3 Agricultural Growth and Industrial Development in Punjab

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Punjab has achieved remarkable growth since independence and is now the richest state of India. This growth and prosperity are primarily the result of Punjab's adoption of new technology in agriculture. Its cultivators were the first to adopt the Borlaug seed-fertilizer technology during the mid-1960s, and within a few years the state became the symbol of a green revolution in India.

From 1960/61 to 1987/88, the net state domestic product (NSDP) grew at 5.3 percent per year, compared with 4.3 percent for the country as a whole. Over this period, per capita income rose by 3 percent annually compared with 1.97 percent for India (India CSO, various years). Income from crop production grew at an annual rate of 3.6 percent and that from animal husbandry at a remarkably high rate of 7.3 percent (table 3.1). Punjab has also experienced labor force diversification. According to the forty-third round of the National Sample Survey (NSS), the share of Punjab's labor force in agriculture declined from nearly 60 percent in 1977/78 to 50 percent in 1987/88 (India 1990a). Unlike the rest of India, where the average per worker income in agriculture during 1987/88 was only 35 percent of the average income in the non-agricultural sector, Punjab recorded much the same per worker income in both the sectors, because of much higher productivity growth in its agricultural sector.

The rapid growth of agriculture has had a large impact on the entire economy, especially the agroindustries that supply both current and capital inputs and that process agricultural produce. The emergence of large market surpluses in agriculture stimulated an unprecedented increase in trade and transport. And the rapid increase in the per capita incomes of the rural and urban population widened the market for consumption goods and services. In short, by raising the income of a large proportion of rural workers, rapid agricultural growth not only made a deep dent in rural poverty but also led to development of other sectors.

Over the years, agricultural price policy helped Punjab farmers sustain and further develop new technology. The Agricultural Prices Commission (re-

TABLE 3.1 Net domestic product at factor cost, by industry of origin and growth rates in Punjab and India, 1967/68, 1980/81, and 1987/88

	Punjab at 1970/71 Prices (millions of rupees)			Growth Rates[a] (1967–68 to 1987–88)	
Industry	1967/68	1980/81	1987/88	Punjab	India
Agriculture	6,432	8,235	12,755	3.6	—
Livestock	1,233	2,976	4,746	7.3	—
Agriculture and livestock	7,665	11,180	17,501	4.5	2.8
Forestry	29	57	53	4.8	−1.1
Fishery	5	8	18	7.9	3.6
Mining and quarrying	1	3	8	21.2	4.8
Primary	7,700	11,248	17,580	4.5	2.8
Manufacturing	914	2,618	3,592	7.6	5.2
Registered	456	1,272	1,911	8.0	6.0
Unregistered	458	1,345	1,682	7.3	3.9
Construction	835	1,133	1,222	2.3	2.7
Electricity	103	285	583	10.4	8.5
Secondary	1,852	4,035	5,397	5.9	4.7
Transport and storage	377	992	1,424	7.3	6.5
Trade and hotels	1,505	3,803	5,337	7.0	5.1
Banking and insurance	172	548	992	10.1	9.5
Real estate and dwellings	225	321	413	3.4	4.4
Public administration	239	806	1,538	10.7	9.6
Other services	617	1,107	1,239	3.8	3.4
Tertiary	3,136	7,576	10,943	6.8	6.1
Net state domestic product	12,687	22,859	33,920	5.3	4.3
Per capita SDP (rupees)	1,002	1,374	1,755	3.0	1.9

SOURCES: For Punjab, *Statistical Abstract of Punjab*, various issues; Chandigarh Economic and Statistical Adviser. For India, Ministry of Planning, *National Accounts Statistics*, various years.
[a]Growth rate is the average of annual variations, 1960/61 to 1987/88.

named the Commission for Agricultural Costs and Prices in 1986) and the Food Corporation of India created in 1966 played crucial roles in augmenting agricultural output by ensuring highly remunerative prices to farmers, which encouraged large investments in tubewells, pumpsets, and other farm assets.

During the postindependence period, farmers in Punjab also were helped by a large inflow of resources from the national government for both rehabilitation and infrastructural investment. India assigned the public sector a crucial role in the development of rural and urban infrastructure. This enabled Punjab to make substantial investments in infrastructure, primarily in irrigation, power, roads, and communications. These investments were financed by large

central plan transfers and the internal resources of the state. With a well-developed infrastructure, Punjab was able to adapt the Mexican seed-fertilizer technology to local conditions, whereupon it spread rapidly and was successfully exploited by Punjab farmers. Furthermore, administered prices for most crops ensured the profitability of the new technology, which encouraged farmers to invest heavily in their operations.

Punjab also benefited from specialization and comparative advantage in the context of a constrained open economy. Demand and supply constraints did not operate with the same rigor as would have been the case in a small closed economy. The state received large grants from the center. Since the state generated large surpluses in agricultural production, these were increasingly invested in the rest of India. Note, too, that many agricultural laborers continue to migrate to Punjab from Bihar and other less developed states.

The growth rate in the secondary and tertiary sectors in Punjab, although creditable, seems rather slow compared with that of Taiwan and other economies of Southeastern Asia. Why has this happened? Why has the state not been able to translate the agricultural growth into rapid growth of the entire economy?

There are several possible reasons: an inappropriate macroeconomic policy framework; an inadequate resource base, particularly in basic raw materials; a large outflow of funds; and insufficient investment in domestic industry. The dearth of domestic investment may be due to several factors. For one thing, entrepreneurs may have been reluctant to invest in a border state. For another, trained and skilled labor was not available and few people had the necessary entrepreneurial skills. In addition, the recent disturbances and instability caused by terrorism might have caused the flight of capital. Finally, increased demand for both inputs and consumption could easily be satisfied from outside the state.

Development of Agriculture Before Independence

Agriculture before independence was greatly affected by the physical features of the land, land utilization patterns, the country's cultural unity, and the colonial regime.

Physical Features and Land Utilization Patterns

The state of Punjab is composed of a submontane strip, alluvial plains, and an arid southwestern region. The submontane strip in the foothills of the Shivalik range covers nearly one-fifth of the total area of the state and is inhabited by one-fifth of its population. Average rainfall is 87.2 centimeters. Because tubewells are difficult to dig in mountainous areas, only about 60 percent of the cropped area is irrigated in this part, compared with more than 90 percent for the state as a whole.

The central plains, which cover 55 percent of the total area and are home to 55 percent of the population, are composed of new and old alluvium. More than 90 percent of the gross cultivated area is irrigated from three perennial rivers, numerous canals, and a large number of tubewells. The average rainfall in this area is 57.4 centimeters. Agriculture in the plains is more developed than in other parts of the state.

The southwestern region of Punjab is sandy, although there is some flood-plain (*bet*) area along the river. Underground water is unfit for irrigation in most parts. More than 85 percent of the area is irrigated, mostly from canals. The rainfall averages only 26.7 centimeters per year.

Wheat, rice, and sugarcane are extensively grown in the submontane strip and the central plains. Wheat and cotton are the main crops in the southwestern region. Land is intensively used in Punjab. Nearly 83 percent of the total area was cultivated during 1987/88, and there is no permanent fallow. Forests constituted a mere 4 percent of the area.

The net sown area increased rapidly during the 1950s and the 1960s but has stagnated in recent years. However, the gross cropped area increased at an annual rate of 1.64 percent between 1960/61 and 1987/88 because of an increase in cropping intensity.

The People

Until recently, Punjab enjoyed a great deal of cultural unity despite the diversity of its physical conditions, religion, customs, living habits, dialects, and racial characteristics. This unity was the product of living conditions, the predominance of agriculture, and the traditions of village life. Unfortunately, the rise of religious fundamentalism in recent years has placed cultural unity under severe strain.

Like the rest of India, Punjab is a land of villages. Even after 40 years of independence, only about 30 percent of the population lives in urban areas, and the rest still live in 12,000 or so villages. Population density in Punjab in 1991 was 401 per square kilometer, far above the national average of 267.

Agricultural Growth during the Colonial Period

Punjab was the last province to be annexed by the British, who took over in 1849. At that time, the major sources of water for agriculture were rainfall and many wells, which provided fresh underground water.

Production technology in Punjab agriculture began to change in the late nineteenth and early twentieth centuries when the British made large investments in canal irrigation in the state. Capital outlay on productive irrigation canals in Punjab was 40 percent of the total made by the British government in India up to 1919/20. Consequently, the share of irrigated acreage in Punjab was 50 percent of the total for agricultural acreage (Hirashima 1978, 22–35).

Attempts were also made to improve agricultural husbandry. The govern-

ment established agricultural colleges and encouraged the production of new crop seeds and leguminous fodder.

With the coming of the canals in the first half of the twentieth century, the production of cereals and commercial crops started increasing. The output of wheat increased from 0.87 million tons in 1904/5 to 1.17 million tons in 1944/45, maize from 0.28 to 0.33 million tons, cotton from 70,000 bales to 196,000 bales and sugarcane from 124,000 tons to 279,000 (India, Ministry of Agriculture, 1976).

Despite the increases, the balance between Punjab's food supply and demand continued to be precarious during the first half of the twentieth century. The surplus, if any, was confined to commercial crops like cotton and sugarcane. While the Punjab population grew—from 7.55 million in 1901 to 9.60 million in 1941, a compound growth rate of 0.60 percent per year—agricultural production in the state increased by only about 0.70 percent per year from 1904/5 to 1944/45.

In spite of a huge investment in canal irrigation, institutional barriers inhibited the performance of agriculture in Punjab during the colonial period. The widespread prevalence of tenancy severely constrained agricultural growth. The control of credit by moneylenders also limited the ability of the peasantry to invest for modernization. Consequently, the full potential of irrigation technology could not be tapped.

Rural Institutional Structure

During the Mughal and Sikh periods, Punjab inherited the Mahalwari system of land settlement which conferred land rights on the cultivating class in the village community. After the British annexed Punjab on March 30, 1849, the system changed somewhat.

Changes in Land Relations: Preindependence Period

In 1887 the British passed the Land Revenue Act, which retained most of the rights conferred under the earlier Mahalwari settlement system. These rights benefited a large proportion of the peasantry. Since land could now be freely bought or sold, however, the rights also paved the way for moneylenders to acquire the land of cultivators who defaulted on their loans. The number in default rose to such a level that in 1901 the British government had to enact legislation on land alienation pertaining to noncultivating castes (Punjab 1901). Nevertheless, until the late 1930s, many Punjab peasants became heavily indebted during periods of both prosperity and depression and gradually lost their only asset, land, through alienation or mortgage (Darling 1925).

Belatedly, the British passed acts to provide some legal security to the cultivators. For example, The Restitution of Mortgage Land Act of 1938 passed under the stewardship of Sir Chottu Ram returned mortgaged land to the culti-

vators during 1939. Despite these legislative attempts, land relations in Punjab remained fairly archaic.[1] There were a large number of absentee landlords, and tenancy was widespread in British Punjab, and even more so in the princely states. Furthermore, the big landlords had complete control of economic and political life in most of rural Punjab. It was one of the few provinces in India that had a noncongress Zamindara (Landlord) League government during the late 1930s. The predominance of landlords, a high incidence of tenancy, and inadequate investment in rural infrastructure limited agricultural growth during the colonial period.

Change in Land Relations: Postindependence Period

The independence of India brought a new momentum to land reforms. The Congress party was committed to radical changes, and several important reforms were enacted during the 1950s and the 1960s.[2] The main objectives of this legislation were to abolish intermediates (those standing between the land operator and the land), safeguard the security of land tenure, impose land ceilings, and consolidate holdings.

Only part of this legislation was implemented. The most significant achievement was the abolition of intermediaries in large parts of Punjab, particularly in the Patiala and East Punjab States Union (PEPSU), where the peasant movement was strong. However, many big landlords were able to keep their landed property intact by self-cultivation tactics. Thousands of tenants were dispossessed under the guise of "voluntary surrenders."

The rural vested interests were also able to evade the reforms involving ceilings and security of tenure. The ceiling legislation had serious loopholes. For example, the ceiling was fixed at 30 standard acres and applied to individual landowners instead of families. Large exemptions were allowed for orchards and specialized dairy, poultry, and sugarcane farms. Consequently, only 174,122 standard acres could be declared surplus and available for distribution during the mid-1950s. Another adverse consequence was the large-scale evictions of tenants. The Land Reforms Act of 1972 reduced the ceiling to 7 hectares for a family of five for lands irrigated for at least 2 crops in a year. The

1. Some of the important legislation on debt relief that was passed included the Punjab Alienation Act, 1901; the Punjab Preemption Act, 1913; the Redemption of Mortgages Act, 1915; the Usurious Loans Act, 1918; the Relief of Indebtedness Act, 1934; Debt Protection Act, 1936; the Restitution of Mortgages Lands Act, 1938; and the Registration of Money Lender's Act, 1939.

