WORKING PAPER 45

Effects of Trade Liberalization on Agriculture in India: Commodity Aspects

Ramesh Chand

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The CGPRT Centre

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Abbreviations

BOP	Balance of payments
CACP	Commission on Agricultural Costs and Prices
CIF	Cost insurance and freight
FAO	Food and Agriculture Organization
FOB	Free on board
GATT	General Agreement on Tariffs and Trade
GCA	Gross cropped area
GDP	Gross domestic product
ha	Hectare
HYV	High yielding varieties
ICAR	Indian Council of Agricultural Research
kg	Kilogram
km	Kilometre
MIO	Market intervention operations
MNCs	Multi national companies
MSP	Minimum support price
NAFED	National Agricultural Cooperative Marketing Federation of India, Ltd.
NCAP	National Centre for Agricultural Economics and Policy Research
NDDB	National Dairy Development Board
NOTP	National Oilseed Technology Project
NPC	Nominal protection coefficient
OGL	Open general license
PDS	Public distribution scheme
QRs	Quantitative restrictions
R&M	Rapeseed and mustard
RPS	Retention price scheme
TE	Triennium ending
WTO	World Trade Organisation

Foreword

Responding to the growing concern for the effects of trade liberalization on regional agriculture, the CGPRT Centre has implemented a three-year research project "Effects of Trade Liberalization on Agriculture in Selected Asian Countries with Special Focus on CGPRT Crops (TradeLib)" since March 1997, in collaboration with partners from ten countries: China, India, Indonesia, Japan, Malaysia, Pakistan, the Philippines, the Republic of Korea, Thailand and Viet Nam. In all these countries, important issues regarding trade liberalization were investigated with an identical research framework by national experts.

The investigation covers major crops which might receive either favorable or unfavorable effects of trade liberalization both in export and import. I believe that the project will provide broad and practical knowledge on various aspects of the effects of trade liberalization; moreover, the information will be useful for researchers and policy planners not only in participating countries but also in other countries in the region. I would like to note that, however, since this project was conceived and started before the current currency and economic crisis began in the middle of 1997, the analysis handles basically the period before the crisis with available current information.

I am pleased to publish **Effects of Trade Liberalization on Agriculture in India: Commodity Aspects** as a report of the second phase of the country study of India. A report of the first phase of the country study, which includes institutional and structural aspects on the same subject, has been published before. I certainly hope these reports will be fully utilized for the improvement of agricultural trade and the encouragement of regional agriculture.

I thank Dr. Ramesh Chand of India for his intensive research and the National Centre for Agricultural Economic and Policy Research for allowing him to work with us and for providing continuous support. Dr. Boonjit Titapiwatanakun ably coordinated the various complex steps in the study. I would also like to express appreciation to the Government of Japan for funding the project.

Haruo Inagaki
Director
CGPRT Centre

Acknowledgements

The recent General Agreement on Tariffs and Trade (GATT), which culminated in the formation of the World Trade Organisation, requires all the member countries to adjust their trade and other policies as envisaged under GATT. An important obligation of WTO members is to liberalize trade by removal of quantitative restrictions on trade and reduction in tariff rates. This is expected to have far reaching implications on the agriculture sector, which has so far been guided mainly by policies based on domestic concerns. It was in this context that the UN/ESCAP CGPRT Centre, Bogor, Indonesia, sponsored the present study in selected Asian countries. We are grateful to the CGPRT Centre for including India as one of the countries in this study.

The study was conducted under the guidance of Dr. Dayanatha Jha, Director, National Centre for Agricultural Economics and Policy Research (NCAP), New Delhi. I wish to express my deep gratitude to Dr. Jha for providing support and for proposing my candidature to undertake this study.

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Ms. Sonia Chauhan ably helped in data collection and analysis and Ms. Umeeta Ahuja provided secretarial assistance for preparation of this report. Mr. Douglas Stoltz of the CGPRT Centre, Bogor, has taken the editing part. I am thankful to all of them.

