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## GLOBALISATION AND THE INDIAN AGRICULTURE SECTOR

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### Introduction

Following the introduction of economic reforms in early 1990s, the 1980s, the Indian economy has registered a significant growth. Liberalization of the Indian economy has resulted in massive inflow of foreign investment which has resulted in a significant increase in the country's foreign exchange reserves. Economic prosperity has also contributed to enhancement in India's stature as a major global power. The growth of the Indian economy has also led to a significant increase in research on various aspects of the Indian economy. A large number of studies have examined the impact of globalization on the Indian economy. Some have argued that the rewards of economic growth in India are not equally shared.<sup>1</sup> Klein and Palanivel (2003) have argued that if the Indian economy grows at an annual rate of 10% then the agricultural sector must grow by 4-5% on a sustainable basis. A closer examination of the Indian economy reveals that while the Indian manufacturing and services sectors have registered strong growth in recent years, the Indian agricultural sector has continued to perform poorly. In 2002-03 the agricultural sector contracted by 7.3%, whereas the manufacturing sector grew by 6.8% and transport & communication sector grew by 14.1%. In 2007-08, the agriculture sector growth rate was 2.6% whereas the manufacturing sector grew by 9.4% (see Table 1). In 2010-11, the growth rates of agriculture and manufacturing sectors respectively are estimated to be 5.4% and 8.1% (Economic Survey, 2010-11).

Within the agricultural sector, cereal and main crop productivity remains low as compared to not only all industrialized but also a number of developing economies. Table 2 provides a comparison of India with China and the US.<sup>2</sup>

While the Indian yield is below many countries, there has been a substantial improvement in both the yield and agricultural productivity over time. For example, the cereal yield increased from 1324kg per hectare averaged over 1979-81 to 2321kg per hectare over 1999-01. Janaiah, Achoth and Bantilan (2005) have argued that green revolution

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1 Ravallion and Datt (1999) and Datt and Ravallion (2002) have considered income distributional issues. Goyal (2006), Drèze and Sen (2002) and Goldin and Reinert (2006) have considered the impact of globalization on the Indian economy. Sachs, Bajpai and Ramiah (2002) have considered economic growth in different regions of India. Sridharan (2004) focuses on the Indian middle class.

2 Also see Mahadevan (2003).

Table1: Rate of Growth of GDP (per cent). Source: Economic Survey (2007-08).

Year	Agriculture	Manufacturing	Transport & Communication	Finance, Real Estate & Housing	GDP
2002-03	-7.2	6.8	14.1	8.0	3.8
2003-04	10	6.6	15.3	5.6	8.5
2004-05	0.0	8.7	15.6	8.7	7.5
2005-06	5.9	9.0	14.6	11.4	9.4
2006-07	3.8	12.0	16.6	13.9	9.6
2007-08	2.6	9.4	15.8	11.7	8.7

Table 2: Comparative Yield of Important Crops in 2004 (Kg per Hectare).  
Source: Indian Horticulture Database (2006).

	Wheat	Paddy	Total Cereals
India	27070	30496	24341
China	42029	62638	51416
US	29029	77808	68494

Table 3: Rank of India – Production of Various Fruits and Vegetables (2004).  
Source: Indian Horticulture Database (2006).

Crop	Rank	Crop	Rank
Apple	9	Brinjal	2
Banana	1	Cabbage	2
Mango	1	Cauliflower	2
Papaya	1	Peas	1
Pine apple	6	Onion	2
Grapes	12	Potato	3
<b>Total fruits</b>	<b>2</b>	<b>Total vegetables</b>	<b>2</b>

Table 4: Rank of India in Area, Production and Exports of Plantation Crops (2004).  
Source: Indian Horticulture Database (2006).

Crops	Rank			
	Area	Production	Productivity	Export
Tea	2	1	2	4
Coffee	7	6	3	6

technologies have contributed to significant growth in cereal production in India. The real agricultural value-added per worker also increased from US\$269 to US\$402 over the same period (WDI, 2008). As far as the horticulture and plantation sectors are concerned, India has a better global position. As is clear from Tables 3 and 4, India ranks at number one in the world in the production of banana, mango, papaya, peas and tea.

In addition, India's productivity ranking in plantation crops, such tea and coffee is also very high. However, given the land constraints, the scope for expanding the acreage under such plantation crops is limited (Economic Survey, 2007-08). It has been argued that in overall terms, due to rising GDP per capita, demand for vegetables and fruit in India is expected to continue to rise (Mittal, 2008).

Although the agricultural productivity has increased in both India and China during the 1980s, China's productivity growth was considerably more rapid during 1978-84 which can be attributed to decentralization of production in 1978. In addition, improvements to infrastructure such as roads in rural areas and power supply resulted in improvements to cold storage facilities. Improvements in marketing also led to the growth of the rural non-farm sector in China. Given the success of China, it can be argued that India needs to do much more to improve its rural infrastructure, especially if India wishes to make a significant dent in rural poverty (Kowalski, 2008). The trend so far is not encouraging. The share of agricultural sector's real gross capital formation declined from 10.2% in 2001-02 to 5.8% in 2006-07 (Economic Survey 2007-08). The other lesson from the Chinese experience is that India needs to invest much more in agricultural R&D. Despite high social returns, India's R&D investment in agriculture is low by international standards (Cheng and Orden, 2005). As will become clearer in this paper, Indian government has increased its subsidies to agriculture, while reducing its share of investment in agriculture. As far as the subsidies are concerned, it is interesting to note that India has increased subsidies for urea but not for other types of fertilizers that could improve soil balance and hence the land productivity. China's internal agricultural markets are much more integrated than those of India. As far as India is concerned, each state tries to protect its farmers from competition from other states' farmers (Adams, 2002).

Since the early 1960s, India's net agricultural exports have been largely declining. While the net exports are still positive, current projections suggest that the net exports are going to be negative in next 4-5 years. Indeed, the net exports of pulses, edible oil and rice are likely to be negative from 2011 (Mittal, 2008). The aim of this paper is to provide an analysis of the present situation of the Indian agriculture sector and highlight the emerging challenges.

The rest of this paper is organized as follows. Section 2 outlines recent developments in agricultural trade in general and in India in particular. The state of the Indian agriculture is discussed in sections 3 to 8 where production, consumption, and storage issues are explicitly considered. Government response to rising price has been considered in section 9. Section 10 contains a discussion of various distortions and the last section contains some concluding remarks.

