hect.
1. 1960-61	-	100	228	236	1 035	1 394	1 725	1 237	123	58	462
2. 1961-62	103.31	102.4	228	236	1 035	1 433	1 763	1 230	129	79	612
3. 1962-63	99.24	102.8	249	268	1 076	1 516	1 760	1 161	123	65	528
4. 1963-64	104.67	106.8	257	282	1 097	1 510	1 897	1 256	92	49	535
5. 1964-65	127.71	104.9	287	351	1 223	1 563	2 360	1 510	160	61	381
6. 1965-66	114.44	102.2	295	293	1 000	1 548	1 916	1 238	156	80	548
7. 1966-67	129.66	102.8	285	338	1 185	1 608	2 451	1 524	184	150	815
8. 1967-68	163.21	109.1	314	415	1 322	1 790	3 335	1 863	209	208	994
9. 1968-69	180.34	118.0	345	470	1 364	2 063	4 491	2 177	193	204	1 055
10. 1969-70	200.11	122.9	359	535	1 490	2 166	4 865	2 245	213	238	1 117
11. 1970-71	208.97	128.3	390	688	1 765	2 299	5 145	2 238	207	243	1 176
12. 1971-72	224.89	127.6	450	920	2 045	2 336	5 618	2 406	145	171	1 180
13. 1972-73	222.13	128.3	476	955	2 007	2 404	5 368	2 233	129	108	836
14. 1973-74	229.45	133.4	499	1 140	2 287	2 338	5 181	2 216	147	144	982
15. 1974-75	236.89	129.3	569	1 179	2 071	2 207	5 286	2 395	135	120	886
16. 1975-76	258.39	148.6	568	1 450	2 553	2 449	5 809	2 372	182	189	1 235
17. 1976-77	NA	NA	681	1 776	2 608	2 630	6 392	2 432	154	142	924
18. Growth rate 1966-67 to 1970-71	12.7	5.7	8.1	19.4	10.5	9.3	20.5	10.1	3.0	12.9	9.6
19. Growth rate 1961-62 to 1975-76 (Three-year averages)	6.8	2.6	7.0	13.6	6.6	3.8	9.0	5.2	1.6	5.9	4.3

Source: Statistical Abstract of Punjab.

3

PRODUCTION OF FOODGRAINS (PUNJAB STATE)



are set and administered by the central and state governments, prices of commercial crops are far more determined by market forces and show very considerable variations. Thus, for example, in 1978-79, the potato market collapsed leading to large losses for Punjab's farmers and a subsequent decline in potato production.

The other important characteristic of Punjab's agricultural transformation is that most of the rise in production is due to increased yields rather than because of an increase in the area under cultivation. Between 1960-61 and 1975-76, whilst the area sown grew at a rate of 2.16 per cent per annum, yield increased at a rate of 4.83 per cent per annum.

Foodgrains as well as commercial crops have participated in the enormous increase in land yields. Tables III.2 and III.3 provide comparative statistics on wheat and rice yields in Punjab and in other countries. Table III.2 shows that by 1977-78, only Mexico among the countries cited had a higher yield per hectare than Punjab. During 1961-65, Punjab's wheat yield was on average about 50 per cent greater than that of India as a whole; by 1977-78, Punjab's yield was nearly twice as high as India's. Table III.3 indicates an equally impressive increase in the State's rice yields both by Indian and international standards. Rice yields are the highest in the world in Japan. During 1961-65, Japan's average yield of paddy was more than twice as much as Punjab's; by 1977-78, it was only 30 per cent greater than Punjab's.

III.2 Science, technology and industrial inputs in Punjab's agrarian transformation

The agricultural revolution in Punjab is essentially a revolution of inputs - of the application of science, technology and modern industrial inputs to the agrarian economy. Specifically, the green revolution technology required heavy use of fertilizers and an assured supply of water. Table III.4 shows the enormous increase in fertilizers consumption in the State since the mid-1960s. From a low initial level, total fertilizers consumption (in terms of nutrient tons) increased sixfold between the mid-1960s and mid-1970s. It has doubled again from 1975-66 to 1978-79 coinciding with the recent leap forward in agricultural production. Fertilizer consumption in kg per hectare of cropped area increased from 9.8 in 1967 to 50.5 in 1972, to 60 in 1977 and to 87 kg per hectare in 1979. However, despite this huge increase, as table III.5 shows, Punjab's fertilizer consumption is still low by international standards. This suggests that yields could improve further as fertilizer use increases, although the returns will obviously not be as high as they have been in the past.

Water is as vital an input as fertilizer and it is impossible to resort to high-yielding varieties of seed without assured water supply. Moreover, availability of irrigation enables more intensive use of land through multiple cropping. There has been a vast increase in irrigation in the State during the last 15 years, mainly through privately sunk and owned tubewells. In 1966, Punjab only had about 25,000 tubewells; by 1977-78 the number had increased to more than half a million, of which nearly 200,000 were electric operated and the rest were diesel based (see table III.6). In 1976-77, the percentage of gross irrigated to gross cultivated area was 76 in Punjab compared with an all-India average of barely 25.

TABLE III.2 AVERAGE WHEAT YIELDS IN PUNJAB, INDIA AND OTHER COUNTRIES: 1961-65 AND 1977-78

Name of the country	1961-65	1977-78
Mexico	2 085	3 757
USA	1 700	2 046
Canada	1 379	1 822
Argentina	1 534	1 477
Pakistan	833	1 475
USSR	964	1 429
China	882	1 270
Australia	1 227	881
World	1 205	1 600
India	835	1 394
Punjab	1 238	2 537

Source: Gill (1980)

TABLE III.3: AVERAGE YIELD OF UNHUSKED (PADDY) IN PUNJAB, INDIA AND OTHER COUNTRIES: 1961-65 AND 1977-78

Name of the country	1961-65	1977-78
Japan	5 012	6 166
China	2 780	3 325
Burma	1 642	1 839
Bangladesh	1 680	1 796
World	2 035	2 443
India	1 480	1 873
Punjab	1 500	4 365

Source: Gill (1980)

TABLE III.4: FERTILIZER CONSUMPTION IN PUNJAB: 1966-79

	(Lakh tonnes)
1966-67	0.50
1972-73	3.25
1973-74	3.07
1974-75	2.44
1975-76	2.95
1976-77	3.73
1977-78	4.65
1978-79	6.00

Source: Gill (1980).

TABLE III.5: FERTILIZER CONSUMPTION (KG) PER HECTARE OF CROPPED AREA: PUNJAB, INDIA AND OTHER COUNTRIES

	1973-74	1977-78		1973-74	1977-78
Japan	404.4	428.1	Mexico	7.7	46.0
UK	99.0	287.0	Pakistan	16.5	35.1
USA	40.2	99.5	Canada	17.2	34.3
USSR	14.4	77.6			
China	17.5	74.3	Australia	2.9	24.5
			India	15.6	25.3
			Punjab	50.9	72.1

Source: Gill (1980).

The spread of tubewell irrigation has led to a huge increase in electricity consumption in the State. Starting from a low level, the per capita consumption of electricity has now become the highest in the country. In 1977-78, Punjab's consumption was over 300 kwh compared with the all-India per capita figure of about 130 (see table III.7). This table also shows that per capita consumption of electricity in agriculture was 107.19 kwh in Punjab whilst in the country as a whole, it was 18.7. In March 1979, 100 per cent of Punjab's villages were electrified compared with 40.5 per cent for the whole country. Similarly, the number of tractors per thousand hectares is as high as 10 in Punjab's Ludhiana district, 12 in Jullundu, the lowest figure of 4 being in Ropar. This should be compared with an all-India average of nearly one tractor per thousand hectares.

It should be clear from the above account that it is the utilisation of high doses of modern inputs which has enabled the Punjab farmers to achieve high rates of growth and levels of productivity. It is in respect of modernisation that the Punjab agriculture differs from agriculture in most other parts of the country. Virtually all of Punjab's grain is now grown from the miracle seeds.

TABLE III.6: TUBEWELLS IN PUNJAB: 1966 to 1978

(Lakhs)

	1966	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78
Electric driven	0.25	1.10	1.30	1.39	1.46	1.67	1.90
Diesel-operated	-	2.52	2.70	3.00	3.04	3.78	3.80
Total	0.25	3.62	4.00	4.39	4.50	5.45	5.70

Source: Gill (1980)

TABLE III.7

ਬਿਜਲੀ

ELECTRICITY

ਸਾਰਟੀ 10.15--ਭਾਰਤ ਵਿੱਚ ਬਿਜਲੀ ਦੀ ਸਾਲਾਨਾ ਪ੍ਰਤਿ ਜੀਅ ਖਪਤ
Table 10.15--Annual Per Capita Consumption of Electricity in India

(ਕਿਲੋਵਾਟ ਘੰਟੇ)
(KWH)