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Executive Summary

India is a founder member of the World Trade Organization (WTO) and is thus committed in moving in the direction of liberalization of trade in agricultural commodities. Quantitative restrictions on imports are being phased out and exports are also being liberalized. Both agricultural exports as well as imports are now permitted through private trade, except for a few commodities. There is lot of anxiety, interest and apprehension about the impact that trade liberalization may have on producers, consumers and the economy. The present study is an attempt to analyze the impact of trade liberalization on selected commodities and locations and it reviews production, marketing and trade-related policy concerning these commodities. It also discusses the strategy and prospects of trade liberalization to meet WTO obligations.

The study focuses on four crops, namely paddy (rice), maize, chickpea and rapeseed-mustard. Of these, rice is the most important for food security of the country as it constitutes 44% of total foodgrain consumption. Rice is also the most important crop for farmers. It occupies 23% of the gross sown area of India, which is the highest among all the crops grown in the country. Traditionally, India used to export only Basmati rice but since 1991/92 non-Basmati rice has emerged as a significant export crop.

Maize is one of the important coarse cereals grown in India and it occupies an important share in the food basket of poor people. Rapeseed-mustard is the second most important oilseed crop grown in India. It is grown on about 6.66 million hectares, which constitutes one-fourth of the total area under all oilseeds grown in India. Rapeseed-mustard is mainly used for edible oil. There is a chronic shortage of edible oils in the country, which is met through large imports. According to some studies India does not have comparative advantage in producing edible oilseeds including rapeseed. Therefore, liberalization of trade is expected to encourage imports and decrease domestic prices of rapeseed-mustard. This crop represents the case where trade liberalization is going to have a negative effect on domestic production. Chickpea is the most popular among all pulses in India. It comprises about 30% of the area under all pulses in the country. There is a chronic shortage of pulses in the country, which is met through large imports.

The effects of trade liberalization on the four commodities were studied at the national level as well as at the farm level. The effect at the national level was studied by estimating the impact on wholesale and farm level prices and by estimating consumer surplus, producer surplus and net social welfare. To study the farm level effects of trade liberalization, partial budgets for each of the selected commodities were prepared using survey data for the chosen locations. The effect has been measured on crop income by substituting existing domestic prices with international reference prices for comparable quality produce.

Until 1991 export as well as import of the selected commodities has been subjected to various kinds of regulations and restrictions. There has been no restriction on export of Basmati rice, but common rice was subject to canalization, minimum export price and export quota until 1991. Restrictions on export of common rice were somewhat relaxed during 1992 following initiation of economic reform programmes in June 1991. A major boost to rice export occurred during 1995/96 when under a major policy change the government of India decided to release 2 million tons of rice for export. Due to a comfortable situation on the food front, quantitative ceilings on exports have now been abolished. There is no duty on import of rice.

There has been no special policy for import-export of maize, nor is this crop considered very important from the trade point of view. Like other cereals, maize export and import have

been subject to several restrictions, except for feed grade maize for poultry or animals. There is no duty on import of maize.

Due to a growing imbalance between demand and supply of edible oilseeds in the post green revolution period, India had to import a massive amount of edible oil, which constituted 30% of the total supply by the mid 1980s. Prior to 1994 the oilseed sector was protected through QRs on imports and exports and imports were canalised through state agencies. Domestic prices of oilseeds were maintained at more than double the world prices. In 1995 rapeseed-mustard oil was put under OGL at an import tariff of 30%. The tariff has been further reduced in stages to the present level of 15%. Trade policy on rapeseed/mustard and edible oils has been caught between two opposing viewpoints. According to one viewpoint India would benefit by liberalizing import of rapeseed-mustard oil and other edible oils as their domestic prices have been higher than world reference prices for several years. According to the second viewpoint the policy of import liberalization would have an adverse impact on the oilseed sector and Indian producers. It is asserted that world prices of rapeseed/mustard are low because U.S. and Europe provide large direct and indirect subsidies to the producers, so world prices are not an appropriate yardstick for comparison with Indian prices.

Despite a highly favourable resource cost ratio and high domestic profitability, chickpea area and production did not show any perceptible growth during the last 20 years. While chickpea export is restricted, its import is free and is regulated mainly through tariffs which are also quite low at present.