### Developments in agricultural trade

Despite the rhetoric of globalization and free international trade, there have been only limited world-wide moves towards liberalization of agricultural trade. This can be attributed to high tariffs, health and safety regulations and countervailing duties (on the pretext that trade has caused excessive damage to local producers) by the developed countries.

In 2005 the value of world agricultural exports accounted for around US\$669 billion (FAO, 2008). Within agricultural trade, trade in food products has substantially increased over time. The developed countries due to their superior technology have a comparative advantage in agricultural goods production and hence their agricultural exports have been growing at a much faster rate as compared to the developing countries. The share of farm products in merchandise trade has fallen over time, because of technological change and increased protection. Some countries like India, Japan, South Korea and Russia have linked agricultural sector protection with their objective of ensuring food security. On the other hand, the US and EU have used trade restrictions to protect the income of farmers. This is contrary to the fact that in a rational world, trade in food would contribute to food security by augmenting domestic supplies and reducing the food prices.

During the recent Doha round of WTO negotiations, India, while seeking abolition of subsidies from the developed countries, has ruled out making any concessions in agriculture on the grounds that with the bulk of its population dependent on agriculture, food security and rural development are livelihood issues.<sup>3</sup> The Indian stand has to be seen in the context of some historical developments. It is related to the tendency among some countries, particularly the US to use trade as a weapon to punish countries for not following their preferred policies. For instance, India's increased efforts to stimulate food production reflected the sudden withdrawal in 1965 of exports from the US, which were previously supplied for payments in rupees under Title I of PL 480. This withdrawal occurred as a part of the sanctions imposed on India in the context of Indo-Pakistan war of 1965. This withdrawal, though temporary, combined with the 1965-66 drought, created serious food shortages in India. It created a massive increase in absolute poverty and in malnutrition reversing the process of nutritional improvement, which had occurred over the 1947-1965 period. While the US restored food supplies in late 1966 under PL 480, Indian government has already decided to work towards food self-sufficiency. Subsequent developments also pushed India towards policy of achieving and maintaining food self-sufficiency. Firstly, President Johnson sought for changes in India's foreign policy with regard to North Vietnam, as a price for supplying grain. Secondly, the US export grain lobby was alleged to have worked towards mixing a harmful weed with wheat exported to India. The weed spread fast onto the fields of northern India, requiring enormous efforts to contain it.<sup>4</sup>

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3 Bullion (2006) argues that progress in the stalled WTO negotiations is possible if the Indian proposals put to the WTO for reform are taken seriously by the developed world.

4 For an interesting discussion of the related issues, see Bhattacharya and Sakthivel (2004), Datt and Sundharam (2008) and Kumar and Hans (2008).

While India started the process of trade liberalization after its economic crisis of 1990-91, India even in 2008 maintained a tariff of 50% on agricultural imports. This also explains the 2007 Indian wheat import policy under which it has refused to allow US exporters to tender, unless such exports have been certified by the US government. Thus India's agricultural trade policy is not based on comparative advantage but has been determined by past historical experiences and short-term considerations based on changes in its stock-piles of grain, as well as ad hoc policy making. The policy is mainly aimed at reducing surpluses and/or keeping prices of essential items low. In India, during 2007-08, the command economy aspects returned with increased vigour as the government tried to stem inflationary pressures facing the Indian economy. The Indian government either banned or restricted the export of certain commodities. For instance exports of wheat and most pulses were prohibited, even as internal prices paid to the producers were well below international market prices. This policy has discouraged farmers from expanding their production. In the case of rice, a stiff minimum export price has been stipulated which has discouraged exports. A sharp rise in the price of rice in international market forced the Indian government to ban the export of rice. While this step is good for the Indian consumers, it contributed to a further rise in the price of rice in international market (Economist, 2008).

India is a leading producer of a number of agricultural commodities yet its share in international trade in many commodities is negligible. For instance, India is the largest producer of sugar and milk and also maintains large stockpiles of wheat and rice. But agricultural exports have stagnated at around \$6 billion which is less than 1 per cent of international trade. This is partly because of restrictions on exports. India has in fact become uncompetitive in the international market place. In addition, there is a global perception that the quality of India's products is somewhat poor (Khan and Bano, 2007 and Mittal, 2008). Obviously, unless perceptions of quality and reliability change, it will be difficult to compete with countries such as Australia, the EU and the US. The rising surplus of wheat, rice and milk during the early parts of this decade led India to market these products and their derivatives more aggressively in the neighbouring countries. India's share of Asian exports of wheat and rice rose for a while but as the surplus dwindled such exports fell. With growth rate of around 15 per cent, the share of agriculture and allied exports has been on a path of slow decline (World Bank, 1999 & 2000).

India began the process of dismantling quantitative restrictions over the 2000-01 financial year and agreed to lift all quantitative restrictions in April 2001. The opponents of this move have feared that imports would flood into the economy. However, with the exception of edible oil there has not been much change. This is not surprising because within the framework of the WTO agreement, India has been able to put in appropriate tariffs in place. Three levels of binding commitments were given to the WTO with regard to agriculture. On raw commodities, processed agro-commodities and edible oil, India has given a commitment to bind tariffs, respectively, at 100 per cent, 150 per cent and 300 per cent. These are fairly high levels. This was achieved in the context of its submission in 1995-96, when it argued that the agricultural sector as a whole faced a negative effective rate of assistance of 31 percent of total value-added – 38.5 per cent



of negative product specific subsidy and 7.5 per cent of positive subsidy in the form of non-product specific support, such as for fertilizer, credit, electricity, irrigation and seed (Muralidharan, 2001 and Gulati, 2003).

A number of agricultural commodities have registered a steep rise in price in 2007 and 2008 which can be attributed to (a) rising prosperity experienced by China and India and (ii) a decrease in the supply of certain agricultural products due to (i) droughts and (ii) growing use of crops such as wheat and corn to make bio-fuels.<sup>5</sup> As a result, some countries including India have imposed restrictions on export of a number of agricultural products. In the light of these developments, there is a need for a comprehensive review of the Indian agricultural and agricultural trade policies.