1978-79

ਰਾਜ/ਸੰਘ ਰਾਜ	State/Union Territories	ਘਰੇਲੂ ਵਿਉਪਾਰਕ ਉਦਯੋਗਿਕ ਸਰਕਾਰੀ ਖੇਤੀਬਾੜੀ ਜੋੜ ਗੈਰ ਕੁਲ ਬਿਜਲੀ ਬਿਜਲੀ ਬਿਜਲੀ ਬੱਤੀਆਂ ਉਪਯੋਗ- ਕਿਲੋਵਾਟ ਅਤੇ ਅਤੇ ਟਰੇਕਸ਼ਨ, ਤਾਵਾਂ ਘੰਟੇ ਸਮਾਲ, ਸਮਾਲ ਵਾਟਰ ਪਾਵਰ ਪਾਵਰ ਵਰਕਸ ਅਤੇ ਫੁਟਕਲ							
		Domes- tic Light and small power	Com- mercial Light and small power	Indus- trial including electric Traction water works and Misc.	Public Lighting	Agricul- ture	Total	Non- Utilities	Tota Kwh
1		2	3	4	5	6	7	8	9
(ੳ) ਰਾਜ	(A) States								
ਆਂਧਰਾ ਪ੍ਰਦੇਸ਼	Andhra Pradesh	8.59	3.92	56.96	0.79	17.03	87.29	5.73	93.02
ਆਸਾਮ	Assam	2.97	1.19	27.50	0.24	0.27	32.17	4.77	36.94
ਬਿਹਾਰ	Bihar	2.85	1.86	58.80	0.10	3.13	66.74	20.72	87.46
ਗੁਜਰਾਤ	Gujarat	18.30	9.11	153.00	2.07	35.31	217.79	13.40	231.19
ਹਰਿਆਣਾ	Haryana	15.37	5.96	104.46	0.65	77.49	203.93	7.48	211.41
ਹਿਮਾਚਲ ਪ੍ਰਦੇਸ਼	Himachal Pradesh	12.33	6.67	30.92	0.49	0.80	51.21	—	51.21
ਜੰਮੂ ਅਤੇ ਕਸ਼ਮੀਰ	Jammu and Kashmir	14.48	6.10	45.43	1.07	3.96	71.04	0.01	71.05
ਕਰਨਾਟਕ	Karnataka	14.83	3.04	114.36	1.66	10.04	143.93	4.81	148.74
ਕੇਰਲਾ	Kerala	11.72	6.10	72.33	1.42	3.31	94.88	2.55	97.43
ਮਨੀਪੁਰ	Manipur	3.51	0.42	0.52	0.13	—	4.58	—	4.58
ਮੱਧ ਪ੍ਰਦੇਸ਼	Madhya Pradesh	5.35	3.88	69.45	0.66	5.59	84.93	11.54	96.47
ਤਾਮਿਲ ਨਾਡੂ	Tamil Nadu	14.47	14.07	100.73	1.89	46.21	177.37	6.67	184.04
ਮਹਾਰਾਸ਼ਟਰ	Maharashtra	24.39	15.66	154.98	2.28	23.67	220.98	8.63	229.61
ਉੜੀਸਾ	Orissa	3.73	3.02	82.10	0.29	1.34	90.48	24.22	114.70
ਪੰਜਾਬ	Punjab	25.97	8.81	159.34	0.83	107.19	302.14	1.00	303.14
ਰਾਜਸਥਾਨ	Rajasthan	5.67	4.17	55.87	0.62	16.28	82.61	10.37	92.98
ਉੱਤਰ ਪ੍ਰਦੇਸ਼	Uttar Pradesh	7.48	0.74	43.53	0.31	23.84	75.90	12.09	87.99
ਤਰੀਪੁਰਾ	Tripura	5.53	1.44	2.86	0.19	0.74	10.76	—	10.76
ਪੱਛਮੀ ਬੰਗਾਲ	West Bengal	13.34	10.69	83.27	0.88	1.28	109.46	8.99	118.45
ਨਾਗਾਲੈਂਡ	Nagaland	7.91	4.48	13.06	0.61	—	26.06	3.74	29.80
ਮੇਘਾਲਿਆ	Meghalaya	9.48	7.34	19.07	0.97	0.64	37.50	—	37.50
ਸਿਕਿਮ	Sikkim	20.88	3.33	10.04	0.21	—	34.46	—	34.46
	ALL INDIA	11.81	6.72	82.16	1.01	18.75	120.48	10.46	130.94

Source : Statistical Abstract of Punjab, 1980

Finally, the important role of science and agricultural research in this technological transformation should not be overlooked. The rice and wheat seeds, the basis of the green revolution, originated from scientific research done abroad. However, scientists at Punjab's Agriculture University at Ludhiana have developed this research further and continually adapted the seeds to the State's needs and conditions. Moreover, for a whole range of other crops (e.g. sugar cane) the basic scientific research itself has been carried out at Ludhiana.

III.3 The role of the state

The Brolaug wheat seeds were not simply restricted to Punjab, but were offered to all States in the country, as indeed, they were to all wheat growing areas in the world. However, none of the other Indian States (except Haryana), or even the western half of the former Punjab itself which is now in Pakistan,¹ were able to make as effective and purposeful a use of the new technology, as did the Indian Punjab. The main reason for this lies in the crucial role of the State. The new technology, as we have seen, required massive inputs of fertilizer, water and the associated infrastructure. The Government in Punjab was able to make the administrative arrangements for the efficient supply of all these to the farmers. The reasons why the Government acted in this way lie deep in history and in the constellation of political forces which dominate the state apparatus. Very briefly, the Government's role was crucial in the following specific spheres:

First, there was the supply of cheap, short and, equally importantly, long-term credit to meet the farmer's fertilizer and water needs. Punjab, for historical reasons, has long had an effective co-operative network with funds provided by the State. In 1966-67, the Punjab co-operatives advanced Rs.250 million in short-term crop loans to farmers, of which Rs.40 million was in the form of fertilizer. By 1968-69, the total loan had jumped to Rs.620 million with fertilizers accounting for Rs.270 million. In 1978-79, the co-operatives gave Punjab's farmers Rs.1,050 million which despite an average annual rate of inflation of 5 per cent or so during 1965-80 represents a massive real increase. Further, to ensure efficient and timely distribution, the Punjab MARKFED, a state agency, maintained nearly 5,000 fertilizer distribution depots for the 11,000 villages in the State. Similarly, to sink the tubewells, the long-term loans given by co-operatives increased from a mere Rs.3 million in 1960 to Rs.160 million in 1972 and to Rs.230 million in 1978.

Second, the State Government made continuous and heavy investments in infrastructure: irrigation, roads, electricity and power, and not least the crucial agricultural university and the associated extension service. Every Punjab village today has electricity and a metalled link road. The expansion in irrigation and electricity consumption were reviewed in the last section. The total road length increased from 8,386 km in 1960-61 to 26,872 km in 1975-76; per million of population, it increased from 7.6 km to 17.7 km over this period.

Third, the Government played an important role in the marketing of the produce. Village roads, apart from anything else, are crucial for access to the market. As early as the 1930s, Punjab had developed formal, government-sponsored markets.

¹ See Amjad and Sen's (1979) interesting study.

These regulated markets were greatly expanded and their number increased from 87 in 1966-67 to 108 in 1975-76.

Fourth, the Government took the initiative and over a ten-year period carried out a consolidation of landholding throughout the State. Landholdings in Punjab (as they still are elsewhere in the country) were typically divided into many fragments. As a result of the consolidation, even the largest Punjab farms are divided into less than two plots on average, compared with an average of nine, for instance, in Orissa. Many agronomists would argue that the consolidation of landholdings was an essential precondition for Punjab's agricultural revolution.

III.4 Technology and agriculture: evidence from the rest of India

It was seen earlier that applications of science, technology and inputs of modern industry have been the most important factors in raising agricultural output and productivity in Punjab. It will be useful to review briefly the evidence on this subject from the rest of the country. Bhalla and Alagh (1979) have recently reported the results of a large inter-district study of agricultural productivity in the whole country, covering 272 districts. Their most important conclusions are as follows:

First, they found that rapid agricultural growth is confined to only 17 per cent of districts in India. Of the 282 districts, only 48 (comprising less than 20 per cent of total area) recorded a growth rate (in the early 1970s) exceeding 4.5 per cent per annum. All of Punjab's 11 districts were included in this group of high-growth districts.

Secondly, Bhalla and Alagh found that fast agricultural growth as well as high levels of productivity are significantly associated with high use of modern inputs - fertilizers, tractors and irrigation. Table III.8, which summarises the results of their cross-section analysis of inter-district productivity levels in the country, brings this out clearly. Thus, the 69 high-productivity districts (with productivity greater than Rs.1,300 per hectare) accounted for 20.48 per cent of total area, but 36.4 per cent of national output. With only one-fifth of the area, they consume 44 per cent of fertilizers, use over 50 per cent of tractors and comprise nearly 40 per cent of total gross irrigated area in the country. At the other extreme, the 83 districts whose productivity is less than Rs.700 per hectare hardly use any modern inputs.

Thirdly, and most significantly, the two authors found that the new agricultural technology is highly capital-intensive. On the basis of the costs of fertilizers, irrigation and other necessary inputs they estimate the average incremental capital-output ratio to be over 4. If mechanised innovations like tractors and harvester combines are introduced, the ICOR in high-productivity Indian agriculture may well be more like 5 or 6 to 1.

TABLE III.8: PERCENTAGE DISTRIBUTION OF TOTAL AGRICULTURAL OUTPUT
AND INPUT FOR THE TRIENNIUM 1970-3, 282 INDIAN DISTRICTS

70s Yield Levels (Rs. hectares)	Area	Output	Fertiliser	Tractor	Irrigation Pumpsets	Gross Irrigated area
Above 1,300	30.48	36.40	34.23	50.39	45.47	38.43
700 - 1,300	47.77	47.92	42.93	38.25	33.52	49.73
Less than 700	31.71	15.68	12.83	11.36	19.01	11.85
Total 282 districts	100.00	100.00	100.00	100.00	100.00	100.00
Region above average (average 974)	44.55	63.78	70.42	71.52	64.86	68.41a

Source: Bhalla (1979).