2. Among the main acts passed by the Punjab Legislative Assembly, those pertaining to the abolition of intermediaries were the Punjab and PEPSU Occupancy Tenants (Vesting of Proprietary Rights) Act, 1953; and the Punjab and PEPSU Abolition of Ala Malkiyat and Talukdari Rights Act, 1952 and 1954. Those that covered the security of tenure were the Punjab Security of Tenure Act, 1953; and the PEPSU Tenancy and Agricultural Lands Act 1955. Those that covered land ceilings were the Punjab Land Ceilings Act, 1955; and the Punjab Land Reforms Act, 1972. And those pertaining to the consolidation of holdings were the East Punjab Holdings (Consolidation and Prevention of Fragmentation) Act, 1948; and the Utilization of Land Act, 1950.

ceiling limits were graduated upward for poorer-quality land. Since the owned area had already been subdivided, this act also provided little surplus land for distribution.

The acts relating to the security of tenure and regulation of rent also met with the same fate. In the early 1950s, the landlords began fearing that the lands they owned that were being cultivated by tenants might be lost, and they ejected many tenants on the plea of "self-cultivation." In any case, the tenancy legislation failed to provide full security to tenants but instead tended to drive tenancy underground. Nor was the legislation able to regulate rents, which were being determined more by market force rather than by legislation.

The institutional structure that has emerged in the state both as a result of the implementation of land reforms and the nature of agricultural development has several distinctive features, as explained in the next section.

Distribution of Ownership and Operational Holdings

As a consequence of the unsatisfactory implementation of land-ceiling acts, the distribution of owned and operational holdings has continued to be highly unequal. Furthermore, because of demographic pressures and the lack of occupational diversification, the extent of marginalization has increased sharply over time, and there has been a marked increase in the concentration of both ownership and operational holdings in the lowest two categories. In 1953/54, 51 percent of cultivating households owned less than 5 acres of land and accounted for only 9 percent of the total owned area. By 1982, the proportion of those owning less than 5 acres had swelled to 75 percent, and they accounted for 16 percent of total owned area. At the other extreme, in 1953/54, only 11 percent of households owning more than 20 acres accounted for 47 percent of the total area. By 1982, their proportion had dropped to 4 percent, and they had claim on 28 percent of the owned area. The distribution of operational holdings, though less unequal, also continues to be highly skewed (table 3.2).

In another development, the proportion of farmers cultivating 10 to 20 acres has increased both with regard to land owned and land operated. At the same time, the proportion of area held by big farmers owning and operating more than 20 acres has dropped by about 40 percent. An important feature of the agrarian structure is the preeminent position of middle- and upper-middle peasantry who own and operate 5 to 20 acres of land. They constitute nearly one-fourth to one-third of the owning/operating households and now have two-thirds of the total land area. Their prosperity in the wake of the green revolution has had a far-reaching impact on the political economy of the state (India NSSO, 1975, 1986).

The inequalities in land distribution implies that income is bound to be distributed in an uneven manner. Furthermore, the gains in income through the adoption of new technology also are going to be inequitably shared among the peasantry.

TABLE 3.2 Changes in the percentage distribution of ownership and operational holdings in Punjab, 1953/54 to 1982

	Proportion of Holdings (%)		Proportion of Area (%)	
Farm Size	1953/54	1982	1953/54	1982
Ownership holdings (acres)				
<2.49[a]	36.01	64.62	3.28	5.59
2.50–4.99	14.71	10.78	6.23	10.76
5.00–9.99	21.59	12.42	17.29	22.87
10.00–19.99	16.57	8.96	26.00	32.43
20.00–29.99	6.40	2.23	17.21	13.97
>30.00	4.72	0.99	29.99	14.39
All sizes	100.00	100.00	100.00	100.00
Operational holdings (acres)				
<2.49	20.78	57.03	1.64	3.91
2.50–4.99	14.30	10.89	4.72	8.92
5.00–9.99	23.63	14.65	15.28	21.76
10.00–19.00	25.22	12.89	30.53	36.71
20.00–29.99	8.54	3.01	17.76	15.27
>30.00	7.53	1.54	30.07	13.45
All sizes	100.00	100.00	100.00	100.00

SOURCES: For 1953/54, India, Cabinet Secretariat (1955); for 1982, India, Cabinet Secretariat (1983).
NOTE: Figures for 1953/54 and 1961/62 relate to erstwhile Punjab.
[a]0.00-acre class has been ignored.

Changes in the Incidence of Tenancy

Of all the states in India, Punjab had, until recently, the highest incidence of tenancy. The percentage of pure and mixed tenant households decreased from a high of 53 percent in 1953/54 to 43 percent in the early 1970s but then fell to 25 percent in 1982. The total area leased by tenant households declined from 40 percent in 1953/54 to 19 percent by 1982. Tenant households and the share of area leased by them have declined in all size classes (India, NSSO, 1986).

Tenancy is also becoming commercialized. An overwhelming majority of very small farms (less than 1 acre) and large ones (between 20 and 50 acres) lease in on a fixed rent basis. Those between 2.5 and 8.0 acres lease in primarily on a crop-sharing basis. For farms of 8 to 20 acres, leasing-in is almost equally divided between fixed-rent and crop-sharing practices (India, NSSO, 1986).

Small cultivators operating on 5.0 acres or less account for only 13.0 percent of the total area leased. In contrast, nearly one-fifth is being leased in by cultivators operating on 25 acres or more. The small farmers who augment their

holding through leasing in do so to optimize the use of surplus family labor, but large farmers with tractors lease in to make more optimum use of their capital assets. According to one research study, the extent of such leasing is quite high in the southern part of the state, where the holdings and numbers of tractors are relatively large. The production efficiency of the area leased by large farms was found to be as good as that of the area owned (Singh 1985). The land and credit markets in Punjab are linked, although much less than in Bihar. Nearly 14 percent of the tenants in Punjab reportedly borrow money from their landlords, in comparison with 30 percent in Bihar (Bell and Srinivasan 1989).

A recent study suggests that production efficiency is no lower on fixed-rent leased areas than on self-cultivated areas but is significantly lower on crop-sharing leased areas (Chadha 1979; Singh 1985).

Land reforms combined with rapid technological innovations have brought about important changes in the rural institutional structure in Punjab, as in many other states. For example, self-cultivation has become the dominant mode of production in Punjab, but because of the failure of land-ceiling acts, big and middle farmers work most of the land. They led the way in adopting new technologies and were the main beneficiaries of the green revolution. Consequently, their economic and political clout has increased tremendously. They are now able to resist any attempts to mobilize the surplus through increases in rural taxation or in the supply prices of highly subsidized inputs such as power, fertilizers, irrigation, and credit. In addition, they are able to exert immense pressure to get higher procurement prices for major crops.

Successive governments have found it politically expedient to respond positively to these pressures. Thus, the power of big and middle farmers is gradually becoming a barrier to accelerated capital formation, both inside and outside agriculture. Even so, increased demand has enabled agricultural laborers to obtain higher wages and remove the age-old shackles of Jajmani (the traditional system). Their emergence as free labor has increased their political consciousness and enabled them to bargain for higher wages and assert their right to human dignity. Consequently, a sharp division now exists between agricultural laborers as employees and cultivators as employers.

The rich farmers use various methods to resist the demands of agricultural laborers for higher wages. These include coercion, efforts to attract cheaper labor from poorer states like Bihar, and mechanization. As a result, real wage rates in Punjab are going through a period of very slow growth, if not stagnation, and the elasticity of employment with respect to output is also declining (Bhalla 1987; Jose 1988; Bhalla and Tyagi 1989, 41).

To sum up, archaic land relations created a barrier to rapid agricultural growth during the colonial period. Land reforms in the postindependence period abolished intermediaries and absentee landlords and thereby helped remove this barrier. The ceilings on landholding failed to eliminate large inequalities in

land distribution, however, and thus led to an unequal sharing of the benefits of new agricultural technologies.

Growth and Productivity of Punjab Agriculture Since Independence

West Bengal in the east and the present Punjab bore the brunt of the partition of India in 1947. Large-scale riots and the migration of millions of refugees precipitated a serious economic crisis. Despite this shattering experience, the state was able to rehabilitate its economy in a few years. Thanks to large investments in infrastructure, its agricultural economy started on a steep growth path.

According to the available data for Punjab of that period (now Punjab and Haryana), agricultural output grew at the rate of 4.6 percent per year between 1952/53 and 1964/65 (India, Ministry of Food and Agriculture, 1968). Area increased at the rate of 1.9 percent, and yield at 2.6 percent (table 3.3). After the adoption of new seed-fertilizer technology in the mid-1960s, yield increased more rapidly than output. The first notable change came in wheat yield. This was followed by a large increase in the yield and output of summer rice in the 1970s. Consequently, wheat and rice became the state's leading crops, accounting for nearly 60 percent of gross cropped area. In contrast, the area under gram declined sharply and that under oilseeds also recorded a moderate decline. The unprecedented growth in area and output of wheat and rice reflected technological, price, and profitability advantages.

Another important development was the dramatic rise in income from animal husbandry. Between 1960/61 and 1987/88 income grew 7.3 percent per year, and livestock generated nearly 27 percent of the income in the primary sector compared with only 14 percent in 1960/61 (table 3.1). This rapid growth was due to a technological breakthrough in fodder production, the import and development of pure and hybrid cows that could produce high yields of milk, a decline in the demand for draft animals as a result of rapid mechanization and, most important, a big increase in the demand for milk and milk products because of the higher per capita income of agricultural households.

The Nature of Production Technology

Irrigation was the key to the unprecedented increases in wheat and rice yields and output. Large investments in canal irrigation during the colonial period had given Punjab an initial advantage in adopting the new seed-fertilizer technology. Subsequent investments in tubewells and pumpsets not only vastly increased the irrigated area but also helped improve it structurally. From 1950/51 to 1989/90 the net area irrigated by government canals declined from 59 to 40 percent, but that irrigated by tubewells increased from 36 to about 60 percent (Punjab, Economic and Statistical Adviser, various years).

The replacement of traditional seed by high-yielding varieties was made

Table 3.3 Area, output, and yield of principal crops, 1950/51 to 1987/88, and their growth rates

Crop	1950/51	1960/61	1964/65	1967/68	1984/85	1987/88	Growth Rates (%) 1952/53 to 1964/65	Growth Rates (%) 1967/68 to 1987/88
Rice								
Area	120	227	287	314	1,644	1,720	6.82	10.15
Output	107	229	351	415	5,054	5,442	6.68	15.56
Yield	892	1,009	1,223	1,322	3,074	3,164	1.74	4.91
Wheat								
Area	1,137	1,400	1,563	1,790	3,094	3,131	3.34	2.54
Output	1,024	1,742	2,360	3,335	10,176	11,084	5.38	4.91
Yield	901	1,244	1,510	1,863	3,289	3,540	1.98	2.67
Gram								
Area	851	838	744	530	102	66	1.11	−8.02
Output	511	681	666	452	60	29	1.11	−10.17
Yield	600	813	895	853	588	439	—	−2.34
Oilseeds								
Area	128	185	239	399	198	224	3.27	−3.66
Output	55	121	222	314	199	210	6.13	−3.02
Yield	430	654	929	987	1,004	938	4.68	0.67
Sugarcane								
Area	91	133	122	137	79	106	4.61	−2.48
Output	257	486	444	480	492	582	6.72	0.34
Yield	2,824	3,654	3,639	3,507	6,226	5,491	2.01	2.89

(*continued*)

TABLE 3.3 (*continued*)

Crop	1950/51	1960/61	1964/65	1967/68	1984/85	1987/88	Growth Rates (%) 1952/53 to 1964/65	Growth Rates (%) 1967/68 to 1987/88
Cotton								
Area	255	447	487	419	472	621	4.68	2.17
Output	43	121	136	132	210	316	7.06	2.86
Yield	191	271	279	315	445	509	2.28	0.65
Gross crops area	4,224	4,723	5,113	5,441	7,013	7,172	1.90	1.84
Agricultural index[a]								
Output	44.63	77.65	77.56[b]	97.41	219.33	244.34	4.56	4.90
Yield	47.89	73.75	74.49[b]	94.30	169.59	178.17	2.61	3.14

SOURCES: Ministry of Food and Agriculture (1968), 203, for growth rates for the period 1952/53 to 1964/65. For the period 1967/68 to 1987/88, statistical function of the type $Y = AB^t$ was fitted to time series of yearly data, drawn from the *Statistical Abstract of Punjab* (various years).
NOTE: Area is in thousand hectares; output in thousand metric tons; and yield in kilograms per hectare.
[a]Base: triennium ending 1969/70 = 100.
[b]Relates to year 1965/66.

possible by the research of agricultural scientists who adapted the Mexican and International Rice Research Institute (IRRI) varieties of wheat and rice to local conditions. By the end of 1970s, almost all of the cultivated area under wheat and paddy was planted with high-yielding varieties.