### **Agricultural production in India**

The expansion in food-grain production in India over the 1950-51 and 1970-71 period were the combined results of expansion in the area under cultivation and improvements in land yield. In the subsequent period, this expansion has been almost exclusively due to improvements in land yield (Hans, 2009). Table 5 shows that since 1999-2000, production of food grains has not only fluctuated, but has on average been lower until 2004-05. It is interesting to note that agricultural productivity growth has also tapered off since 2001-02. India-wide productivity is also uneven. For instance against the average Indian wheat productivity of 26.2 quintal per hectare in 2005-06, Punjab recorded 41 quintal per hectare, showing scope for considerable improvement elsewhere through broader use of hybrid thermo-resistant variety of seeds.

From the mid-sixties to the late nineties, the food grain yield per hectare increased by almost 2.5 times. Crop-wise changes in yield are shown in Table 6. The growth in land yield of food grains was the most rapid during the 1980s, clocking a remarkable 4.61 per cent a year. The sharp increase in food grain productivity during the 1980s was facilitated by the government making significant investments in agricultural technologies, such as in high-yielding varieties of rice and wheat and in irrigation, in services through extension, credit and inputs, and rural infrastructure, such as roads and markets during the 1970s and 1980s.

During the 1990s, agricultural productivity growth was almost halved to 2.43 per cent, this was somewhat higher than the level achieved in the 1960s and much higher than that of the 1970s, when it registered only 1.17 percent. Most of the benefits of such investments occurred in Punjab, Haryana, parts of Andhra Pradesh and west Uttar Pradesh (Ahluwalia, 2002 and Khan and Bano, 2007).

India is one of the largest producers of milk and per capita milk availability increased from 128 grams per day in 1980-81 to 246 in 2006-07. India has steadily increased production of milk at the rate of around 4.25% per annum to become the largest producer of milk in the world – between 1970 to 2007 milk production increased

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5 Due to the current global financial crisis, the price of crude oil at present has fallen below US\$50 per barrel which is going to discourage the use of bio fuel at least in the short term.

Table 5: Food Grain Production. Source: Economic Survey (2002-03 and Economic Survey, 2007-08).

Year	Area (million hectares)	Production (Million tonnes)	Productivity (Kg per hectare)
1950-51	97.3	50.8	522
1960-61	115.6	82.0	710
1970-71	124.3	108.4	872
1980-81	126.7	129.6	1023
1990-91	127.8	176.4	1380
1997-98	123.8	192.3	1552
1998-99	125.2	203.6	1627
1999-00	123.1	209.8	1704
2000-01	121.0	196.8	1626
2001-02	122.8	212.9	1734
2002-03	113.9	174.8	1535
2003-04	123.4	213.19	1727
2004-05	120.00	198.36	1652
2005-06	121.60	208.59	1715
2006-07	124.07	216.13	1707

Table 6: Growth of Yield of Food grains (kg/hectare) per cent per year.

Year/Crop	Rice	Wheat	Coarse Cereals	Total	Pulses	Total food grain
1950s	4.29	2.07	3.01	3.27	1.44	2.88
1960s	1.91	5.25	1.29	2.33	2.60	2.41
1970s	0.72	2.02	1.68	1.62	-2.56	1.17
1980s	5.45	4.17	4.01	4.73	4.02	4.61
1990s	1.36	2.86	2.03	2.38	1.81	2.43
1999-2000 until 2005-06	0.87	-0.98	1.99	0.37	-1.0	0.1
Average for 1950-51 to 2005-06	2.1	2.53	1.94	2.37	0.56	2.19

by 500 per cent to 100 million tones (Economic Survey, 2007-08). Such increases have come, until 2003, within a regulated environment, based around co-operatives, licensing and procurement. Deregulation and decontrol have been brought about by changes to the Milk and Milk Products Order, 1992, from financial year 2002-2003. Under these changes, the milk shed concept, under which a particular dairy had to procure milk from a specific designated area, is being scrapped. In addition, restrictions on and the need for registration of new milk processing facilities are being lifted. Restructuring of the milk industry is certainly likely and there are likely to be winners and losers. There is a fear among some 70,000 village co-operatives, the backbone of the dairy industry, that the scrapping of the milk shed concept and entry of unregulated and unregistered processors will lead to unhealthy competition and that standards of sanitation, hygiene, quality and food safety may be compromised (Kurien, 2002 and Sharma, 2004). This in turn will reduce scope to export processed milk to the neighbouring milk deficit countries and reduce future prospects of growth of the industry. But growth momentum in the post-deregulated period has been sustained, as private sector investors have entered the field. In 2007, as domestic prices of powdered milk increased, the government banned its exports. This is despite even a more rapid increase in international prices. Such restrictive policies are likely to be counter-productive, because they prevent dynamic efficiency and improved quality of milk products being achieved.<sup>6</sup>

### **Subsidies and the Indian agriculture sector**

Increase in yield, given the scarcity of land, is a positive development which can also be partly attributed to increased subsidies.<sup>7</sup> For example, water and electricity used by the farmers is subsidized along with the fertilizer. Between 1996-97 and 2001-02, the subsidy on fertilizer approximately doubled to over 140 million Indian Rupee (approximately US\$3.3 million). While the subsidies on fertilizer that appear to mainly benefit a limited number of high cost domestic manufacturers were to be phased out over five years starting from 2001, there were no plans to tackle the issue of subsidized water and electricity. This follows on top of decline in the rate of growth in fertilizer consumption during the nineties, caused by dismantling of controls in August 1992 (Sivakumar and Chowdhury, 2002). Water rates, despite the growing recognition that water is increasingly becoming scarce, have not been revised by most states over the last two decades, even though there is a policy in place to recover the cost of maintenance and capital investment as well as operating cost. Even in the case of fertilizer, due to political sensitivities, it is unlikely that the subsidies will be completely phased out in the near future. In fact the price concession (subsidy) on decontrolled fertilizer was substantially increased in the early part of this decade, even as the subsidy for the controlled fertilizer was being wound back (Government of India 2001). Such subsidies

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6 Jha (2004) has argued that growth of the live stock sector has contributed to rural employment growth. For an interesting analysis of the Indian dairy industry, see Jha and Debroy (2000) and Jha (2004).

7 Ranjitha (1998) has argued that prospects for further increases in agricultural production depend on investment in advanced research that is location specific.

in fact create unnecessary pressures on the budget and these in turn have contributed to a fall in public investment in agriculture (Gulati and Narayanan, 2003). The net effect of these developments is a slowdown in the expansion of irrigation, electricity generation, rural cold storage facilities and agricultural research.

