

## 8

# **Economics of Food and Agriculture**

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Viewed against the relative stagnation under foreign rule, the performance of Indian agriculture since Independence has been generally impressive. The introduction of new seed varieties in the mid-sixties has had a clearly positive response. Output of wheat has grown impressively at an annual compound rate of 6.5 percent per annum, and output of rice at a more modest growth rate of 2.5 percent per annum. A long-run overall growth rate of around 3.0 percent per annum has been steadily maintained;<sup>1</sup> even though numerous problems remain including the slow growth of output of coarse cereals, pulses and oilseeds; tendencies toward regional concentration; greater sensitivity of output to rainfall; and degradation of the environment. There has been a qualitative change in the pattern of growth as well: where the main source of output growth until the mid-sixties was expansion in area, since then it has been a rise in yield.<sup>2</sup> A number of factors have contributed including technological improvements in crops and production methods, especially investment in agriculture such as irrigation, better institutions, and policies providing price incentives.

The relative role of price and non-price policies in stimulating agricultural growth continues to be much debated. Such policies have complex repercussions on the allocation of resources, employment, income distribution and the incidence of poverty. These occur differently across commodities, classes and regions. Technology policies affect output expansion as well as employment and incomes of peasants and laborers. This chapter will review the country's past experience, and offer some reflections on future possibilities of reconciling price and technology policies with objectives of growth and equity. Three main subjects are planned to be covered: producer incentives; the public distribution system; and technology policy. Each of these has been discussed in the past but there does not seem to have been any synthetic overview of them all. This chapter aims to provide such a view. We begin with a brief reference to the recent trends in inter-sectoral terms of trade, and farm profitability and support prices for the two principal cereals, wheat and rice. We shall then assess the wide range of government restrictions on the internal and external trade with a view to establishing the extent to which these interventions may have damaged producer incentives; protected consumer interests; and restricted the expansion of aggregate output. This is followed by an analysis of the implications of price and non-price policy instruments for income distribution.<sup>3</sup>

### **TERMS OF TRADE, SUPPORT PRICES AND PROFITABILITY**

Trends in net barter terms of trade for agriculture have been extensively investigated. Long-term trends show considerable annual fluctuations so either deteriorating or improving terms of trade can be argued for by choice of initial and terminal years. Although there are methodological issues relating to measurement and aggregation, these do not seem to affect the broad pattern. Table 8.1 indicates that between 1970 and 1975 the shift in terms of trade was in favor of agriculture; since the mid-seventies, the net barter terms of trade have begun to move against agriculture.<sup>4</sup> In the case of wheat and rice at least, Government intervention in the form of effective support prices which covered full costs and allowed

TABLE 8.1  
Indices of Net Barter Terms of Trade between Agricultural  
and Nonagricultural Sectors during 1970-71 to 1983-84

	Thamarajakshi (1985) 1970-71=100.0	Tyagi (1986) 1969-72=100.0
1970-71	100.0	100.0
1971-72	94.6	97.5
1972-73	97.2	103.5
1973-74	105.3	109.6
1974-75	102.3	99.9
1975-76	92.4	84.6
1976-77	90.9	90.7
1977-78	95.1	90.8
1978-79	91.0	85.4
1979-80	87.3	88.6
1980-81	81.6	87.3
1981-82	81.8	82.9
1982-83	83.4	84.7
1983-84	88.3	86.1

Source: R.Thamarajakshi, 'Inter-relation between Agriculture and Industry,' paper presented at the 68th Annual Conference of the Indian Economic Association, 1985.

D.S. Tyagi, 'Domestic Agricultural Terms of Trade and its Effects on Supply and Demand of Agricultural Sector,' paper presented at the World Economic Congress, New Delhi, India, 1986.

for a return of at least 10 percent, has enabled farm profitability to be maintained despite a fall in net barter terms of trade. Farm productivity may well have been undermined in the absence of such interventions.

Since the mid-sixties, price support has emerged as an important form of intervention inducing farmers to adopt new technologies, although the levels of support prices fixed by the Government have remained controversial. Full average cost, including the imputed rental value of owned land and the imputed cost of family labor, has long become the criterion for setting of support prices. In 1980, the terms of reference of the Commission of Agricultural Costs and Prices were amended. Since then, not only full average cost but also changes in the net barter terms of trade between agricultural and nonagricultural sectors are explicitly taken into account while setting support prices.

Relevant data pertaining to costs and support prices for wheat and rice are given in Tables 8.2, 8.3 and 8.4. It can be seen the

TABLE 8.2  
Difference between the Cost of Production and the Procurement  
Price of Wheat, Various States, Districts, and Years

State/District/Crop	Period	Average proportion by which the procurement price exceeds the cost of production (%)
<b>Haryana</b>		
Karnal, Rohtak, and Jind Tehsil of Sangrur		
Unirrigated wheat	1961/62-1963/64	-23.3
Irrigated wheat		-28.6
<b>Bihar</b>		
South Monghyr		
Shahabad	1957/58-1959/60	-27.0
	1960/61-1962/63	-37.9
<b>Rajasthan</b>		
Pali		
	1962/63-1964/65	-29.2
<b>Punjab</b>		
Amritsar and Ferozepur		
Unirrigated wheat	1954/55-1956/57	-14.0
Irrigated wheat		-1.5
<b>Ferozepur</b>		
Deshi wheat		
Mexican wheat		+11.0
		+30.0
<b>Uttar Pradesh</b>		
Meerut and Muzaffarnagar		
Unirrigated wheat	1955/56-1956/57	-21.0
Irrigated wheat		+8.0
<b>Deoria</b>		
Unirrigated wheat		
Irrigated wheat	1966/67-1968/69	+39.6
		+21.0
<b>Muzaffarnagar</b>		
Unirrigated wheat		
Irrigated wheat	1966/67-1968/69	+41.0
		+66.0

## NOTE:

The cost data are from samples taken from districts selected in farm management studies as representative of states or regions. They are averages of the two or three crop years of the period. The sample, taken each year, usually covered 200 farms, with the number of farms in each size class proportional to the number of farms in that class in the district.

Source: Raj Krishna and G.S. Raychaudhuri, 'Some Aspects of Wheat Price Policy in India,' *Indian Economic Review*, October 1979.