The rapid expansion of fertilizer application after 1965/66 was another important component of the new technology. Fertilizer use per hectare of cropped area increased from a mere 19 kilograms in 1965/66 to 51 kilograms in 1970/71 and 155 kilograms in 1989/90. Wheat and rice seemed to be the predominant users of fertilizers. There were also large increases in the use of other modern inputs such as insecticides, diesel oil, and electricity, whereas the use of traditional inputs such as organic manure and bullock feed declined steeply, especially after the mid-1960s. Consequently, the relative share of purchased inputs increased from about 30 percent in 1960/61 to more than 87.0 percent in 1980 (Bhalla et al. 1990).

Among the other technological changes in Punjab agriculture was an increase in mechanization, accompanied by changes in factor proportions. The number of tractors increased more than twentyfold between 1966 and 1987, and the average net area sown per tractor declined from 356 hectares in 1966 to only 19 hectares in 1987. Similarly, the number of tubewells increased fifteenfold between 1966 to 1987. There was a tubewell for every 83 hectares of net area sown in 1966, and one for every 6 hectares in 1987.

As the importance of bullocks declined, threshing became almost completely mechanized. Notable inroads were made by harvester combines. As a result, the capital structure in Punjab agriculture changed significantly. It is no wonder that Punjab's share in the national distribution of capital and other modern production assets is now disproportionately high.

Several factors were responsible for this rapid mechanization. To begin with, the highly profitable new technology in wheat and rice could not be adopted without irrigation, which accounts for the spurt in tubewell installation. But the drive toward mechanization was caused mainly by the relative scarcity of labor and a sharp rise in wages, particularly during peak agricultural operations. Tractors were increasingly used for plowing and transport and soon became a status symbol that led many small and medium farmers to purchase one, although the investment was not economically justified. Large-scale investment in tubewells, tractors, and other farm mechanization was facilitated by the ready availability of cheap institutional credit and large remittances from outside.

Agricultural Modernization and the Growth of Factor Productivities

With rapid modernization and changes in factor proportions, significant changes took place in the shares of various factor incomes in value added during the process of agricultural production. These changes are evident from data on the cost of cultivation for wheat, paddy, and cotton (India, ESA, various years).

With the technological breakthrough in wheat and rice, the output per

TABLE 3.4 Capital, employment, output, and value added in unregistered sector in Punjab and India, 1984/1985

		Punjab				India			
Code	Industry Name	Fixed Assets (Rs lakhs)	Employees (numbers)	Output (Rs lakhs)	Value Added (Rs lakhs)	Fixed Assets (Rs lakhs)	Employees (numbers)	Output (Rs lakhs)	Value Added (Rs lakhs)
20–21	Food products	43,395 (80)	78,312 (61)	18,777 (14)	6,534 (32)	624,206 (75)	6,560,714 (86)	793,810 (36)	220,541 (54)
22	Beverages, tobacco, and products	266 (18)	4,854 (53)	1,768 (18)	488 (20)	51,488 (70)	2,448,857 (87)	85,485 (30)	46,414 (48)
23	Cotton textiles	14,231 (79)	37,121 (68)	1,548 (7)	714 (20)	309,151 (60)	6,279,415 (87)	259,848 (27)	120,468 (43)
24	Wool, silk, and synthetic fiber textiles	665 (5)	11,192 (22)	3,045 (7)	820 (8)	28,756 (19)	843,644 (75)	91,712 (20)	33,778 (28)
						1,181 (6)	139,103 (32)	12,445 (8)	2,892 (7)
26	Textile products	32,805 (96)	121,367 (95)	6,308 (30)	3,703 (64)	846,776 (98)	5,567,223 (98)	277,831 (68)	168,724 (85)
27	Wood and wood products, furniture	2,241 (97)	49,856 (98)	6,410 (94)	4,209 (98)	423,032 (98)	4,944,295 (98)	260,507 (85)	149,184 (93)
28	Paper and paper products	375 (6)	6,393 (49)	996 (15)	425 (27)	45,880 (19)	390,458 (57)	75,673 (20)	29,668 (25)
29	Leather and fur products	22,232 (97)	15,781 (90)	2,816 (57)	958 (73)	98,985 (89)	759,383 (92)	102,080 (54)	41,845 (73)
30	Rubber, plastic, petroleum, and coal products	143 (9)	1,973 (19)	4,198 (24)	3,778 (63)	22,130 (10)	189,849 (50)	64,452 (5)	17,630 (13)
31	Chemicals and chemical products	225 (1)	2,573 (21)	1,824 (5)	274 (3)	29,045 (5)	359,396 (41)	85,900 (6)	18,991 (6)
32	Nonmetallic mineral products	468 (35)	16,741 (93)	2,196 (72)	946 (87)	151,722 (46)	2,598,148 (86)	107,196 (22)	60,943 (33)

33	Basic metal and alloys industries	569 (8)	5,007 (17)	3,537 (6)	417 (7)	10,211 (1)	140,920 (17)	54,840 (4)	13,799 (5)
34	Metal products and parts	915 (35)	15,571 (57)	10,275 (52)	6,858 (82)	199,226 (82)	1,036,019 (84)	164,688 (43)	81,550 (60)
35	Machinery, machine tools, and parts	11,016 (73)	20,985 (50)	7,476 (28)	2,268 (37)	47,856 (25)	284,904 (39)	76,371 (11)	28,552 (13)
36	Electrical machinery, apparatus, appliances	139 (2)	976 (14)	272 (3)	166 (11)	18,431 (12)	104,615 (23)	49,812 (8)	13,923 (7)
37	Transport equipment and parts	300 (5)	5,514 (15)	7,118 (16)	4,962 (41)	12,631 (5)	110,639 (17)	72,163 (11)	51,825 (22)
38	Other manufacturing industries	897 (65)	16,562 (88)	2,043 (51)	907 (69)	100,901 (83)	1,363,427 (95)	97,026 (56)	51,230 (65)
39	Repair services	11,471 (97)	141,415 (98)	8,672 (84)	6,633 (91)	287,437 (95)	2,538,660 (93)	170,356 (71)	116,078 (79)
	Total	142,369 (61)	552,831 (69)	89,280 (19)	45,236 (42)	3,268,026 (51)	36,785,414 (84)	2,902,179 (23)	1,268,028 (37)

SOURCES: India, Ministry of Planning, CSO (1989); India Ministry of Planning NSSO (1989a).
NOTE: Figures in parentheses are the percentage share of unregistered sector total in that industry.

hectare of cultivated area almost tripled from 1960–61 to 1987/88 (table 3.4). The increases for cotton and sugarcane were also significant. The yield index for all crops (base triennium ending 1969/70 = 100) rose from 74 in 1960/61 to 178 in 1987/88. In addition, the technological breakthrough brought impressive increases in labor productivity in both wheat and paddy, and in the total factor productivity in wheat and rice.

The Solow index of technical change shows highly positive technological changes in both wheat and rice but is negative for cotton. Between 1971/72 and 1983/84, the index value for the three crops together was 2.89, which indicates that technological change for the agricultural sector as a whole was positive and significant.

Changes in Factor Shares

Between 1970/71 and 1983/84, the trend value of value added as a proportion of the value of output was −0.003 for wheat and −0.002 for cotton. In contrast, the trend value for paddy was 0.0102, which was both positive and significant. The time coefficients of the ratio of wages to value added in paddy and wheat production were −0.025 and −0.002, respectively, which showed a declining trend. For paddy, the trend was statistically significant, whereas for wheat, it was not.

Wage rates for all the three crops showed a statistically significant relation with labor productivity over time. The regression coefficients (in double log equations) were 0.62 for wheat, 0.41 for paddy, and 0.64 for cotton. Thus the rate of growth of money wages was only 41 to 64 percent of the rate of growth of labor productivity in these crops.

Real wages for all crops taken together grew only 0.91 percent per year during the period 1970/71 to 1984/85. This slow growth can be attributed to both a large-scale inmigration of laborers from poorer states and the mechanization of agriculture.

Over the period 1970/71 to 1986/87, there was evidence of increasing mechanization in farm production. The trend value of the share of depreciation and interest in value added (0.0049) was both positive and significant for wheat, but the time coefficients for paddy and cotton, though positive, were insignificant. The trend in the share of rent in value added declined for all these crops but was significant for paddy. This trend contradicts the findings of a study on rice cultivation in Southeast Asia (Hyami et al. 1980).

One consequence of the increasing mechanization in Punjab is that the elasticity of employment with respect to agricultural output has begun to decline. The initial period of the green revolution in Punjab was highly labor absorptive. Whereas agricultural output rose at the rate of 8.2 percent per year from 1962–65 to 1970–73, the number of male agricultural workers grew at the rate of 3 percent, which was well above the national rate of 1.8 percent. The growth rate of agricultural output dropped to 5.4 percent per year between

1970–73 and 1980–83, and that of male agricultural workers fell to 1.4 percent. Thus the elasticity of labor absorption was 0.4 during the first period and 0.3 during the second (Bhalla 1987:545; Bhalla and Tyagi 1989). By the same token, labor productivity and wages in agriculture show a rising trend (see also India, Ministry of Finance, 1990).

Sharing the Gains of the Green Revolution

The changes in factor productivities and shares do not indicate how the gains of the new technology were distributed among the various categories of cultivators and landless labor. Unfortunately, there are no up-to-date secondary data or studies on income distributed among the peasantry in Punjab. However, two studies (Bhalla and Chadha 1983; and Singh 1991) provide a basis for some broad generalizations on income distribution.

Gains from the new technology seem to have trickled down to all sections of the rural population. But the distribution was quite inequitable, since these gains were distributed more or less in proportion to the initial landholding position, which was highly skewed. Despite the limited land base, the total crop output and farm business income per unit of area of small and marginal farmers were almost as high as that of the larger farmers. Their technological level was nearly as good, and they made optimum use of surplus family labor. They also supplemented their earnings with wage and other income from nonagricultural occupations. Nevertheless, many were still living below the poverty line. Although there is evidence that landless labor has also obtained higher wages from agriculture and expanded nonagricultural occupations, many of them also remained below the poverty line. Even so, the Punjab experience shows that rapid agricultural growth over a long period makes a significant dent in rural poverty (Ahluwalia 1978). NSS data show that the state has the lowest poverty ratio among the larger states of India (India, Planning Commission, 1986; India, NSSO, 1990b).

According to data on asset distribution for 1971 and 1981, the average value of assets in rural Punjab was 2.68 times that for rural India as a whole, which reflects the general prosperity in the state, but these assets were unequally distributed. In 1981, 60 percent of households with assets of less than Rs 50,000 accounted for only 9 percent of assets. At the other extreme, rich households with assets in excess of Rs 100,000 accounted for 27 percent of households and 81 percent of the total value of assets (RBI 1977, 1987).

Determinants of Agricultural Transformation

The state and the public sector have played a crucial role in the rapid growth of Punjab agriculture since independence and its phenomenal transformation since the mid-1960s. On the eve of independence, Punjab had the most developed canal irrigation network in the country. It also had an enterprising peasantry that had been acquainted with irrigation technology for a long time.

Many of the pioneering families that helped to develop the canal colonies of Lyallpur, Sargodha, and Montgomery came to east Punjab after partition and brought with them their rich experience and enterprise.

Institutional factors also played an important role. Although land reforms during the mid-1950s were limited, they abolished landlordism and thus made it possible for self-cultivation to become the predominant mode of production. By 1982, 81 percent of the net operated area was under self-cultivation, in comparison with only 60 percent during 1953/54. With the removal of intermediaries, the self-cultivators had a personal stake in augmenting production through investment in new technology.

Large-scale planned investment in rural infrastructure from the beginning of planning in 1951 laid the basis of the technological breakthrough in Punjab agriculture. Among the states, Punjab had the highest per capita plan expenditure during the first three plans and the second highest in subsequent plans. According to various plan documents, during the First Five Year Plan per capita plan expenditure was Rs 174 in Punjab, compared with Rs 26 in Bihar and Rs 38 for India as a whole. During the Seventh Plan the corresponding figures were Rs 1729 for Punjab, Rs 622 for Bihar, and Rs 980 for India as a whole.

Rural Infrastructural Investment

The plan investment in Punjab gave top priority to rural infrastructure such as irrigation and power, agriculture, community development, credit, markets, and research and extension, which together constituted nearly 70 percent of the total outlay during all the plans.

