



INDIAN AGRICULTURE

trends, trade and policy reforms

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- **While a combination of key agricultural policies and institutions introduced in the 1960s has enabled India to achieve food self sufficiency, a major reform to those policies and institutions is required if Indian agriculture is to maintain its long term growth and sustainability.**
- **Overall productivity growth in India's agriculture sector has slowed considerably in the past decade. Expenditure on input subsidies is 'crowding out' much needed investment in the sector and maintenance of existing rural infrastructure and investment on agricultural research and extension.**
- **Increasing urbanisation and rising incomes in India are being reflected in changes in food consumption patterns. Growth in consumption of food grains has slowed, while consumption of meat and livestock products is increasing. The greatest growth is in the consumption of fruit and vegetable products.**

Introduction

India has experienced strong economic growth over the past decade, with gross domestic product growing at an average annual rate of 6 per cent since 2000. This growth has been fueled largely by growth in the services sector and to a lesser extent in manufacturing industries. However, the agriculture sector is still a major component of the economy, making up 23 per cent of national gross domestic product in 2002-03. More importantly, in a country where the population is now

in excess of one billion and growing at around 1.7 per cent a year, around 60 per cent of the workforce is employed in the agriculture sector.

As a consequence, how agriculture develops into the future will be crucial not only for Indian farmers and agribusinesses, but to all in India. To understand the future direction and potential for Indian agriculture it is important to understand how a range of policy measures have combined over many years to bring Indian agriculture to its current situation.

For example, achieving food security has been one of the main focuses of Indian agricultural policy since independence in 1947. Food security is a broadly used term. For Indian agricultural policy, food security can be considered at both the national and household levels. That is, India has pursued policies that target both national level food self sufficiency as well as the local availability of food (and indeed the availability of food at affordable prices).

The major policy measures currently in place in India were largely introduced in the mid-1960s and include farm input subsidies, minimum price support, public food distribution and trade protection. The cost of price support and food distribution is known collectively (in government budget terms) as the food subsidy. India's protectionist trade policies were already in place in the 1960s and continued virtually unchanged until the implementation of the World Trade Organisation (WTO) Uruguay Round Agreement on Agriculture that commenced in 1994.

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At a national level, India has largely achieved self sufficiency in agricultural production. Agriculture exports (excluding cotton and leather based goods) make up around 12 per cent of total export earnings. Conversely, agriculture based imports account for only 6 per cent of total imports. However, at the household level, it is arguable whether food security has been achieved; a quarter of the Indian population is estimated to be below the poverty line (Dev et al. 2004).

It has become increasingly apparent that forty years of national and household food security policies have cost India dearly, not only directly (the food subsidy has risen sharply in recent years and is estimated that it will increase to Rs 270 billion, or US\$5.9 billion, in 2004-05) but also indirectly through lower levels of investment in infrastructure and lower rates of productivity improvement.

Significant economic change is now under way in India. However, with such a high degree of reliance on the agriculture sector for employment, reforms to agriculture are likely to proceed slowly.

The dynamics of the relationship between the central and state governments is also likely to moderate the pace of change. The three states of Uttar Pradesh, Bihar and Maharashtra make up around a third of the country's population. With their strong agriculture base, the governments of Uttar Pradesh and Bihar strongly advocate antipoverty programs, rural subsidies and more rural development schemes. The government of Maharashtra, with its stronger industrial base, argues for more programs favoring infrastructure development, better telecommunication services and industrial development (Pai Panandiker 1997).

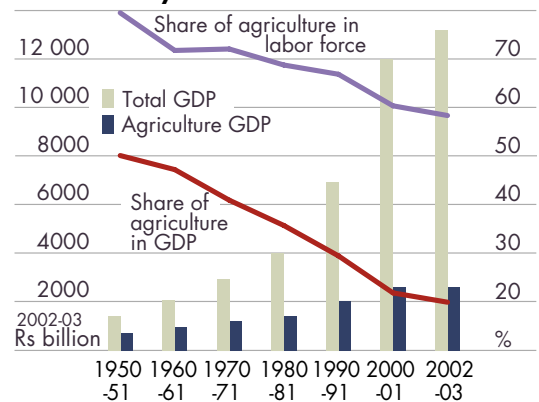
In this article the current state of Indian agriculture is examined, including a brief overview of key agricultural policies. Whether the suite of policies introduced almost forty years ago is still appropriate is a key question. In the following section, an outline of the current state of Indian agriculture is provided. This is followed by a discussion of recent trends in food consumption. Finally there is a detailed discussion of India's agricultural support programs and agricultural trade policies.

Agricultural development

India experiences a wide range of climates and soil conditions, and although around 40 per cent of the cropping area is now irrigated, the cropping sector is still heavily dependent on the annual monsoonal rains that fall between June and September.

India is a major world producer of many agricultural products. Of the major world traded products, it is the world's largest producer of milk and pulses, the second largest producer of sugar and rice, the third largest producer of cotton and wheat, the fifth largest producer of

A Contribution of agriculture to the Indian economy



eggs and the seventh largest producer of meat. India is also a major fruit and vegetable producer, including being the world's largest producer of bananas, mangoes, cauliflowers and peas and the second largest producer of papaya, onions and cabbages.

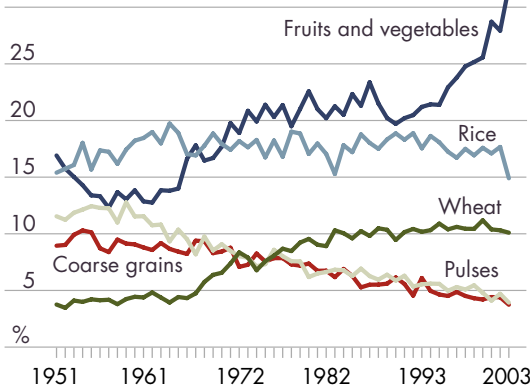
In the early 1950s, agriculture was the dominant sector of the Indian economy, contributing 50 per cent of gross domestic product and employing 80 per cent of the total labour force (figure A). As other sectors of the economy grew more rapidly than agriculture, especially in the last fifteen years, the contribution of agriculture to gross domestic product and employment has declined.

Value of agricultural production

There has been a steady increase in the real value of agricultural production over the past fifty years, reflecting the expansion in production from the sector over this period. Crop production dominates Indian agriculture, representing 70 per cent of the total value of agricultural output in 2002-03. Of the total value of crops, fruit and vegetables accounted for 32 per cent, rice 15 per cent and wheat 10 per cent (figure B).

Of the remaining crops, oilseeds accounted for 7 per cent, sugar cane 7 per cent, pulses and coarse grains 4 per cent each, and cotton 2 per cent of the total value of crop production.

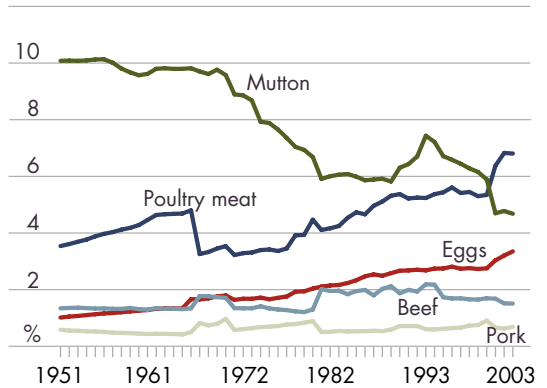
B Shares of value of output of crop industries, India



Between 1990-91 and 2002-03, the total value of fruit and vegetables output grew strongly from 20 per cent to 32 per cent of the total value of crop production. In comparison, the total value of food grain production (rice, wheat, coarse grains and pulses) declined from 39 per cent to 33 per cent of the total value of crops in the same period.