By 1999-2000, electricity subsidy comprised 64% of total subsidy and benefited only a small proportion of the farmers. Given the shortages of electricity faced by the general public and the near bankruptcy of the State Electricity Boards, the need for some reform was recognized (Gulati and Narayanan, 2003). With the introduction of the 2003 Electricity Act, compulsory metering has been introduced and electricity subsidies to farmers in most states were cut. There was some reversal of this development, following the 2004 Parliamentary Elections, when the farmers vented their anger at the ruling parties in some regions of India where such tariffs were raised.<sup>8</sup>

### **Food consumption in India**

As indicated by Fogel (1994), nutritional improvements are an important factor in long-run economic growth. He indicates that about 30 per cent of the British growth rate over the past 200 years may be attributable to improvements in gross nutrition (i.e., increases in caloric intake). Fogel further argues that while mean improvements in gross nutrition are important, distributional improvements, especially for the bottom 20 per cent of the population are equally (if not more) important. This is because the bulk of such population is likely to be engaged in agricultural activities, requiring the expending of enormous physical energy. Thus deficiency in energy requirements may be much greater at that level. As nutrition improves, the intensity of effort per worker hour can rise. As nutrition improves, the incidence of disease among the population is also reduced. India has experienced expansion of food grain production and over the second half of the nineties and early part of the 21<sup>st</sup> century, it experienced for a short period an unforeseen problem of food glut, as food stockpiles increased. Despite such food glut, about a third of the population continued to suffer and still suffers from malnutrition. Lifting long-run economic growth rate will require a concerted effort to improve the nutritional intake of this population and specifically the potential and nursing mothers and the children in this category, since the build-up of physiological factors is a cumulative process.

There has been a steady improvement in average per person food availability in India over time. Once production of sugar, milk, groundnuts, coconuts and vegetables are included in the basket of food, India has achieved sufficient production to satisfy the nutritional needs of its population. Based on Engel's law it can be argued that economic growth leads to a shift in consumption pattern from the staple food to high value commodities such as fruits, vegetables, milk, fish and eggs and this has been the case in India. However, a large proportion of the population and a larger proportion

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8 An interesting discussion of the subsidies can be found in Gulati and Sharma (1995) and Gulati and Narayanan (2003).

of the females continue to suffer from inadequate nutrition (Mittal, 2007).<sup>9</sup> This can be attributed to the fact that the production of coarse grain, which is accessed by the poorer strata of the population has increased only marginally since 1970 and is subject to sharp fluctuations with no buffer stock policy. The paradox of plenty during the late 1990s and early years of this decade co-existing with high levels of inadequate nutrition have contributed to reduced purchasing power of the poor. Frequent changes in public distribution policies have also not helped (Hans, 2009). Inadequate nutrition continues to impact on the physical productivity of such population and therefore continues to restrain the economic growth of India. Inadequacy of nutrition among females has implications for the low weight of infants born to such females and their subsequent mental and physical development and hence for the future productivity of the Indian population in general.

The nutrition intake of the school children is likely to improve if the primary schools were to provide a free mid-day meal. This will also encourage many parents to not only send their children to school but also help to improve the school retention rate. There is some evidence to suggest that an increasing number of Indian families are now opting for fewer children. This development is likely to reduce the future outlays required by the states for schools and release more resources for improvements in the quality of education and health. This policy has successfully been in place in Tamil Nadu for some time, with clear indications of falling fertility and birth rates, as well as improvements in nutrition and education. Tamil Nadu's birth-rate is now below replacement level. The Supreme Court of India has stepped in to enforce the mid-day meal scheme in the Government and Government-aided primary schools in all states. However, a number of states continue to dither on the grounds that they lack funds to implement such policy (The Hindu, 2002). Nevertheless, there has been steady expansion in the provision of mid-day meals. This may have played a part in the enhanced enrolment ratios in schools in the 1990s and during the current decade.

The problem of inadequate food consumption in India can be linked to government policies. The actual production of food grain has not been a serious problem. For example, in July 2000, the stock of wheat held by the government was 27.76 million tonnes – an increase of more than 100% from the stock held in July 1997. In July 2002, the stock of wheat reached 24.2 million tonnes. Such accumulation was the result of previous policies and rising output (Jha, 2001). But by early 2003, the stock had dropped to 24.2 million tonnes. In January 2008, in the midst of rising prices, the stock held by the government was merely 7.7 million tonnes. Changing policies and severe drought

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9 A number of authors have discussed the issue of regional disparity in India. For example, Bhandari and Khare (2002) have argued that the Western part of India is experiencing an increase in its share of the economy at the expense of the eastern part. Dholakia (2003) has argued that despite economic progress, not much has been achieved in terms of human development index and welfare both at national level and at the level of North East India. Human development index remains below 0.62 in India and much lower in its North Eastern region. Dholakia further argues that rural-urban disparity especially gender disparity across the Indian states is quite significant. Similar views are also expressed by Datt and Ravallion (2002) and Datt and Sundharam (2008).

conditions led to falling stock-piles. Changing policies involved increased net exports of cereals and reversal of policy on the issue prices to those above the poverty line (APL) and below the poverty line (BPL).<sup>10</sup> Net exports were increased to 8.5 million tonnes in 2002 and to over 7 million tonnes in the three subsequent years.<sup>11</sup> These figures are much higher than the previous years. The reversal in issue prices to APL and BPL followed the disastrous impact of these increases and these reversals in issue prices were combined with substantial increases in the amounts available under both schemes.<sup>12</sup>

### **Food grain accumulation in India**

The increase in accumulation of food grain stock until 2002 (see Table 6) reflects considerable increase in minimum support prices over the 1997-2000 period (see Table 7), even as Central issue prices for those above the poverty line (APL) for wheat and rice respectively were raised sharply from Rs 402 per quintal and Rs. 550 per quintal in 1996-97 to Rs.900 per quintal and Rs. 1135 per quintal in 2000. In other words, the issue prices were more than doubled over this period to essentially equal the economic cost stipulated by Food Corporation of India. The issue prices for those below the poverty line (BPL) were also raised sharply in 2000 for rice to Rs. 590 per quintal from Rs. 390 per quintal and for wheat to Rs. 450 per quintal in 2000 from Rs. 250 per quintal. These steps contributed to a decrease in demand for food grain. At the same time, the Indian economy has also started to slowdown thereby further reducing the demand for food grain. This was reflected in a slump in food grains' off-take under the public distribution system over the 1998 to 2000 fiscal years which sharply reduced the off-take of wheat from 7.95 million tonnes to 3.98 million tonnes (Government of India, 2001). The increase in the issue price was primarily aimed at reducing the gap between the price paid by the government and the price charged to the consumers. The end result was a substantial increase in the stock held by the government. The cost of holding the stock which consists of freight, storage and interest charges, increased sharply between 1997-98 and 2001-02 from less than 13% of the food subsidy to 42% (Economic Survey, 2002-03).