III.5 Summary

The main points of this chapter may be summarised as follows:

1. During the 1960s and 1970s, Punjab's agriculture under the impact of the green revolution achieved sustained rapid expansion. Its long-term rate of growth of about 7 per cent per annum must be among the highest in the world.
2. Although there was some increase in the area under cultivation, most of the growth has been due to the enormous increase in land yields.
3. The growth in production and productivity is almost entirely due to the application of science and the spread of new agricultural technology. This technology is in turn crucially dependent on inputs of modern industry in the form of fertilizers, pesticides, electrification (for irrigation), etc.
4. The Government of Punjab has played a central role in this agrarian transformation by its arrangements for the provision of these inputs, through investment in infrastructure (including irrigation, power and village roads), by the establishment of a first-rate agricultural university and the agricultural extension service, and by its regulation of agricultural marketing. Moreover, in the early 1950s, the Government initiated and carried out a major change in the economic and social organisation of the State's agrarian economy by its comprehensive programme of consolidation of landholdings. In the opinion of many scholars, this provided the essential precondition for subsequent agricultural development.
5. Evidence from other parts of India also indicates that increases in land yields to meet the needs of a growing population are only possible through the introduction of modern technology. This technology is found to be highly capital-intensive, with incremental capital-output ratios ranging from 4 to 1 to 6 to 1.

Chapter IV

Industrial development in Punjab: the significance of modern small-scale industry

IV.1 Introduction

At the time of the partition and the country's independence Punjab was an industrially backward State. The pre-independence undivided Punjab had a relatively high level of agricultural development (although as we saw in the last chapter, the Indian Punjab was a food deficit area) but contained very little industry. Available statistics show that in 1947, East Punjab (the Indian part of Punjab) was left with only 547 registered factories employing 37,486 workers.¹ No data are available on unregistered factories, but an analysis of the age structure of over 18,000 small-scale industrial units showed that only 363 of these were established before 1940 (Pandit, 1978). An economic survey at the time estimated that the gross value of output for all industries in 1946-47 (i.e., the year before partition) was only Rs.12.5 crores (Rs.120.5 million).

The partition caused particular disruption to the industry which existed. This was because "the Muslim artisans who migrated to Pakistan, contributed almost 90% of our skilled labour. Most of the factories and workshops, as well as small and cottage industries had to close down. A number of famous industrial institutes were lost to us, let alone the loss of raw material and markets".² Thus, the State did not inherit even its small number of industrial enterprises at the time of independence.

From these meagre beginnings, the industrial development in the State during the last 30 years has been quite remarkable. In 1978-79 manufacturing industries in Punjab employed nearly 400,000 workers (i.e., ten times as many in 1947); the value of their production at over Rs.1,400 crores was nearly 120 times as large. This industrialisation has inevitably had its strengths and weaknesses; these will be analysed in the following sections. However, its most important feature has been the development of the modern small-scale industry, which will be discussed first.

IV.2 Modern small-scale industry

In 1972, the Government of India, for the first time carried out a census of "modern" or organised small-scale industry in all States of the country.³ Based on the results of the census, table IV.1 and charts IV.1 and IV.2 provide information on output, valued added and employment in the small-scale sector in Punjab and in other States. The definition of the "small-scale unit" used in the census was in terms of "capital" of Rs.7.5 lakhs (Rs.0.75 million) or less in original value of plant and machinery and Rs.10 lakhs or less in the case of ancillary small-scale units. The coverage of the census was not comprehensive; it was restricted to

¹ Census of India, 1951, Part I.

² The Statistical Abstract of Punjab, 1947 to 1950 (Government of Punjab, no date).

³ There has been no subsequent census, although some new information is collected each year on a sampling basis.

TABLE IV.1: OUTPUT, VALUE ADDED AND EMPLOYMENT IN MODERN
SMALL-SCALE SECTOR: INDIAN STATES, 1972

Sl. No.	State/Union Territory	Census of SSI results				For all manu- facturing industries		Percentage	
		Total working units	Gross value of output (Rs. lakhs)	Value added (Rs. lakhs)	Employment (Nos.)	Value added (Rs. lakhs)	Employment (Nos.)	Col. 5 as % of Col. 7	Col. 6 as % of Col. 8
1	2	3	4	5	6	7	8	9	10
1.	Andhra Pradesh	8 999	8 591	2 935	78 673	23 096	1 628	13	5
2.	Assam	1 739	2 264	912	19 652	11 230	170	8	12
3.	Bihar	6 368	7 203	2 715	61 465	36 353	887	7	7
4.	Gujarat	11 599	20 862	6 746	114 500	40 674	1 013	17	11
5.	Haryana	5 361	10 179	3 036	48 503	11 996	n.a.	25	..
6.	Himachal Pradesh	1 729	452	161	5 851	1 831	53	9	11
7.	Jammu & Kashmir	1 232	1 103	338	9 598	1 955	93	17	10
8.	Karnataka	7 062	7 977	2 876	64 385	21 077	1 038	14	6
9.	Kerala	6 902	11 565	3 618	126 514	13 323	978	27	13
10.	Madhya Pradesh	8 727	7 003	2 086	59 612	29 990	1 022	7	6
11.	Maharashtra	17 338	52 947	19 122	239 770	129 345	2 395	15	10
12.	Manipur	518	332	138	3 409	286	41	48	8
13.	Meghalaya	179	120	45	1 188	..	11	..	11
14.	Nagaland	46	48	21	448	..	3	..	15
15.	Orissa	2 163	2 226	912	18 624	9 765	406	9	5
16.	Punjab	14 827	24 338	6 359	123 544	17 731	442	36	28
17.	Rajasthan	8 055	5 638	1 603	45 860	15 511	533	10	9
18.	Tamil Nadu	18 547	32 178	10 422	215 182	63 617	2 041	16	11
19.	Tripura	275	145	54	1 698	..	11	..	15
20.	Uttar Pradesh	13 939	22 267	6 790	160 027	50 872	1 991	13	8
21.	West Bengal	16 904	27 022	8 874	176 198	53 987	1 739	16	10
22.	Arunachal Pradesh	12	11	7	181	..	1	..	18
23.	Chandigarh	349	635	146	2 882	..	12	..	24
24.	Dadra & Nagar. Haveli	36	47	14	361	..	1	..	36
25.	Delhi	5 327	13 698	3 634	64 880	18 552	292	20	22
26.	Goa	641	1 080	445	7 253	1 000	32	45	23
27.	Mizoram	84	30	16	36	..	..	..	..
28.	Pondicherry	362	314	75	2 570	..	25	..	10
29.	Andaman, L.M. & A. Islands	..	..	..	..	..	7	..	..
ALL INDIA		159 321	260 274	841 000	1 653 178	581 700	17 068	14.5	10

Source: Census of Small Scale Industrial Units. See text for details.