As such, there is no discernible impact of liberalization of the rice trade and rise in its export during the last six years on acreage allocated to rice and its output. One reason for this could be that the benefit of rice export has not percolated down to producers in terms of higher prices and income.

The impact of trade liberalization on the selected commodities has been analysed for two situations: first, if trade were liberalized in the past, how would it have affected domestic prices during the last six years; and second, by comparing a base scenario represented by the triennium ending 1996/97 with a free trade scenario as it existed in this period and projected multi-lateral free trade scenario with full compliance with the Uruguay Round agreement.

A comparison between domestic and international prices of selected commodities during the recent four years shows that international prices of rice of comparable grade have been more than one-third higher than the domestic price. There is no clear difference between international and domestic prices of maize. In some years the domestic price is lower and in other years it is higher than the international price. The position of rapeseed-mustard oil is the opposite of rice. Per ton prices of rapeseed-mustard in the country ranged between $839.3 and $962.3 during 1994 to 1997 while international prices varied between $557 and $617. In the case of chickpea there is tremendous inter and intra year instability in domestic prices, so it is difficult to say whether international prices are consistently lower/higher than the domestic prices.

A comparison of international and domestic prices sometimes does not indicate trade possibilities since freight, insurance and related charges can make a significant difference to price. Accordingly, prices were compared using the CIF price for importable commodities and the FOB price for exportable commodities.

Comparison of domestic wholesale prices with CIF world prices for importables and FOB world prices for exportables relevant to India reveals that liberalization of agricultural trade would lead to an increase in export of rice and maize. On the other hand, trade liberalization would lead to large-scale import of rapeseed-mustard oil. Thus, one can expect that domestic prices of rice and maize would go up and that of rapeseed mustard oil would go down because of trade liberalization. This may have further adverse effects on rapeseed-mustard area, output and its producers, whereas rice and maize area, output and producers may be affected favourably. In the case of chickpea, it appears that trade liberalization would not

have significant impact on domestic prices and production. Import would continue to fill the gap between domestic demand and supply without seriously affecting domestic production.

Year-wise comparison indicates considerable volatility in the international price of rice, whereas the domestic price has maintained a steady trend. Unlike rice, the domestic price of maize shows oscillations in price. The volatility in FOB export price was found to be much larger than in the domestic price. The CIF price of rapeseed-mustard oil imported by India showed violent fluctuations. In fact this fluctuation is not in the international price. The actual CIF price of rapeseed-mustard oil imported by India was found to be quite high compared to the imputed CIF price derived by adding freight charges to the international price. The reason for this seems to be that India is not a stable importer of rapeseed-mustard oil and the quantity imported varies considerably depending upon the domestic supply situation. The country does not have a stable trading source or partner for the import and there is not sufficient planning of imports. As a result when a shortfall in domestic market is felt the country resorts to panic buying for fear of a violent rise in domestic prices. With proper and advance planning, the country can have access to cheaper imports compared to what it has been paying.

India is big importer of pulses including chickpea. However, domestic prices of chickpea in the wholesale market of the biggest producing state were lower than the CIF price at port in three out of the six years. When internal cost is added to the landed cost, then the import price turns out to be higher than the domestic price only in one out of six years. It may appear ironical that import of chickpea took place when domestic prices were lower than the CIF import price. One explanation for this seems to be that there is considerable intra year and inter market variation in chickpea prices in the country and imports are undertaken to keep a check or to take advantage of peak prices in the lean months in some of the markets.

In the ex ante analysis we have estimated the impact of trade liberalization on prices in the baseline scenario which is taken as an average of the triennium ending 1996/97. The impact is studied in two ways:

- assuming unilateral free trade by the country in which there is no restriction on imports and exports: this would imply that domestic prices would be equated to corresponding CIF or FOB prices during TE 1996/97, adjusted for internal marketing and transport cost. This has been termed the baseline scenario with liberalization.
- the other scenario refers to year 2000 and assumes multilateral trade liberalization with full Uruguay agreement impact, in which subsidies, etc. are removed as envisaged in the Uruguay round. This would entail an increase in international prices by 7% in the case of rice and 4% in the case of maize and rapeseed-mustard oil.