POWER. During all the plans, the highest expenditures in Punjab were for power and irrigation. The per capita consumption of electricity increased from 6 kilowatt-hours in 1951 to 478 in 1986/87, whereas consumption for India as a whole increased from 18 kilowatt-hours to only 259. By 1981, all Punjab villages were electrified as against only 47 percent in India. By 1986/87, 44 percent of the electricity was being consumed in agriculture in Punjab, as against only 21 percent at the national level. The availability of power in rural Punjab made possible the electrification of thousands of pumpsets and tubewells and enabled farmers to use power threshers, sugarcane crushers, and chaff cutters on a large scale. This reduced the drudgery associated with traditional operations. Electric lights and electrical appliances helped some farmers improve their quality of life. However, the demand for power exceeded the supply, and an even higher investment was needed.

IRRIGATION. Because of large public investment, the proportion of gross irrigated area to gross cropped area in Punjab rose from 52 percent in 1950/51 to 91 percent by 1985/86, which was far above the 32 percent for India as a whole. Tubewells accounted for 59 percent of gross irrigated area in the state during 1987/88 (Punjab, ESA, various years). Because of this large invest-

ment, the irrigation base of the small and middle farmers became as good as that of large farmers (Chadha 1986, 94, table 35).

COOPERATIVE CREDIT. A rapid increase in cooperative credit to cultivators was another important component of infrastructural development. Total loans by primary agricultural cooperative credit societies in Punjab rose from only Rs 22 million in 1950/51 to Rs 3,104 million by 1986/87. Loans per hectare rose from Rs 7 in 1951/52 to Rs 430 in 1986/87 in Punjab, compared with an increase from Rs 2 to Rs 245 for India as a whole. The per hectare disbursement of short-term cooperative loans for the purchase of fertilizers and other inputs was much higher for holdings of less than 2 hectares than for medium and large holdings (Chadha 1986, 81, table 3b). In addition, cultivators were able to obtain long-term loans for the installation of tubewells, the purchase of tractors, land improvement, and allied agricultural activities. These loans were made by the primary cooperatives and the state land development banks, regional rural banks, and commercial banks.

INFRASTRUCTURE. The state's massive program of infrastructural development brought a marked improvement in roads, extension services, agricultural research, and education. By 1985, nearly all villages were linked by metalled roads, and the proportion of surfaced roads per 100 square kilometers of area far exceeded that for India as a whole. Between 1965 and 1988, the number of passenger vehicles increased by nearly 350 times and goods vehicles by more than 75 times. The number of regulated markets and the storage capacity of procurement agencies increased sharply (Punjab, ESA, various years).

The National Extension Program, the Panchayati Raj, and the Community Development Program introduced during the 1950s created a cadre of trained agricultural extension workers. The Punjab Agricultural University at Ludhiana contributed to the development of new seed varieties and has been active in research, extension, and training programs.

Once educationally backward, Punjab has become one of the leading states in education facilities at schools and universities, as well as in engineering and medicine, as a result of the substantial investment in education. The enrollment of rural males and females at the primary, middle, and higher secondary levels has increased quite rapidly. According to most indicators, Punjab is now second only to Kerala in education, health, and social development (Nag 1989, 143–170).

Agricultural Price Policy

A favorable price climate since the establishment of the Agricultural Price Commission in the mid-1960s also contributed to the rapid growth of agriculture in India, particularly in Punjab. Most studies have shown that the minimum support prices fixed by the government on the recommendations of the commission were remunerative. The procurement price of wheat that the Food Corporation of India paid in Punjab from 1967/68 to 1985/86 ranged from 104 to 152

TABLE 3.5 Index of total factor productivity and technology change (Solow Index) in Punjab and India, 1979/1980 to 1985/1986

		Punjab				India			
Code	Industry Name	1979–80	1982–83	1985–86	Solow Index[a]	1979–80	1982–83	1985–86	Solow Index[a]
20–21	Food products	100	112	111	5.63	100	123	139	12.64
22	Beverages, tobacco, and tobacco products	100	163	142	8.36	100	107	88	5.65
23	Cotton textiles	100	60	65	−6.91	100	70	72	−2.64
24	Wool, silk, and synthetic fiber textiles	100	100	113	3.73	100	86	104	1.97
25	Jute, hemp, and mesta textiles					100	99	74	−8.78
26	Textile products	100	111	102	3.45	100	122	108	4.62
27	Wood and wood products, furniture, and fixtures	100	41	15	−15.35	100	75	71	−1.46
28	Paper and paper products	100	32	130	8.57	100	69	71	−4.24
29	Leather and fur products	100	204	31	−10.07	100	119	111	5.49
30	Rubber, plastic, petroleum, and coal products	100	96	158	10.54	100	118	166	5.28
31	Chemicals and chemical products	100	258	249	19.14	100	107	108	4.13
32	Nonmetallic mineral products	100	69	37	−13.75	100	94	78	0.32

33	Basic metal and alloys	100	65	75	−5.31	100	104	99	−2.06
34	Metal products and parts	100	77	72	−4.51	100	84	87	−0.47
35	Machinery, machine tools, and parts	100	129	136	0.96	100	106	114	3.23
36	Electrical machinery and apparatuses, appliances	100	110	55	−13.87	100	133	127	6.49
37	Transport equipment and parts	100	99	83	0.62	100	123	121	5.02
38	Other manufacturing industries	100	176	194	8.93	100	144	278	17.45
97	Repair services	100	108	131	5.84	100	110	104	2.16
2–3	Manufacture (20–21 to 38)	100	117	129	4.47	100	105	108	3.91
	All industries	100	96	102	−0.14	100	106	108	3.08

SOURCE: India, Ministry of Planning, CSO (various years).
NOTE: Total factor productivity is the ratio of the index of net value added to weighted input index. Where the weighted input index is the addition of the index of labor and capital, the weights are cost of labor and capital in the base year.
[a]Solow Index: rate of growth (v/l) − b rate of growth (k/l) where b is the capital share in net value added in base year.

percent of the average cost of production. The procurement price for paddy ranged from 107 to 124 percent of the average cost (India, ESA, various years). The cost of both grains included the imputed value of rent, which constituted between 25 and 33 percent of the cost of production. The Punjab farmers who produced large amounts of wheat, rice, and cotton for the market were the major beneficiaries of the new price policy (Bhalla 1989, 48, 53).

Manufacturing Sector

Before the middle of the twentieth century, industrialization in India was fairly limited. Initially, most of the industries were concentrated around the port towns of Calcutta, Bombay, and Madras. Industrialization in Punjab did not begin until the mid-1920s, when the coming of canal irrigation stimulated agricultural growth. Completion of the railway network contributed to the commercialization of agriculture. Agricultural growth also encouraged the development of agroprocessing and agro-input machinery industries. In response to the increased demands created by the two world wars, Lahore, Amritsar, Dhariwal, Sialkot, Wazirabad, Batala, and a few other towns emerged as important industrial centers.

The partition of India in 1947 disrupted the entire economy of Punjab, and its industrial production came to a near halt. According to the Census of India for 1951, only 7 percent of the total work force in Punjab was engaged in industries, construction, and public utilities compared with 65 percent in agriculture and allied occupations, 10 percent in commerce and transport, and 18 percent in services (India, Ministry of Home Affairs, 1951). A substantial proportion of those in manufacturing were independent workers assisted by family labor and used little or no power. Most of the manufacturing was done in the small-scale sector. There were only about 1,000 registered factories (employing more than 10 workers and using power), which provided employment to not more than 50,000 people. In 1950 Punjab accounted for less than 2 percent of the total value of output by the registered sector in India, compared with 33 percent for Bombay, 27 percent for Bengal, and 12 percent for Madras (Khanna 1983, 119–24, appendix B-I–B-IV).

Manufacturing began to increase in the mid-1950s, as the result of concerted efforts to create a pool of trained workers and provide incentives to entrepreneurs as a part of the rehabilitation program for displaced persons. Planning helped channel resources to priority areas. In all the five-year plans, the state government gave the highest priority to investment in power and other infrastructure.

Increasing agricultural output during the 1950s created a demand for more agroprocessing, agro-input, and machine goods. This was supplemented by an increased demand from the rest of India for such products as machine goods, hosiery, knitwear, textiles, and sporting goods. These factors encouraged in-

dustrial development in Punjab, particularly among small-scale industries. By the beginning of the 1960s, Punjab was also producing agricultural implements, bicycles, and foundry products.

A few towns emerged as industrial centers after independence. Most of these towns were on the grand trunk road to Delhi. By the middle of the 1960s, Ludhiana had surpassed Amritsar in manufacturing engineering and consumer products. Gobindgarh's numerous steel rerolling mills produced various iron products. These developments notwithstanding, the state's industrial activity remained rather limited until the green revolution of the mid-1960s, which brought unprecedented growth in agricultural output. Because of close input, output, and consumption linkages, rapid agricultural growth was accompanied by even faster growth in the secondary and tertiary sectors of the Punjab economy. Consequently, between 1967/68 and 1987/88 the income from manufacturing in Punjab grew 7.6 percent per year compared with 4.5 percent for agriculture and 5.2 percent for manufacturing in India as a whole (table 3.1). Net per capita domestic product originating in manufacturing in Punjab rose from a ranking of sixth among the major states of India in 1960/61 to third by 1985/86.

Data Base for Manufacturing

The Annual Survey of Industries (ASI), which is based on a census and sample survey, covers all of India's manufacturing units registered under the Factories Act that employ 10 or more workers and use power, along with all units that employ 20 or more workers and do not use power. Except for statistics on capital invested, the data are fairly reliable. The data on capital employed, which is estimated on the basis of historical costs depreciated on a straight-line method, suffer from serious limitations. The ASI data for states are published regularly by the Central Statistical Organization (CSO). The CSO and the various state statistical organizations also use the ASI data to estimate value added from the registered sector (India, CSO, Annual Survey of Industries, various years).

The data base for the unregistered sectors is very weak. Until recently, estimates of the value of output and value added for some specific unregistered enterprises were obtained through ad hoc surveys by the NSSO. Consequently, it was not possible to build reliable data series for most of these industries. One of the earlier sources for Punjab was the Census of Unorganized Industries conducted in 1975–77. This was a one-time survey that covered only urban units employing more than five workers.

Recently, the CSO introduced economic censuses to remedy this deficiency. Comprehensive data on the unregistered sector both for India and all the states are available for only 1984/85. This sector includes both directory enterprises employing six or more workers, with one hired worker on a fairly regular basis, nondirectory enterprises employing fewer than six persons with at least

one hired worker on a regular basis, and own-account enterprises with no hired workers on a regular basis.

Some information is also available on small-scale industries in which fixed investment does not exceed Rs 3.5 million (Rs 4.5 million in the case of ancillary units) in assets, plant, and machinery. These units are registered with the district industries centers for the purpose of receiving various incentives. But not all of these units are registered under the Factories Act, and therefore data on small-scale industries cannot be correlated with other available information. These limitations should be kept in mind in the analysis of unregistered sectors in the state.

Structure of Manufacturing: Significance of the Unregistered Sector

Industrialization in Punjab continues to be dominated by the unregistered enterprises to a much greater extent than in the country as a whole. The unregistered sector accounted for approximately half the value added in manufacturing during 1967/68 and 1987/88 (table 3.1). For India as a whole, the share fell from 41 percent to 39 percent. The 5,344 registered manufacturing units under the factory sector in Punjab in 1984/85 (excluding "electricity") had fixed capital assets worth Rs 8,918 million, employed 236,159 persons, generated Rs 5100 million worth of value added, and produced Rs 39,015 million of output. The 292,843 unregistered enterprises—which included 236,080 own account, 47,814 nondirectory, and 8,949 directory establishments—had assets of Rs 14,237 million, engaged 552,831 employees, but produced only Rs 4,524 million of value added and Rs 8,928 million of output. Thus, with 60 percent more fixed capital, the unregistered sector generated more than twice as much employment as the registered sector.

The highest value of output from the unregistered sector came from food production, textile products, machinery, transport, repairs, wood, and furniture. Repair services provided the largest employment (table 3.4). In 1984/85, the unregistered sector contributed nearly 70 percent of industrial employment in the state. Because of lower productivity, however, its share in the total value of output was only 19 percent and that in value added 42 percent.

In terms of the value of output, the registered sector was dominant in food products, cotton textiles, wood, silk and synthetic fibers, chemicals, basic metals, nonelectrical machinery, and transport equipment. The small-scale sector dominated in textile products, wool and wood products, leather products, nonmetallic mineral products, metal products, and repair services. In terms of employment, it was dominant in many other areas. Output and value added per employee were much lower in the unregistered sector than in the registered sector in both Punjab and in India as a whole. This was true at the aggregated levels and for most individual industry groups. In 1984/85, for example, the value of output per employee for all manufacturing industries (except electricity) in the registered sector in Punjab was nearly 10 times that in

the unregistered sector, and value added per employee was 2½ times greater. The only notable exceptions were in rubber, plastic, petroleum and coal products, and transport equipment, where the reverse seemed to be true.