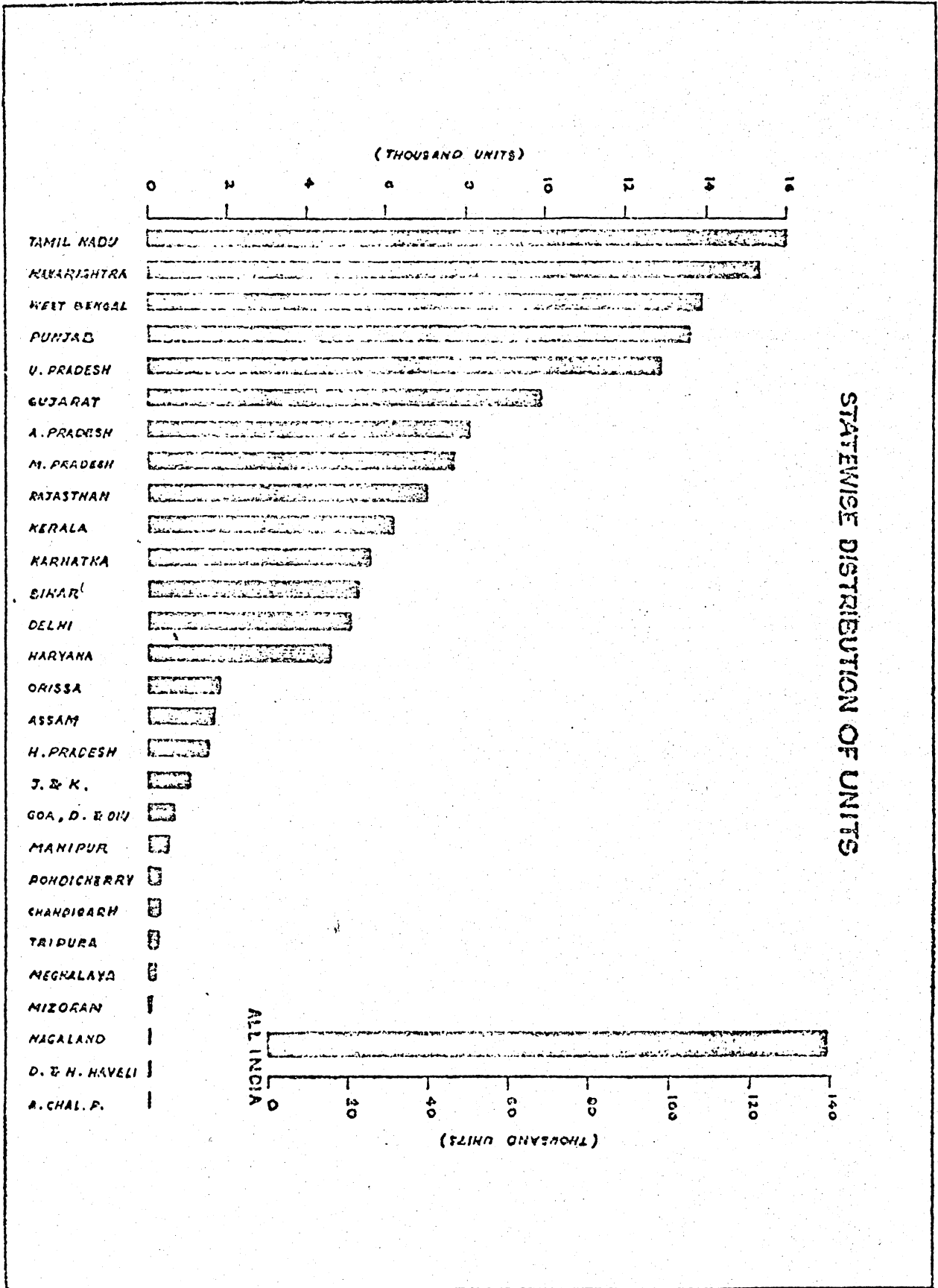
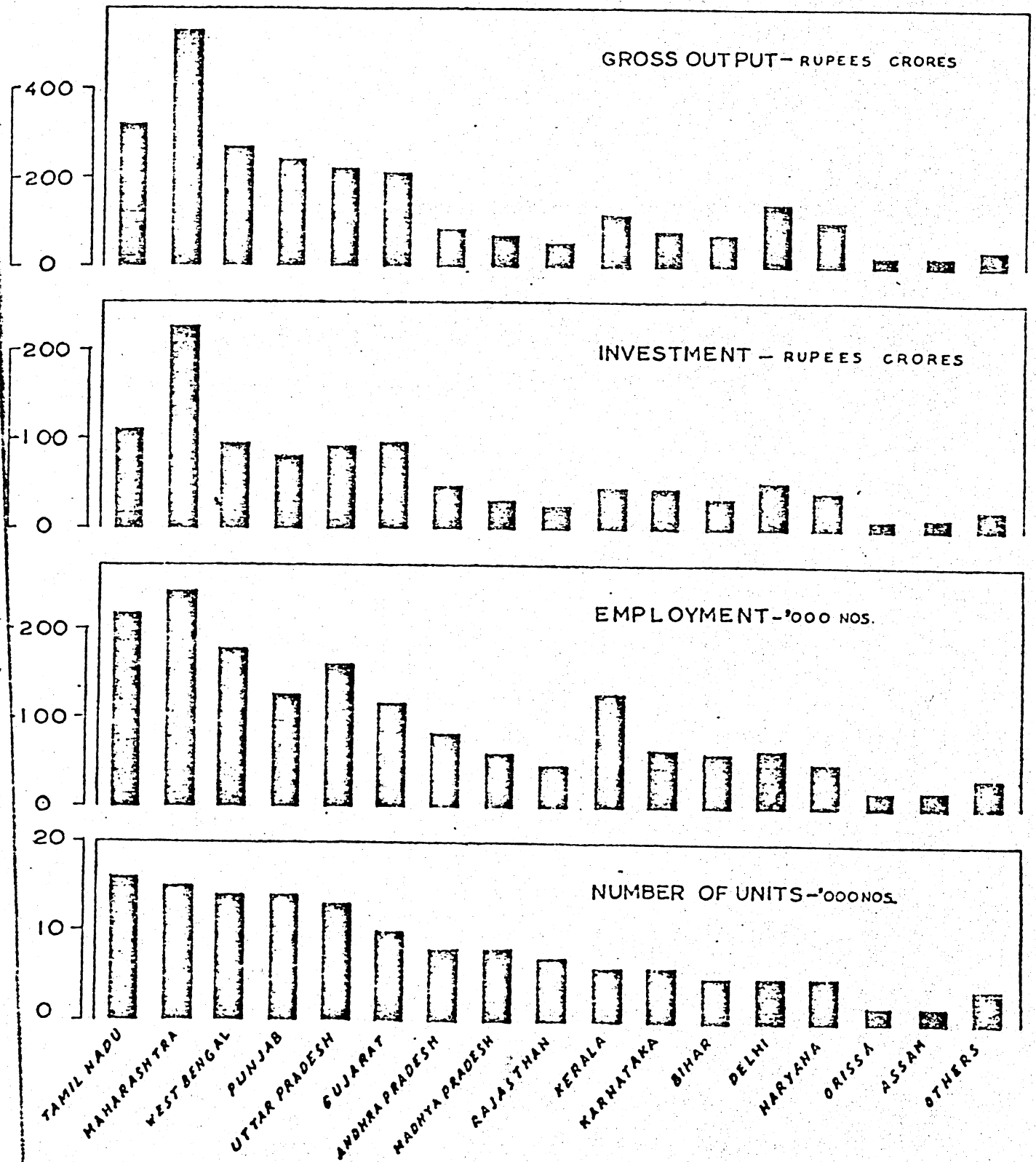


CHART IV.1.

CHART IV.2

STATE-WISE NUMBER OF UNITS, EMPLOYMENT, INVESTMENT AND GROSS OUTPUT



units registered with the Directorate of Industries (who carried out the census). The Directorate observed "the census coverage excluded a large category of small scale units which come within the purview of different specialised boards, committees or agencies operating them. This was a conscious decision with a view to cover the modern small-scale sector falling within the purview of Small Industries Development Organisation (SIDO) and availing assistance and facilities made available to them.¹ Despite the exclusion of unregistered and other small enterprises, the census did obtain statistical data on nearly 160,000 individual industrial units, and remains the best source of information on the modern small-scale industry in the country.

Table IV.1 shows that in 1972 Punjab had 14,827 working small-scale industrial enterprises, about 10 per cent of the country's total. Punjab's share in the gross value of output, value added and employment in India's modern small-scale industry was of a roughly similar order of magnitude, i.e., 8 to 10 per cent. This is of course several times larger than the State's share of the country's population (which is about 2.5 per cent).

Equally significant, table IV.1 shows that modern small-scale industry is much more important in Punjab's manufacturing sector than in any other large State in the country. In 1972, it contributed 36 per cent of the total value added by all manufacturing industries in the State and accounted for 28 per cent of total industrial employment. This compares with all-India figures of 14.5 and 10 per cent respectively (see the last two columns of the table). In Tamil Nadu, the State with the largest number of small-scale units in the country (18,547), the corresponding percentages are 16 and 11; in Maharashtra, the State with the next largest number of small enterprises, these percentages are 15 and 10 respectively.

Table IV.2 provides information on the structure of modern small-scale industry in Punjab, and for comparative purposes in the country as a whole. The table reveals a surprising picture; as the major agricultural State in the country, Punjab might have been expected to specialise in agro-based industries. Instead the table indicates that the most important small-scale industries in the State are hosiery and ready-made garments (which constitute 15.4 per cent of total gross output of the modern small-scale sector), basic metal alloy industries (21.9 per cent), metal products (17.4 per cent), machinery and parts (13.2 per cent), and transport equipment and parts (12.2 per cent). As Punjab does not possess any mineral resources or basic industries like steel, the raw materials for all these industries have to be imported from other States or abroad. Hosiery industry, particularly for higher quality goods, depends almost entirely on imported wood. Even in the case of wool produced in India, more than 95 per cent is accounted for by other regions. On the other hand, the share of the agricultural processing industries (food products and beverages) in small-scale industrial production is very small.

Most of the output of Punjab's small as well as large-scale industry is sold in other parts of the country or exported. Exports to other countries are significant in many important industries. In 1971-72, Punjab alone accounted for

¹ Report on Census of Small Scale Industrial Units, Vols. I and II, Government of India, Ministry of Industry, New Delhi, 1977.

TABLE IV.2: THE STRUCTURE OF MODERN SMALL SCALE INDUSTRY IN PUNJAB

1972- 1974

INDUSTRY	PERCENTAGE OF GROSS OUTPUT	
	PUNJAB	INDIA
Food Products	1.2	5.8
Beverages	0.2	0.3
Hosiery and Ready Made Garments	15.4	6.0
Wood Products	1.1	3.9
Paper Products and Printing	0.7	4.8
Leather Products	0.9	3.4
Rubber and Plastics	3.5	5.8
Chemicals	7.2	13.3
Mineral Products	0.6	4.8
Basic Metal Alloy Industries	21.9	11.3
Metal Products	17.4	18.0
Machinery and Parts	13.2	8.1
Electrical and Machinery Appliances	2.5	5.8
Transport Equipment and Parts	12.2	5.2
Miscellaneous Manufacturing Industries	1.4	2.3
Repair and Service	0.3	0.9
Total (%)	99.9*	99.7*
Total (Rs lakhs)	24338	260,274

* Total does not add up to 100.0 because of rounding errors.

Source: Based on data supplied in Report on Census of Small Scale Industrial Units, Vol. I and II, Govt. of India, New Delhi, 1977.

about 100, 68, 67, 29, 14 and 12 per cent of the country's exports of woolen hosiery, sports goods, bicycle parts, complete bicycles, domestic sewing machines and pipe fittings respectively.