For rice, the reference price in the base scenario arrived at by adding internal costs to domestic price works out to be Rs. 8,548 per ton while the FOB price was Rs. 8,653. Corresponding to this FOB price the domestic price works out to be Rs. 7,684. This shows that if trade were liberalized the domestic rice price would go up by 1.39% and the farm level price of paddy would rise by 1.45% in the base scenario. The impact is quite strong in the free trade scenario with full Uruguay impact, which envisages a 7% rise in international prices and thus makes exports more attractive. Under free trade this would result in a 9.38% increase in the rice price and a 9.81% rise in the farm level price of paddy in India.

The impact of freeing export on maize prices is very strong. In the base scenario trade liberalization involves about a 21% increase in domestic wholesale and farm level prices. Multilateral free trade with full Uruguay impact would raise the base level wholesale price by more than 25%.

Free import of rapeseed-mustard oil in the base scenario would have rendered this edible oil cheaper by 18%. Similarly, prices received by farmers for rapeseed-mustard seed would go down by about 16%. In the second scenario, in which the international price increases by 4%,

the domestic price of edible oil falls by 14.75% and the farm level price of seed declines by 13%.

Changes in consumer surplus and producer surplus were estimated from changes in prices due to liberalization and resulting changes in demand and supply. Liberalization of rice export in the baseline scenario would have a very small impact on the producer price and hence on supply. This would result in an increase in producer's surplus by Rs. 7,237 million. The impact on consumer surplus is Rs. 7,545 million, which shows there would be a decline in net social gain due to liberalization in the base scenario. Under multilateral free trade the difference in producer's gain and loss in consumer surplus would increase further. These calculations demonstrate that free trade in rice would lead to a small net social loss to the country. In the case of maize, liberalization of trade is found to be highly beneficial to the country. The gain to producers is almost double the loss to consumers due to the price rise.

In the case of rapeseed-mustard, when the domestic price of its oil is equated to the relevant import price and the required change is incorporated in the seed price, the net social welfare improves by Rs. 563 million. In the second scenario international prices increase by 4% and the difference between CIF and domestic prices is narrowed down. The net social gain still remains positive, but is less than in the base scenario.

It was observed that results based on a single year price can lead to misleading conclusions because of considerable year to year variation in domestic as well as international prices. Also, the impact of trade liberalization would not be uniform across commodities.

The study shows that implementation of WTO would have a mixed impact on net social welfare of India. The country would be a net winner in some commodities and it would be a net loser in some other commodities.

The impact of different levels of trade liberalization and removal of subsidies on farm level income was studied by preparing partial budgets based on primary data taken from representative locations. Gross returns from paddy production increased from Rs. 19,006 per hectare in the base scenario to Rs. 19,282 under free trade prices of the base scenario and further to Rs. 20,870 in the free trade scenario with full Uruguay impact. However, when subsidies are removed along with free trade then the gross return without liberalization is higher than the gross return under free trade. A similar pattern holds for the net income. Reduction in income due to removal of input subsidies in rice production would not be compensated for by the access to international prices under free trade.

Trade liberalization in the base scenario increased net returns from maize cultivation by Rs. 1,007, while the increase due to free trade with full WTO impact is Rs. 1,279. The domestic subsidy for maize is Rs. 729, which is lower than the gain from trade liberalization.

In the case of rapeseed-mustard, liberalization of oil imports would reduce the net return to farmers by 25% of the existing net returns. Along with this, if subsidies are removed, the net return declines by about 35%. As multi lateral trade liberalization takes place leading to a rise in international prices, the adverse impact on net returns would be reduced.

For selected crops, free trade is estimated to have sharp positive impact on net returns from production of exportables such as maize and rice, whereas it is going to have a small negative impact on net returns from the importables such as rapeseed-mustard. In rice where the input subsidy is high, free trade would not be sufficient to counter the adverse impact on income due to withdrawal of subsidies. It can be concluded from the above analysis that trade liberalization is a mixed bag and its impact would vary from commodity to commodity.