Higher labor productivity in the registered sector ought to reflect higher capital intensity. However, reported data on capital employed do not reflect this difference adequately, since capital per employee in the registered sector was only one and a half times that in the unregistered sector.

Although labor productivity in the unregistered sector was lower than in the registered sector in Punjab, it was much higher than in India. This was also the case for most of the unregistered industries at the two-digit level (a more detailed classification of industry). The only exceptions were in paper and paper products and electrical machinery. The higher per worker productivity in the unregistered sector in Punjab was primarily due to more fixed capital per employee (table 3.4).

Growth of Registered Manufacturing

Registered manufacturing units have also made rapid progress since the mid-1960s. This is evident from an analysis of ASI data on output, employment, and capital invested for the factory sector. While registered factories increased from 3,023 in 1967 to 5,710 by 1985/86, net fixed capital rose from Rs 2,277 million to Rs 37,438 million, and the number of employees from 114,213 to 321,877 (India, ASI, various years). During this period, both capital employed per employee and the value of output per employee nearly doubled. Because of more capital employed per worker, Punjab had much higher labor productivity than India as a whole in food products, beverages, cotton textiles, textile products, chemical products, and basic metals and alloys (India, ASI, various years).

Between 1978–79 and 1985–86 the annual trend growth rates for manufacturing output and employment in the factor sector were 6.9 percent and 4.7 percent for Punjab and 6.2 percent and 0.4 percent for India. Unlike the industries in India, those in Punjab experienced high output growth generally in association with high employment growth. The elasticity of employment for total manufacturing during 1978/79 to 1985/86 was 0.70 percent for Punjab and 0.06 percent for India. For most individual industries, Punjab's employment elasticities were also much higher (derived from India, ASI, various years).

Factor Productivity and Technological Upgrading

Some studies for Punjab based on censuses concluded that during 1966/67 to 1973/74 the growth of the registered factory sector was hampered by the inefficient use of resources. Total factor productivity declined at both the aggregated and disaggregated levels (Dhesi et al. 1983; Singh 1990). Furthermore, the manufacturing sector appeared to be suffering from technological stagna-

tion. The Solow index of technological change was also negative. These results contrast with those obtained for India, which showed total factor productivity increasing and positive. The Solow index was also positive.

These relationships changed radically during the 1980s.[3] For example, in the registered manufacturing sector in Punjab (according to both census and sample data), excluding power, total factor productivity increased from 100 in 1979/80 to 129 in 1985/86 but rose from 100 to only 108 for India. The performance of the "power" sector has been declining at a rapid rate, in part because of the large subsidies being given for power to the agricultural sector. Unlike the power sector, however, most of the important manufacturing subsectors have performed well.

Solow's index shows that most of the industries in the registered sector are undergoing technological upgrading (table 3.5). However, the period under consideration is too short to permit firm conclusions about these trends.

Main Features of the Industrial Sector

Like most developing regions, Punjab has a pyramidical industrial structure. At the bottom are nearly 293,000 own-account household and village industries that use traditional methods of production. They produce traditional goods for local markets and employ a large number of people. The productivity of these industries is low. In the middle are small-scale industries, most of which produce high-quality commodities by modern methods, though some still use traditional methods of production. At the top are a few medium- and large-scale industries that use fairly advanced methods of production and modern forms of organization.

Another feature of Punjab's industries is that they are dominated by small-scale enterprises. Punjab has only 2.5 percent of the population of India but more than 8 percent of the registered small-scale units. In 1984/85, the small-scale sector accounted for nearly 70 percent of total employment and 42 percent of total income generated in manufacturing. Obviously, the state is a land of small-scale enterprises.

Some scholars attribute the continued dominance of small enterprises to historical factors (Khanna 1983, 99). Others think it is due to the influx of entrepreneurs after partition and the incentives and other assistance provided by the state (Singh 1983).

Unlike the small enterprises in many other states, those in Punjab do not rely on traditional methods of production and organization that are largely independent of other units in the economy. Instead, most use power, and many operate as ancillary units of modern enterprises. Their technology improved considerably after they entered the export market.

3. For Punjab, the earlier data apply only to the census sector, whereas the latter data (census plus sample) pertain to the factory sector of the ASI.

The fastest-growing small and medium firms in Punjab rely almost entirely on the rest of India or foreign countries for their raw materials and markets. For example, wool is imported from Kashmir and Australia, while coal and pig iron come from the rest of India. Diesel and petroleum fuel is also imported. Only the agroprocessing industries are largely dependent on local raw materials.

In spite of a rapid rise in local demand after the advent of the green revolution, many small-scale industries are highly dependent on sales to the rest of India and abroad. Until recently the main market for hosiery goods, for example, was the former Soviet Union. According to one writer, Ludhiana accounts for nearly 20 percent of the total (noncommunist) world exports of cycle parts (Dasgupta 1989). Similarly, hand tools, sewing machines, cycles, and many engineering goods have their main market outside the state. Thus earlier characterizations that portrayed India's small-scale industries as lower forms of production with independent cycles of reproduction are no longer valid in Punjab (see, e.g., Shirokov 1980, 265–302).

Modern small-scale units in Punjab have flourished despite competition from large units, partly because of government support, but also because of their ability to defray costs through the sharing of risks. Entrepreneurs are able to take advantage of interlinkages among formal and informal, agricultural and nonagricultural, and rural and urban sectors. Many workers engaged in small-scale manufacturing, for example, also do seasonal agricultural and casual industrial work. This practice enables the entrepreneurs to cut costs without losing control of their labor force. Small-scale units are seldom covered by labor legislation as they generally employ, or manage to show that they employ, fewer than the number of workers that would require them to pay minimum wages or social security benefits to workers. They are resilient also because they are able to share production risks. The interpersonal relations enable them to reduce costs through mutual obligations. Another significant advantage enjoyed by small-scale units is that they are family run and have low overhead costs. In many instances family members work long hours, as is typical in self-exploitation. Cheap power is available from hydroelectric plants in the state. Industrial centers like Ludhiana, Gobindgarh, and Batala provide a pool of trained labor, state-run tool rooms, banks, export firms, and credit facilities. A prosperous agriculture has provided a market for many small-scale industries manufacturing agricultural machinery and consumer durables.

The state has played a crucial role in the development of the small-scale sector in Punjab, providing adequate power, land for plant location, research facilities, credit, and subsidized raw material. The state also undertakes active promotional efforts such as education and training and makes available modern decentralized technologies to independent entrepreneurs.

Contribution of Agriculture to Industrialization

Punjab is one of the few states in India in which rapid agricultural growth has induced rapid industrialization. Much of the recent literature on economic development has emphasized the rural-led employment-oriented strategy of growth, especially for developing countries with a labor surplus (Mellor 1976, 181). Some argue that a major constraint to employment growth is the availability of foodgrains. It is claimed that acceleration in the growth rate of foodgrains production from 2.5–3.0 percent to 4.0–5.0 percent would greatly advance the growth of employment. It is generally recognized, however, that the rapid growth of foodgrains production alone will not generate much employment. Consequently, high agricultural growth is sought in combination with accelerated growth in employment in other sectors. Some also point out that increased production of nonfoodgrains would stimulate output in the livestock sector, which would provide increasing employment opportunities because consumption demand would likely shift from cereals to milk and milk products. Since the livestock sector is highly labor intensive, its capital requirements are likely to be much lower than those of many other consumer goods industries. A formal model of this type developed and tested by Mellor and Mudahar (1974) has suggested that the process of integrated rural development from this strategy would have many advantages. First, income would continue to increase in rural areas. Second, a major proportion of increased demand would be for nonfoodgrains. Third, the rapid growth in agriculture would likely necessitate the development of rural infrastructure such as irrigation, roads, and electrification. Fourth, the developed infrastructure would attract trained personnel to the rural areas. Fifth, increased infrastructure would reduce disparities in rural-urban price relationships. Sixth, rural industries would be labor intensive, though new agriculture technology would be likely to widen income inequalities. Seventh, it would be possible to tap rural savings through taxes for infrastructure or for investment in small-scale firms. Eighth, widened rural income disparities would increase the need for a broad range of state-based public health and education facilities. Under this strategy, it would also be necessary to set up institutions in small market-towns as focal points for organization and decisionmaking.

To sum up, the necessary elements suggested for a policy for rural-led strategy were (1) accelerated expansion in foodgrains production; (2) massive public investment in transportation, communication, and electrification in rural areas; and (3) a shift in the structure of industrial production toward small-scale enterprises producing consumer goods in rural or semiurban areas (Mellor 1976).

Many of Mellor's preconditions seem to have been satisfied in Punjab. First, between 1967/68 and 1987/88 Punjab recorded annual growth of 4.9

percent in wheat, 15.6 percent in rice, and 6.6 percent in foodgrains, as against the suggested growth of 4 to 5 percent per year. Second, and particularly important, demand shifted in favor of livestock products, and both rural and urban consumption of milk recorded sharp increases. Between 1967/68 and 1987/88 income originating in animal husbandry grew at a phenomenal annual compound rate of 7.3 percent per year (table 3.1). This subsector accounted for 27 percent of the income generated in agriculture during 1987/88. Finally, large public investment in rural and urban infrastructure, particularly in power, roads, and communications, fostered the growth of small-scale industries in agroprocessing, agro-input, and consumer goods.

Although industrial growth in Punjab was creditable, many scholars believe that it fell far short of expectations, primarily because the state failed to tax the financial surpluses of agriculture and invest in manufacturing. This brings up another point of view concerning appropriate development strategies based on accelerated growth in agriculture.

As pointed out above, the agricultural sector can contribute to industrial growth in many ways: by providing foodgrains, releasing surplus labor for nonagricultural activities, providing raw materials for agroprocessing industries, creating demand for agro-input industries, and above all, creating a market for consumer goods industries through widespread income generation in agriculture. Some scholars give special emphasis to shifting the financial surpluses of agriculture to industry for capital formation, and simultaneously transferring labor from low-productivity agriculture to manufacturing, where labor productivity is significantly higher. This strategy has long been stressed by classical and Marxist writers. The historical development of industrial capitalism has also been explained in these terms by scholars such as Simon Kuznets and Colin Clark. Both emphasized that the success of this strategy depended on the rapid growth of labor productivity in agriculture.

A distorted application of this strategy can be seen in the former Soviet Union, in the form of Stalin's collectivization of agriculture. What Stalin failed to appreciate was that once a goose is killed, it stops laying eggs. Forcibly extracting surplus from stagnating agriculture can be both painful and often counterproductive. In contrast, policy measures that help agricultural growth can provide resources for capital formation in industry. Whatever strategy is adopted will have important political implications.

The recent revival of theoretical approaches stressing resource transfers from agriculture for industrial growth owes a great deal to Japanese and Taiwanese scholars, who have used this conceptual framework to explain rapid industrialization in their economies.

To a great extent this approach complements Mellor's strategy and perhaps helps strengthen it. It also brings out the importance of political processes, the relative strength of rich peasants, their role in initiating and spreading new

technology that augments output, and their increasing influence and clout in different political regimes.

Japan and Taiwan started out by investing heavily in rural infrastructure, which buoyed agriculture. In both Japan and Taiwan, public investment in irrigation and other infrastructure was initially supplemented by large private investments. This led to a rapidly growing and prosperous agriculture. These countries then designed specific policies to extract large agricultural surpluses for investment in manufacturing. They were able to do so because of political conditions. However, the balance of political forces is likely to be quite different in a democracy where farming interests that benefit from public and private involvement in agriculture might command a predominant voting strength. Therefore the experience of India (and Punjab) must be explained in the context of its democratic polity and, to use Myrdal's term, of its "soft state." But before critically examining this issue, it is useful to look at some of the evidence.

Unfortunately, not much work has been done on intersectoral resource flows in India, particularly at the state level. Some estimates of net resource flows from agriculture to industry have been contradictory. According to Mundle (1977, A-52), the net inflow into agriculture was nearly Rs 9,000 million in 1951/52, but by 1970/71 about Rs 6,000 million were flowing out of agriculture annually. According to Mody (1981, 425–40), however, there was a substantial resource flow into agriculture during 1950 to 1970.

Unlike Mundle, Mody based his estimates on financial flows (i.e., receipts, tax payments, government expenditure) in agriculture and financial assets and liabilities of the agricultural sector. Like Ishikawa, he appreciates the necessity of resource flows into agriculture during the initial period of development for building rural infrastructure, whether or not these are reversed subsequently. The success of industrialization will depend to a large extent not only on the capability of agriculture to generate surpluses but also on whether and how these surpluses can be channeled into industrial investment.