Table IV.3 reveals another important feature of Punjab's modern small-scale industry. It shows the percentage distribution of the different categories of workers in the various industries. The table indicates that the State's leading industries require a high proportion of skilled workers. In 10 out of 13 industries, the proportion of skilled workers is above 60 per cent. In industries where Punjab is the largest producer in the small sector in the country, the proportion of skilled workers is even higher. (These industries include woolen knitted wear, sports goods, bicycles and parts, sewing and knitting machines, machine tools, sanitary plumbings, fixtures and fittings.) In all these industries, skilled workers form over two-thirds of the total employed. If supervisory and managerial workers are included among the skilled, then the skilled workers would constitute over 80 per cent of the total labour force. In general, it appears that the industries where the state is an important employer and producer in the country are those where the requirements of skilled labour are very high and that of the unskilled labour very low (Pandit, 1978).

IV.3 Manufacturing industry: all sectors

Although modern small-scale industry has made rapid progress in Punjab - achieving both fast expansion and diversification - there is an apparent paradox that in terms of other usual criteria, the State may be regarded as being industrially backward relative to the rest of the country. For example, in 1978-79, the contribution of industries (registered and unregistered) to the GDP in Punjab was only 11.7 per cent as against 24.9 per cent in Maharashtra, 23 per cent in Tamil Nadu and 18 per cent in West Bengal. At an all-India level, the corresponding figure was 16.8 per cent. In terms of per capita valued added in manufacturing, Punjab is not among the top ranking States, although it has the highest total per capita income and the highest per capita income from agriculture.

This paradox becomes even more curious when it is observed that during the 1960s and 1970s manufacturing in Punjab has expanded at a faster rate than in the country as a whole; it has also grown somewhat more rapidly than agriculture and the tertiary sector in the State. The reasons for the paradox were alluded to in Chapter II. Normally there is a large excess of the rate of growth of industry over that of the GDP as a whole and over agriculture growth. Although Punjab's industry has grown quite fast (see table IV.4), its growth rate has exceeded that of the State's GDP and of its agriculture production by only a small margin (compared with the normal pattern and the pattern in the country as a whole).

Table IV.4, based on information supplied by the State's directorate of industries,¹ provides comprehensive statistics on production, investment and employment in Punjab's organised manufacturing industry during the 1970s. It should be noted that the definition of "small-scale industry" in this table is different than that in tables IV.1 to IV.3 (which were based on an all-India census,

¹ I am grateful to Dr. A. Singh, Director, Economic and Statistical Organisation, Punjab, for making this data available to me.

TABLE IV.3: EMPLOYMENT OF DIFFERENT CATEGORIES OF LABOUR IN PUNJABS
 MODERN SMALL SCALE INDUSTRY: 1972 (PER CENT)

I N D U S T R Y	S M A L L S C A L E S E C T O R			
	SKILLED	UNSKILLED	SUPERVISORY & MANAGERIAL	OTHERS
Woollen knitted wear	75.7	3.7	14.1	6.5
Rubber footwear	61.5	20.2	12.2	6.1
Hand tools and cutting tools	65.1	13.5	14.2	7.3
Sanitary plumbing fixtures & fittings of metal	66.1	17.8	9.3	6.8
Bolts and nuts	65.4	15.9	13.4	5.4
Agricultural Implements & hand tools	64.3	16.8	13.8	5.2
Utensils	58.4	24.7	14.1	2.7
Machine tools	69.4	10.5	12.0	8.1
Sewing and Knitting machines	78.0	5.6	11.0	5.3
Auto components Parts & accessories	54.3	24.2	13.6	7.7
Bicycle and parts	70.2	11.6	13.2	4.9
Laboratory scientific instruments	54.4	16.9	16.9	11.9
Sports goods	73.1	4.8	14.4	7.7
All Industries	59.9	19.8	14.1	6.3

Source: Same as table 1.

TABLE IV.4: NUMBER OF SMALL-SCALE UNITS, PRODUCTION INVESTMENT AND
EMPLOYMENT IN PUNJAB, 1973-74 TO 1979-80
(PRODUCTION AND INVESTMENT AT 1973-74 PRICES)

Item	Years							Average annual rate of growth (simple)
	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	
1	2	3	4	5	6	7	8	9
<u>A. Small-scale sector</u>								
1. No. of working units	30 691	32 968	34 776	36 737	38 652	42 233	47 437	9.09
2. Fixed investment (Rs. crores)	-	-	-	147.28	180.47	210.83	237.26	-
3. Production (Rs. crores)	408.25	393.83	439.01	453.33	573.32	584.18	653.13	9.99
4. Employment (No.)	233 660	249 939	254 456	262 776	275 727	298 925	333 090	7.09
5. Exports (Rs. crores)	37.83	35.68	38.83	46.01	44.82	51.94	58.74	9.21
6. Per unit fixed investment (Rs. lakhs)	x	x	xx	0.40	0.47	0.50	0.50	
7. Value of production per unit (lakhs)	1.33	1.19	1.26	1.23	1.33	1.38	1.38	0.63
8. Output per worker (Rs.)	17 472	15 757	17 253	17 252	18 617	19 543	19 608	2.04
<u>B. Large and medium</u>								
1. No. of units	122	132	144	160	175	188	203	11.06
2. Fixed investment (Rs. crores)	73.69	89.92	159.73	205.03	241.57	296.44	523.33	118.3
3. Production (Rs. crores)	282.83	254.54	313.70	375.63	473.49	552.76	625.24	36.9
4. Employment (No.)	56 537	57 891	63 291	69 942	77 971	91 551	98 376	12.3
5. Production per unit (Rs. crores)	2.32	1.93	2.18	2.35	2.71	2.94	3.08	5.4
6. Output per worker (Rs.)	50 026	43 969	49 565	53 706	60 726	60 377	63 556	4.5

(DLS data).

carried out by the Ministry of Industry in New Delhi). Table IV.4 uses the traditional definition of "small scale": enterprises employing 50 or less workers when using power or 100 or less workers without power. Consequently, some of the "modern small-scale industry" enterprises in tables IV.1 to IV.3 will be included among the "large and medium" enterprises in this table. In addition, the coverage of the small-scale sector in table IV.4 is more comprehensive than in the national census, which as noted earlier was deliberately restricted in its scope.

The table shows that between 1973-74 and 1979-80, production in the small-scale sector grew at a rate of nearly 10 per cent per annum and employment at a rate of over 7 per cent per annum. This yields a crude employment elasticity of about 0.7 per cent, greater than in agriculture noted in the last chapter. On the other hand, in the large and medium sector, manufacturing production during these six years increased at a rate of over 35 per cent per annum. In 1973-74, output of large and medium enterprises was about 70 per cent of that small establishments; by 1979-80, it was nearly level. Employment in the large and medium sector increased at a rate of 12.3 per cent per annum, which gives a crude employment elasticity of about 0.33 per cent. Thus, over-all (for both small and large sectors), employment elasticity in Punjab's organised manufacturing industry would be about 0.5 per cent.

The main reason for the much faster expansion of the large and medium sector has been, not surprisingly, the enormous increase in investment in this sector. Fixed investment in the sector increased from Rs.73.7 crores in 1973-74 to Rs.523.3 crores in 1978-79 - a rate of increase of over 100 per cent per annum. In 1978-79 investment in the large-scale sector was more than twice as large as in the small sector, although the latter in terms of production is about the same size as the former. Most of the investment in the large-scale sector was carried out by the State and was devoted to food processing and agro-based industries. This increased the share of these industries in the State's industrial production to about 13 per cent in 1978-79.¹

Finally, table IV.4 indicates that in 1979-80 the level of productivity in the large and medium sector was on average more than three times greater than in small enterprises. The rate of growth of productivity in the former group of firms during 1973-74 to 1979-80 was about 4.5 per cent per annum; it was more than twice as large as the corresponding growth rate of productivity in the small sector.

IV.4 The strengths and weaknesses of Punjab's industrial economy

Clearly, the main strengths of Punjab's industrial economy are the skill-intensive and diversified modern small-scale industry, reviewed in section IV.2. A major factor in the development and expansion of this industry has been the large supply of entrepreneurs in the State, many of whom are formerly displaced persons who had to migrate to the Indian Punjab following the partition. However, the State Government has also provided extremely important assistance in the following ways.

¹ The Statistical Abstract of Punjab, 1980.

- (i) Allotment of factory sites on a deferred payment basis is at very low rates of interest.
- (ii) Loans for building factories and purchase of plant and equipment at up to 75 per cent of their cost, again at low interest.
- (iii) Construction of factory buildings by the State according to specification of the enterprises and then making them available on a lease basis.
- (iv) Special allotment of commodities in short supply, e.g., iron and steel and yarn.

The Punjab Government was the first State in the country to set up its own Financial Corporation with a view to offering long-term financial support to industrial concerns. Equally importantly, the State has helped by providing for training of skilled labour by the establishment of a network of vocational work centres and industrial schools.¹

Nevertheless, the rate of industrial growth in the State has not been commensurate with its over-all growth rate or that of its agriculture. There are relatively few direct industrial linkages to the State's agricultural economy. The State's agriculture is based on modern industrial inputs, but most of these inputs - steel, cement, etc., come from elsewhere in the country, as Punjab does not have the raw materials for these basic industries. This is not to deny that agricultural expansion has not spawned the important agricultural machinery industry in the State or certain other agro-based industries, e.g., cattle feed, poultry, milk products. Nevertheless, their share in total industrial production is not very large, and most of Punjab's industrial production is sold outside the State. Similarly, rising agricultural incomes in Punjab provide an important and growing market for industrial produce of other States.