TABLE 8.3  
Support Prices and Cost of Wheat Production

Year	Percent excess of support prices over cost of production		
	Punjab	Haryana	Uttar Pradesh
1967-68	51.9	—	—
1968-69	12.7	—	—
1969-70	21.2	—	—
1970-71	24.5	58.0	50.8
1971-72	27.3	54.1	15.5
1972-73	20.7	—	(- )2.0
1973-74	41.2	40.3	—
1974-75	28.8	22.6	—
1975-76	13.6	25.5	—
1976-77	8.5	(- )4.0	—
1977-78	4.7	8.2	—
1978-79	13.4	1.0	20.9
1979-80	13.7	16.1	4.2
1980-81	4.2	11.8	7.0
1981-82	19.6	7.8	2.0
1982-83	20.6	11.1	16.4
1983-84	10.6	7.8	2.0
1984-85	15.2	11.1	—
1985-86	25.3	28.9	—
1986-87	—	—	—

Source: Computed from APC Reports.

procurement price for wheat was less than average cost until the mid-sixties in most states, but farm harvest prices ruled higher than average costs and support prices, and Government procurement was negligible. From 1967-68 onwards, support prices were higher than average costs in every State. Support prices for rice were higher than average cost of production in Punjab, Bihar, Madhya Pradesh, and Orissa. For Andhra Pradesh and West Bengal, the opposite prevailed in some years. But it must be noted there are substantial annual variations in unit costs in a state like Andhra Pradesh. However, it is possible that, compared to wheat, support prices for rice may have been less favorable in some years especially for Andhra Pradesh, Tamil Nadu, and West Bengal.

Since 1967-68, there has been rapid growth in production of wheat and more modest growth of rice. Favorable support prices

TABLE 8.4  
Support Prices and Cost of Paddy/Rice Production

Year	Percent excess of support price over cost production					
	Andhra Pradesh	Bihar	Madhya Pradesh	Orissa	Punjab	West Bengal
1971-72	-10.3	—	—	—	—	-11.5
1972-73	-20.7	—	—	—	—	-15.0
1973-74	16.1	—	—	—	—	27.2
1974-75	-4.0	—	—	—	—	-2.0
1975-76	-6.5	—	—	—	—	-7.0
1976-77	-13.0	—	—	—	—	-13.2
1977-78	-11.5	—	44.0	—	—	8.6
1978-79	-3.8	—	—	29.3	23.7	-11.7
1979-80	2.0	—	—	—	—	—
1980-81	—	2.3	29.0	28.0	—	—
1981-82	8.5	25.5	19.0	8.5	12.4	—
1982-83	5.6	14.8	40.1	3.7	17.5	—
1983-84	-6.0	12.6	—	25.9	7.9	7.3

Source: Computed from APC Reports.

generally covering the average cost of production, and a positive growth in productivity, ensured farm profitability per hectare for these two principal crops. As a consequence of generally rising productivity levels, the acreage under wheat increased even when support prices were raised only marginally (1976-77, 1979-80, and 1981-82 to 1983-84), as farm profitability for wheat cultivation remained high relative to other crops. That farm profitability in the Punjab and other Green Revolution areas has been high is also evident from trends in income terms of trade for Punjab agriculture. Recent evidence suggests that although the net barter terms of trade moved against Punjab agriculture since the mid-seventies, the income terms of trade remained favorable to it throughout the period beginning 1974-75, mainly because of improvement in the volume of production and marketable surplus. An improvement of 15 percent in the capacity of the agricultural sector to purchase nonagricultural goods has been registered during the late seventies, as compared to the early seventies.<sup>5</sup>

In a large country like India, support prices fixed on a national basis have implications for inter-regional equity and inter-farm equity. While the support price policy is intended to affect all

farmers uniformly throughout the country, and is not designed in the interests of any particular region or class, these policies as they operate in practice inevitably benefit or hurt some regions and classes more than others. Announcement of a support price by the Government amounts to a declaration of an intention to intervene in the market as a buyer in the event the market price falls below the announced support price. But the extent and regional effects of intervention depend on prevailing market prices at different locations. It is interesting to compare the differences between market prices and support prices in the Green Revolution tracts with regions of slow agricultural growth. Complete data on costs and prices for recent years are available only for a few states. These are shown in Table 8.5. In Punjab and Haryana, there was no difference between market and support prices for both wheat and rice; in fact, support prices acted as market prices. Market prices declined and converged into support prices because the supply of wheat and rice had risen sharply relative to local demand. An important additional factor for the low demand in these states is the shift in the location of production. Thus in the predominantly wheat-consuming northwest, rice has emerged as an important crop the demand for which is located far away in the east and the south. Falling market prices may explain the agitations led by resourceful and politically articulate farmers in the Green Revolution tracts for still higher support prices.

On the other hand, in the eastern belt and arid zone, unit costs of wheat and rice are about the same as in advanced regions but market prices have differed. Here, due to slower growth of agricultural output relative to the demand, there has been a steady rise in market prices. Ruling market prices covered the cost of production and have also remained above the support prices in some states and for some crops. The growing concentration of procurement activity in the high productivity regions is largely due to a decline in market prices. These regions now account for nearly four-fifths of Government purchases. While all farmers and regions can, in principle, sell their output to the Government at support prices, given market conditions, in actual practice it has been farmers in high productivity regions who have tended to benefit from support prices. It is interesting that since the mid-sixties, the surplus-growing rich farmers in both the advanced and backward regions have been protected: the former by Government intervention, and the latter by the prevailing market situation.

TABLE 8.5  
*Unit Costs, Support Prices and Market Prices in High and Low Productivity Regions, Wheat and Rice*

State	Year	Yield per hectare (kg)	Unit cost (Rs./ Quintal)	Farm harvest price (Rs./ Quintal)	Support price (Rs./ Quintal)
<i>Wheat</i>					
High productivity regions					
Punjab	1983/84	29.5	137.5	141	152
	1984/85	33.5	136.3	—	157
	1985/86	35.6	129.3	—	162
Haryana	1983/84	25.6	140.9	—	152
	1984/85	26.5	141.3	—	157
	1985-86	31.2	125.6	—	162
Low productivity regions					
Madhya Pradesh	1981/82		132.7	201	142
	1982/83		—	178	151
	1983/84		140.2	173	152
<i>Paddy/Rice</i>					
High productivity regions					
Andhra Pradesh	1983/84	33.9	141	149	132
	1983/84	52.8	122	133	132
Low productivity regions					
Bihar	1983/84	18.7	133	175	132
	1983/84	27.0	123	173	132

Source: Computed from APC Reports.

Support prices affect producers differently depending upon the crop combinations grown by them. This is because there are sharp inter-crop differences in the effectiveness of support price policy. There are regions which grow predominantly coarse grains. Support prices, when compared with three-year average unit costs, have covered costs for most coarse grains. However, the support price policy did not benefit producers of coarse cereals, due to significant annual fluctuations in the average costs of production per quintal in turn due to large annual fluctuations in yields of coarse grains. In fact in 1987 and 1988, support prices have been substantially raised for these crops. Yet production of coarse grains has stagnated due to lack of a viable technology (except for sorghum). Coarse cereals indicate that high prices are not enough to augment production.