Livestock industries are growing in importance, with their share of the value of agricultural production increasing from 23 per cent in 1992-93 to 28 per cent in 2002-03. Dairy is by far the dominant livestock industry, accounting for 69 per cent of the total output value of livestock industries in 2002-03. Poultry meat and egg production has been growing rapidly in the

C Shares of value of output of livestock industries, India



past two decades and currently represents about 7 per cent and 3 per cent respectively of the total value of livestock production (figure C). Poultry meat also accounted for 50 per cent of the total value of meat production in 2002-03. Over the same time, there was only a limited increase in goat and sheep meat production.

Land ownership

A feature of the agriculture sector is the large number of landholdings and the small farm size (table 1). Historically, land ownership has been viewed as a means of overcoming poverty. The incidence of poverty is highly correlated with lack of access to land (Mearns 2000). The number of landholdings in India has increased over time and average holding size declined. The latest census data for 1995-96 indicate that the number of operational holdings increased by 8 per cent between 1990-91 and 1995-96 to 115.6 million, and average holding size decreased by 10 per cent to 1.41 hectares. Nearly 62 per cent of holdings were less than 1 hectare in area.

Many factors — historical, political, economic and demographic — have affected the distribution of landholdings in India. Under the Indian Constitution, land reform is the responsibility of individual states. While the Government of India can provide broad policy guidelines, the nature of land reform legislation, institutional support for land reform and the degree of success in implementing land reform varies considerably from state to state.

1 Distribution of land holdings in India

	1985-86		1990-91		1995-96	
	'000	%	'000	%	'000	%
Under 1 hectare	54 147	58	63 389	59	71 179	62
1-2 hectares	17 922	18	20 092	19	21 643	19
2-4 hectares	13 252	14	13 923	13	14 261	12
4-10 hectares	7 916	8	7 580	7	7 092	6
Over 10 hectares	1 918	2	1 654	2	1 404	1
Total	97 155	100	106 637	100	115 580	100
Average holding size (ha)	1.69		1.57		1.41	

Source: Government of India (2004).

After India achieved independence in 1947, individual states passed laws that imposed ceilings on the size of individual land holdings. Surplus land was then dispersed to landless persons in order to encourage increased farm production and as a means of overcoming rural unemployment and poverty. The land ceiling laws continue to operate.

Some states have moved to relax land ceiling laws in order to encourage private sector investment, particularly in the horticulture sector where economies can be achieved through large scale production and processing (Sharma 2001).

The small average size of holdings does limit the potential to improve farm productivity. From many of the existing small holdings there is little marketable production. As a result, farmers face difficulties in saving and investing to improve farm productivity, with the majority of Indian landholders also depending on some form of off-farm income to supplement their farm production. Increasing average farm size has the potential to increase the marketable surplus and contribute to improved land use efficiency through investing to improve on farm productivity.

In view of the importance of the agriculture sector to rural employment and as a means of alleviating poverty, any changes to land ownership legislation are likely to be gradual. Growth and improved employment opportunities in other sectors of the economy would encourage a reduction in the agricultural workforce and could assist farm consolidation.

Crop industries

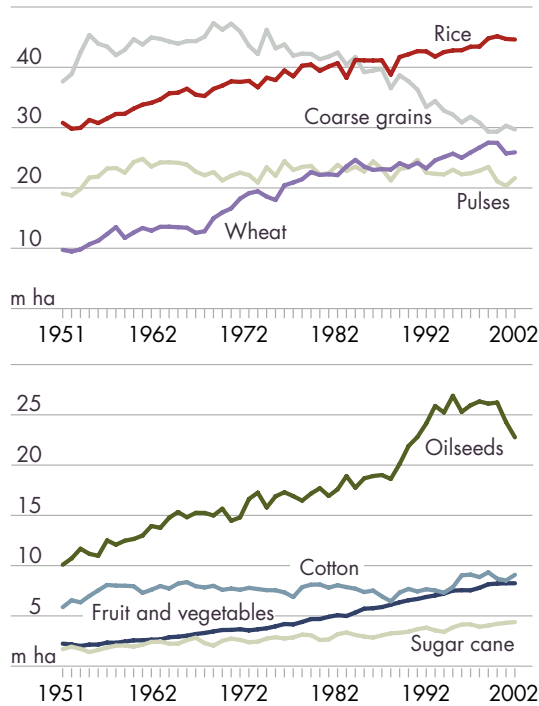
The area under cultivation peaked at around 190 million hectares in 1998-99, up 20 million hectares from 1980-81, but eased back by around 5 million hectares by 2000-01. Government policies introduced to increase food production have favored an expansion in the area sown to rice and wheat (figure D). The area sown to rice in 2001-02 was 44.6 million hectares (24 per cent of total cultivated area and up 5 million hectares since 1980-81) and for wheat 25.9 million hectares (14 per cent and an increase of 3.6 million hectares since 1980-81).

The increase in the area sown to rice and wheat has come about partly at the expense of coarse grains (down 12.1 million hectares since 1980-81 to 29.7 million hectares) and pulses (down 0.8 million hectares to 21.7 million hectares).

The three major oilseeds, groundnuts, rape/mustard and soybeans, make up around three-quarters of the area sown to oilseeds. The oilseeds crop area increased by 53 per cent between 1980-81 and 1996-97 to 26 million hectares, but has since declined by around 3 million hectares (figure D).

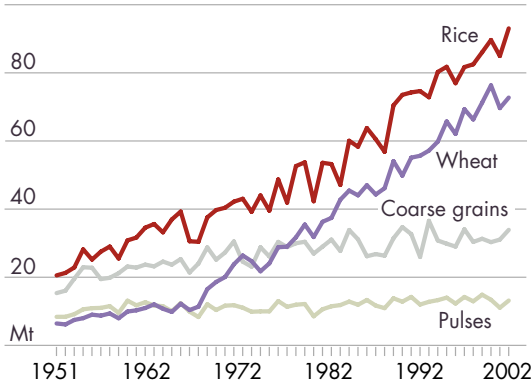
In 1986 the Government of India launched the 'technology mission on oilseeds' to increase the production of oilseeds in order to achieve self sufficiency. The subsequent increased research and investment into new varieties and technologies, restrictive trade policies that supported domestic oil prices, and the strong growth in

D Area under crops, India

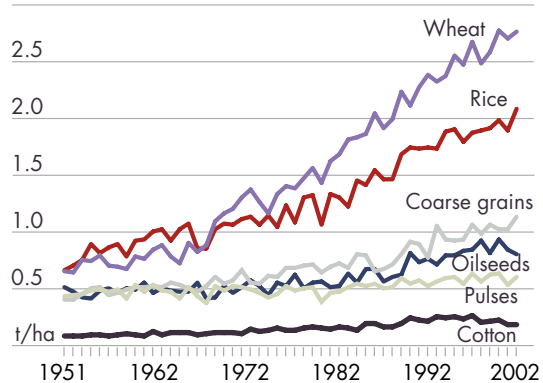


demand for vegetable oils fueled the increase in production of oilseeds (Gulati and Mullen 2003). However, the expansion in oilseeds production could not be sustained past the mid-1990s when the government eased restrictions on importing edible oils, leading to a fall in domestic oil prices.

E Changes in crop production, India



F Changes in crop yields, India



Recent trends in production of the major crops are given in figure E. Solid gains were made in crop yields particularly for rice and wheat following the introduction of the green revolution program in the mid-1960s (figure F). This program consisted of the import and distribution of high yielding rice and wheat varieties accompanied by schemes to encourage increased fertiliser use and an expansion in irrigation.