The total food subsidy cost including the carrying cost increased to a whopping Rs238.28 billion including carrying costs (PTI, 2002). The major beneficiaries of this largesse were the farmers in the relatively affluent states of Punjab and Haryana, who had received prices considerably above the market prices – in 2001-02, out of the total wheat procurement of 20.63 million tonnes, Punjab alone accounted for 10.45 million tonnes, while Haryana followed with 6.41 million tonnes (Economic Survey, 2002-03).

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10 See Datt and Ravallion (2002) for an interesting discussion of equity issues in India.

11 Aertthayil (2008) among other argues that roots of the crisis faced by the Indian agricultural sector can be found in globalisation. For an interesting discussion of poverty reduction efforts in India, see Jha (2004).

12 Matuschke, Mishra and Qaim (2007) suggest that Indian farmers can benefit significantly from the proprietary seed technology. They further argue that neither farm size nor the subsistence level influence the adoption decision but access to information and credit does.

Table 7: Minimum Support/Procurement Price (MSP) of Wheat and Paddy (Rs./quintal).  
Source: Economic Survey (2002-03 and 2007-08 and 2010-11).

Crop Year	Wheat		Paddy*	
	MSP	Per Cent Change	MSP	Per Cent Change
1991-92	275	11.1	230	12.2
1992-93	330	20.0	270	17.4
1993-94	350	6.1	310	14.8
1994-95	360	2.9	340	9.7
1995-96	380	5.6	360	5.9
1996-97	475	25.0	380	5.6
1997-98	510	7.4	415	9.2
1998-99	550	7.8	440	6.0
1999-00	580	5.5	490	11.4
2000-01	610	5.2	510	4.1
2001-02	620	1.6	530	3.9
2002-03	620	Nil	530	Nil
2003-04	630	1.6	550	3.8
2004-05	640	1.6	560	1.8
2005-06	650 (+ 50 bonus)	9.3	570	1.8
2006-07	750 (+ 100 bonus)	17.7	580 (+ 40 bonus)	8.8
2007-08	1000	17.6	645	11.2
2008-09	1080	8.0	850	31.8
2009-10	1100	1.9	950	11.8
2010-11	1120	1.8	1000	5.3

\* Until 1996-97, there were two additional categories of Paddy with their own MSP, since 1997-98, there is Grade 'A' Paddy, in addition to Common Paddy, with its own MSP.

For rice, 75% of the procurement was made from Andhra Pradesh and Punjab. In the case of sugar, the richest state in India on per capita basis, Maharashtra, which produces one-third of India's sugar, benefits from the statutory minimum price, which has tended to be above the world price, creating the build-up of inventory estimated at 10.3 million tonnes in 2001. The other adverse development is that because of distorted price signals, the area cultivated under wheat, rice and sugarcane increased more rapidly in the nineties than in the eighties, even as the growth in yield slowed down (see Table 6). It is interesting to note that these three states started supplanting the other crops even though the price signals emanating from the international market suggested an opposite

Table 8: Stock of Food Grain held by Central and State Agencies (1992 -2008 in Million Tonnes). Source: Economic Survey (2002-03, 2007-08 and 2010-11).

As At	Rice	Wheat
July 1992	8.31	6.74
July 1993	10.44	15.22
July 1994	14.42	17.78
July 1995	16.44	19.22
July 1996	12.88	14.13
July 1997	10.95	11.42
July 1998	12.04	16.48
July 1999	10.74	21.63
July 2000	14.49	27.76
July 2002	21.9	41.1
July 2003	11.0	24.2
July 2004	10.8	19.1
July 2005	10.1	14.5
July 2006	11.1	8.2
July 2007	11.0	12.9
July 2008	11.3	24.7
July 2009	21.6	32.9
July 2010	24.3	33.6

strategy. Until 2002, bulging stocks in the context of rising share of procurement by the Food Corporation of India (FCI) had pushed up the spoilage rate, especially in the case of wheat, as FCI was forced to store more wheat in the open. While it was estimated that spoilage rate in closed warehouses was about one percent, in the case of wheat stored in the open the spoilage rate was estimated to be 15-20 per cent (Barua and Adil, 2002).

### **Food grain storage issues**

The problem with storing grain is that not only that it involves costly storage but over time the quality of items stored deteriorates. Extensive use of covered and plinth storage increases losses and also increases difficulties in implementing the first-in, first-out principle of inventory management. Until the reduction in stock, 30 per cent of the food stored with the Food Corporation of India was between two to four years old; and some grain was 16 years old Chauhan (1997) has estimated food grain losses at about 11 to 15 percent from the farm to distribution levels. With average consumption of 15kg of



food grain per month, the grain lost as a result of the storage was enough to feed about 70 to 100 million people, about one-third of India's poor a year (Umali-Deininger and Deininger, 2001). In fact, given the accumulating costs of storage, it might be a better strategy to provide grain to primary schools without charge.

In addition to the poor storage of grain by FCI, most of India's roughly 6,800 wholesale state operated markets are severely congested and rapidly deteriorating due to inadequate maintenance. The predominantly manual system and ageing infrastructure has resulted in considerable wastage (especially spillage), quality deterioration and increased cost of marketing. The less efficient milling technologies used in both paddy and wheat have resulted in smaller recovery and extraction rates (Umali-Deininger and Deininger, 2001). Thus improved food security is connected not only with increased food production and improved distribution but also with improved storage and milling technologies (see Hans, 2006).<sup>13</sup> A decline in quantity distributed through the public distribution system (PDS) has contributed to a significant increase in the stock held by the government. From a peak of 20.8 million tons in 1991, the quantity of grain distributed fell to 14 million tonnes in 1994 (Swaminathan, 2002). While there was some reversal of this trend during 1995 to 1998, there were declines in both 1999-2000 and 2000-2001, as PDS was narrowly targeted to those below-poverty-line (BPL). Given that poverty line was set at a very low level, covering only 37 per cent of the population and the entitlement for BPL families was set at a uniform low of 10kg of grain per family per month, it created a problem of off-take for the PDS.<sup>14</sup> BPL was lifted to 20kg in 2000-01 and subsequently to 25 kg in 2001-02 budget year. In order to reduce the mountain of grain, the government on 24th March 2002 increased the rations from 25 kilos to 35 kilos per family for both above and below the poverty line groups and in addition lowered the prices for the above poverty line group. The latter development, given that such prices are considerably below the market prices led to a reversal in the size of the stock. By December 2002, the stock had dropped to 48.2 million tonnes and continued the downward trend in the subsequent years. In addition exports, despite some problems with quality, were increased. But the rationale for selling in the international market, at considerably below domestic prices, when a large proportion of the Indian population remains food insecure, remains questionable (Swaminathan, 2002). Nevertheless, one advantage of the reduction in food-grain stockpiled with the government agencies is the reduction in the carrying costs and the wastage of food stored by them.