The study shows that implementation of WTO would have a mixed impact on net social welfare of India. The country would be a net winner in some commodities and it would be a net loser in some other commodities. For selected crops, free trade is estimated to have a sharp positive impact on net return from production of exportables such as maize and rice, whereas it is going to have a small negative impact on net returns from the importables such as rapeseed-mustard. In rice where the level of input subsidy is high, free trade would not be sufficient to

counter the adverse impact on income due to withdrawal of subsidies. Trade liberalization is a mixed bag and its impact would vary from commodity to commodity. There is considerable scope for increasing benefits due to trade liberalisation by reducing domestic marketing costs and by tapping proper markets for imports.

In our opinion, signals from the ratio of domestic to global prices should not be stretched too far. There should not be major policy shifts for important crops like foodgrains and oilseeds based on global price signals. Agriculture should be subjected to world competition, but domestic policy support must continue. The policy of attaining self-sufficiency in oilseeds should also emphasize improvement in resource use efficiency through technological improvements.

The challenges due to import liberalization cannot be met through trade policy changes alone, nor can trade policy in itself help in taking advantage of export in a liberalized world. Both of these would depend on the growth rate in domestic output and production efficiency built in to cost of production. If domestic output does not grow to keep pace with domestic demand then domestic prices would go up, which would be attractive for imports and unfavourable for exports. Similarly, if the cost of production in the domestic market were sufficiently higher than in competing countries, this would attract imports and discourage exports. The best strategy to face the challenge of import liberalization and to take advantage of export potential would be to ensure that (i) growth in aggregate domestic supply is higher than 2.75%, which is estimated to be the growth rate in domestic demand, and (ii) there is continuous improvement in efficiency of production to keep the cost of production low.

Along with trade policy reforms, attention needs to be given to domestic market reforms to improve competitiveness of the country's agriculture and to improve long term growth prospects.

There are formal as well as informal restrictions on inter state movement of agricultural produce, stocking and trading. The consequences of this are slow movement of produce from surplus to deficit markets, low market integration, depressed prices in producing areas and high prices for consuming areas. There are several government regulations such as the Essential Commodities Act (1956), stock limit, credit control, etc. which were meant to deal with scarcity situations and to curb the activity of hoarders. These regulations need to be modified to encourage increased participation of the private sector in agricultural trade and commerce. The idea is not to allow a free ride to the private sector, but to allow more room for market manoeuvring. Under the provision of levy, millers are required to sell part of the rice and sugar they mill to the government at a price derived from the procurement price. The levy on rice is as high as 75% in agriculturally progressive northern states. Millers often complain that after contributing as much as 75% of their rice at a price which is often below open market price, they are left with little produce to run their business and thus are at a disadvantage compared to their counterparts in other countries. Removal of the levy on the export quantity would provide a level playing field to India's rice exporters.

The agricultural trade of India has been significantly affected by the financial crisis that hit Southeast Asian economies in 1997. India's agricultural exports to the four crisis ridden countries had been growing rapidly until 1997. During 1997/98 after the crisis hit these economies, India's agricultural exports plummeted by 22% compared to the previous year. This decline is a result of both very high devaluation of the currencies of the crisis-hit countries and worsening of their economic conditions.

Like agricultural exports, there has been a marked decline in total exports from India to all the four Southeast Asian countries, whereas imports from these countries increased significantly due to exchange rate developments. Exports to the four countries during the period April-December 1998 declined by almost half over the corresponding period in 1997. There has been a slowdown in exports to other countries also, which can be partly attributed to an indirect effect on India's export due to the effect of the crisis on the rest of the world. Depreciation of

Southeast Asian currencies has adversely affected India's exports and balance of payments. Due to this depreciation, competition for export from India has increased, which has implications for exports and the economy.