### PUBLIC DISTRIBUTION AND RESTRICTIONS ON INTERNAL TRADE

The intended purpose of restrictions on internal trade (such as movement restrictions and levies on producers and millers) has been to allow procurement of grains in times of scarcity and prevent inordinate rise in market prices. Grains then can be supplied through a public distribution system (PDS) to consumers in the scarcity regions. Policies relating to procurement internal restrictions are linked to the objective of running a PDS. These constituted a single policy package until the close of the sixties.

The PDS has changed over time. Prior to the Green Revolution, its purpose was to make available grains to all consumers in selected states of acute scarcity like Kerala. Since the seventies, the PDS has evolved as a way to provide household-level food security to economically vulnerable households in all states. The system began to be viewed more as a way to reduce poverty rather than as a supply-equalizing intervention.

As this happened, and the national food supply position improved with the Green Revolution, the instruments also changed. In the initial years, public procurement of grains was supplemented with restrictions on movement of foodgrains from surplus to deficit states. The adverse allocational implications of these restrictions are well known.<sup>6</sup> Even so, it has been argued that the system helped in mopping up surpluses in those periods of excessive scarcity, or the state of Kerala may have faced extreme hardship.<sup>7</sup> The unresolved question is whether the allocative inefficiency was worth paying for in maintaining supplies to Kerala. All movement restrictions have been withdrawn as the Green Revolution progressed and a graduated producer-levy was adopted in India during 1977-79. Producers above a minimum size of holding were obliged to sell a portion of their output to the Government at prices lower than the market prices. This policy has been defended by some on the ground that the loss to the producer for selling in the Government market would be compensated by a corresponding rise in the price in the residual free market, causing no disincentive because the weighted average price received by the producers for the combined sales to Government and free market sale would not be lower than the equilibrium price in the absence of intervention.

Evidence for paddy producers in Andhra Pradesh confirmed that farmers were indeed compensated for the lower procurement price through a rise in the open market price. Yet in actual practice, levies were evaded by large producers who always enjoyed political power and privilege in the villages. Because of such evasions by large farmers, the policy has had an unintended regressive effect on income distribution. Therefore, market intervention policies such as levies are to be discouraged, less perhaps due to producers disincentives resulting in efficiency losses, and more perhaps because it impairs equity where land is unequally distributed and larger farmers enjoy considerable political power.<sup>8</sup> Large farmers in India have consolidated their political power since then. After a short-lived experiment, all levies on producers have been withdrawn.

How has the PDS worked in the recent past? The per capita food consumption of the lowest three deciles continues to be very low in some regions. For example, in Bihar, the lowest three deciles of the population had a per capita food consumption of Rs. 15.58 in 1983-84 (at 1970-71 prices)—less than half of that of Punjab.<sup>9</sup> In spite of the Green Revolution, the existing distribution of income and wealth and regional concentration of production may be such as to leave large segments of population without the necessary purchasing power to buy staple foods in quantities necessary to meet minimum nutritional standards. In the medium run, the public distribution system has been considered an important instrument to ensure access to essential commodities such as grains for poor households, especially in rural areas where the poor have to contend with low incomes and weather-induced variability of incomes. In the long run, of course, the solution to this problem would be an improvement in the income and employment prospects of these households.

The public distribution system, by providing grains at lower than market price to the poorest households, can in principle play a significant role in maintaining, even improving, their nutritional levels, as is seen by the experience of Kerala and Gujarat.<sup>10</sup> The central role of the system has come to be recognized even more following the drought of 1987. State Governments were quick to expand food-for-work programs in the affected regions, and in those areas where a well-established and properly supervised public distribution system existed to carry grains to the work sites,

the effectiveness of the employment programs increased. More widespread rural coverage of the system to targeted populations would improve the outreach and effectiveness of income-generating work programs. Other advantages have been recently recognized, for example the new Rs. 2-a-kilo scheme in Andhra Pradesh ensured access to grain in the off-season at a low price, reducing the dependence of laborers on landlords for grain loans. As a consequence, the debt-peonage contractual arrangement of attached laborers in existence for over a century is on the decline there. Moreover, laborers are also taking advantage of a seasonal rise in the wage rate during the peak season and demanding cash wages. An effective public distribution system appears to generate other favorable side effects.

Recognizing the advantages, serious attempts to develop the system as an effective instrument for providing nutritional support to poor households have been proposed by the Government. However, like many other welfare interventions, PDS coverage and extension to rural areas depended upon the initiative and resources of State Governments. This is because the distribution of food supplies from the Central Government is not adequate to maintain the system all year. The distribution of Central supplies have not always corresponded with the needs of a state, and political factors influence such decisions. States then have to purchase additional grains within the state at market prices. The difference between the market price and the subsidized price at which grain is sold to poor consumers, plus the cost of operations constitute the subsidy expenditures of the states. Poor states could afford the costs of subsidies. In actual practice, besides Kerala, in Andhra Pradesh, Tamil Nadu, and Gujarat the public distribution coverage of rural areas is weak. Statewide distribution of total public distribution supplies is shown in Table 8.6. A rural/urban analysis of quantities distributed is unfortunately not available. Also, these data show only the Central Government's direct contribution to the states, but do not include the states' own procurement efforts (although the only major state effort is in Andhra Pradesh). States that account for a substantial share of all-India poverty population such as Bihar, Uttar Pradesh, Madhya Pradesh, and Rajasthan account for only a small share of the public distribution supplies. A substantial share of supplies has been going to metropolitan cities. For example, the Union Territories and Delhi

TABLE 8.6  
PDS Supplies and Population Below Poverty Line (thousand tons)

States	Distribution of PDS supplies to state government and direct sales to fair price shops			Percent distribution of PDS supplies to state government and direct sales to fair price shops			Percent distribution of PDS supplies to state government and direct sales to fair price shops			Percent distribution of population below poverty line
	Rice	Wheat	Total foodgrains	Rice	Wheat	Total foodgrains	Rice	Wheat	Total foodgrains	
Andhra Pradesh	991	103	1,094	16.70	3.23	11.99	7.6			
Assam	221	141	362	3.72	4.42	3.97	1.5			
Bihar	84	271	355	1.42	8.49	3.89	13.5			
Gujarat	92	18	110	1.55	0.56	1.21	3.2			
Haryana	9	53	68	0.15	1.66	0.75	0.8			
Himachal Pradesh	31	23	54	0.52	0.72	0.59	0.2			
Jammu and Kashmir	121	77	198	0.04	2.41	2.17	0.4			
Karnataka	232	74	306	3.91	2.32	3.36	5.1			
Kerala	1,332	146	1,468	22.28	4.58	16.09	2.6			
Madhya Pradesh	167	46	213	2.81	1.44	2.33	9.4			
Maharashtra	271	314	585	4.57	9.84	6.41	8.6			
Orissa	43	146	189	0.73	4.58	2.07	4.4			
Punjab	1	15	116	0.02	0.47	0.18	0.9			
Rajasthan	5	10	15	0.08	0.31	0.16	4.7			
Tamil Nadu	271	95	366	4.57	2.98	4.01	7.4			
Uttar Pradesh	168	138	306	2.81	4.33	3.35	19.6			
West Bengal	731	669	1,400	12.32	20.97	15.34	8.3			
Other states and union territories	1,174	852	2,026	19.78	26.70	22.20	1.6			
All India	5,934	3,191	9,125	100.00	100.00	100.00	100.0			

NOTE:

PDS data belong to the year 1984; distribution of people below poverty line is for the year 1983/84.

in particular have only 1.6 percent of the poverty population but received 22 percent of PDS supplies. That the regional distribution of PDS supplies seems generally unrelated to incidence of both rural and urban poverty is an obvious and appalling fact.