Average Indian crop yields are low by world standards, with the exception of wheat (table 2). However, as discussed below, with well over 80 per cent of the Indian wheat crop irrigated, it would be expected that Indian wheat yields would be relatively high.

There is little scope for an expansion of the area sown to crops and there is growing concern

2 Comparative crop yields, 2000-03

	India	Developing countries	World
	t/ha	t/ha	t/ha
Rice, paddy	2.9	3.8	3.9
Wheat	2.7	2.7	2.7
Sorghum	0.8	1.1	1.3
Pulses	0.6	0.7	0.8
Ground nuts	0.9	1.4	1.4
Soybeans	0.9	2.1	2.3
Cotton lint	0.2	0.5	0.6
Sugar cane	67	64	65

Source: FAO (2004).

3 Changes in crop yields

	Rice	Wheat	Pulses	Oilseeds
	%/yr	%/yr	%/yr	%/yr
1961–71	1.4	4.8	0.4	2.1
1971–81	1.7	2.2	-0.5	0.1
1981–91	3.4	3.1	1.5	3.0
1991–2001	1.6	1.7	0.7	0.1

Source: Derived from FAO (2004).

about soil degradation and inefficient use of water resources (Hazra 2001). Therefore, future increases in crop production will be largely dependent on yield increases and improvements in land and water management policies. As shown in table 3, there was a slowdown in the overall increase in both rice and wheat yields during the 1990s. Also the rate of increase in pulse and oilseeds yields slowed during the 1990s.

Further expansion in food processing is one area for growth in the agriculture sector. It would offer farmers in irrigation areas a chance to diversify into high value horticultural crops as well as providing employment opportunities in rural areas. The present state of rural roads and the unreliability of the electricity transmission network are hindrances to an expansion in food processing. In spite of being one of the world's largest producers of fruit and vegetables, less than 3 per cent of Indian production is processed. In comparison, in Thailand 30 per cent of fruit and vegetable production is processed and in Malaysia it is as high as 80 per cent (Dev 2004).

Role of irrigation

Irrigation plays an important part in agricultural production in India. As discussed in more detail later, governments have encouraged an expansion in irrigation in order to boost food production by subsidising the cost of irrigation water and rural electricity. However, there are growing problems associated with the overuse of ground water resources, overwatering and increased salinity in some areas (Hazra 2001). In addition, as India's urban population grows and manufac-

turing industries expand, competition for available water will increase. This will continue to increase pressure to improve the efficiency of irrigation water use.

By world standards, a relatively high proportion of India's crops are grown with the assistance of irrigation. In the three years to 2002, around 21 per cent of the world's irrigated areas were found in India, although only around 12 per cent of the world's arable land was in India (FAO 2004).

Around 75 million hectares, or 41 per cent of the area of cultivated crops, were estimated to have been irrigated in 2001-02, up from 50 million hectares in 1980-81 (29 per cent of the area of cultivated crops). Rice and wheat are the major irrigated crops, currently accounting for 32 per cent and 31 per cent of the total irrigated area respectively. Overall, 54 per cent of the area sown to rice is now irrigated while 88 per cent of wheat crops are irrigated.

In comparison, only 13 per cent and 23 per cent of the areas sown respectively to pulses and oilseeds are irrigated. Of the other crops, over 90 per cent of the sugar cane area, 42 per cent of the area under fruit and vegetables and a third of the cotton area are irrigated.

Livestock industries

India is the world's largest producer of milk; the third largest producer of eggs and sheep meat; the fifth largest producer of beef and buffalo meat; and the sixth largest producer of poultry meat. India's livestock sector is an integral part of agriculture and plays an important role in the livelihood of Indian farmers. Livestock are a source of animal protein, supplementary income, farm manure, fuel for cooking and are used for farm cultivation.

In the past two decades, the livestock industries' share of agricultural gross domestic product has been increasing steadily (currently estimated at 27 per cent) as livestock numbers have grown (table 4). Continued strong growth has also enabled the livestock sector to largely maintain its share of the total gross domestic product at around 5–6 per cent despite the rapid expansion of the Indian economy in the past decade.

4 Livestock numbers in India

	1971	1981	1991	2003
	million	million	million	million
Buffaloes	57	68	82	97
Cattle	178	189	204	226
Sheep and goats	107	137	164	184
Poultry	141	213	323	949
Pigs	7	10	13	19

Sources: Government of India (2004); FAO (2004).

Buffaloes, and to a lesser extent cattle, are still widely used for farm cultivation. India's buffalo and cattle populations represent around 57 per cent and 16 per cent of the world's buffalo and cattle populations respectively. India's goat and sheep flock make up around 10 per cent of the world sheep and goat numbers. Poultry and pigs numbers on the other hand are still small relative to world totals but poultry numbers have been growing strongly in the past decade.

Average annual growth rates in production of major livestock products, with the exception of poultry meat have slowed down in the past decade (figure G). This has been brought about largely by a deterioration of grazing land and low feed availability. Crop residues comprise the bulk of the feeding material for all livestock, with the exception of poultry, while supplementary concentrate feeding is restricted to lactating,

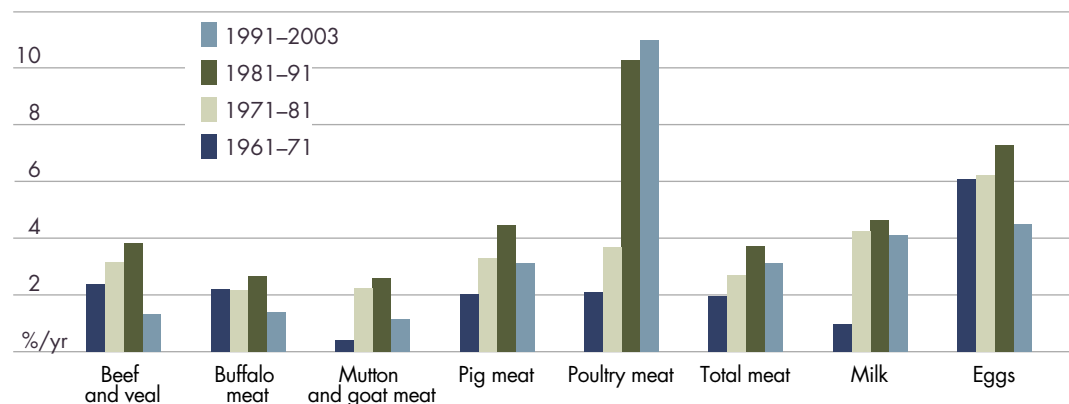
high yielding bovines and work animals (Birthal and Parthasarathy Rao 2004).

The rapid expansion of the poultry industry in the past two decades has been driven by the emergence of vertically integrated operations and the introduction of high yielding layers and broilers breeding stock (Landes, Persaud and Dyck 2004). The use of breeding stock with high feed conversion ratios has increased efficiency and productivity, enabling India to become one of the world's low cost producers of eggs and poultry meat (Desai 2004).

Availability of feed at reasonable prices appears to be the key factor that will determine the future growth path of the poultry industry. If the industry is able to sustain the strong growth rates achieved in the past two decades and address phytosanitary requirements, India could gradually establish a presence in world markets.

The milk industry is the largest industry by value in the Indian agricultural sector. The industry is dominated by small producers, with processing of milk undertaken by producer controlled dairy cooperatives. Milk production has grown at twice the rate of growth of population in the past three decades. Only recently India has become a small net exporter of dairy products. Milk yields in India are improving but are still less than half of the world average (table 5). With increased crossbreeding, improved feeding and control of infectious diseases, yields could increase significantly and lead to India

G Average annual growth in livestock product production, India



5 Comparative livestock yields, 2000–03

		India	Developing countries	World
Milk	kg/cow	941	1 004	2 169
Eggs	kg/hen	12	10	11
Average carcass weight				
Beef and veal	kg/hd	103	166	203
Mutton and lamb	kg/hd	12	15	16
Poultry	kg/hd	0.9	1.4	1.5

Source: FAO (2004).

becoming a much more important participant in world dairy product markets.