The estimates of both scholars suffer from two deficiencies. They cover only the period up to the early 1970s, and they are for all of India and do not take into account the country's wide regional disparities.

Ashok Gulati (1989) recently computed aggregate subsidies to agriculture on various inputs at state level. Gulati estimated that for India as a whole during the 1980s annual subsidies to agriculture averaged Rs 90,000 million and constituted 16 percent of NSDP from agriculture. Subsidies for Punjab alone averaged Rs 7,162 million per year and constituted 24 percent of the agricultural NSDP.

Since Gulati did not compute direct and indirect taxes or other financial flows in and out of agriculture, it is not possible to determine conclusively the direction of resource flows. There is, however, indirect evidence that financial resources are now flowing out of agriculture. The first is the large increases in savings, most of which come from rural households. The second is the fact that

during 1975–90 the terms of trade moved against agriculture.

In a recent study Bhalla and his associates (1990, table 17) attempted to estimate the net resource flow out of the total Punjab economy. They found that by the end of the 1970s the state had become a highly export-surplus economy. In 1979/80, the net trade surplus for Punjab was Rs 7,739 million, or 17 percent of its gross domestic product. Most of it originated in agriculture, which had an export surplus of Rs 12,217 million. It is obvious that an export surplus of this magnitude must have created assets outside the state.

Another indicator of net financial flows from the state to the rest of the country is the credit-deposit ratio of commercial banks. In 1973, the credit deposit ratio in Punjab was 36 percent compared with 75 percent for Maharashtra and an all-India average of 69 percent. The ratio of Punjab moved up to 60 percent by 1987/88 (RBI, 1982/83, 1987/88).

To sum up, existing literature on flow-of-funds analysis does not permit definite conclusions about intersectoral resource flows in Punjab. Indirect evidence suggests that resources are flowing out of agriculture, but there is virtually no evidence that indicates how much is being used for industrial investment.

Available data make possible some conclusions on the movement of labor from agriculture to industry. In 1961, 56 percent of the male workers in Punjab were engaged in agriculture, which contributed 48 percent of total state income. By 1971, the proportion of male workers had increased to 63 percent. Agriculture's share of state income had marginally declined to 45 percent. The increase in the percentage for male workers reflected rapid growth in agriculture. During 1961/71, agricultural output increased 8 percent in Punjab and only 2.4 percent in all of India. The male agricultural labor force growth rate of 3.1 percent per year was nearly double the national rate. The growth rate started to decelerate during the next two decades and declined sharply to about 1.4 percent both during 1971/81 and during 1981/91. For India as a whole, the annual growth rate of male agriculture labor was 1.74 percent even during 1981/91. In Punjab, the proportion of male agricultural workers to total male workers also declined, from 63.0 percent in 1971 to 57.3 percent in 1991 (India, Registrar General). The NSSO data for 1988 confirm that the percentage of workers engaged in agriculture declined from 61 percent in 1977/78 to 50 percent in 1987/88. The comparative figures for India were 71 percent and 62 percent (India, NSSO, 1990a).

Some scholars have analyzed the influence of agricultural growth on industrial growth by building macroeconometric models. Rangarajan (1982, 87) in his study of India concluded that 1 percent growth in agricultural output increased industrial production by about 0.5 percent and national income by 0.7 percent. Another notable study (Hazell and Roëll 1983) used data on expenditure patterns of farm and nonfarm households to quantify forward and backward linkages. A recent study on Punjab (Bhalla et al. 1990) used the detailed

input-output tables for 1969 and 1980 to estimate the contribution of rapid agricultural growth to the development of the agro-input, agroprocessing, and consumption goods industries through backward, forward, and consumption linkages. An attempt was also made to calculate the extent of forward and backward linkages with the nonagricultural sectors.

The increasing use of intermediate modern inputs in the new agricultural technology stimulated the demand for fertilizers, pesticides, power, diesel, and other nonagricultural inputs for current production. With increased capital investment in agriculture, the demand for capital goods such as electric motors, diesel engines, threshers, tractors, and construction materials also rose rapidly. These demands were partly met through imports but also gave a fillip to local industries. As a result, vibrant engineering and hand-tool industries emerged. These industries also started selling large quantities to the rest of the country. The value of production of agricultural implements grew 10 percent annually between 1970/71 and 1982/83. In the meantime, production and employment for hand tools and nuts and bolts was high. Domestic production of fertilizer was up sharply, but large quantities were also imported.

Increases in output and marketed surplus of agricultural commodities also led to the rapid growth of industries processing agricultural products. Many of them catered mostly to local demand, but over time exports also became important. For example, nearly 93 percent of the total paddy production in Punjab is marketed. Since Punjab is a new rice-producing state, it did not have a tradition of hand pounding of rice and was able to directly graduate to modern mechanized rice shelling. All the marketed paddy is now being converted into rice through modern shellers. Higher income per capita of Punjab's large rural population has pushed up the demand for consumption goods. As in most states, consumption is the most important component of final expenditure. Both the direct and indirect income generated by consumption is high. A consumption multiplier of 1.6 during 1979/80 indicates the importance of consumption-based activities in the state. Imports of consumer goods from the rest of India have increased, and the state's consumer goods industries have expanded rapidly.

The composition of consumption has also changed, particularly for income-elastic foods such as livestock products, beverages, cloth, consumer durables, and some other commodities. Among the food items, the highest proportion, that is, 17 percent of the total expenditure, went for milk and milk products; 14.4 percent for sugar, salt, and spices; 10.9 percent for cereals; and 3.8 percent for beverages and refreshments. Among nonfood items, clothing accounted for 9.4 percent, fuel and light for 6.5 percent, and consumer durables for 3.05 percent of total expenditure (India, NSSO, 1990b).

The increased consumption induced rapid expansion in Punjab's manufacture of food products like dairying, grain mill products, edible oils, and breweries and beverages. There was also a big spurt in the domestic production of

textiles and durable consumer goods such as sewing machines, bicycles, radios, and television sets.

An IFPRI study (Bhalla et al. 1990) recently examined the development process of agro-input, agroprocessing, and consumer goods industries, along with the intersectoral linkages in the Punjab economy. An attempt was also made to find out the direct and indirect quantum and strength of forward and backward linkages generated by different sectors, and to trace the direct and indirect impact of final expenditures on sectoral output, income, wages, and employment through multiplier analysis, with special attention to the linkage between the agricultural and nonagricultural sectors. The input-output model was modified to take into account import leakages from the Punjab economy. It was found that direct and indirect increases in the demand for intermediate nonagricultural inputs strengthened the linkages between the agricultural and nonagricultural sectors. But many of the modern intermediate inputs, especially fertilizers and petroleum products, were imported from outside the state. The incremental direct and indirect output requirements from the domestic economy were found to be notably smaller in Punjab than in India as a whole, because of the high level of these imports. The inducement effect of consumption on the state economy was also considerably reduced because of imports of consumption goods from the rest of India.

A condensed five-sector input-output table for Punjab and India for 1979/80 was used to bring out the important differences in their linkages. These differences arose, first, because in Punjab agricultural production made much greater use of nonagricultural inputs than agricultural production in India as a whole and, second, because Punjab had much higher import leakages.

When the import leakages in Punjab were taken into account, a Rs 1.00 increase in final demand from agriculture led to a direct and indirect output of only Rs 0.998 in agriculture and Rs 0.10 in manufacturing. When import leakages were neglected, the direct and indirect output levels were Rs 1.11 in agriculture and Rs 0.22 in manufacturing. For India also, the incremental outputs of various sectors were reduced because of imports, although to a much smaller degree (Bhalla et al. 1990).

In the case of Punjab, import leakages were even higher when final demand from manufacturing was increased. Thus, a unit increase in the final demand from manufacturing resulted in a direct and indirect output of only Rs 0.85 in manufacturing, compared with Rs 1.66 when import leakages were not taken into account. In the case of India, direct and indirect output in manufacturing decreased from Rs 1.67 to Rs 1.43, even after accounting for import leakages. Because of a very high degree of interdependence with the rest of the country, many of the gains of rapid development in Punjab were shared with the rest of India. At the same time, Punjab benefited immensely from the existence of an assured market for wheat and rice surpluses and other industrial products and from the easy availability of modern intermediate inputs, such as fertilizers

and diesel fuel, at nationally subsidized rates. The modernization of agriculture and the rapid growth of the manufacturing and tertiary sectors tended to strengthen the links between the state economy and the national economy and integrate it with the national market.

A disaggregated analysis of sectoral linkages and changes therein was also conducted for the period 1969/70 to 1979/80 using information from a 36-sector input-output table for 1969/70 and a 39-sector input-output table for 1979/80. It turned out that in 1969/70 only the agricultural sectors (including animal husbandry) and some agroprocessing sectors were generating high forward and backward linkages. In 1979/80, the farm sectors and agroprocessing sectors continued to generate high forward and backward income linkages. When linkages were considered with or without import leakages, however, many more sectors fell into this group, and this change indicated that the economy was functioning at a higher technological level (Bhalla et al. 1990, 5.7).

The multiplier analysis in the study further confirmed that important changes had taken place in the structure of the Punjab economy between 1969/70 and 1979/80. In 1969/70, it was primarily the agrobased industries that demonstrated the highest levels of indirect income and employment in response to changes in their final demand. In 1979/80, other industries—such as basic metals, metal products, "other chemicals," machine goods, electrical and nonelectrical machinery, and drugs and pharmaceuticals—also showed high indirect income and employment levels. The production of consumption goods remained a major economic activity in the state, and very high induced incomes were recorded by agriculture-based industries that had an important place in the consumption basket. Some other basic and heavy industries—such as basic metals, electrical machinery, and basic chemicals—also became important because of direct and indirect effect. In 1979/80, in addition to many manufacturing sectors, construction also emerged as significant in the generation of indirect as well as induced income and employment (Bhalla et al. 1990, 83–84).

Urbanization

The nature and pattern of urbanization in a region can only be understood in terms of the region's economic structure. The distinctive pattern of urbanization in Punjab was due to rapid agricultural growth combined with the dominant position of small-scale industry. Since agriculture is still the largest sector of the economy, the extent of urbanization is limited. In 1991, nearly 30 percent of Punjab's population lived in urban areas compared with 26 percent for India as a whole and 39 percent and 34 percent for Maharashtra and Gujarat, respectively, the two most industrialized states.

Urbanization accelerated during 1961 to 1981, particularly in agricultural

marketing cum trading towns. The marketing of large agricultural surpluses stimulated urban marketing and trade. The agroprocessing, agro-input, and consumer goods industries also got a boost as the income of the agricultural population rose. This led to greater occupational diversification. By 1987/88, half of the work force was engaged in nonagricultural occupations compared with 39 percent in 1977/78 and 43 percent in 1983 (India 1988). The rate of urbanization was faster during the 1970s than in the 1950s and 1960s. The urban population grew by 44.5 percent during 1971/81 compared with only 25 percent during the preceding decade. According to data from the latest (1991) census, the growth rate of the urban population in Punjab (as in all other states) fell to 29 percent during 1981/91, and Punjab's proportion of urban population increased to only 30 percent in 1991. In the meantime, the share of urban population in India increased from 23 percent to 26 percent. Punjab now ranks fifth in urbanization among the larger states (India, Ministry of Home Affairs, 1991).

Urbanization and agricultural development are closely linked in Punjab. Although industrialization remains the main force for urbanization, many small and medium firms specialize in the trade, marketing, and processing of agricultural produce, and provide agricultural implements and other inputs. Since agricultural development is fairly evenly distributed over the whole state, the development of agroprocessing and agro-input industries also is spread widely among small and medium market towns. At the same time, numerous large industries and modern small-scale industries have begun to cluster in large cities on the grand trunk road from Delhi to Amritsar. Consequently, the pattern of industrialization now emerging in Punjab exhibits a high level of spatial inequality, with a large proportion of the nonhousehold manufacturing activities concentrated in a few cities of the state with a population in excess of 100,000 (class I cities). This is likely to adversely affect the balance of urbanization in the future.

At present, the distribution of the urban population by city size is somewhat more balanced in Punjab than in India as a whole (table 3.6). There were only 10 cities in Punjab with a population greater than 100,000 (class I) and these held only 54 percent of the urban population compared with 65 percent living in class I cities in India. The 43 small and intermediate towns with a population of 20,000 to 99,000 account for 33 percent of the urban total compared with an urban population of 24 percent that lived in towns of similar size in India. Thirteen percent of the urban population lives in 67 small towns with a population of less than 20,000. The comparative figure for India is 11 percent. The growth rates for all categories of towns in Punjab were higher in 1971/81 than in 1961/71 but were lower in 1981/91 than in 1971/81. While the growth rate of intermediate towns was slightly higher than that of 7 big cities during 1971/81, the reverse was the case during 1981/91 (Bhalla et al. 1982).