### **Expanding cotton production and suicides**

1980s witnessed a significant increase in the land yields of both food grains and major commercial crops (see Table 6). But, unlike food grain, land yields of a number of commercial crops, such as ground nuts, cotton (lint) and tobacco have seen big increases

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13 Bangladesh experience shows that trade liberalization offers potential benefits for national food security by enabling a rapid increase of food supplies following domestic production shortfalls.

14 For a family of five members, it provided only around 18 per cent of the recommended intake.

in land productivity in the first half of the current decade. Production increases in cotton (lint) have been driven by a number of small farmers, who have expanded production in the suitable black soil and alluvial soil districts, increasingly through the use of Bt seeds leading to bulk of the cotton production coming now from longer staple, which can be used for the production of finer cotton textiles. Unfortunately, some of these increases have come through excessive borrowing. However, most producers are ill-equipped to handle unpredictable fluctuations such as droughts and falls in prices and of course rising interest rates. Spiraling inflation (in excess of 11%) is likely to lead to further increase in the interest rate. Unable to repay loans, suicides among some farmers, particularly in some districts of Maharashtra (for example Vidarbha) and Andhra Pradesh have increased (Assadi, 2008). As production of India's textile sector has failed to keep pace with the expansion in cotton (lint) production, there has been a rapid expansion in exports to China. The reorganization of Indian textile sector has been slow and in the face of an appreciating rupee, it has had difficulty in competing against the highly competitive Chinese textile sector. Thus Indian textile sector appears to have failed to adequately take advantage of the excellent quality of cotton staple being produced in India.

Growing public pressure led to the introduction of Rs.60,000 debt waiver for farmers over three years in 2007-08 budget. This announcement was clearly not put through the scrutiny of the budgetary process and represents ad hoc policy making that has taken over at the Centre as the ruling Congress Party led United Progressive Alliance government geared itself for 2009 elections. This is evident from the fact that Rs.10,000 were provided subsequently for this in the 2008 Supplementary Budget. But the waiver, since it was restricted to marginal (those owning less than 1 hectare) and small farmers (1-2 hectares), who had borrowed from institutional lenders, was unlikely to benefit farmers in the cotton growing districts, where most of the suicides are taking place. This is for two reasons. Firstly such cotton growing farmers are based mostly in rainfed, arid and semi-arid areas and are likely to own close to 4-5 acres of land. Secondly, most of them have borrowed from non-institutional lenders, such as money-lenders. One of the inadequacies of Indian agriculture has been the meager resources expended on relevant and effective R&D. One consequence of this has been the continued high price paid for Bt cotton, which is resistant to the dreaded boll worm, by Indian farmers compared to Chinese farmers. This is because Indian agricultural scientists have not come out with a *desi* (local) version of Bt cotton, whereas the Chinese have. The consequence of this is that whereas an Indian farmer in 2007 paid around US\$50 for a 450 gram seed packet of Bt cotton, a Chinese farmer paid only around US\$2 for it! Nevertheless, with increases in outlays on R&D in cotton, its production in India has continued to increase. India in 2008 was easily the second largest producer of cotton, after China, having overtaken the USA in 2007. Nevertheless, instead of Rs. 60,000 debt waiver scheme and its associated problems of moral hazard coupled with its discriminatory nature against cotton growers, the Price Stabilisation mechanism (Radhakrishna Committee Report on Agricultural Indebtedness, 2007) combined with the strengthening of the insurance mechanism, which was introduced in the 2004 budget, would have provided a better solution to the problems of the cotton growing districts and the suicide problem in these districts.

### **Government's response to the rising food prices**

As the global prices began to rise from 2001 onwards, the procurement prices for wheat were revised marginally upwards between 2001 and 2004 (see Table 7). This together with the increased frequency of drought led to a fall in wheat's land yield over the period 1999-2000 to 2005-06 and a marginal increase in total food grain output (see Table 6). Despite a sharp increase in the price of agricultural products in recent months, the response of the Indian government has been very slow which has to a greater extent forced the hands of the Indian farmers. Managing food security, while minimizing costs to the exchequer requires a better understanding of global changes in food prices. Increased investment in infrastructure, agricultural R&D and rural cold storage facilities is imperative. The rapid economic growth experienced by India has substantially improved fiscal situation at both the Centre and States' level and hence such investment is feasible (Hans and Jayasheela, 2006 and Hans, 2009). The ruling Congress Party appears to be more focused on its re-election campaign (election are to be held in 2009). Consequently, instead of minimizing cost and putting more resources into agriculture that will address the potential long term problems, the congress led government especially at the state level appears to be considering measures that will help only in the short term.<sup>15</sup> For example, the decision of the ruling United Progressive Alliance (UPA) government to set up a strategic reserve of 3 million tonnes of wheat and 2 million tonnes of rice will simply create an additional bureaucracy with all its associated costs.<sup>16</sup> It would have been much better to simply increase the current required stocks held by the central and state agencies.

The reduced off-take of food-grains in India reflects a shift away from food grain to other food within the average food basket and also a reduction in the share of expenditure on food in the overall average consumption basket (Table 9); average per capita calorie intake in India has risen from 2082 in 1980 to 2413 in 2000 and the share of calorie intake from grain consumption has declined from 71 per cent to 63 per cent over this period (FAO, 2008, FAOSTAT Statistical Database). Both these developments reflect an increase in discretionary consumption connected to an increase in income. However, a sharp rise in the price of essential food items and oil in recent years have reversed this trend.