1. Introduction

1.1 Background

The decade of the 1990s has thrown two serious challenges to Indian agriculture. One concerns growth and the second concerns efficiency of production. Agricultural GDP during the 1980s witnessed a growth of more than 3% per annum, which has outstripped population growth and enabled the country to substitute import of foodgrains and attain food security at the national level (Vyas 1994). However, this growth rate could not be maintained during the first eight years of the 1990s (Misra 1998; Bhide et al. 1998) despite the improvement in terms of trade for agriculture as a sequel to economic reforms initiated in 1991. What has happened in agriculture is in contrast to non-agricultural GDP, which witnessed acceleration in growth (Table 1.1).

The slowdown in agricultural growth not only affects agricultural income and growth of the economy but also affects self-reliance and self-sufficiency in agricultural products acquired after a hard struggle of five decades.

The post GATT world environment and India's obligations to meet WTO requirements pose the second challenge. The most important aspect of this is liberalization of agricultural trade exposing Indian agriculture to global competition, in imports as well as exports. Fears have been expressed that liberalization of agricultural imports would adversely affect Indian farmers and growth prospects of Indian agriculture. Similarly, free export may jeopardize food security of the country through a shift in favour of high value crops (Patnaik 1996).

Domestic demand for most agricultural commodities is expected to increase at an annual rate of about 2.75%, about 1.75% on account of population growth and 1% on account of increase in per capita income. Hence, domestic agricultural output must grow by at least 2.75% per annum to prevent imports from becoming necessary to meet domestic demand. However, this is only a necessary condition for preventing dependence on imports. The sufficient condition is that cost of production and domestic prices must not be higher than in those countries from which import is directed to the domestic economy. The implication of this is very clear. The required growth rate in output should take place in a cost-effective manner such that domestic products are more competitive than imports.

Table 1.1 Growth rates of food crops, non-food crops, all commodities, GDP and population in different periods.

Period	Food-Grains	Non-Food Crops	All Crops	GDP (Agri)	GDP (Non-agri)	Population
1967/68 to 1980/81	2.13	2.23	2.17	2.21	4.06	2.25
1980/81 to 1990/91	3.00	4.08	3.40	3.28	6.38	2.11
1990/91 to 1997/98	1.69	3.18	2.26	2.97*	6.91*	1.77

* Refers to period 1990-91 to 1996-97.

Note: 1. Growth rates are derived from semi-log trend equations.

2. For foodgrains, non-food crops and all crops index number with base triennium ending 1981/82=100.
GDP Agriculture and GDP non-agriculture are measured in value terms at constant prices of the year 1980-81.

Source of basic data: Agricultural Statistics at a Glance, March 1998, Government of India, New Delhi.

Producing at a lower cost is equally important to tap the world market for export. When we compare the strength of India's agriculture with agriculture in the developed world, it is found that the latter enjoys advantages in terms of scale, infrastructure and capital. Agriculture in the developed world is at a disadvantage in respect to labour (wage rate), which is available at a relatively cheap rate in developing countries like India. However, Indian agriculture is at a

disadvantage in terms of scale, infrastructure and capital. Future agriculture policy and strategy must address the disadvantages faced by Indian agriculture vis a vis the developed world. Facing the challenges of growth and efficiency and taking advantage of new opportunities offered by the post GATT situation will require suitable reforms in trade policy and infrastructural and institutional interventions.

India signed the GATT treaty on 15th April 1994 at Marakesh and is a founder member of the World Trade Organization (WTO) which is entrusted with implementation of various provisions of GATT. This commits the country to adjusting its domestic and international trade policies to meet WTO obligations. The new treaty has included for the first time an agreement on agriculture under which the members are required to adjust their policies and to undertake reforms in four areas mainly (i) market access (ii) domestic support (iii) export competition/subsidy and (iv) sanitary and phyto-sanitary measures.

In the area of market access the member countries are under obligation to (i) dismantle all physical barriers or quantitative restrictions (QRs) like quotas, bans, etc. on imports and exports and replace these by bound tariffs, and (ii) reduce tariff levels by 24% in 10 years in the case of developing countries and by 36% in 5 years in the case of developed countries. Accordingly, India is slowly adjusting its policies to meet WTO obligations and is moving in the direction of liberalization of trade in agricultural commodities. Quantitative restrictions on imports are being phased out and exports are also being liberalized. Both agricultural exports and imports are now being permitted through private trade, except for a few commodities.