About 45 per cent of India's milk production is consumed in liquid form and a further 34 per cent as butter and ghee; the rest is processed into other milk products (Kadivrel 2004). In comparison less than 20 per cent of Australia's milk production is consumed in liquid form.

Trends in food consumption

Rapid economic growth, increased per person incomes together with the emergence of an expanding middle class, and increased urbanisation appear to be driving changes in food consumption patterns in India. Real income per person in India grew on average by over 4 per cent a year between 1992–93 and 2003–04 while

the number of people living in urban areas rose by 100 million since 1990 to over 300 million and is projected to reach 400 million by 2015.

As seen elsewhere around the world, the sustained increase in disposable incomes and urbanisation has led to a diversification in consumption patterns away from cereal dominated diets toward consuming more livestock based products, fruit and vegetables. Currently per person consumption of coarse grains and pulses are respectively about a third and half of their levels in the early 1960s while consumption of wheat and rice has increased only slightly in the past decade (table 6).

At the same time, consumption of milk, eggs, and fruit and vegetables has grown significantly, especially in the past two decades. Although total meat consumption per person has increased only slightly since the 1960s, most of that increase reflected increased poultry meat consumption, with poultry meat comprising 26 per cent of total meat consumed in India in 2002. Poultry meat consumption has grown strongly from less than half a kilogram per person in 1990 to 1.3 kilograms per person in 2002.

Agricultural policies and domestic support arrangements

The constitutional responsibilities and financial management arrangements between the central,

6 Per person consumption of food items in India

		1962	1972	1982	1992	2002	<i>Average growth rate</i>	
							1962–2002	1992–2002
Wheat	kg	29.6	44.1	45.1	56.9	58.4	2.4	0.3
Rice	kg	73.0	70.8	69.3	79.6	83.4	0.4	0.5
Coarse grains	kg	47.5	34.1	33.3	33.7	16.1	-1.7	-5.2
Pulses	kg	20.4	15.0	12.9	11.7	12.4	-1.0	0.6
Fruit	kg	25.9	24.8	25.7	30.0	37.7	1.1	2.5
Vegetables	kg	38.2	44.6	50.0	53.1	69.5	2.1	3.1
Poultry meat	kg	0.2	0.2	0.2	0.6	1.3	17.2	13.6
Other meat	kg	3.6	3.4	3.8	4.1	3.9	0.2	-0.7
Milk	kg	36.2	33.4	42.8	54.6	62.9	1.8	1.5
Eggs	no.	6.9	10.4	15.4	24.6	31.4	9.0	2.8

Source: FAO (2004).

state and territory governments in India have many similarities to the situation that exists in Australia. Although the management of the agriculture sector in India is constitutionally the responsibility of the states, the central government plays a key role in formulating policy and providing financial resources to the states to implement these policies and to manage their agricultural sectors.

The revenue raising powers of the central and state governments are set out in the constitution. States are able to collect revenue from land taxes, agricultural income tax, alcohol excise and sales taxes. Central government raises revenue through customs and excise duties and personal and corporation income taxes. The central government revenues are shared with the states according to proportions decided every five years by a specially established Finance Commission (Joshi and Little 1996).

After gaining independence in 1947 India pursued a policy of national self sufficiency, particularly in food grains, with a major underlying objective being to provide a fair standard of living for farmers and agricultural workers. The key instruments used by the Government of India and state governments to provide support to farmers (discussed in more detail below) are interlinked and are price support schemes, the provision of input subsidies and the establishment of the Food Corporation of India.

The role of the Food Corporation of India (see boxed section later) is to accumulate grain to counter fluctuations in output to ensure supplies for consumers. The grain is available for market intervention and for distribution through government sponsored food shops at subsidised rates through the targeted public distribution system.

The Government of India is also responsible for trade policy and is a major investor in marketing infrastructure. It also formulates policies on credit availability and marketing infrastructure that are implemented by state governments.

Minimum support price schemes

At present 23 crops are covered under the minimum price support program (paddy rice, wheat, five coarse grains, four pulses, eight

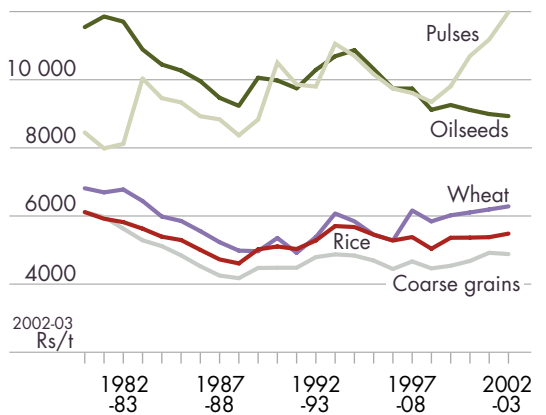
oilseeds, cotton, jute, tobacco and sugar cane). Together these crops account for about 80 per cent of the cropped area and about 75 per cent of the gross value of crop production. The Government of India announces the minimum support prices prior to sowing, acting on the advice of the Commission on Agricultural Costs and Prices.

In determining minimum support prices, the Commission on Agricultural Costs and Prices is to take into account costs of production as well as domestic and global market conditions. In estimating the costs of production, the commission uses the ‘full cost of production’ that includes the rental value of land, an imputed value of family labor and a return to management. Such a pricing system reduces the incentive for farmers to improve efficiency.

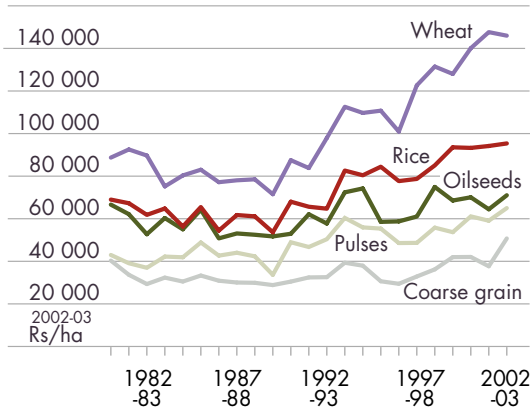
Increases in minimum support prices for some of the major crops are given in figure H. When account is taken of yield changes over time, rice and wheat producers have benefited more from increases in minimum support prices. In figure I, movements in average revenue per hectare for the various grains and oilseeds have been plotted under the assumption that all grains were sold at the minimum support price.

It is difficult to compare movements in domestic support prices (such as minimum support prices) and world prices for similar products because of possible quality differences and the different bases under which the prices are quoted. Figure J shows movements in the

H Minimum support prices, India

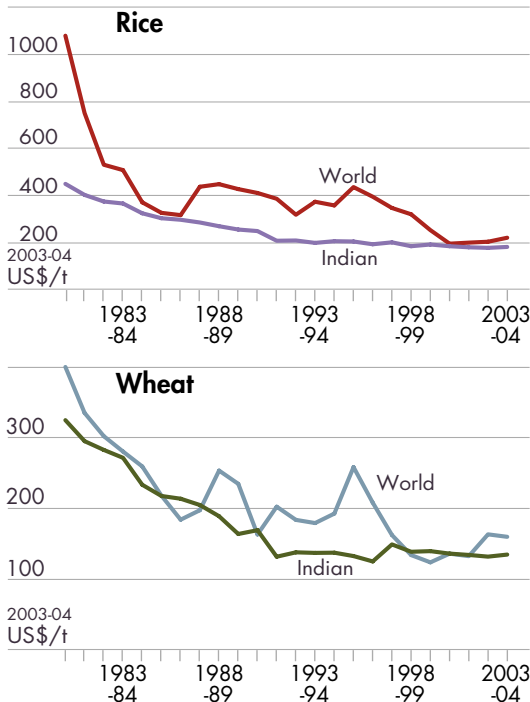


I Crop revenue, India



minimum support prices for rice (converted to a milled equivalent price) and wheat against movements in world indicator prices for these products (Thai white rice, fob Bangkok, and hard red winter wheat, fob US gulf ports respectively) measured in 2003-04 US dollars.