Global prices of wheat and other food products firmed in 2006 and have risen sharply in 2007 and 2008 for a number of reasons. Firstly, droughts hit a number of major wheat exporting countries in 2006 and the recovery from these droughts in 2007 was anemic. Secondly, land is being used for production of bio-fuels instead of wheat and rice. For instance, wheat is competing against corn for acreage in a number of countries, more specifically in the huge US market, as production of ethanol is ramped up because of rising price of oil and oil security concerns. The required share of ethanol

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15 Jha (2007) argues that the current policy is neither efficient nor equitable. It is further argued that stagnation of agricultural investment has resulted in a lack of production capacity. See Nayyar and Sen (1994), Pushap (2007) and Revathy (2008) for an interesting analysis of the effect of rapid globalisation on Indian agriculture sector.

16 Business Times (2008).

in fuel mix to power motor vehicles is being raised in all the major economies towards 10 percent and subsidies are being provided by most governments for this shift in response to growing energy security concerns. In another major oil consuming market, EU, oil-seeds are being used for ethanol production. This is driving up the price of oil seeds. In China, some of the rice-land has given way to the production of higher value vegetables and fruits. Something similar is happening in India.<sup>17</sup> Thirdly subsidies to leave the agricultural land fallow by important wheat producing economies of the US and EU have reduced global production of wheat. Wheat production in the US has been falling steadily since 1998. Fourthly there has been a steady rise in the farm animal population in the important markets of China and India, leading to reduced availability of land for wheat and rice at the same time there has been an increase in demand for grain and other feed-stock. Fifthly, rising fuel prices have not only increased transportation costs, but also costs of inputs, such as fertilizer. Sixthly and more specifically for India, low MSP in the early part of this decade reduced the incentive to increase production of wheat and rice. The consequence of this was that India was forced to import wheat of 0.795 million tonnes in August 2007 at a very high price to replenish dwindling stocks held by the central and state agencies. The landed price of these wheat imports amounted to Rs.1600 per quintal, which was around twice the MSP of Rs.750 (plus Rs.100 bonus) per quintal for Indian farmers in 2006-07 (see Table 7).<sup>18</sup> The bonus additions for wheat and rice (Rs.40 per quintal) had not yielded positive outcomes in terms of output partly because of draught. The total cereal production in 2005-06 was lower than that achieved in 2001-02 which resulted in a sharp increase in MSP for both rice and wheat in 2007-08.<sup>19</sup>

While the acquisition cost and therefore economic cost of food grain is set to rise, the Indian government can mitigate the burden on consumers by getting the food surplus states of Punjab, Haryana and Andhra Pradesh to waive the ad valorem state taxes and levies currently set at over 10 per cent. In addition, a reduction in food stock and its better management through reduced wastage has already reduced the buffer carrying cost for government agencies. The introduction of the Futures Commodities Market, including that for wheat and rice, in India in 2003, reduced the need for the government to set the MSP. Futures' markets have provided farmers with a platform to sell and/or hedge the price risk. As farmers get better informed about the operations and risks associated with the Futures' Market, there will be less and less reason to feel threatened by them and their operations will not be suspended as they were in March 2007. As the wheat and rice prices rose in 2008, the Futures' Market has remained suspended. There is no evidence to suggest that this policy has achieved the aim of putting a downwards pressure on essential cereal prices. Adjustments in regulatory arrangements that would allow more frequent changes in rate of margin to occur and to curb trading outside the recognized commodity exchanges are needed. Futures' market should be restored to help with price discovery and the development of skills to develop Mumbai as an important global financial centre.

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17 For an interesting comparison of China and India, see Kowalski (2008).

18 Also see, Indian Agro Industry (2008).

19 For projections up to 2020, see Bhalla, Hazell and Kerr (1999).

Table 9: Monthly Per Capita Food and Food Grain Expenditure. Source: Economic Survey (2002-03).

Year NSS Rounds	Consumption Expenditure as a percentage of Total Expenditure		Share of Food Expenditure in Share of Food-grains Expenditure	
	Urban	Rural	Urban	Rural
1972-73 (27th Round)	72.9	64.5	46.0	27.1
1977-78 (32nd Round)	64.3	60.0	37.3	24.5
1983 (38th Round)	65.6	59.1	36.3	22.9
1987-88 (43rd Round)	64.0	56.4	30.6	18.7
1993-94 (50th Round)	63.2	54.7	28.3	17.3
1999-2000 (55th Round)	59.4	48.1	26.2	15.3
2004-2005 (61st Round)	55	42.5	18	10

India's attempts to export some of the surplus grain to countries such as Iraq have been unsuccessful, because of inadequate attention to quality. Nevertheless, globalisation is forcing the exporters to pay more attention to quality issues. A number of developing countries are unable to buy Indian grain because they simply do not have the means to pay for it. On the other hand, developed countries are unwilling to buy Indian grain because of the quality and perceived health concerns (Khan and Bano, 2007). In addition, India is likely to be challenged by other grain exporting countries, such as Canada and Australia, on the grounds that the Indian grain production is subsidized. Even though, EU has agreed to remove its subsidies over a period of time, India has so far not made similar undertaking. In addition, because of falling stocks and rising prices, government has taken steps to restrict exports of agricultural products (Economic Survey, 2002-03).

### **Growth of the agriculture sector and distortions**

From 1992-93 to 2001-02, the average growth rate of the agriculture sector was 3.4 percent which was well above the rate of growth of population of around 1.9 per cent which contributed to improvements in nutritional intake.

Rate of growth of yields of most crops declined in the 1990s as compared to the 1980s and, without infrastructure improvement, this trend is likely to continue (Economic Survey, 2007-08). Agricultural productivity improvement requires significant increase in R&D spending and along with substantial investment in infrastructure improvement. The additional cost can be covered by reducing subsidies for electricity and water. Subsidies have contributed to wasteful practices adopted by farmers. For example, because of subsidization, many farmers leave their electric water pumps switched on for extended hours thereby wasting electricity as well as depleting the scarce water resources.<sup>20</sup>

Indian farmers have historically been cushioned from market fluctuations but as India removes its protective barriers, the farmers will be exposed to increased price and income volatility. Given lower risk-bearing capacity, the farmers may have greater difficulty in coping with such changes. In fact, the high incidence of suicide among cotton farmers in parts of Maharashtra and Andhra Pradesh reflects this low risk-bearing capacity. One proposed solution to reducing such uncertainties is to use counter-cyclical tariffs and at the same time invest in infrastructure to improve yield.<sup>21</sup> But the former is difficult to implement, while the latter should be undertaken as part of a long-term plan to boost agricultural productivity. The other option is to provide insurance against the vagaries of the market. This may enhance the capacity of the farmers to meet their loan repayment obligations during periods when the prices fall and/or when the yield falls.