Small market villages and towns on main roads connecting larger town-

TABLE 3.6 Distribution and growth of urban population in Punjab and India, by city size

Class	Population	Punjab 1991		Punjab Growth Rate		India 1991		India Growth Rate	
		Number of Towns	Percentage Distribution	1971–81	1981–91	Number of Towns	Percentage Distribution	1971–81	1981–91
I	>100,000	10	54.36	39.40	35.54	296	65.20	41.41	34.49
II	50,000 to 99,999	18	19.79	43.06	29.77	341	10.95	36.15	31.60
III	20,000 to 49,999	25	12.89	33.10	30.33	927	13.19	39.53	29.57
IV	10,000 to 19,999	44	10.46	33.85	21.21	1,135	07.77	35.00	28.41
V	5,000 to 9,999	16	20.30	39.00	25.48	725	02.60	36.99	30.02
VI	<5,000	7	00.47	50.34	12.01	185	00.29	47.74	43.88
	Total	120	100.00	37.96	31.36	3,609	100.00	39.68	32.81

SOURCE: Registrar General, *Census of India*, 1971, 1981, and 1991.

ships have gradually become hubs of economic activity, not only in trading, agroprocessing, and repairs, but also in the provision of social services, health, and recreation. In many cases, these small growth centers serve a network of peripheral villages and provide nonagricultural employment and income to a large number of workers.

Another notable feature of Punjab's pattern of development is that many rural areas have acquired urban functions and amenities owing to their fairly well-developed infrastructure and the good road connections between most villages, but have retained their rural characteristics. Urbanization statistics fail to reflect this important phenomenon. In a sense, rapid rural development has inhibited urbanization by providing increasing employment to the rural population and thereby reducing rural-urban migration.

As is the case for agriculture, industrial development in Punjab owes a great deal to state policies. In particular, the government's decision to invest in infrastructure and provide other basic facilities to entrepreneurs played a vital role in industrial development.

The State and Industrial Development

Policymakers in Punjab have been acutely aware of the need to accelerate industrialization. It is much more difficult, however, to provide comprehensive investment, input, marketing, and infrastructural support to the industrial sector than it was for agriculture. The geographic location of the state puts it at a serious disadvantage. Basic raw materials such as coal, pig iron, and petroleum products have to be brought in from long distances. Similarly, the market for many of its industrial products lies outside the state. And being a border state, Punjab finds its entrepreneurs have to be given special incentives to attract capital. Despite these drawbacks, policymakers have taken several steps to accelerate industrialization in Punjab.

In India, the macroeconomic policy of state governments is part and parcel of national policy. This is particularly true for licenses, controls, tariffs, custom duties, export and import duties and subsidies, and investment policy. Although the state has benefited immensely from national assistance in planned investment in infrastructure, licensing policy has in general curbed the development of sufficient capacity, particularly in agroprocessing industries.

The main objectives of Punjab's industrial policy as enunciated in the Industrial Policy of 1978 and the New Industrial Policy of 1989 were to develop village and small industries, encourage as many industrialists and small entrepreneurs as possible to set up industries in the state with special incentives for nonresident Indians, maximize sales of industrial products outside the state, attract investment in new technology and agrobased sectors, provide technical facilities and financial assistance for upgrading technology and modernization, and encourage young people to enter into business and bring industries to the

area known as the "no industry block" (a small administrative unit covering several villages) (Punjab 1978, 1990).

The state government introduced several packages of incentives for setting up and promoting industries. The first were enunciated in 1973 and the New Policy in April 1978. The main promotional packages concentrated on infrastructural facilities, incentives to new industries, incentives for locating industries in backward districts, assistance to small industries, and the establishment of promotional and financial and research institutions.

INFRASTRUCTURAL FACILITIES. An important component of infrastructural support was the move to set up focal points and industrial estates (parks) in different parts of the state. The focal points and industrial estates were provided with power, roads, and communication. In some cases, research and training institutes were also set up in these centers. The main objective was to provide entrepreneurs with all the infrastructural facilities they needed, including sheds in industrial estates. In addition, a substantial land subsidy was made available to prospective entrepreneurs.

INCENTIVES TO NEW INDUSTRIES. A variety of tax incentives are available to entrepreneurs interested in setting up new industries. These include exemption from the municipality border tax (*octroi*) and terminal tax, a depreciation allowance, and a capital investment subsidy. Interest-free loans given to new industries are equivalent to 5 to 6 percent of their annual sales subject to a ceiling of Rs 0.5 million to Rs 0.7 million per year. The loan periods range from 5 to 10 years depending on the degree of backwardness of the location. In addition, interest subsidies are given for small loans up to Rs 25,000 carrying an interest rate of 8 percent or more. Also, new units are not required to pay for electricity duty (*ceso*) for 5 to 10 years.

INCENTIVES FOR LOCATING INDUSTRIES IN BACKWARD DISTRICTS. The central government has introduced numerous incentives to attract industries to backward districts such as Hoshiarpur, Sangrur, Bhatinda, and Faridkot. All industries set up in these districts receive a central subsidy of 15 percent on fixed capital investment (land, buildings, and machinery) of up to Rs 1.5 million. The state gives similar subsidies to all new industries set up in the districts and in submountainous and other backward areas.

According to a study by the Economic Adviser to Government (Punjab 1984), industries that received such subsidies experienced higher growth than industries in the rest of the state. In most cases, however, the disbursement of announced subsidies was delayed, and the amounts were very small in relation to the capital outlay. The supply of raw materials to these units was irregular, particularly for engineering-based units. These industries had difficulty getting raw material from the Steel Authority of India and had to buy it at a higher price in the open market. Other problems included power shortages, a lack of housing, a lack of skilled labor, inadequate credit, poor communication facilities

and other social infrastructure, and difficulty in making full use of capacity (Punjab 1984).

ASSISTANCE TO SMALL INDUSTRIES. Several promotional measures, incentives, and training programs have been designed to develop small-scale industries at both the national and state level. Initially, their objective was to protect small industries from competition with large units. Accordingly, the number of items reserved for manufacture in the small-scale sector rose from 47 in 1967 to 838 in 1989; however, the reserve did not apply to large units that export 75 percent of their output (India, NSSO, 1989a, 8–9). Other protective measures included exemption from excise duty up to a certain limit, credit on the modified value added tax, government purchases earmarked for this sector, and controlled prices for scarce raw materials.

The most important promotional programs for small-scale enterprises at present are those that provide refinancing facilities through the Industrial Development Bank of India and the National Bank for Agricultural and Rural Development. Commercial banks provide credit for working capital on a priority basis, and the State Financial Corporations do so for investment capital. Institutions such as the National Small Industries Corporation and the State Small Industries Development Corporation also provide financial help, some of which is in the form of hire-purchase assistance for acquiring machinery.

The central government has made a considerable outlay for direct assistance and for infrastructure. In addition, the state government has provided technical assistance and common service facilities through a network of quality marking centers, industrial development-cum-service centers, testing and toolroom facilities, and research and development facilities for all types of industries. The upgrading of technology is also being promoted by the Hand Tool Design Institute at Jalandhar, Machine Tool Design and Development Center at Batala, Research and Development Center for Bicycles at Ludhiana, and the Sewing Machine Development Center at Ludhiana. These and other facilities are being set up with the assistance of the central government and the United Nations Development Programme and the United Nations Industrial Development Organization.

The state government has established district industrial centers in each district to expedite the implementation of the programs for small-scale industries to reduce delays and to help prospective entrepreneurs. All services are to be made available from a single office.

PROMOTIONAL AND OTHER FINANCIAL AND RESEARCH INSTITUTIONS. The main institutions promoting and financing industrialization in the state are the Punjab State Industrial Development Corporation (PSIDC), the Punjab State Financial Corporation (PSFC), and the Punjab State Small Industries and Export Corporation Limited (PSSIEC). The PSIDC promotes equity among entrepreneurs, and provides term loans (up to Rs 9 million) over and above those

from the PSFC. The PSFC distributes term loans up to Rs 3 million to small and medium industries, and the PSSIEC is a multiservice corporation that provides industrial sheds, distributes raw materials to small units, and provides marketing support.

These institutions have played an important role in industrialization in Punjab. The PSIDC has promoted 60 projects since its inception in 1972, and 48 of these have already been commissioned (Punjab 1986). Numerous corporations also have been set up to develop and upgrade technology in areas considered important to industrial development, such as electronics, hosiery and knitwear, handloom materials and textiles, and leather and agroindustries. Some of the public sector promotional corporations have performed creditably, but a few have been corrupt and inefficient. The Vidhan Sabha Committee on Public Undertakings has suggested a number of measures for improving the performance of these enterprises (Singh 1983).

The large number of promotional measures, financial incentives, and other facilities offered by the central and the state governments have played a crucial role in fostering industrialization in Punjab. One drawback to this system is that when raw materials are scarce, the quotas and permits given to small industries fetch a high premium. These often are cornered by politically influential middlemen and sold on the black market, with the result that some end up buying raw material at prices much higher than controlled prices. Those who are able to obtain permits and quotas earn extra profits (see Bhagwati and Desai 1970).

Although some public and private sector enterprises have performed well, many have reached the point at which they ought to be made to stand on their own feet and become cost conscious and efficient. Consequently, government policies—including controls, quotas, and subsidies—require some serious attention.

Summary and Conclusions

Agriculture has been a fast-growing sector in Punjab, thanks to large investments in irrigation both before and after independence in 1947. The introduction of seed-fertilizer technology during the mid-1960s led to unprecedented growth in agricultural output, particularly in wheat and rice among foodgrains and cotton and sugarcane among commercial crops. Animal husbandry also experienced phenomenal growth.

On the eve of independence, Punjab was industrially backward in comparison with the other states of India. It then introduced programs to rehabilitate refugee entrepreneurs and workers and made large investments in infrastructure such as power, industrial estates, transport, and communications. This state intervention created a favorable environment for industrial development, which was accelerated by the increasing demand from Punjab's rapidly growing agri-

culture and rising export demand. By the beginning of the 1960s, Punjab had become known as the land of small-scale enterprises. Nevertheless, the income from manufacturing was still only 7.3 percent of the state total.

During the mid-1960s industrialization in Punjab received a big boost as a result of the rapid growth in agricultural output spurred by new technology. The rapid growth in agriculture and manufacturing was also accompanied by fast growth in the tertiary sector.

The Punjab experience illustrates that rapid agricultural growth stimulates growth in other sectors through input, output, and consumption linkages and thereby helps transform the economy. As the productivity and per capita income of the agricultural work force rose to much higher levels, the demand for consumption goods also increased. This change not only made a deep dent in rural poverty, but also led to the development of other sectors through forward and backward linkage effects.

Although the growth rate in the secondary and tertiary sectors in Punjab has been creditable, the growth of manufacturing has fallen considerably short of expected levels. This assessment, however, is based on growth calculated for value added rather than on the value of output. An annual growth rate of about 7 percent for value added in manufacturing (as in table 3.1) would imply a growth rate of about 9–10 percent in the value of output. However, even a 9–10 percent rate for manufacturing growth is not consistent with the rapid agricultural growth recorded in the state.

Import leakages may be one reason why manufacturing growth lagged behind expectations. Because Punjab's economy is linked with the rest of the country, it has a comparative advantage through specialization in certain crops and in a few manufacturing lines. For many important agro-inputs such as fertilizers, petroleum products, and agricultural machinery and for numerous consumer goods, however, the state is highly dependent on inputs from the rest of India.

A second, related reason is that, because of the extraordinary increases in the output of many agricultural products, processing capacities in Punjab fell far short of requirements. The problem here is that the regional distribution of manufacturing tends to be historically determined, particularly in agroprocessing and agro-input industries. These industries often do not conform to current patterns of agricultural output, particularly in areas that recently started to produce substantial marketable surpluses. A lack of sufficient investment in agroprocessing seems to have been a major constraint. In 1988/89, for example, Punjab produced 24.4 percent of India's raw cotton but had only 1.9 percent of all installed spindles and 0.6 percent of all looms. The lack of investment in processing facilities for wheat and sugarcane also helps account for the slower-than-expected growth of manufacturing.

The large outflow of financial resources from the state played a role as well. Despite the substantial increase in imports of raw material and consump-

tion goods, Punjab has become an export-surplus economy, primarily because of its large marketed surpluses and exports of wheat, rice, and cotton and some industrial products. A large part of the balance of trade surplus is not being returned to the state for investment in the nonagricultural sectors.