J Indian and world prices



In spite of increase in minimum support prices during the 1990s, Indian rice and wheat minimum support prices remained below world prices assisted by the steady devaluation of the Indian rupee against the US dollar over this period.

The Food Corporation of India in concert with state government agencies has established purchase centres in the major producing states, purchasing grain at the announced minimum support prices. In practice, trading is largely confined to rice and wheat. In deficit grain producing regions (see maps on the following page), purchase centres have not been established and any marketing of surplus grain is undertaken through private grain traders. It has been reported that farmers in some regions have received less than the minimum support price when they sell their surplus product to local grain traders (Government of India 2002).

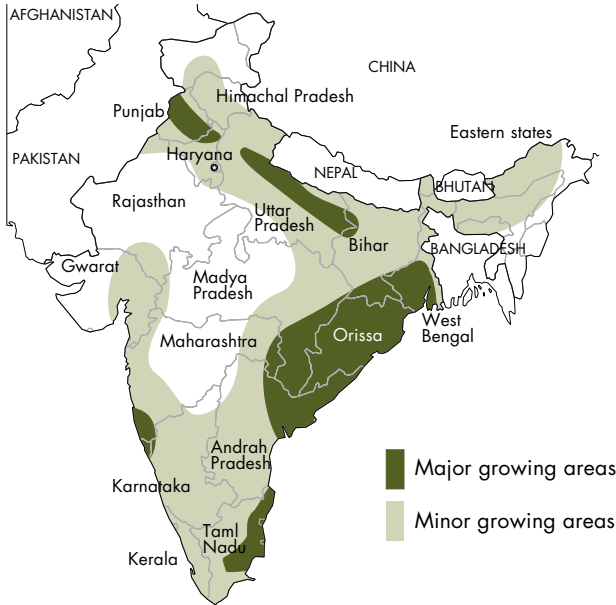
In addition to purchases from farmers, rice and sugar millers are required to deliver additional product to the Food Corporation of India. Each season, the Government of India announces procurement prices that the Food Corporation will pay millers for their rice and sugar deliveries. The percentage of product processed that millers are required to deliver the Food Corporation varies between states, ranging for rice from 10 per cent in low producing states to 75 per cent in some of the surplus producing states (Jha and Srinivasan 2004). On average, the Food Corporation of India procures roughly 15–20 per cent of India's wheat production and 12–15 per cent of rice production.

Input subsidies

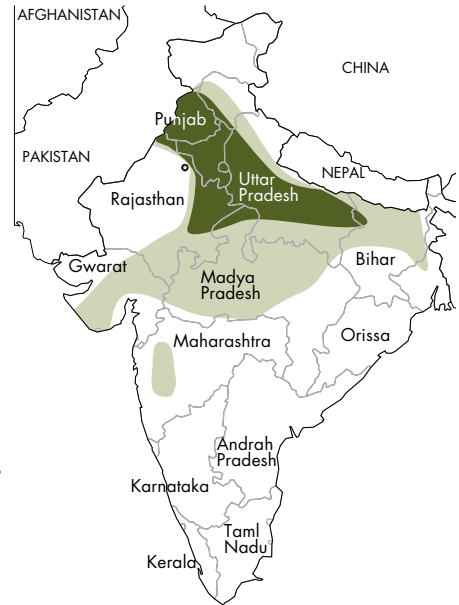
In order to encourage food grain production and to enable farmers to better exploit the high yielding characteristics of the new rice and wheat varieties introduced in the 1960s, subsidy schemes were introduced to reduce the costs for farmers of power, irrigation water and fertiliser. As a result, farmers' costs are reduced, which in turn influences calculations of minimum support prices.

As discussed in more detail below, a lower minimum support price enables grain to be sold to domestic consumers at prices below that would otherwise be the case (Gulati and Narayanan

Kharif rice



Winter wheat



2003). The provision of input subsidy support is in contrast to the support policies that frequently have been used in developed countries where prices paid to farmers for the products have been artificially maintained at well above what would have been possible under free trade.

For the nitrogenous fertiliser urea, domestic producers of urea are paid a cost based, plant specific price that is essentially derived on a cost plus formula. The government in turn fixes a low uniform national purchase price that farmers pay for the fertiliser. The difference between producer and consumer prices and the costs of operating a fertiliser freight equalisation scheme are met by a budget allocation (Ahluwalia 1999).

Such a pricing system provides little incentive for fertiliser manufacturers to reduce costs. Gulati and Narayanan (2003) have estimated that in the three years to 2000-01, the subsidy paid to urea manufacturers was equivalent to a subsidy of 44 per cent if farmers had to pay for the fertiliser based on the price of imported urea.

In the case of power and water, farmers are supplied both inputs at below cost. The manage-

ment and operation of the power and water subsidy schemes are the responsibility of individual state governments, with the subsidies available to farmers varying between states.

In some states, farmers are not charged for the electricity they use. As a result, electricity tariffs for industrial and commercial users are set at higher rates to at least partially cover the losses incurred in supplying electricity to the agriculture sector. Gulati and Narayanan (2003) estimated that in 2000-01 the average tariff on agricultural power consumption was only 9 per cent of the unit cost of power supply. The lack of revenue has also meant that state electricity boards face difficulties maintaining supply networks, are unable to provide reliable day to day services and increasingly depend on government support to maintain services.

Much of the expansion of irrigation in India has been based on exploiting ground water resources. The availability of free or low cost electricity has assisted farmers in accessing ground water. However, increasingly the ground water resource is being overused and wells have to be drilled deeper to maintain supplies.

In irrigation areas where water is supplied via channels, the lack of revenue received by authorities has meant that channel distribution networks have been inadequately maintained, leading to water wastage. In turn, this has meant that the area able to be irrigated is much less than was initially planned.

Gulati and Narayanan (2003) have estimated the extent of the subsidies for the period 1980-81 to 1999-2000. The cost of the subsidies rose over this period. By 1999-2000, input subsi-

dies on fertiliser, irrigation and power were estimated to account for 2.1 per cent of India's gross domestic product and as much as 8.8 per cent of the gross domestic product of the agricultural sector. In 1999-2000, the power subsidy made up 64 per cent of total subsidy payments followed by fertiliser (22 per cent) and irrigation (14 per cent).

As the costs of the subsidies have increased, governments have been under increasing pressure to reform these input subsidy schemes. The

Food Corporation of India

The Food Corporation of India was established in 1965 as a major part of the Indian Government's policy at the time to improve the national availability and distribution of basic foods. Its establishment followed the widespread famines of the early 1960s and the resultant high grain prices faced by consumers.

Holding stocks

As well as providing indirect price support for farmers through its grain procurement operations, the other major functions of the Food Corporation of India are to maintain a satisfactory level of operational stocks of food grains; to distribute food grains throughout the country under a public distribution system; and to maintain buffer stocks. These buffer stocks are to guard against natural disasters such as droughts or other crop failures so as to prevent large fluctuations in market prices and to ensure national food security.

The bulk of the food grain stocks held by the corporation are rice and wheat and, as shown in the first table, there has been a big rise in rice and wheat stocks in recent years. The steady increase in rice and wheat production and the limited growth in domestic rice and wheat consumption have contributed to the increase in grain stocks held by the Food Corporation.