This is how it should be in an integrated national economy with mobile factors of production and, in principle, the relative lack of integration between the State's industry and agriculture need not be a weakness.

The real cause for concern is the relatively slow rate of growth of industry. Although up to now Punjab's agriculture has been able to absorb labour, its future development is likely to be even more capital-intensive and there will be an inevitable reversion to the pattern observed elsewhere in the world: growing productivity in agriculture being associated with a decline in the agricultural labour force. Only faster industrial growth in the State (or elsewhere in the country) can create adequate employment opportunities.

This requires far more investment in the State's industry than has been the case up to now. For example, the estimated "plan" (i.e., capital account) expenditures during 1980-81 (which was quite typical) in Punjab were as follows:²

Agriculture and allied services	13.84	per cent of the total
Co-operation	1.91	"
Irrigation and power	49.2	"
Industry and mineral	4.16	"
Transport and commodities	10.07	"
Social services, etc.	20.8	"

¹ See further Pandit (1978).

² Punjab Economy in Figures, 1981.

There is no suggestion here that investment in agriculture or irrigation should be curtailed as that is essential from the national point of view. Similarly, neither industry nor agriculture can do without power, the slow growth of which is already constraining the development of both agriculture and industry. Nevertheless, more resources need to be generated for industrial investment either from within the State or from elsewhere in the country.

It also seems to me that within the national industrial economy Punjab's comparative advantage lies in skilled-intensive high value added engineering, machine tools and machinery industries. These industries tend to have a high income elasticity of demand; they also require relatively small amounts of initial capital and create relatively more employment per unit of capital. The State already possesses a significant base in these industries, but their level of technical development is low by international standards (and in a number of cases now even by national standards). As in the case of agriculture the State should now take similar steps to put these industries on a proper scientific basis and to steadily raise their technological level.

IV.5 Summary

The main points of this chapter are summarised below:

1. From very meagre beginnings following the partition, the Indian Punjab achieved rapid industrial expansion over the next three decades. In 1978-79, the manufacturing industries in the State employed nearly 400,000 workers, ten times more than in 1947; production over the same period increased more than a hundred fold.
2. The hallmark of the State's industrial development is the modern small-scale industry in which it has achieved a pre-eminent position in the country. Much more than elsewhere, this sector dominates the State's industrial economy.
3. Modern small-scale industry in Punjab is (a) highly diversified and (b) skill-intensive. But surprisingly instead of specialising in agro-based industries (which might have been expected in view of the State's leading position in agriculture), the most important industries in the State are hosiery, machinery and parts, metal products and metal industries. The raw materials for all these industries come from other Indian States or from abroad; the markets for the products also lie largely elsewhere in the country and abroad.
4. It is paradoxical that although manufacturing in Punjab has grown rapidly, and at a much faster rate than in the country as a whole, the share of manufacturing in the State's GDP (11.7 per cent) is significantly smaller than the Indian average (16.9 per cent). The main reason for this paradox lies in the fact that compared to the rest of the country, agriculture in Punjab has grown relatively much more rapidly than industry. In contrast with the international pattern of structural change (see Chapter I) as well as the pattern in India (Chapter II), the growth rate of industry in Punjab has exceeded that of the State's GDP and of its agricultural production by only a small margin. Normally this margin is very much greater.
5. The Government of Punjab has played an active role in fostering industrial development, most importantly through provision of credit and the training of skilled labour in a network of vocational work centres and industrial schools.
6. As Punjab's agriculture is already very capital-intensive and further agricultural growth will most likely require even greater capital-intensity, Punjab would need to step up its rate of industrialisation in order to provide adequate employment opportunities in the future.

Chapter V

Poverty, basic needs and economic development in Punjab

V.1 Introduction

According to the World Bank estimates, about 45 per cent of the Third World's (excluding China) poor live in India. And 90 per cent of the absolutely poor people in India, as elsewhere in the Third World, live in the rural areas.

There is a well-known Indian literature which argues that despite economic growth, the proportion of people living below the poverty line in the country has been increasing over time. It is suggested that the trend increase in poverty has been particularly marked with respect to the rural poor. More significantly in relation to the impact of green revolution in states like Punjab, it has been asserted that the new agricultural technology has benefited only the upper strata of cultivators and that the development process has led both to proletarianisation and immiserisation of large sections of the rural population. It is believed that in view of the capital-intensive character of the new technology, the small farmers unable to compete with the mechanised larger farms are forced to sell their land and thereby join the reserve army of the rural proletariat.¹

These studies have had wide international impact. Many economists have drawn general conclusions from them to doubt the over-all benefits of economic growth and of technological advances in agriculture associated with the green revolution. It will be argued in this chapter that in the case of the Punjab, the conclusions of this pessimistic literature are at the very least open to serious question, if not to be rejected, in view of the more recent research and the latest available direct evidence on the issues involved.

V.2 Rural poverty and agricultural development

We shall first review the all-India studies to which the most well-known recent addition is Ahluwalia (1978). Its comprehensive analysis of rural poverty in the country as a whole and in the individual states suggests a revision of the more depressing results of the earlier literature. Ahluwalia has used more complete information than any of the previous investigators (e.g. Rajaraman (1975), Lal (1976)) and provided a systematic time-series analysis of trends in rural poverty over the period 1956-57 to 1973-74. As in a number of other studies, Ahluwalia is also mainly concerned with analysing the extent of absolute poverty, defined with respect to a fixed poverty line in terms of real per capita consumption. This "fixed" poverty line has a famous pedigree - it is the so-called Dandekar-Rath norm which has been used by most researchers in this field. It represents a per capita monthly expenditure of Rs.15 in rural areas (and Rs.22.5 in urban areas) at 1960-61 prices.

¹ There is a vast literature in this whole subject. See among others, Bardhan (1971); Byers (1972), Dandekar and Rath (1971), Raj (1976); Griff and Khan (1976).

Ahluwalia's main conclusions are as follows:

- (i) Over the period studied, there is no trend increase in the incidence of poverty in the country as a whole (see table V.1). The incidence fluctuates over time, with poverty increasing during periods of poor agricultural performance and vice-versa.
- (ii) With respect to Punjab and Haryana, the conclusions of the studies by Bardhan (1971) and Rajaraman (1976) of a trend increase in rural poverty in this region since 1961 are incorrect. The incidence of rural poverty in Punjab and Haryana was unusually low in 1961 (see table 1), which produces misleading results if that year is used as a basis for comparison. There does not appear to be any trend change in rural poverty in the State.
- (iii) For India as a whole, Ahluwalia found firm evidence of an inverse relationship between incidence of rural poverty and growth of agricultural production, as the following regression shows:

$$Y = 128.79 - 0.47 x$$

(5.40) (3.30)

$$R^2 = 0.49$$

"t" values are given in the parentheses

Y stands for percentage of poor

x denotes average of the previous and current year's net domestic product in agriculture per head of rural population.¹

- (iv) However, in the case of Punjab and Haryana, an analogous regression equation did not show similar results. Although the regression coefficient relating rural poverty to an index of agricultural production per capita had a negative sign, it was not statistically significant. On the face of it, this is a disquieting result since it indicates that the enormous growth of agricultural production and yields in the region have had little beneficial effect on the poorest quarter of the rural population. However, on the basis of some additional evidence, Ahluwalia hypothesises a more benign explanation. He suggests that the rural population below the poverty line in Punjab and Haryana contains an increasing proportion of immigrants, and although the real consumption levels of the poorest quarter appears stagnant over time, this group consists increasingly of individuals whose consumption is higher than it would have been if they had not migrated. Thus "trickle-down" benefits of the green revolution take the form of increased employment benefiting migrants from other states, rather than increased wages benefiting the already existing rural poor.

Ahluwalia's results have been vigorously challenged in studies by Griffin and Ghose (1979) and Saith (1981). The former show that for a shorter reference period 1960-61 to 1973-74, there was a trend increase in poverty in most individual states. Saith, using a longer period, arrives at a similar conclusion for the country as a whole, on the basis of a weighted average of state-specific poverty trends. He also attempts to explain annual variations in the percentage of population below the poverty line in terms of the following factors: (a) a time trend; (b) the deviation of the index of agricultural production from trend level; and

¹ See Ahluwalia (1978), table 5.