Public distribution also has been expensive, because of lack of serious effort to limit its access to only the most vulnerable groups. Not only have costs increased, but effectiveness has been reduced. For example, in Andhra Pradesh, where coverage is set wide, the system met only 34 percent of the minimum requirements of rice and 31 percent of oil for the poorest.<sup>11</sup> Recent reports suggest that the State Government could ensure a supply of only 1.7 million tons. If all the eligible most vulnerable households were to be supplied their full quota of grains, 2.5 million tons would be required. These households could not obtain even a small share of their quota of the ration. Better targeting through more limited access may ease the supply problem while serving the poor better.

As of 1987, the Central Government has been incurring a subsidy cost of Rs. 7,500 million per annum on public distribution. Yet vulnerable groups in many states do not have any access to supplies, while the poor and those not poor tend to have access in the urban areas. The role of public distribution in normal and in drought years as a cost-effective instrument of food supply can be realized only if its access is restricted to the most vulnerable and poorest households. Kerala introduced the system in rural and urban areas as early as 1964. Because Kerala is a food deficit state, the system also serves the non-poor, but their access is limited to 10 to 15 percent of requirements, whereas nearly two-thirds of the total grain requirements of the poor are met from the PDS. Eligibility is determined on the basis of multiple criteria, one of which is size of landholding. Kerala avoided an income criterion for targeting, which is practically difficult, and resorted to a 'social class criterion'. The evidence is that the distribution has favored lower income groups. The wide coverage led to the population developing a stake in the efficient functioning of the system and reducing leakages. Private trade was not abolished, and a dual market always enabled the rich to buy from the open market, which eased the pressure on resources for running the scheme. The Kerala Government has been able to recover the operating costs of the scheme from consumers by differential pricing: a higher price for the rich and a lower price for the poor. Substantial positive nutritional

impact has been noted owing to a well-managed and targeted public system in both Kerala and Gujarat. In the recent past in Gujarat, public coverage is reported to have been further restricted towards the lowest two deciles for whom the ration price was further reduced. In Tamil Nadu, of the 11.8 million ration cards issued 8.6 million belonged to poor families with income of less than Rs. 500 per month.<sup>12</sup> Kerala, Gujarat and Tamil Nadu represent relatively successful cases of effective targeting. The experience of these states suggests it is possible to restrict access of the public system to the poor; that it is probably easier to administer the scheme if the coverage is restricted when the scheme is introduced, rather than later; that innovative methods for self-targeting do exist; that restricting access of the scheme to the poor is absolutely essential since costs are directly related to coverage, as well as to the ration quota and the ration price; and that a well-managed public distribution system does result in an improvement in the nutritional status of vulnerable households. Notwithstanding the relative success achieved in some states towards protecting the rural poor via targeted public food distribution, there has been a pervasive resistance to establishing a stable, long-run targeted distribution for the poor in the states which have a substantial proportion of the nation's population under the poverty line. Rather than addressing the critical question of equity in distribution, the policy response in most of these states has been merely one of restricting private trade, which did not result in any short-run protection of poor consumers.

### FOREIGN TRADE AND EXCHANGE-RATE POLICIES

Domestic agricultural price policy previously outlined is most certainly conditioned by the overall trade policy pursued in India. The argument that industrial protection and overvalued exchange rates have had an adverse impact on the agricultural sector is now commonplace.<sup>13</sup> Whether or not a combination of trade, fiscal, and public investment policies have been biased against the agricultural sector is an empirical question. It has been addressed for a number of countries, though not for India.<sup>14</sup> To find out whether

agriculture in India has been discriminated against as compared to industry, we need to know the effective protection coefficients for agriculture and industry; relative direct income tax burden on the two sectors; and the relative public investment flows into the two sectors. No comprehensive analysis of this is presently available.<sup>15</sup> [See Table 8.7.]

Tables 8.8a and 8.8b give the most recent available estimates of nominal and effective protection coefficients for wheat and rice.<sup>16</sup> The following findings deserve notice. First, wheat and rice seem to have been 'disprotected', rice more so than wheat. Second, effective protection coefficients under the hypothesis of wheat and rice as importables are generally less than unity, and also less than the ratios under the alternative hypothesis of treating these commodities as exportables. In fact, effective protection coefficients under the exportable hypothesis are generally higher than unity for wheat but not for rice which suggests that rice has the potential of becoming an exportable item. Third, regional disaggregation suggests that Punjab and Haryana cultivators in the case of wheat, and Punjab and Andhra Pradesh farmers in the case of rice, are less disprotected than others. In other words, while there is considerable evidence of some discrimination against rice in general, the regional impact has been that the regions and farmers in the Green Revolution tracts by and large did not suffer from disincentives induced by trade restrictions. This tends to confirm that the regional distribution of subsidies has been such that although wheat and rice sectors as a whole were marginally disprotected, relatively affluent farmers in the high productivity areas have been relatively insulated from this bias. While such findings need serious qualification, an overall conclusion may be that agriculture as a whole has been close to neutral or only slightly disprotected by the Government trade policies directly affecting that sector; and that in any event these trade-related disincentives may have been minimal in the technologically advanced regions.<sup>17</sup>

In order to know whether agriculture has suffered from indirect discrimination via industrial protection and overvaluation of the exchange rate, we need to compare these findings with estimates of industrial protection. It is well known that industrial regulatory and incentive policies of the past several decades have given low weight to comparative advantage and specialization, and economic development has been biased in the direction of capital-intensive