Food Corporation buffer stock requirements vary through the season, peaking in the immediate post-harvest period and subsequently declining through the year, as shown in the second table. Stocks of nearly 50 million tonnes at the beginning of 2003 were well in excess of what the corporation regards as normal buffer stocks. Poorer harvests, increased exports and stronger domestic consump-

tion in 2003 led to stocks declining to more manageable levels by the beginning of 2004.

Grain stocks held by the Food Corporation of India and agencies As at 1 January

	Rice	Wheat	Coarse grains
	Mt	Mt	Mt
1993	9.48	3.47	0.18
1994	11.95	11.10	0.47
1995	17.42	12.88	—
1996	15.41	13.15	—
1997	12.94	7.08	—
1998	11.49	6.76	—
1999	11.68	12.70	—
2000	14.72	17.17	—
2001	20.70	25.04	0.03
2002	25.62	32.41	0.08
2003	19.37	28.83	—
2004	11.73	12.69	0.60

Source: Government of India (2004b).

Food Corporation of India buffer stock requirements, 2004

	January	April	July	October
	Mt	Mt	Mt	Mt
Rice	8.4	11.8	10.0	6.5
Wheat	8.4	4.0	14.3	11.6
Total	16.8	15.8	24.3	18.1

Source: Food Corporation of India (2004).

rising costs of the schemes are limiting the ability of governments to invest in rural infrastructure such as roads and expanding and upgrading irrigation facilities. More importantly these subsidies are putting the sustainability of the natural resource base at risk. The depletion of ground water, spreading salinisation and increasing land degradation indicate that agricultural production will decline if current practices continue.

The public distribution system

Food grain distribution in India is undertaken through a combination of private grain traders and the ‘public distribution system’. The origins of the system can be traced back to the late 1940s when India was a major importer of grains, and a ‘fair price shop’ system was established by the government to lower food prices by managing supplies of grain onto the market (Zhou, Liu and Perera 2001).

In contrast to the location of grain procurement centres, food price shops are located across the country. The shops, that are either owned privately or cooperatively, are licenced by state governments to distribute food items (wheat, rice, sugar and edible oils) to customers at fixed prices. All people are entitled to draw food supplies under a family entitlement scheme using a three tiered pricing structure (the ‘targeted public distribution system’) that was introduced in 1997. Families judged to be below the poverty line are able to purchase given amounts at lower prices. If these families wish to purchase additional grain, they have to pay the ‘above the poverty line’ price.

Products are available at below the ‘economic cost’ of supplying the product, with state governments being able to adjust the central government issue prices. The central issue prices for wheat in 2004 are as follows:

	Rs/t	US\$/t
Families above poverty line	6100	132
Families below poverty line	4150	90
‘Poorest of the poor’	2000	43
Minimum support price	6300	137

Even for families judged to be above the poverty line, wheat is available at less than the

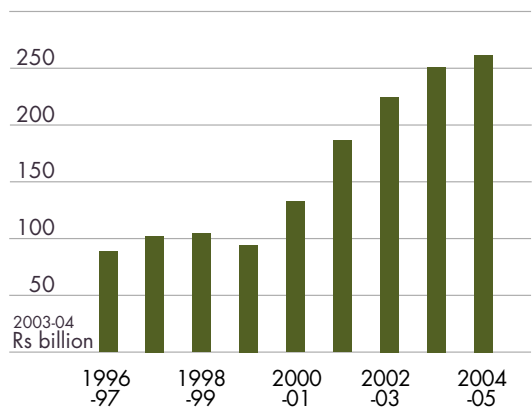
price that the Food Corporation of India paid farmers to acquire the grain. (The world wheat indicator price averaged US\$160 a tonne for the first ten months of 2004.) In addition to the cost of procuring the grain, the Food Corporation incurs costs throughout the year in handling, storing and transporting grain from surplus producing regions to deficit regions as well as losses incurred from grain wastage.

The cost of the price support and food distribution programs is known in Indian budget terms as the ‘food subsidy’, and there has been a sharp rise in the food subsidy in recent years (figure K). As the grain stockpiles have increased, the deficit between the cost of procuring grain and revenue from the sale of grain through food shops and the costs incurred in storing and handling the growing stockpile have increased.

A consequence of the increasing costs of Food Corporation operations is that opportunities for ongoing investment in maintaining and upgrading grain storage facilities, which could reduce wastage and losses from grain held in storage, are reduced.

The functions of the Food Corporation of India have remained largely unchanged since its inception, but a number of recent studies have indicated that a loosening of regulatory arrangements governing grain trading could improve the efficiency of the grain marketing system (for example, World Bank 1999; Jha and Srinivasan 2004).

K Food subsidy, India



Government controls on private grain trading activities have limited opportunities for private sector investment in grain storage and marketing infrastructure. Controls vary from state to state, but private traders have been required to obtain a permit to transport grain out of a state or region, particularly in times of shortages. In some states, private traders can be limited in the volume of stocks they hold, while credit controls implemented by the Reserve Bank of India have been another measure used to limit stockholding activities of grain traders.

Trade

For a country of its size, India is a very minor participant in world trade. At present, India accounts for less than 1 per cent of overall world exports and imports (Mattoo and Subramanian 2003). India has been a consistent but small net exporter of agricultural products since 1980 (figure L). The major devaluation of the Indian rupee that followed the balance of payment crisis in 1991 has had a much greater impact on the value of exports of clothing, textiles and other manufactured goods than on exports from the agriculture sector.

The share of agricultural exports in total Indian exports has been declining in recent years. In 2003-04, agricultural products made up around 10 per cent of the total value of Indian exports, compared with 18 per cent in 1990-91.

L Indian trade, by commodity group



No one agricultural product dominates export trade. In 2003-04, rice was the major agricultural commodity exported, making up 14 per cent of total agricultural based exports. Other important exports were oil meals (11 per cent), wheat (8 per cent), nuts and seeds (6 per cent), fruit and vegetables (6 per cent), meat and meat products (6 per cent), and spices (4 per cent).

Agricultural imports make up only a small component of imports, comprising around 6 per cent of the total value of imports in 2003-04 and 3 per cent in 1990-01. Agricultural imports are dominated by edible oils (55 per cent in 2003-04), with other important products being pulses (11 per cent), fruit and nuts (10 per cent) and cotton (7 per cent).

Movements in the net trade position for some of the major agricultural products over the ten years to 2002 are presented in figure M. At some stage in this period, India has been a net importer of wheat, sugar and cotton lint. While India is a major importer of vegetable oils, it is an exporter of oilmeal products, reflecting the limited livestock feeding industries in India, in contrast to the growing demand for edible oils. Meat exports consist largely of buffalo meat.

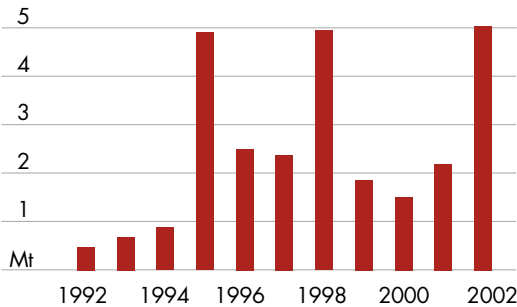
Trade policy

After achieving independence, India adopted a protectionist trade policy. In the case of agriculture, trade was subject to quantitative restrictions, canalisation (the exclusive importing of certain goods through designated government agencies), licences, quotas and high tariff rates. In 1990-91 India had one of the most restrictive import tariff structures among the developing countries of the world; an estimated 93 per cent of India's local production was being protected by some form of quantitative restriction on imports (Chadra 2001).