TABLE V.1: PERCENTAGE OF RURAL POPULATION IN POVERTY: PUNJAB, OTHER INDIAN STATES AND INDIA, 1957-58 TO 1973-74

	1957-58	1959-60	1960-61	1961-62	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1970-71	1973-74
Andhra Pradesh	53.5	48.8	50.1	47.2	45.6	41.5	45.4	47.9	46.0	47.3	41.0	39.8
Assam	28.0	31.4	25.6	29.4	24.4	24.2	31.3	46.8	38.4	47.3	35.3	39.3
Bihar	59.7	55.7	41.5	49.9	52.3	54.3	59.4	74.4	70.9	59.4	59.0	58.4
Gujarat	✕	41.5	31.6	39.7	45.7	49.8	50.7	54.1	50.8	42.8	43.8	35.6
Karnataka	41.3	48.9	39.1	35.4	50.5	55.1	63.9	59.5	56.9	58.8	47.2	46.9
Kerala	59.6	62.3	57.8	50.3	52.8	60.7	70.7	67.1	63.4	64.6	62.0	49.3
Madhya Pradesh	57.7	46.4	43.8	40.0	43.6	42.1	47.2	58.3	62.3	56.0	52.9	52.3
Maharashtra	✕	54.5	48.4	43.6	48.2	59.1	57.8	63.2	57.2	54.8	46.6	49.8
Orissa	66.6	63.4	62.4	49.3	60.0	61.9	62.1	64.2	64.7	71.2	65.0	58.0
Punjab and Haryana	28.0	24.2	18.8	22.3	29.4	26.5	26.5	29.5	33.9	24.0	23.6	23.0
Rajasthan	33.4	NA	32.3	33.0	32.6	31.8	30.8	37.1	35.9	41.4	41.8	29.8
Tamil Nadu	67.8	64.4	53.9	51.0	52.0	57.4	59.5	62.7	58.1	60.6	57.3	48.3
Uttar Pradesh	52.3	36.7	37.9	35.4	56.6	53.7	47.1	55.2	60.2	46.4	40.6	47.3
West Bengal	62.3	61.4	40.4	58.3	63.3	64.0	56.5	64.3	80.3	74.9	70.1	66.0
INDIA												
Estimate II (Weighted averages)	53.4	48.7	42.0	42.3	49.1	50.4	51.1	57.4	57.9	53.5	49.1	47.6

Source: Ahluwalia (1978).

(c) the deviation of an index of cost of living for agricultural labourers from its trend level. There are two main reasons given for the inclusion of the last variable: (i) "the stickiness of money wage rates (of agricultural labour) in the face of inflation"; and (ii) that "the total human-labour requirements of Indian agriculture have not really increased significantly". Saith's results indicate that improved agricultural performance does reduce poverty but that this reduction is not adequate to outweigh the negative effects of time trend and price rise.

Broadly similar conclusions to those of Saith have been obtained by Sinha (1981). On the other hand, Tyagi (1982) argues persuasively that there are serious deficiencies in the relevant statistical series used in all these investigations which significantly exaggerate the measured incidence of poverty over time.

My own assessment of the current state of the Indian literature on the relationship between poverty and growth of agricultural production is as follows:

- (i) There is no firm conclusion whether or not there has been a trend increase in the incidence of poverty in the country between the mid-1950s and the mid-1970s.
- (ii) Most studies agree that other things being equal, the growth of agricultural production reduces poverty.
- (iii) Because of the stickiness of money wages and the relatively small increase in the employment of agricultural labour, the incidence of rural poverty in India increases with an increase in agricultural prices.

V.3 The incidence of poverty in Punjab

Perhaps the most reliable estimates of the incidence of poverty in Punjab and in other Indian states are provided by the data presented in the reports of the seventh Indian Finance Commission. The main reason for this is that the Finance Commission has the statutory duty of making recommendations concerning the allocation of certain central government revenues to the individual states. The seventh Finance Commission used the following criteria for allocating these revenues:

(a) total population; (b) the poverty ratio; and (c) the inverse of the state per capita income. Under (b), the Commission estimated the number of people living below the poverty line in each state. Unfortunately, the Commission's data do not give the time series for the incidence of poverty in each state; information is provided only for the year 1970-71. However, the Commission used a more satisfactory definition of the poverty line than in the studies reviewed in section V.2. They improved upon the Dandekar-Rath poverty norm, used in these studies, by calculating an "augmented poverty line". The latter was obtained by adding to the Dandekar-Rath norm per capita public expenditure in each state on the following:

- (i) health and family planning;
- (ii) water supply and sanitation;
- (iii) education;
- (iv) administration of police, jails and courts;
- (v) roads;
- (vi) social welfare.

The results of the Commission's investigations are reported in table V.2. They clearly show that in 1970-71, Punjab had by far the lowest incidence of poverty in the country, both for rural areas and over-all. A little over 20 per cent of the population was absolutely poor in Punjab in that year, compared with a figure of well over 40 per cent in each of the relatively prosperous States of Gujarat and Maharashtra, and of over 60 per cent in West Bengal.

The seventh Finance Commission's findings are confirmed in a study by Murti. Murti took a rather different definition of poverty line (in terms of a nutritional norm of 2,810 calorie intake per diem). He also came to the conclusion that rural poverty in Punjab was the lowest in the country. Similarly, data from the National Sample Survey (27th Round) show that of all states in India, the extent of unemployment is the lowest in rural Punjab (see Bhalla (1979)).

V.4 The green revolution, employment, real wages and standards of living in rural Punjab

In the Indian studies on the growth of agricultural production and rural poverty reviewed in section V.2, a central issue which emerged was the effect of the former on employment and real wages. In the case of Punjab, there is fortunately direct evidence on this subject provided in a recent study by Sheila Bhalla (1979).

Sheila Bhalla carried out a comprehensive investigation of real wages of agricultural labourers in all districts of Punjab during the 1960s and 1970s. Her main conclusions are as follows:

- (a) The real wages for each category of rural work (ploughing, sowing, weeding, harvesting, etc.) did rise between 1961 and 1977, but the rise was relatively small compared with the recorded increase in agricultural productivity.
- (b) As table V.3 (parts A and B) indicates, there was a statistically significant positive relationship between movements in real wage and those in agricultural production.
- (c) A cross-section analysis of inter-district variation in real wages in Punjab's districts in 1971 showed that it is best explained by the variations in productivity per male agricultural worker.

The latter variable captures the influence of two factors which worked in opposite directions during the 1960s: rising land yields and increased supply of wage-paid labour. As was seen in Chapter III, agricultural labour force in Punjab in the 1960s increased at a rate over 3 per cent a year. (Agricultural labour force grew at a rate of 1.95 per cent per annum in the country as a whole during this period. The rate of growth of population was 2.2 per cent per annum.)

Further extremely important information on the effects of the green revolution on the standards of living and the production conditions of Punjab's farm population is presented in another large study, Bhalla and Chadha (1982). This is a very careful and systematic study which provides the best available direct evidence (as opposed to hypotheses and conjectures) on these issues. The conclusions of this research are unambiguous:

The advent of the green revolution in Punjab has brought over-all prosperity to its peasantry. Thanks to the creation of an assured irrigation base and its fairly equitable distribution, all categories of cultivators have been able to record substantial increase in their output and income through the adoption of new technology. However, the gains of the new technology have been distributed more or less in proportion to the initial landholding position. Since the

TABLE V.2: STEPWISE DATA BASE FOR DERIVATION OF POVERTY PERCENTAGE (STATEWISE) - 1970-71

Sl. States No.	State specific poverty lines		Augmented poverty lines (APL)		Percentage of population below APL		Number of persons below APL		Total number of persons below APL		Ratio of all persons below APL	Poverty percentage	Rank	
	1960-61		1970-71		1970-71		1970-71		1970-71					Rural + urban
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Col. 10 + Col. 11			
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Andhra Pradesh	15.50	22.87	26.51	42.92	30.68	47.09	45.63	57.14	16 016 212	4 801 204	20 817 416	47.85	7.52	7
2. Assam	16.31	22.63	33.09	40.30	37.26	44.47	33.95	22.66	4 527 548	292 130	4 819 686	32.95	1.74	13
3. Bihar	15.80	22.03	32.55	42.14	36.72	46.31	64.78	57.53	32 856 029	3 241 221	36 097 250	64.06	13.03	2
4. Gujarat	16.80	21.87	29.06	39.37	33.23	43.54	44.21	46.61	8 488 751	3 494 119	11 982 870	44.88	4.33	11
5. Haryana	15.90	22.01	30.85	42.65	35.02	46.82	29.43	45.36	2 432 051	804 214	3 236 265	32.24	1.17	14
6. Karnataka	15.60	22.64	29.33	41.42	33.50	45.59	48.85	51.29	10 833 425	3 652 921	14 486 346	49.44	5.23	9
7. Kerala	16.10	22.32	34.45	43.78	38.62	47.95	61.82	64.44	11 053 980	2 233 780	13 287 768	62.25	4.80	10
8. Madhya Pradesh	14.10	23.22	27.92	43.94	32.09	48.11	56.99	60.15	19 872 043	4 081 037	23 953 080	57.50	8.65	5
9. Maharashtra	16.01	21.79	30.72	39.71	34.89	43.88	46.67	38.07	16 194 967	5 981 258	22 176 225	43.99	8.01	6
10. Orissa	14.51	22.00	30.74	41.15	34.19	45.32	69.18	49.20	13 904 640	907 934	14 812 574	67.50	5.35	8
11. Punjab	15.90	22.29	30.85	42.57	35.02	46.74	17.47	34.94	1 805 504	1 123 733	2 929 237	21.62	1.06	15
12. Rajasthan	14.70	22.46	25.43	41.83	29.60	46.00	41.84	51.28	8 870 304	2 330 041	11 209 345	43.50	4.05	12
13. Tamil Nadu	16.40	22.22	28.54	38.05	32.71	42.22	61.32	59.29	17 610 893	7 390 400	25 010 293	60.71	9.03	4
14. Uttar Pradesh	14.51	22.25	26.54	42.70	30.71	46.87	48.02	64.88	36 472 413	8 037 721	44 510 134	50.38	16.07	1
15. West Bengal	18.11	22.25	37.29	40.34	41.46	44.51	70.82	36.30	23 614 913	3 981 033	27 595 946	62.28	9.96	3
Total - All India	15.00	22.50	28.80	41.40									100.00 (15 States)	
	Annexure I	Annexure II	Annexure III	Derived from Annexure IV R and IV U	Derived from Annexure V	Derived from Annexure V	Derived from Annexure V	Derived from Annexure V	Derived from Annexure V	Derived from Annexure V	Derived from Annexure V	Derived from Annexure V	Derived from Col. 12 of this table	Derived from Col. 5 of Annexure V

Source: Report of the Finance Commission, New Delhi, 1978.