The ongoing process of trade liberalization is not going to be uniform across commodities, regions and different sections of the population. The impact is expected to vary from crop to crop, region to region and over producers and consumers. The impact would also depend upon domestic policies concerning production and marketing of different commodities.

In the first phase of this study we analyzed direction and trend in trade in agricultural commodities and discussed trade regime, trade policies followed by the country and related aspects at the aggregate level. This phase focuses on the impact of trade liberalization on specific commodities and locations.

1.2 Objectives

The objectives are:

- to discuss domestic policy concerning production, marketing and trade for selected commodities,
- to analyze impact of trade liberalization on selected commodities at the national level,
- to study the effect of trade liberalization on selected commodities at the farm level, and
- to discuss prospects and strategies for liberalization of trade in agricultural commodities.

1.3 Outline of the study

The study has been carried out in two phases. The first part termed the “institutional study” presented a history of the trade regime, government policies on agriculture and trade towards 2000, infrastructure for trade, trend and directions of agricultural trade, trade indicators and current issues concerning trade liberalization. A summary of the first part of the study is presented in the next section. The second part (i.e. the present study) concentrates on specific commodities and specific locations selected for detailed analysis. It analyses the impacts of trade liberalization on selected commodities and reviews production, marketing and trade-related policy for them. The prospects of trade liberalization to meet WTO obligations and the strategy to meet this situation are discussed towards the end.

1.4 Summary of the institutional and policy review study

The first phase of this study focused on institutional and policy aspects of trade liberalization in the country, and it has already been published as a working paper by the CGPRT Centre (Chand 1998). As the institutional and policy aspects are quite important for understanding ongoing liberalization and its impacts, a summary of the first phase of the study is presented below.

Agriculture is described as the backbone of the Indian economy as it constitutes the largest share of the country's national income and provides employment to about two-thirds of the workforce of the country. Agriculture in India is in the hands of millions of peasant households, most of which comprise tiny land holdings with a preponderance of owner cultivation. There is hardly any direct government intervention in the production and investment decisions of farmers, but the government does influence the legal, material and economic environment in which farmers operate. Agricultural policy followed during the last four and a half decades can be broadly distinguished in three phases. The period from 1950/51 to the mid 1960s, which is also called the pre green revolution period, witnessed tremendous agrarian reform, institutional changes and development of major irrigation projects. Intermediary landlordism was abolished, and tenant operations were given security of farming and ownership of land. Land ceiling acts were imposed by all states to eliminate large holdings and cooperative institutions were strengthened to minimize exploitation of cultivators by private moneylenders and traders. Land consolidation was also affected to reduce the number of land fragments.

The country faced severe food shortages and crises in the early 1960s, which forced policy-makers to realize that continuous reliance on food imports and aid imposed heavy costs in terms of political pressure and economic instability, and there was a desperate search for a quick breakthrough in agricultural production. Amidst a serious debate the government took a bold decision to go for the import and dissemination of high-yielding varieties (HYV) of wheat and rice, which involved use of fertilizers and irrigation. This marked the second phase of agricultural policy in the country. This strategy produced quick results, as there was a quantum jump in yield. The biggest achievement of the new agricultural strategy, also known as green revolution technology, was attainment of self-sufficiency in foodgrains. Since the green revolution technology involved use of modern farm inputs, its spread led to fast growth in the agro-input industry. Agrarian reforms during this period took a back seat while research, extension, input supply, credit, marketing, price support and spread of technology were the prime concerns of policy-makers.