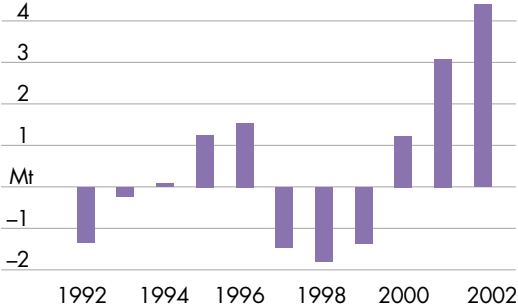
The balance of payments crisis in 1991 caused a reassessment of trade policy. The exchange rate was devalued, restrictions on capital inflows and foreign investment loosened, tariffs reduced and quantitative import restrictions eased. However, the reductions in tariffs were mainly focused on manufacturing industries; change for the agriculture sector was largely ignored. It was not

M Net trade in agricultural products, India

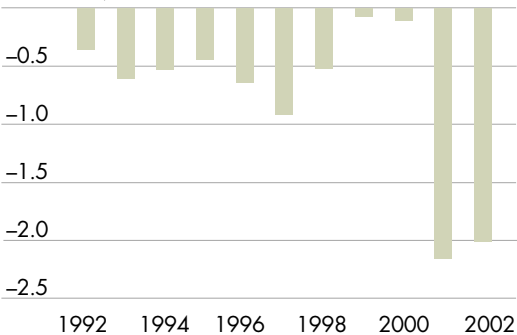
Rice



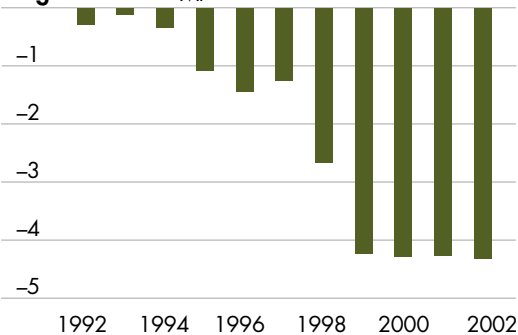
Wheat



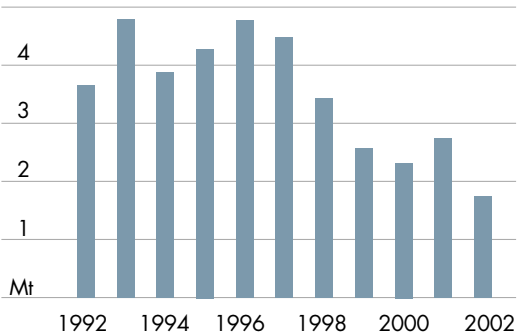
Pulses



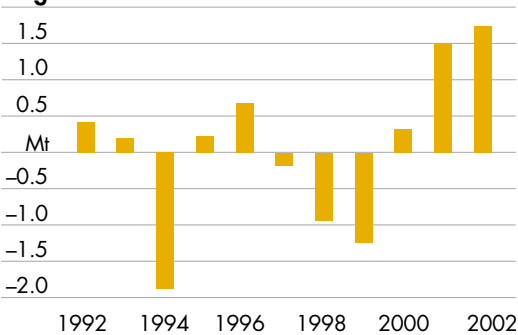
Vegetable oils



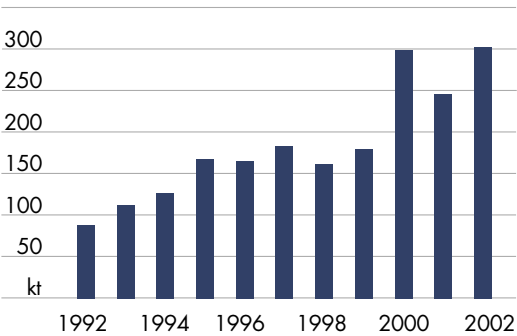
Oilmeal



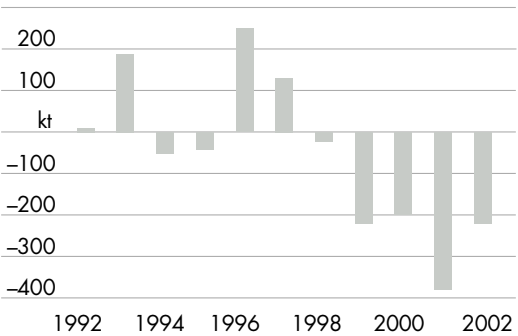
Sugar



Meat



Cotton lint



until the commencement of World Trade Organisation (WTO) in 1994 and the implementation of the Uruguay Round Agreement on Agriculture that major reforms were introduced to the trading policies then in place for the agriculture sector.

Import controls

In dealing with import measures in place in 1994, the major change involved removing all quantitative restrictions. The process of tariffication of nontariff barriers was a central element of the Uruguay Round Agreement on Agriculture. Under that agreement, nontariff measures were to be converted to tariff equivalents. Developing countries were given the flexibility to offer 'ceiling bindings' (agreed maximum tariffs) on products that were subject to previously unbound tariffs or subject to some form of qualitative restriction. These ceiling bindings could be higher than the September 1986 applied tariffs (the rate at which developing countries were required to limit tariffs under the General Agreement on Tariffs and Trade then in place.) In addition, there was no obligation to reduce these ceiling bindings during the implementation period (FAO 2003).

For products where tariffs had not been previously bound under earlier international trade agreements, the basic tariff structure initially adopted resulted in a range of tariffs of 100 per cent for commodities, 150 per cent for processed products and up to 300 per cent for some edible oils (WTO 2002a).

In previous agreements, India had bound some of its agricultural tariffs. These included rice and dairy products (1947), maize and millet (1951), sorghum (1962) and soybean and rapeseed oil (1979). However, imports of these products were usually subjected to some form of quantitative restrictions. With quantitative restrictions to be removed under the 1994 agreement, there was apprehension that imports could increase, particularly in the case of commodities for which the bound tariffs were set at zero per cent, such as the cereals. In order to raise these bound rates, India initiated negotiations with trading partners under Article XXVIII of GATT, which permitted developing countries 'to implement

programmes and policies of economic development designed to raise the general standard of living of their people, to take protective or other measures affecting imports', and renegotiated new bound rates. The bound rate for milled rice, for instance, was raised from zero per cent to 80 per cent.

In practice, the actual or applied tariff rates used are much lower than the bound rates. In 2002, the simple average bound tariff rate was estimated at 115.7 per cent for agricultural products, while the simple average applied tariff on agriculture was 37.5 per cent (WTO 2002a). Differences in the bound and applied tariff rates for some key agricultural products are given in table 6.

In addition the Government of India has had a propensity to change applied tariff rates in response to changing domestic market conditions. For example, the applied tariff rate on crude palm oil, the major agricultural product imported into India, had fallen to 16.5 per cent in mid-1998. In response to falling world prices and rising imports, it was then progressively increased to 75 per cent by March 2001. It was then reduced to 65 per cent in November following concerns raised by Malaysia about the discrepancy between the tariff on crude palm oil and the 45 per cent applied (and bound) rate on crude soybean oil (Dohlmán, Persaud and Landes 2003). The same kind of behavior has occurred with sugar, with applied tariffs being varied from year to year according to world market conditions and prices.

At the time of signing the agreement establishing the World Trade Organisation in 1994, India claimed temporary exemption from removing all quantitative restrictions for balance of payments reasons (under Article XVII:B). However, some member countries questioned the justification to continue these restrictions with the improvement in India's balance of payment situation in the mid-1990s. Subsequently, following a WTO dispute settlement case brought by the United States (WTO 1999), all quantitative restrictions were phased out by April 2001 and replaced by bound tariffs.