TABLE 8.7  
Relative Share of the States in Input Subsidies

	Relative shares in input subsidies (average) for the period 1979-80 to 1981-82				Relative shares in 1978		Total input subsidies		Irrigation water charges as % of gross value added (in Rs. per hectare)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Central									
Madhya Pradesh	12.9	2.49	3.5	6.07	12.60	5.07	44.35	81.26	3.6 (W)
Rajasthan	11.8	4.46	2.7	6.16	10.14	7.26	53.00	142.93	2.7 (W)
Uttar Pradesh	12.0	20.67	20.8	18.04	14.08	22.24	119.25	120.49	3.8 (W)
East									
Assam	1.8	0.04	0.1	0.61	1.92	1.20	29.49	37.17	na
Bihar	7.0	3.03	3.8	4.53	6.59	7.79	59.00	78.75	1.91 (P)
Orissa	3.9	0.22	1.4	1.76	4.79	3.33	37.55	50.00	
West Bengal	3.1	0.65	4.6	2.75	4.56	3.24	72.49	55.06	3.7 (P)
North									
Haryana	2.4	6.64	4.2	4.53	3.20	6.26	143.13	115.99	0.77 (W)
Jammu and Kashmir	0.5	0.30	0.3	0.36	0.57	0.85	61.37	43.16	na
Punjab	2.7	10.76	12.2	8.75	3.84	11.58	234.18	103.34	1.1 (W)
South									
Andhra Pradesh	8.8	8.16	11.7	9.55	7.60	9.86	115.18	135.47	2.33 (P)
Karnataka	7.6	3.63	7.0	6.02	6.45	3.61	83.18	128.35	0.60 (P)
Kerala	1.0	0.77	1.9	1.23	1.67	0.74	113.77	135.38	na
Tamil Nadu	4.9	17.72	10.3	11.27	4.45	8.03	233.26	240.54	na
West									
Gujarat	6.8	10.08	6.9	8.03	6.02	4.07	116.25	259.42	na
Maharashtra	12.6	10.37	8.1	10.34	11.51	4.85	77.17	147.71	1.6 (P)

NOTE:

na = Not available.

(W) = Wheat.

(P) = Paddy.

Source: K. Subbarao, 'State Policies and Regional Disparity in Indian Agriculture,' *Development and Changes*, October 1985.



TABLE 8.8a  
Effective Subsidy Coefficients of Wheat and Rice  
(hypothesis 1: wheat and rice as importables)

States	Years					Average
	1980-81	1981-82	1982-83	1983-84	1984-85	
<i>Wheat</i>						
Haryana	1.01 (1.07)	1.03 (1.21)	1.20 (1.55)	1.21 (1.37)	0.99 (1.08)	1.09 (1.26)
Madhya Pradesh	0.72 (0.75)	0.73 (0.83)	0.84 (1.02)	0.84 (0.92)	0.73 (0.79)	0.77 (0.86)
Punjab	0.84 (0.88)	0.84 (1.02)	1.02 (1.36)	1.04 (1.18)	0.86 (0.94)	0.92 (1.08)
Uttar Pradesh	0.67 (0.71)	0.70 (0.80)	0.80 (1.00)	0.81 (0.90)	0.70 (0.75)	0.74 (0.83)
Weighted average	0.76 (0.80)	0.79 (0.92)	0.92 (1.17)	0.92 (1.03)	0.79 (0.85)	0.84 (0.95)
<i>Rice</i>						
Andhra Pradesh	0.47 (0.48)	0.71 (0.75)	0.87 (0.87)	0.86 (0.85)	0.97 (0.96)	0.78 (0.78)
Bihar	0.42 (0.43)	0.63 (0.67)	0.78 (0.78)	0.74 (0.74)	0.81 (0.79)	0.68 (0.68)
Madhya Pradesh	0.42 (0.43)	0.61 (0.64)	0.76 (0.75)	0.72 (0.72)	0.81 (0.80)	0.66 (0.67)
Orissa	0.44 (0.45)	0.65 (0.69)	0.80 (0.80)	0.74 (0.74)	0.83 (0.82)	0.69 (0.70)
Punjab	0.50 (0.51)	0.74 (0.79)	0.91 (0.91)	0.90 (0.90)	1.02 (0.99)	0.81 (0.82)
Uttar Pradesh	0.39 (0.40)	0.57 (0.60)	0.70 (0.69)	0.69 (0.69)	0.77 (0.75)	0.62 (0.63)
Weighted average	0.44 (0.45)	0.65 (0.69)	0.81 (0.81)	0.75 (0.75)	0.87 (0.85)	0.70 (0.71)

## NOTE:

ESCs without parentheses are of Indian FAQ wheat compared to US Hard Winter No. 2 and of Indian common rice compared to Thai white 5 percent broken, and within parentheses are of Indian FAQ wheat compared to US Soft Red Winter No. 1 and of Indian common rice compared to Thai cargo rice, second grade, respectively.

industries rather than labor or skill-intensive industries. As described in Chapter 5 of this volume, there is much analysis and empirical work to suggest substantial static and dynamic efficiency losses when regulatory barriers are pronounced and incentives distorted.

TABLE 8.8b  
Effective Subsidy Coefficients of Ludhiana Wheat and Rice  
(hypothesis 2: wheat and rice as exportables)

Crop	Years					Average
	1980-81	1981-82	1982-83	1983-84	1984-85	
<i>Wheat</i>						
1. Indian FAW wheat compared to US Hard Winter No. 2	1.40	1.37	1.59	1.74	1.64	1.55
2. Indian FAW wheat compared to US Soft Red Winter No. 1	1.55	1.86	2.59	2.23	1.96	2.04
<i>Rice</i>						
1. Indian common rice compared to Thai White 5 percent broken	0.54	0.80	1.02	1.03	1.22	0.92
2. Indian common rice compared to Thai cargo rice, second grade	0.55	0.85	1.00	0.98	1.18	0.91

Source: Ashok Gulati, 'Effective Protection in Indian Agriculture: Case of Wheat and Rice,' *Indian Journal of Agricultural Economics*, XLII, No. 4 (1987).

Estimates of effective protection coefficients for India's industrial sector are in almost all cases higher than those for agriculture. If it is true that for agriculture, trade-policy may have resulted in protection close to neutral, then industry has undoubtedly received more protection. Considering that the ongoing process of internal and external liberalization has been slow, a basic finding must be of significant protection of industry relative to agriculture.

However, we have also to look at effective resource transfer into and out of industry and agriculture in the form of Government investment spending, and revenues received from direct income taxation. There are serious difficulties in disentangling public investment flows into the two sectors, and there are hardly any satisfactory estimates of these. Available evidence suggests that the share of agriculture in direct Government expenditure increased

in the second half of the seventies and decreased in the eighties.<sup>18</sup> Also, it is well-known that agriculture has, by and large, remained effectively outside direct income taxation. Therefore it must be concluded that, while the framework of subsidies and trade policies have undoubtedly favored industry over agriculture, it is not presently known whether or not this bias against agriculture has been compensated or offset by public investment or taxation policies.