It is interesting to note that the central government sets the minimum procurement prices for paddy and wheat but the procurement price of milk is set by the Maharashtra state government. As a result of this policy, at the end of 2001, there was 18 percent to 25 per cent gap between the retail price of milk between Mumbai and other metropolitan centres in India. In addition, higher prices resulted in increased surplus and hence the surplus milk had to be converted into butter or milk powder. Maharashtra State government had set-up processing facilities but these were running at losses of around Rs. 5 per litre, creating a drain on the exchequer of around Rs 2.25 billion per annum (Sivakumar, 2001). At the same time, rising cost forced the State Government to steadily move towards allowing sale by the co-operatives to private players.

The other problems faced by the Indian agriculture sector include the unavailability of adequate credit that could be used for investment. While the institutional credit to agriculture increased during the period of the NDA government and doubled during the first two years of the present UPA government, more needs to be done. The agricultural sector investment rate in the 10th Plan was only 12.4%, while the rate of growth of agriculture was only 2.5% reflecting an incremental capital output ratio (ICOR) of 5, which is rather high. Part of the reason for this was the deterioration in the terms of trade which had occurred during this plan period. The 11th Plan has a target investment rate of 16 per cent for the agricultural sector, which given the improved resource allocation

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20 For a recent analysis of the effect of subsidies, see Jha (2007).

21 See Sen (2001).

and credit position of agriculture is achievable (Economic Survey, 2007-08).<sup>22</sup> When combined with improving terms of trade for Indian agriculture a projected ICOR of 4 and rate of growth of 4 per cent seems feasible for the 11th Plan period.

It is perhaps worth mentioning that Mittal (2008) has argued that by year 2011, India is likely to start importing sugar, edible oil and pulse and the gap between production and consumption of these items is expected to continue to grow.<sup>23</sup> In Mathusian tradition, Mittal attributes this trend to India's rising prosperity as measured by rising GDP per capita.

In order to enhance efficiency in domestic production, India needs to reduce barriers to national trade. While focusing on Bangladesh-India trade in agricultural products, Dorosh (2001) has argued that trade liberalization offers potential benefits for national food security. Mahadevan (2003) believes that it will take some time before the benefits of trade liberalization will surface. On the other hand, Shiva (2004), in a highly critical piece, believes that globalization and trade liberalization are hurting the Indian agricultural sector. The recent rise in the price of a number of agricultural goods and the subsequent global financial crisis has the potential to seriously jeopardize the economic wellbeing of many low income families in India. In fact few developing countries are likely to remain unaffected by these disturbing developments. India's future economic growth also depends on the growth of its agriculture sector.

### **Conclusion and policy implications**

This paper provides an analysis of the present situation of the Indian agriculture sector and highlights the emerging challenges. India's agricultural trade policy does not appear to be based on comparative advantage. It is however possible to argue the policy has been determined by past historical experiences and short-term considerations based on changes in the stock-piles of grain and inflation concerns. These policies have resulted in a situation where the country has experienced losses in both production and distribution of agricultural products (mostly of grain and milk) for a considerable period of time. Given the world-wide increase in food prices, policies that will reduce such losses are highly desirable. Improved distribution channels assume critical importance during a drought year that appears at least once every five years on a mildly critical level and once every fifteen years on a severely critical level (the last three of these types have occurred in 1972, 1987 and 2002). Agricultural employment, on which a large number of Indians are still dependent, is severely affected by droughts, making the food for work and food for welfare programs extremely important. Resources saved by reducing waste would enable India to invest much more in technology upgrade, such as seed farming, quality upgrade and cold storage linkages. The latter in turn would further reduce waste. But such improvements are partly dependent on improving electricity supply. Indian electricity sector is also affected by distribution losses mainly because

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22 Also see Sahu (2007).

23 Also see Bhalla, Hazell and Kerr (1999).

of electricity theft. Due to rising standard of living, India like other regional economies is facing electricity shortage problem which requires increase in production capacity. An over haul of electricity rental collection system is imperative. This objective can be accomplished with continued but effective implementation of the 2003 Electricity Act.

Agricultural productivity remains low in India. Given that agricultural subsidies have done little to improve agricultural productivity, the government needs to substantially increase investment and R&D in agriculture sector. The 2008 debt waiver scheme is unlikely to significantly help most of the troubled farmers in the cotton growing districts. Some farmers, especially those dependent on non-institutional lenders, are prone to committing suicide when faced with financial hardship. A price stabilization scheme in conjunction with a better designed insurance scheme for cotton growers is likely to be quite helpful.

The paradox of plenty between the late nineties and early years of this decade co-existing with high levels of inadequate nutrition lay in the lack of purchasing power of the poor and the changing policies with regard to the public distribution system and inappropriate minimum support prices. The inadequacies of nutrition affect the physical productivity of around a third of the population and in turn adversely affect the growth of the Indian economy. Rapid economic growth means that more funds are available to both the central and state governments and hence India has steadily extended and improved the quality of its mid-day meal programs.

The sharp increases in global food prices during 2007 and 2008 are a result of the confluence of complex factors. Rising food prices have created problems for ordinary consumers. On the positive side, a rise in price of the agricultural products has improved India's terms of trade for agriculture. This combined with increased credit allocation for and increased investment in agriculture in the 11th Plan is likely to lift agriculture's growth rate in India. A lift in the ban on Futures' Trading will also help price discovery and help in the growth of the agricultural sector.

Quality issues have hampered India's ability to become a major grain exporter.<sup>24</sup> But the past tendencies to restrict exports for reasons other than the welfare of farmers continue to drive policy and make life difficult for farmers. In recent months, due to rising prices, the Indian government has banned export of certain agricultural products which has contributed to a steep rise in the price of some agricultural products in the neighboring countries. India's future economic growth also depends on the growth of its agriculture sector.

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24 A number of countries use sanitary and phytosanitary requirements to restrict agricultural imports (see Henson and Loader, 2001).



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