In the course of the renegotiations to raise zero bound rates, India granted some conces-

sions that led to the establishment of tariff rate quotas for five commodities (table 7). Tariff rate quotas allowed for some minimum market access or quota amount. Trade up to the quota limits is to take place at minimal or low tariff rates while a much higher rate applies to trade above that quota limit.

Prior to 1991, imports of agricultural products were largely undertaken by state trading enterprises. However, such restrictions have nearly all been removed except for cereals (Food Corporation of India) and copra and coconut oil (State Trading Corporation). Such arrangements are permissible under GATT Article XVII as long as the agencies that have been granted the monopolies are allowed to freely trade (Gulati and Mullen 2003). Given that high applied tariff rates have been in place for these products since 1996, imports have been minor.

Export controls

Prior to the balance of payments crisis of 1991, the Government of India managed exports of agricultural goods through a mixture of prohibitions, licences, quotas, marketing controls and minimum export prices in order to promote domestic food security (Gulati and Mullen 2003). The subsequent devaluation of the Indian rupee in the early 1990s made India more export competitive. Changes to export policies were introduced from 1994 onwards including reducing the number of products subject to state trading, abolishing minimum export prices and relaxing export quotas.

Quantitative export restrictions remain only for a small number of relatively minor products, with the exception of the continuation of the ban on exporting paddy rice. Export licences are still required for many products, including cereals, pulses, meat and milk. The existence of licences allows the Government of India to monitor trade flows in the advent of crop failures and a run-down in stocks. After a poor harvest in 2003, the Department of Food and Public Distribution has declined to issue new export licences since August 2003 for wheat and rice drawn from Food Corporation stocks. However, existing commitments under licences already issued have been met.

6 Bound and applied tariff rates

	Bound tariff		Current applied tariff
	Initial ^a	2004	
	%	%	%
Livestock			
Live animals and poultry	100	100	35
Meat bovine animal	140	100	35
Poultry (not cut in pieces, frozen)	140	35	35
Fully processed meat	140	150	100
Dairy products and eggs			
Milk and cream powder	0	60	60
Milk and cream	0	60	35
Buttermilk, yogurt etc.	100	150	35
Dairy spreads and cheese	100	40	35
Eggs	140	150	35
Grains, oilseeds and pulses			
Wheat and meslin	0	100	50
Rice (milled)	0	80	80
Wheat or meslin flour	40	150	35
Other cereal flour	100	150	35
Oilseeds (cotton, mustard, safflower)	100	100	35
Crude palm oil	165	300	100
Crude rape, colza or mustard oil	45	75	75
Sugar and lactose	75	150	60
Chickpeas, lentils	0	100	35
Fish and sea foods			
Fish, whole or in pieces	145	55	35
Crustaceans (prepared or preserved)	140	150	35
Fruits, nuts and beverages			
Natural honey	140	100	35
Fresh apples	55	50	50
Fresh pears and quinces	55	35	35
Fresh plums	30	25	35
Fresh grapes	30	40	30
Nuts	140	100	35
Fresh vegetables	140	100	35
Processed fruit and vegetables	140	100	35
Coffee and tea	140	150	70
Cocoa and processed cocoa	140	100	35
Beverages, spirits and vinegars	140	150	100
Fibres			
Cotton	40	100	35
Cotton yarn	40	20	20
Other textiles fibres	80	100	35
Wool	20	25	15
Coated textiles	40	25	25

^a Initial bound rate relates to 1996.

Sources: WTO (2002); India AGRO Industries (2004).

7 Tariff rate quotas for agricultural products

	Tariff			Imports 2002 t
	Quota t	Inquota %	Out of quota %	
Skimmed powder – fat content under 1.5 per cent	10 000	15	60	32
Skimmed powder – containing no added sweetener	10 000	15	60	17
Maize	450 000	15	60	90
Rape, colza, mustard oil, refined	150 000	45	75	750
Sunflower and safflower oil, crude	150 000	50	80	37 388

Source: WTO (2002a), UN COMTRADE database.

As part of its export and import policy covering the period 2002–09, the Government of India announced the establishment of agricultural export zones (AEZs) with the purpose of sourcing raw agricultural products and undertaking the processing and packaging of these products within the same geographic region leading to their export. The policy is centred around expanding India's fruit and vegetable and associated food processing industries, and involves the participation of both the central and state governments. The provision of specialist advice, easier availability of credit and the granting of tax exemptions are part of the incentives provided to assist in establishing these zones. The expansion of food processing industries would undoubtedly help reduce the wastage and spoilage of fruit and vegetables that occurs because of the seasonal nature of much of the production and the lack of storage facilities.

Though the Government of India does not give any direct export subsidies, it relies on a wide range of indirect subsidies, including duty and tax concessions, export finance, export insurance and guarantees, and export promotion and marketing assistance.

Following the buildup in rice and wheat stocks in the late 1990s, the Government of India decided to encourage the export of grain by offering assistance to exporters. Under the rules of the Uruguay Round Agreement on Agriculture, for a country such as India that did not use export subsidies in the base period, the introduction of new export subsidies is not permitted.

However, India has classified itself as a developing country and the government says that under URAA Article 9-4, developing countries are permitted to make payments to exporters for costs incurred for internal marketing and transport activities.

Concluding comments

India's agricultural support programs have evolved around the central policy aim of achieving food security and improving food availability. While the goal of achieving food security at a national level is being met at present, productivity in the agricultural sector is relatively low by world standards and the rate of productivity improvement has been slowing in recent years in some of the major agricultural industries.

The main planks of the program to encourage food production have been input subsidies on the costs of fertiliser, irrigation water and power and a price support scheme for 23 major agricultural commodities. Restrictive trade policies also largely protected domestic industries for the first 45 years after India gained independence in 1947. To meet consumer needs, a public distribution scheme was established to supply a proportion of cereals, edible oils and sugar required by consumers at prices below market prices.

The various programs are interlinked. Now there is increasing pressure for changes to India's agricultural support programs. Introducing changes to current support policies will

be difficult because of the interrelated nature of current support measures. In a time of coalition governments, at both the central and state level, it is politically challenging to introduce changes that entail short run adjustment costs (Landes and Gulati 2003).

The first tentative changes to support arrangements were introduced following India's implementation of the Uruguay Round Agreement on Agriculture, which required India to revise its trade support policies. As a result, the strict controls on trade in agricultural products were loosened, with the virtual removal of all quantitative restrictions. The replacement of these control measures with relatively high tariffs has so far had little impact on trade or opened the domestic market up to competition.

Changes elsewhere in the economy will also continue to put pressure for change in the agriculture sector. Increasing urbanisation and rising incomes are being reflected in change in food consumption patterns. Growth in food grain use has slowed, consumption of meat and livestock products is increasing while the greatest growth is in the consumption of fruit and vegetable products.

National food grain production has expanded with India now being among the top three world rice exporters as well as being a small but somewhat intermittent wheat exporter. It is not clear how much of this increased production is based on the availability of subsidised inputs of fertiliser, power and water. What is clear, however, is that these input subsidies, which largely benefit farmers in irrigated areas, are increasingly becoming environmentally and financially unsustainable.

The natural resource base is being affected with ground water tables falling and soil salinisation increasing. Excessive use of fertilisers, particularly urea, is also causing soil damage. More sustainable practices will be necessary if the long term viability of agriculture in irrigated areas is to be maintained.

The growing cost and the effectiveness of input subsidies are also being questioned. Overall productivity growth in the agriculture sector has slowed considerably in the past decade. Expenditure on subsidies is 'crowding

out' much needed investment and maintenance of rural infrastructure such as roads and irrigation facilities and investment on agricultural research and extension.

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