Although the data on intersectoral commodity and resource flows are poor at both the national and state levels, the available evidence suggests that surpluses arising out of prospering agriculture in many parts of India, including Punjab, are not flowing into manufacturing. Agriculture is receiving large subsidies in the form of fertilizers, power, irrigation, and credit, particularly in Punjab, which uses more modern agricultural inputs. As was discussed earlier, developing countries with a labor surplus need to invest large resources from other sectors in rural infrastructure in order to accelerate agricultural growth. Once agricultural incomes start growing rapidly, however, it is important to invest the surplus incomes in the nonagricultural sector. In the case of Punjab, not enough surpluses were transferred from agriculture to industry to achieve an adequate level of growth in manufacturing. Because rich farmers now have considerable economic and political clout, it is more difficult to mobilize the surplus through input prices or by taxation. This is an important constraint at India's present stage of development.

Note, too, that an employment-oriented development strategy requires that the increase in incomes be spent on consumer goods produced through labor-intensive techniques. In Punjab, the large demand for milk and milk products is being satisfied through the rapid development of labor-intensive animal husbandry. In the nonagricultural sector, in contrast, the recent liberalization of capital imports has, in many cases, led to the growth of capital-intensive consumer goods industries, particularly, consumer durables. This difference may in part be due to sociological factors. It generally takes a long time for peasant societies to adjust to the regular rhythm and discipline of an industrial culture. Furthermore, recent tensions in Punjab have driven away prospective entrepreneurs and thus slowed down industrial investments.

Punjab's experience of agriculturally induced growth in a partly "open" economy represents a special case. This framework has many advantages, but may also impose some constraints. On the one hand, a region can benefit from specialization and comparative advantage because for a small region in a large country demand and supply constraints do not operate with the same rigor as in a closed economy. At the same time, a region operates within the national policy framework, which in this case brought large grants from the center that enabled Punjab to invest in irrigation and power infrastructure and to pioneer the green revolution. Punjab exported its entire food surplus to the rest of India at favorable prices. It also found a ready market throughout the country (and sometimes abroad) for many of its industrial products, while easily obtaining raw materials and manufactured goods from the rest of the country. It also

benefited from the policy of Indian Railways to equalize freight for bulk commodities.

On the other hand, Punjab has had to share the gains of development with the rest of the economy. Substantial funds from Punjab have evidently been invested in the rest of India since the state began producing an agricultural surplus. In addition, many agricultural laborers have migrated to Punjab from Bihar and other less developed states.

Another important aspect of the national policy of India is that it contributed to the development of Punjab's infrastructure. During the first two economic plans, planned investment in the state was financed largely by the national government. But the national system of licenses and controls discouraged many entrepreneurs from setting up agroprocessing industries there such as sugar mills and cotton textiles. National policy was also restrictive in the sense that it was inward looking and thus has been blamed in some quarters for India's failure to take advantage of the boom in international trade during the 1960s. That would certainly have kept Punjab from participating in the export boom.

The recent liberalization of capital imports has moved the country away from an emphasis on agriculture-based employment. Instead, the government is encouraging the production of various types of consumer durables with the use of highly capital-intensive technologies. Above all, it is important to recognize that in a large country such as India the regional economies are interdependent. As a result, Punjab had to share both prosperity and misfortune with its neighbors. The situation is quite different in the world economy, where countries with varying fortunes coexist.

References

Ahluwalia, M. S. 1978. "Rural Poverty and Agriculture Performance in India." *Journal of Development Studies* 14:298–323.

Bhagwati, J. N., and P. Desai. 1970. *India: Planning for Industrialization*. London: Oxford University Press.

Bhalla, G. S. 1989. *Administration and Implementation of Price Policy in India: A Case Study in Selected Country Studies on Implementation and Administration of Agricultural Price Policy in Asia*. Vol. 1. Rome: Food and Agriculture Organization.

Bhalla, G. S., and G. K. Chadha. 1983. *The Green Revolution and the Small Peasant: A Study of Income Distribution among Punjab Cultivators*. New Delhi: Concept.

Bhalla, G. S., and Amitab Kundu. 1984. "Small and Intermediate Towns in India's Regional Development." In *Small Cities and National Development*, ed. Om Prakash Mathur. Nagoya, Japan: United Nations Center for Regional Development.

Bhalla, G. S. et al. 1990. *Agricultural Growth and Structural Changes in the Punjab*

Economy: An Input-Output Analysis. Research Report 82. Washington, D.C.: International Food Policy Research Institute.

Bhalla, G. S., and D. S. Tyagi. 1989. *Pattern in Indian Agricultural Development: A District Level Study*. New Delhi: Institute for Studies in Industrial Development.

Bhalla, Sheila. 1987. "Trends in Employment in Indian Agriculture, Land and Asset Distribution." *Indian Journal of Agricultural Economics* (October–December).

Bell, C., and T. N. Srinivasan. 1989. "Interlinked Transactions in Rural Markets: An Empirical Study of Andhra Pradesh, Bihar, and Punjab." *Oxford Bulletin of Economics and Statistics* 51 (February).

Chadha, G. K. 1979. *Production Gains of New Agricultural Technology*. Chandigarh: Punjab University Press.

———. 1986. *The State and Rural Economic Transformation: The Case of Punjab, 1950–85*. New Delhi: Sage.

Dasgupta, S. 1989. "The Spirit of Success." *India Today*, October 31.

Darling, M. L. 1938. *The Punjab Peasant in Prosperity and Debt*. Cambridge: Oxford University Press (4th ed., 1947).

Dhesi, A. S., and B. S. Ghuman. 1983. "Productivity Trends and Factor Substitutability in Manufacturing Sector of Punjab Implications for Planning." *PSE Economic Analysis* 3 and 4:27–40.

Gulati, Ashok. 1989. "Input Subsidies in Indian Agriculture: A Statewise Analysis." *Economic and Political Weekly* 24:A57–A66.

Hazell, P. B. R., and A. Röell. 1983. *Rural Growth Linkages: Household Expenditure Patterns in Malaysia and Nigeria*. Research Report 41. Washington, D.C.: International Food Policy Research Institute.

Hirashima, Shigemochi. 1978. *The Structure of Disparity in Developing Agriculture*. Tokyo: Institute of Developing Economies.

Hyami, Y., and M. Kikuchi. 1980. "Changes in Community Institutions and Income Distribution in West and Java Village." Research Paper 50. Philippines: International Rice Research Institute, July:14–16.

India, Cabinet Secretariat. 1955. *NSS Report on Land Holdings: 8th Round 1953–54*. NSS Report 36. New Delhi.

———, Cabinet Secretariat. 1983. *Report on Land Holdings: 37th Round 1982*. NSS Report 331. New Delhi.

———, Ministry of Agriculture. 1976. *Report of National Commission on Agriculture*. New Delhi: Controller of Publication.

———, Ministry of Agriculture and Cooperation, Economic and Statistical Adviser (ESA). Various years. *Comprehensive Scheme for Studying Cost of Cultivation of Principal Crops in India*. New Delhi.

———, Ministry of Finance, Economic Advisory Council. 1990. *Towards Evolving an Employment-Oriented Strategy for Development in the 1990s: Interim Report*. New Delhi.

———, Ministry of Food and Agriculture, Directorate of Economics and Statistics. 1968. *Growth Rates in Agriculture, 1949/50 to 1964/65*. New Delhi.

———, Ministry of Home Affairs, Registrar General of India. 1951. *Census of India, 1951*. New Delhi.

———, Ministry of Home Affairs. 1991. *Census of India, 1991*. Paper 2. New Delhi.

———, Ministry of Industry, Small Industries Development Organization. 1989. *Annual Report, 1988/89*. New Delhi.

———, Ministry of Planning, Central Statistical Organization (CSO). Various years. *Annual Survey of Industries: Summary Results of Factory Sector*. New Delhi.

———, Ministry of Planning, CSO. Various years. *National Accounts Statistics*. Delhi.

———, Ministry of Planning, National Sample Survey Organization (NSSO). 1975. *Tables on Land Holdings at State Level: Punjab*. Vol. 1. New Delhi.

———, Ministry of Planning, NSSO. 1986. *Report on Land Holdings, 37th Round*. New Delhi.

———, Ministry of Planning, NSSO. 1989a. *Directory Manufacturing Establishments Survey, 1984–85*. New Delhi.

———, Ministry of Planning, NSSO. 1989b. *Tables with Notes on Survey of Unregistered Manufacturing: Non-directory Establishments and Own Account Enterprises*. 42d round. New Delhi.

———, Ministry of Planning, NSSO. 1990a. *Key Result of Employment and Unemployment: All India*. Part 1, NSS 43d round. Special Report 1. New Delhi.

———, Ministry of Planning, NSSO. 1990b. *Key Result of Consumer Expenditure*. NSS 44th round, 1988/89. Special Report 2. New Delhi.

———, Planning Commission. 1981. *Technical Note on the Sixth Plan of India*. New Delhi.

———, Planning Commission. 1986. *Technical Note on the Seventh Plan of India (1985–90)*. New Delhi.

Johar, R. S. 1983. "Decentralization of Industrial Development with Special Reference to Punjab." In *Studies in Punjab Economy*, ed. R. S. Johar and J. S. Khanna. Amritsar: Punjab School of Economics, Guru Nanak Dev University.

Johar, R. S., and J. S. Khanna, eds. 1983. *Studies in Punjab Economy*. Amritsar: Punjab School of Economics, Guru Nanak Dev University.

Jose, A. V. 1988. "Agricultural Wages in India." *Asian Employment Programmes Working Papers*. New Delhi: ARTEP, ILO.

Khanna, J. S. 1983. "Lagging Industrial Development in Punjab." In *Studies in Punjab Economy*, ed. R. S. Johar and J. S. Khanna. Amritsar: Punjab School of Economics, Guru Nanak Dev University.

Mathur, Om Prakash. 1982. *Small Cities and National Development*. Nagoya, Japan: United Nations, Center for Regional Development.

Mellor, John W. 1976. *The New Economics of Growth: A Strategy for India and the Developing World*. Ithaca, N.Y.: Cornell University Press.

Mellor, J. W., and M. S. Mudahar. 1974. "Modernizing Agriculture, Employment and Economic Growth: A Simulation Model." *Cornell Agricultural Economics Occasional Paper* 75. Ithaca, N.Y.

Mody, Ashok. 1981. "Resource Flows between Agriculture and Nonagriculture in India, 1950–70." *Economic and Political Weekly* 16:425–40.

Mundle, Sundipto. 1977. "Home Market, Capitalization in Agriculture and Drain of Agriculture Surplus." *Economic and Political Weekly* 12:A49–A54.

Nag, Moni. 1989. "Alternative Routes of Fertility and Mortality Decline: A Study of Kerala and Punjab." In *Population Transition in India*, ed. S. N. Singh et al. New Delhi: B. R. Publishing Corporation.

Punjab, 1901. *The Punjab Alienation Act, 1901*. Lahore.

———, Director of Industries. 1978. *Industrial Policy Statement, 1978*. Chandigarh.

———, Department of Planning. 1986. *Seventh Five-Year Plan, 1985–90: Annual Plan, 1985/86*. Chandigarh.

———, Department of Planning. 1990. *Draft Annual Plan, 1990/91*. Chandigarh.

———, Economic Adviser. 1990. *Economic Survey of Punjab, 1989/90*. Chandigarh.

———, Economic and Statistical Adviser. Various years. *The Statistical Abstract of Punjab*. Chandigarh.

———, Economic and Statistical Organization. 1984. *Report on Impact of Incentives to Set-Up Industrial Units in Centrally Backward Districts of the State*. Publication 435. Chandigarh.

Rangarajan, C. 1982. *Agricultural Growth and Industrial Performance in India*. Research Report 33. Washington, D.C.: International Food Policy Research Institute.

Reserve Bank of India (RBI). 1977. *All India Debt and Investment Survey 1971/72: Assets and Liabilities of Rural Households*. Bombay.

———. 1987. *All-India Debt and Investment Survey, 1981/82*. Bombay.

Shirokov, G. K. 1980. *Industrialization of India*. 1st Indian ed. New Delhi: People's Publishing House.

Singh, Harbans. 1991. *Agricultural Development and Rural Labour—A Case Study of Punjab and Haryana*. New Delhi: Concept.

Singh, Iqbal. 1985. "The Changing Tenancy Structure in a Developing Agricultural Region: A Case Study of Punjab." Ph.D. diss., Jawaharlal Nehru University, New Delhi.

Singh, Lakhwinder, 1990. "Industrial Development in Punjab: An Analysis of Growth of Productivity and Structure of Wages." Ph.D. diss., Punjab University, Patiala.

Singh, Pritam. 1983. *Emerging Pattern in Punjab Economy*. New Delhi: Sterling Publishing.