### PRICE AND SUPPLY RESPONSE

Much work has been devoted to the question of incentives and an appropriate policy environment because agricultural output responds to price incentives and technology.<sup>19</sup> These studies of supply response for various crops in different countries have shown that output of individual crops responds positively to price; that such responsiveness is higher in the long run than in a short run with fixed factors; and aggregate output of all crops can grow only if more resources are devoted to agriculture or if technology improves. Besides prices, technological change is a critical factor in the growth of aggregate farm output in the long run, as are investments in infrastructure, services, and human capital. The dominant role of these non-price factors in influencing aggregate agricultural output have been demonstrated in the case of India.<sup>20</sup> An appropriate price environment is necessary but not sufficient for rapid agricultural output growth: 'Successful innovation is thus an alternative, as well as a strong supplement, to an increase in the output-input price ratio as a means of raising the ratio of returns to cost and thereby stimulating growth. In this important sense, a good technology policy is equivalent to a good price policy.'<sup>21</sup>

This overview suggests a favorable price environment to be essential for growth. A positive long-run price elasticity of aggregate output indicates that agricultural potential exists in the country, which can be harnessed given appropriate incentives. But this does not mean a price-policy by itself can make a dent on the supply of agricultural output in the long run. For that emphasis must also be placed on technology, extension and infrastructure. Future policy

should therefore focus on how to raise public investment in these areas. Proliferation of a variety of subsidies—especially subsidized institutional credit for agriculture with extremely poor recovery rates—has been a main feature of recent policy. Given complementarity of public and private investments in agriculture, it is necessary to maintain public investments in agriculture. However, the prospects for maintaining, if not raising public investment in agriculture in the 1990s, depend critically on the ability of the state to control subsidies.<sup>22</sup> [See Tables 8.9a and 8.9b.]

TABLE 8.9a  
*Range of Previous Estimates of Long-run Aggregate Price Elasticity of Supply*

<i>Method</i>	<i>Estimate</i>
Cross-country	1.27-1.66
Time-series	
Developed	0.34-2.96
Developing	0.13-0.78
Cross-farm	-0.02-0.15
Inter-sector model	0.09

Source: A. Chibber, 'The Aggregate Supply Response in Agriculture: A Survey,' mimeo., World Bank, Washington, D.C., 1988.

### PRICING AND INCOME DISTRIBUTION

Pricing of a commodity is likely to have economy-wide implications if it is an important wage-good on which poor people spend a significant percent of their budget; or if it is a major source of farm income; or if it is internationally traded; or if it generates substantial revenue for the Government. In India, the first two reasons are relevant to the pricing of grains. The manner in which the effects of a price intervention percolate to other sectors of the economy and influence the incomes of participants may be simulated using computable general equilibrium models.<sup>23</sup>

One set of results are presented in Table 8.10, which show under alternative labor market assumptions, simulated effects of a 10 percent increase in agricultural output with flexible or fixed prices. With flexible prices, the landless gain the most from the resulting

TABLE 8.9b  
Estimates from Cross-country Aggregate Supply Function

Explanatory variable	(1)	Research included (2)	Research and irrigation included (3)
Price	1.66 (11.8)	1.27 (6.47)	0.97 (3.62)
Precipitation	0.303 (2.18)	0.290 (2.19)	0.369 (2.84)
Research/ha		0.120 (2.84)	0.215 (2.98)
D 1968-70	0.379 (2.64)	0.30 (2.15)	0.219 (1.49)
Irrigation/ha			0.84 (2.39)
R <sup>2</sup>	0.612	0.646	0.71

## NOTE:

Equations (1) and (2) are from Willis Peterson, 'International Farm Prices and the Social Cost of Cheap Food Policies,' *American Journal of Agricultural Economics*, February 1979.

Figures in brackets are t-values.

Functional form: Log linear.

Estimation method: Instrumental variables.

Data for 53 developed and less developed countries, at two time points, 1962-64 and 1968-70.

Data sources:

Research/ha: Boyce and Evenson (1975); Output, acreage, price, and irrigated area: FAO, Production Yearbook, FAO Agricultural Producer Prices 1961-70.

Source: A. Chibber, 'The Aggregate Supply Response in Agriculture: A Survey,' mimeo., World Bank, Washington, D.C., 1988.

increased employment opportunities and falling food prices. Small farmers also gain since they hire labor out and are net buyers of food. Large farmers benefit only if prices are fixed by either external demand or Government price guarantees and stockpiling. This may explain the demands of the large farmer lobbies for higher prices. It is not surprising that the landless benefit more from constant nominal wages than from wages that respond to supply and demand in the labor market. In the latter case, the falling product prices reduce the value of marginal productivity of their labor and hence their nominal wages. The opposite happens

TABLE 8.10  
Impact of Price/Output Changes on Rural Income Structure in India

Acres	Percent of HHS income <sup>a</sup>	Farm income <sup>a</sup>	Agri-cultural wage income <sup>a</sup>	Other income <sup>a</sup>	Total income <sup>a</sup>	10 percent output increase with flexible prices			10 percent output increase with fixed prices		
						Fixed nominal wages <sup>b</sup>	Full employment <sup>c</sup>	Fixed real wages <sup>b</sup>	Fixed nominal wages <sup>b</sup>	Full employment <sup>c</sup>	Fixed real wages <sup>b</sup>
Landless	12.3	38	354	229	622	39.5	25.8	18.1	7.4	15.5	7.4
0.1-3.8	34.6	246	101	155	502	15.9	11.1	8.5	8.1	10.9	8.1
3.8-6.9	37.0	669	0	161	829	-8.0	-7.8	-7.5	8.9	8.2	8.9
6.9+	16.1	1,807	0	216	2,024	-27.3	-24.4	-22.5	9.4	6.5	9.4
						Fixed nominal wages <sup>b</sup>	Full employment <sup>c</sup>	Fixed real wages <sup>b</sup>	Fixed nominal wages <sup>b</sup>	Full employment <sup>c</sup>	Fixed real wages <sup>b</sup>
						0	-18.5	-25.1	0	12.6	0
						Consumer price index	-23.7	-25.1	0	0	0
						Real wages	23.7	6.1	0	12.5	0

## NOTE:

a. Rupees.

b. Percentage change in real total income.

c. Percentage change in wages and prices.

Source: Alain de Janvry and K. Subbarao, *Agricultural Price Policy and Income Distribution in India* (Delhi: Oxford University Press, 1986).

when prices are fixed since nominal wages rise with productivity gains. Finally, the landless and small farmers benefit the least from the deflationary effects of output growth if fixed real wages prevail—the long-run situation observed in the low productivity regions.