TABLE V.3: REAL WAGES AND AGRICULTURAL PRODUCTION IN PUNJAB 1961-77. RESULTS OF REGRESSION ANALYSIS. INDEPENDENT VARIABLES: INDEX OF AGRICULTURAL PRODUCTION. DEPENDENT VARIABLE: REAL WAGE RATES FOR EACH AGRICULTURAL OPERATION

Agricultural operation	Statistics		Level of significance
	R ²	t	
Ploughing	.25	2.23	95
Sowing	.27	2.35	95
Weeding	.22	1.70	not significant
Harvesting	.36	2.67	98
Other operations	.43	2.97	99

Source: Bhalla, S. (1979).

landholdings are distributed in a very skewed manner, the distribution of gains has also been quite inequitable. It goes to the credit of marginal and small farmers of Punjab that despite their limited land base, they have been able to record almost as much total crop output and farm business income per acre as the bigger counterparts. This they are able to achieve primarily by achieving a much higher cropping intensity through a rational year-round utilisation of their family labour.

V.5 Poverty, per capita income and economic growth

Finally, Bhalla, G.S. (1978) has examined the cross-section relationship between poverty, per capita income and economic growth in Indian states in the census years 1961 and 1971. He first tested the hypothesis whether the proportion of persons below the poverty line (Y) are related to per capita income (X) during 1961 and 1971. The results of the regression analysis are:

$$1961 \quad Y = 102.16 - .13^* X; \quad R = -.55 \\ (2.2)$$

$$1971 \quad Y = 75.04 - .078^{**} X, \quad R = .53 \\ (2.08)$$

* Significant at 95 per cent; ** significant at 90 per cent level.

Thus there is a significant relationship between the variables indicating that the higher the per capita income of the state, the lower is the proportion of poor people in the state.

Bhalla also found that the percentage of poverty in various Indian states in 1971 (Y) was significantly negatively related to the growth of state domestic production during 1961-71 (X).

The estimated regression equation is:

$$Y = 63.998 - 4.686 X^{**} \\ (1.87)$$

** Significant at 90 per cent level.

Similarly, the proportion of rural poverty in 1971 (Y) was significantly negatively related to the growth of income in the primary sector, (X) as the following equation indicates:

$$Y = 58.56 - 4.127^* X \\ (3.03)$$

$$R = -.56$$

* Indicates significance at 99 per cent level.

Although the above results suggest that the incidence of poverty is inversely related both to the level and the rate of growth of per capita income, it is notable that the degree of explanation in the estimated regression equations is not very high. This suggests the existence of other explanatory factors not considered in the regression analysis, e.g. unequal distribution of productive assets, the State Government's social policy among others.

V.6 Conclusions

We have seen in this chapter that Punjab has the lowest proportion of its rural population living in poverty in the country. Increases in agricultural productivity due to the green revolution have not led to immiserisation and growing poverty as has often been alleged. The best available evidence definitely points to the contrary.

We have also seen that in general there is evidence of an inverse relationship between economic growth and the incidence of poverty. Nevertheless, it is significant that the state which it is generally agreed has the best performance in the country in terms of meeting the basic needs of its people is not Punjab, but Kerala. Kerala has much lower per capita income than Punjab and its rate of economic growth has also been much slower. Although as seen in Chapter III, in Punjab, every village is electrified, is connected with the road network by a metalled road, and probably has a bank branch, Kerala has a relatively better record in terms of literacy, education, life expectation and other basic needs indicators. This is because for historical reasons, Kerala is the best "welfare state" in the country; however, because of its poor economic performance, it may find it difficult to sustain that welfare state for very long (Rudra 1978). On the other hand, Bhalla, G.S. (1979) has estimated that if the State of Punjab continues to grow at its trend rate, the proportion of population below the poverty line by the year 2000 will be negligible.

Chapter VI

Implications of Punjab's economic experience

The analysis of the previous chapters has shown that relative to the rest of the country, Punjab has achieved a high rate of growth of both agriculture and industry during the last three decades. The expansion of agriculture has been most impressive by comparative international standards. As a consequence, the State has long had the highest per capita income in India, and has made significant gains in meeting the basic needs of the people.

The conclusions of the earlier chapters were summarised at the end of each chapter, and no purpose will be served by repeating those summaries here. Instead in this chapter, we shall attempt to draw some general lessons from this study (a) for other developing regions and States and (b) for the future course of economic development in Punjab itself.

Briefly, the most important implications of Punjab's experience for other developing countries seem to me to be the following.

First, although Punjab's prosperity is based on agriculture and small-scale industry, it does not follow that capital goods or heavy industry are not required for economic development. That would be a totally wrong lesson to draw from Punjab's development. Punjab's agriculture is highly capital-intensive: the direct capital-output ratio is estimated to be about 4, and if infrastructural investments are also included, it may be as high as 6. The extraordinary growth of agricultural productivity in the State is based on the application of science and the introduction of modern industrial inputs (e.g., fertilizers) and assured irrigation. The latter in turn depends on tubewells and hence on electrification of the countryside. All of these inputs require products of capital goods and heavy industry.

Secondly, a very important related policy implication is that social organisational measures such as land reforms do not provide a sufficient condition for agricultural growth. Land has been historically much more evenly distributed in Punjab than elsewhere in the country. In the 1950s, the State Government implemented a major programme of consolidation of landholdings. Although these factors helped, by themselves, they were not adequate for agricultural modernisation. However, it could legitimately be argued that such organisational changes were a necessary precondition for subsequent agricultural development.

Thirdly, the Government in Punjab has played a direct and major role in organising the provision of necessary agricultural inputs to the individual farmers, via short- and long-term loans made by the state-supported co-operative societies. The State also provided the necessary infrastructural framework - roads, markets, the agricultural university and the agricultural extension service. The experience of Punjab certainly suggests that the role of the Government in all these various ways is indispensable in agricultural modernisation.

Fourthly, the alleged contradiction between agricultural and industrial development does not seem to be valid. From a policy point of view, the two are best viewed as being interlinked and mutually supportive. The growth of agricultural productivity requires industrial inputs; at the same time, increased

agricultural productivity makes possible higher farm incomes and greater demand for industrial products. However, as seen earlier, in Punjab's case, the bulk of these inputs came from industry in other Indian States, just as inter-state specialisation enables Punjab's engineering, metal and other industries to sell the large part of their output outside the State.

Fifthly, expansion of Punjab's agriculture and industry has led not only to increased employment, but also despite immigration of labour from other States, to increased real wages and to a reduction in rural poverty. Further, since over-all economic growth has greatly increased state income, it has permitted increasing fiscal expenditure on basic needs of the people (e.g., education, health, etc.).

Finally, an extremely important implication of this study is that the last two points inter-act with each other. As Krishna Bhardawaj (1982) has recently argued, a general level of well-being (as indicated by per capita consumption levels and by a smaller proportion of people below the poverty line) is essential for the development of both agriculture and industry. On the basis of the Indian experience, Bhardawaj has observed that those areas where not only the agricultural growth rate has been favourable but also where the general level of well-being in the above sense has been higher, there is greater industrial activity. She rightly interprets this association between better agricultural performance and higher level of well-being on the one hand, and higher industrial performance on the other, in the following terms:

If the region is afflicted by a deadweight of utter poverty, the situation offers breeding ground for exploitation through usury, speculative trading, commercial exploitation, etc. All of these divert surpluses into unproductive channels and create relative advantage favouring such operations. The preponderance of such 'unproductive' uses of surplus implies a perverse system of 'social subsidisation' under which the process of pauperisation continues as the surplus is diverted into unproductive channels. Secondly, if the general level of living is reasonably high, it creates an effective demand for the products of the industry.

Turning now to the implications of the present study for future economic development in Punjab itself, we observe that despite the State's impressive record of both agricultural and industrial growth, there has been relatively little structural change in Punjab's economy of the kind which normally accompanies economic growth. The main reason for this has been that although Punjab's industry has grown fast, and slightly faster than its agriculture, its growth has been less than what is normally associated with that degree of agricultural expansion. (See Chapter IV.) None the less, there has been considerable intersectoral change of a beneficial kind. A large shift of labour and output has taken place from the low productivity, subsistence level household and tertiary industries to higher productivity agriculture and modern small-scale industry. Punjab's agriculture and modern small-scale industry have also absorbed considerable labour from other Indian States.

The most important economic problem which the State will face in the foreseeable future arises from the relatively slow development of industry. Up to now, agricultural expansion has been of a kind which has led to increased employment (for example, because of the introduction of triple cropping where formerly there used to be a single or two crops). However, the level of land productivity is now so high that future productivity growth is likely to follow the usual pattern observed elsewhere, i.e., it will involve labour-saving technical progress. Unless industry is able to grow faster - which will then also make for faster expansion of a productive tertiary sector in the manner explained in Chapter I, the State will be faced with growing unemployment.

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