The broad conclusion suggested by these simulations is that price supports may be, in the short run, highly regressive on the distribution of real income, creating sharp losses in the purchasing power of the rural and urban poor. Consequently, while aggregate agricultural output can be modestly increased in the short run by price incentives, reliance has to be placed on cost-reducing technological change for easing agricultural supply constraints in the long run. Indeed, with parameters relevant for the Indian economy, it can be shown that it is better to use productivity growth in agriculture—via investment in comprehensive water management, rural infrastructure, and extension—rather than to raise farm prices to achieve an equal level of output growth with the same budgetary expenditure since the former is more cost effective and, at the same time, has more progressive income distribution implications under a regime of flexible prices.<sup>24</sup>

Such findings reinforce the need for policy to be focussed on the role of non-price factors in output expansion. This does not mean prices do not matter, only that incentive prices have to be complemented with suitable cost-reducing technology policies.

### TECHNOLOGY POLICES AND EQUALITY

The achievements following the adoption of new seed varieties are often cited as reflecting the strengths of Indian agricultural research and extension network. While this is true, these successes cloud some of the basic weaknesses of the prevailing system of agricultural research and the policies pursued with regard to application of science and technology to agriculture.

Land-saving technologies which increase total annual crop output from all crops grown over a crop rotation (i.e., one year) via expansion of cropping intensities have greater potential for labor absorption and income generation than have technologies which raise yields of single crops (such as wheat) per unit of land.

The latter type of mono-crop technologies are generally capital-intensive (and also energy-intensive), and are better suited to capital-abundant and labor-scarce (or high wage) economies. Indeed these technologies evolved in land-scarce economies such as Japan in response to rising labor costs. Even land-abundant economies like the United States have found these single-crop yield-raising technologies suitable because of high labor costs. In brief, in the economies where yield-raising high yield variety technologies were evolved and used, labor absorption was not a major problem.

Even so, promotion of land-saving technology during the sixties was highly desirable, given the mounting population pressure and the food scarcity being experienced at that time. This technology no doubt raised yields of specific crops (wheat in particular) under irrigated conditions. While this approach was urgently needed and desirable, other approaches such as inter-cropping which underscores crop-livestock interaction and promotes greater labor absorption were ignored. Adoption of land-saving high yield variety technology, coupled with producer-oriented price policy, undoubtedly led to increases in production and the marketable surplus of wheat. There has also been accumulation of stocks of grains, and the objective of national food self-sufficiency was achieved. But this strategy has had only limited impact on expansion of labor use. For example, employment per hectare for wheat was around 50 days in Punjab and Haryana in the eighties, whereas it was 80 to 90 man-days in Uttar Pradesh and Bihar (Tables 8.11a and 8.11b). Similarly, in the case of labor-intensive crop like rice, employment per hectare in the northwest was 95 to 104 man-days, whereas in West Bengal and Orissa it ranged between 124 and 143 man-days. These data also show that employment generation per unit of output and cash outlay is lower in the northwest than it is in the eastern states. Thus, while the prevailing combination of technology and price support policies undoubtedly enabled the country to attain the national food self-sufficiency goal and also led to accumulation of stocks, this has been achieved at the cost of other equally important goals such as employment generation.

Diffusion of the high-yielding variety technology was more rapid in pockets of highly developed irrigated agriculture. Farmers in these areas are politically powerful and articulate, and have managed to extract from the state concessional institutional rents in the

TABLE 8.11a  
Employment of Labor Per Unit of Land, Capital and Output: Wheat (per hectare)

State	Period	Yield (quintals)	Cash outlay (Rs.)	Labor input (days)	Labor		Cash outlay
					Output	Labor	
Punjab	1971-74	24.60	1,061.79	55.34	2.27	19.54	
	1981-84	30.31 (23.21)	2,590.75 (144.00)	48.91 (-11.62)	2.19 (-3.53)	52.33 (167.81)	
Haryana	1971-74	19.89	920.29	55.73	2.81	16.31	
	1981-84	26.06 (31.02)	2,231.60 (142.49)	50.64 (-9.13)	1.94 (-30.96)	44.09 (170.32)	
Uttar Pradesh	1971-74	19.34	852.35	86.87	4.58	9.83	
	1981-84	22.01	2,171.37	78.75	3.60	27.54	
Bihar	1975-78	16.45	1,126.35	82.00	4.99	13.73	
	1981-83	22.32 (35.68)	1,394.00 (23.76)	90.04 (9.80)	4.03 (-19.24)	15.56 (13.33)	

## NOTE:

Figures in parentheses represent the percent change in the 1980s from the 1970s.  
Source: Data on cost of cultivation obtained from the Directorate of Economics and Statistics, Ministry of Agriculture and Rural Development, Government of India.

form of subsidized loans, initially for tractors, and later even for harvest combines which further limited the potential for labor absorption. In these regions, institutions have been more favorable than elsewhere in the country. Efforts at diffusion of this technology have not gone very far in the regions characterized by different factor endowments, infrastructure, and institutional structures.

Future agronomic research needs to focus on the development of high-yielding crop-mixes which facilitate inter-cropping so that total output from a crop rotation is maximized. On grounds of efficiency of resource use, increased scientific research needs to be devoted to regions characterized by more diverse agro-climatic conditions. Less energy-intensive and less capital-intensive options need to be explored. It has been argued that the technological imperative at the present stage of India's agricultural development is to generate options that help in raising and stabilizing productivity through well-adopted intercropping possibilities, offer multiple

TABLE 8.11b  
Employment of Labor Per Unit of Land, Capital and Output: Paddy (per hectare)

State	Period	Yield (quintals)	Cash outlay (Rs.)	Labor input (days)	Labor		Cash outlay
					Output	Labor	
Punjab	1981-84	53.89	3,784.99	104.46	1.94	36.26	
Haryana	1977-80	34.40	2,084.95	95.74	2.77	21.82	
Uttar Pradesh	1981-83	20.71 (0.29)	1,475.39 (44.75)	110.57 (-9.95)	5.33 (-10.27)	13.34 (61.30)	
		West Bengal	1971-74	18.30	587.81	122.33	6.13
Orissa	1981-83	18.88 (3.17)	1,818.86 (209.33)	143.69 (17.46)	7.74 (26.26)	12.70 (123.98)	
		1971-73	16.60	454.70	110.67	6.60	4.11
Orissa	1981-83	15.45 (-6.93)	1,242.79 (173.32)	124.40 (12.41)	8.08 (22.42)	10.02 (143.80)	

## NOTE:

Figures in parentheses represent the percent change in the 1980s from the 1970s.  
Source: Data on cost of cultivation obtained from the Directorate of Economics and Statistics, Ministry of Agriculture and Rural Development, Government of India.

and diversified resource use opportunities to match the spatial and temporal heterogeneity of India's arid lands, and are conducive to the protection of the fragile resource base.<sup>25</sup> Past agronomic research has not addressed these; indeed some policies have had an adverse effect in some regions. Extension of high yield varieties to some fragile zones adversely affected the complementarity between crop and livestock production and curtailed the range of multiple options previously available to the farmers.

The neglect of dryland crops research is now being corrected. Yet the approach continues to emphasize mono-crop yield-raising strategies; research and development and extension infrastructure is still heavily tilted in favor of two cereals—wheat and rice. One consequence of this lag in adjustment of technology policy to India's diverse land resources is the widening of the disparity in land productivity and employment between dry land and irrigated land since the mid-1960s. Correction of this disparity calls for not only additional resources for research but a change in the approaches to and directions of agronomic research.

### REFORMING RURAL INSTITUTIONS

With population growth and continual subdivision of holdings, the number of small and marginal holdings has increased very much and the proportion of area held by them to total sown area has also increased even though the average size of their holdings has become smaller. This trend is likely to continue owing to slow growth of non-farm employment opportunities so that the small farm sector is rapidly becoming a potential contributor to output as well as employment. Furthermore, recent evidence from the Agricultural Input Survey reveals that small farmers continue to have a larger proportion of gross cropped area under irrigation, which enables them to have higher cropping intensities. These continuing advantages are mainly attributable to the larger availability of labor per unit of land among the small farmers.

If India is to take advantage of the reservoir of labor available in the small farm sector, this sector needs to be strengthened both by technology and infrastructure policies that promote higher cropping intensities, and by institutional policies that enhance the resource base, such as by consolidation of holdings, redistribution of land via ceilings on land holdings, tenancy reform, and credit and marketing reforms. With the exceptions of Kerala, West Bengal, Assam, and Karnataka, progress on all these matters has been far from satisfactory.

It has been argued recently that the demographic, economic, and socio-political situation has so dramatically changed that there are no more benefits to be derived from such changes in agrarian institutions. There is now not enough surplus land for redistribution under the prevailing ceiling levels; the demographic pressures pushed up land values; and politically, the large producers have consolidated their position since the Green Revolution. Despite such political changes, at least some form of land reform—such as the experiments tried out in West Bengal—may be urgent. This is because the democratization of village-level institutions such as panchayats and cooperatives in favor of the poor has proven extremely difficult due to entrenched landed interests.

What are the prospects and possibilities? First, ceiling levels can be reduced to generate surplus land. The experience in Kerala, Karnataka, and West Bengal suggests that financing is not a major

problem. Moreover, while considering the finances involved, these need to be contrasted with the massive expenditures currently being incurred for the reduction of poverty which could be saved. In fact, on efficiency grounds, expenditure on land reform could be considered superior because ensuring access to the use of land assets has been found to raise poor households above poverty permanently, unlike other strategies to reduce poverty. For example, protecting tenants via registration led to considerable benefits in West Bengal by opening channels of institutional credit which had been closed. This hardly involved additional financial resources; instead, the existing administrative apparatus was able to effect major changes. Third, observers often raise the dangers of political chaos from such measures. The fact that three major states of India have achieved a reasonable measure of success in institutional innovations without any political chaos and through democratic means suggests these fears to be unfounded. Efforts are needed in every state to create an institutional atmosphere conducive to the emergence of healthy, participatory, democratic rural community structures. A certain measure of land restructuring may be essential for such an atmosphere to be created. Efforts at democratic decentralization were relatively more successful in states which took land reform seriously and had the beneficial impact of ensuring the outreach of rural administration to the poor.

### PEASANTS, PRICES AND POLITICS

In the opinion of the present writer, price and technology policies implemented in the country have generally been favorable to the agricultural sector. The observed over-protection of industry relative to agriculture was a major policy error even though its adverse effects on agriculture are not clear in view of the generally favorable treatment given to agriculture in the matters of taxation and public investment. This does not mean that there have been no mistakes of policy. If we were to go by a criterion that the Government should get most policies reasonably right, agricultural policy in India and its implementation, save in the area of institutional

restructuring, while not being perfect has been pragmatic; certainly more so than it is in many other parts of the world.

The gradual acquisition of political power by farmers since Independence has been a crucial development. This has also been the case in other countries with successful agricultural experience.<sup>26</sup> The relative success of agricultural growth, coupled with the relative failure in redistributive land reforms, has reinforced the political power of a small but viable spectrum of large farmers as is also evident from their increasing representation in the Lok Sabha. This has led to an implementation of policies such as input subsidies to stimulate growth and also policies like price-supports to retain the benefits of growth. Indian farmers are not rich by urban standards, and although many reaped a bonanza in the initial years of the Green Revolution due to the prevailing higher prices, there has been a gradual erosion of farm incomes, relative to non-farm incomes since the early seventies, even though farm profitability has been maintained by price supports and productivity increases. It must also be said that this fall in the relative price of food has been good for the country since it has benefited the poor perhaps more than any other policy has done. These benefits have been reaped less by rich urban-dwellers as claimed by the farm lobby (as they consume very little of staple foods) than by the rural poor, for whom the real price of wheat has been nearly *halved* during the period 1966-67 to 1986-87.

With possibilities for extension of cultivation exhausted, and land reform at a standstill, the key factors influencing future agricultural supply will be technology in the form of research, extension and diffusion of modern varieties, and investment in infrastructure, irrigation in particular. Aggregate supply response studies have consistently shown the importance of these to total output expansion. A falling relative price of basic staples in response to output growth, while retaining farm profitability, is essential for the alleviation of poverty in both rural and urban India. We have also outlined the desired reorientation of technology policies to facilitate output expansion with lower real costs, consistent with ecological goals. The process of agricultural diversification has to be speeded up by devoting greater research and development efforts to intercropping as well as to other allied sectors such as agro-forestry and animal husbandry. Extension of cost-reducing technology to the less developed regions would result in direct

benefits via greater employment and incomes, and indirect benefits via lower prices of staple foods. Such a reorientation of science and technology policies towards resource-poor farmers and regions not only improves future growth prospects, but also promotes equity, efficiency in resource use, and stability.

New dry farming technology and efforts at better water management and land consolidation in eastern India are likely to result in greater agricultural diversification in the near future. This may raise farm income on a sustainable basis. However, if the gains from such agricultural diversification are to be shared more equitably, public policy has to focus on ensuring access to extension, credit and inputs to the small and marginal farmers. With the help of administrative and institutional innovations, this is already happening in some states. Recent evidence suggests a substantial lowering of inter-regional and inter-farm bias in the access to institutional credit.<sup>27</sup> An overall strengthening of institutions via consolidation of holdings, registration of tenants, further improvement in systems of credit, marketing, and extension may bring about a more equitable distribution of the potential gains from agricultural diversification.