The next phase in Indian agriculture began in the early 1980s. While there was a clear change in economic policy towards delicensing and deregulation in the industrial sector, agricultural policy lacked direction and was marked by confusion. Agricultural growth accompanied by increase in real farm income led to the emergence of interest groups and lobbies, which started influencing farm policy in the country. There was a considerable increase in subsidies and support to the agricultural sector during this period, while public sector spending in agriculture for infrastructure development started showing a decline in real terms, but investments by farmers kept increasing. The output growth, which was hitherto concentrated in very narrow pockets, became broad-based and got momentum. The rural economy started witnessing the process of diversification, which resulted in fast growth in non-foodgrain output such as milk, fishery, poultry, vegetables and fruits, which accelerated growth in agricultural GDP during the 1980s. This growth seems largely market-driven.

India embraced a new economic policy in 1991 in the wake of compelling domestic economic factors. The country at that time was suffering from serious fiscal indiscipline and a severe balance of payments crisis. The new policy adopted at that time consisted of two components: (i) short-term stabilization measures, which included reduction of fiscal deficit,

devaluation of its currency (rupee), and dismantling of barriers to the free flow of foreign capital; and (ii) medium-term structural programmes involving reforms in fiscal policy, exchange rate policy, trade and industrial policy and policies on financial sector reform and capital market reforms. This period coincided with the new GATT treaty, which makes it obligatory for member countries to reorient their domestic as well as external trade policies consistent with the GATT agreement. Thus, the new economic policy had to meet the twin objectives of adjusting to domestic needs and changes in the international scene.

A new export-import policy for 1992-1997 was also announced. The main feature of the policy was liberalization of trade, except for a small negative list of imports and exports. Agricultural exports and imports in the country were until recently strictly regulated through quantitative restrictions such as quotas and licenses or channeled through some trading organization or some combination of both. With the new trade policy initiated in 1991, three major changes were effected in agricultural export-import. One, channeling of trade was abandoned and now government does not determine the value or nature of imports or exports, except for a few items. Two, most of the quantitative restrictions on agricultural trade flows have been dismantled. Three, there is some reduction in tariffs. The policy of trade liberalization has provided impetus to agricultural exports, which have registered remarkable growth during the last four-five years. Export of agricultural and allied products has risen from $ 3,029 million in 1992/93 to $ 6,759 million during 1996/97.

Economic reforms introduced in India since 1991 and policy changes effected in the light of obligations to WTO focused mainly on industry. Nevertheless, the agricultural sector has been affected by the reforms through adjustment in exchange rates, which has a bearing on agricultural exports and on input - output prices. A strong feeling has emerged in the country that the agricultural sector should not be kept outside the purview of direct reforms.

The opinion on whether India should go for globalization and liberalization of its agriculture is at present sharply divided. Those who support trade liberalization of Indian agriculture argue that India has a strong comparative advantage in agriculture over most of the developed world and that WTO-induced trade liberalization has made agricultural exports more attractive and remunerative. This advantage is said to be strong in the case of high value crops such as fruits, floriculture products and vegetables, Basmati rice, and cotton. Opening up trade in these crops has already shown that there is considerable potential to promote exports of such crops. On the other hand, those opposing globalization of Indian agriculture assert that liberalization of agricultural trade would destabilize prices and expose Indian markets to violent fluctuations in the international market. It is also feared that liberalization of agricultural exports would change the crop pattern away from food, and one-third of country's population is below the poverty line and cannot afford to buy adequate foodgrains even with the existing price structure. There are also fears that liberalization will result in a steep hike in foodgrain prices and jeopardize food security and that promotion of export-oriented crops in some parts of the country will adversely affect marginal and small farmers.

Notwithstanding this unresolved debate concerning liberalization of agriculture, the Indian government during the last four-five years has taken bold initiatives to promote farm exports. India is also adjusting, albeit slowly, its policies to meet WTO requirements. The export-import policy, which is announced every five years, shows that several restrictions in free import and export of agricultural commodities have been removed or made less stringent for the period 1997-2002.

Despite the sharp division of opinion concerning the desirability of liberalization of agricultural trade, India has been marching ahead towards a liberalized trade environment.

Although India enjoys several advantages in export, in the post GATT period international trade would become highly competitive and the competitive advantage would be lost to the infrastructural advantage prevalent in competing countries. Thus, full realization of positive impacts and minimization of adverse impacts due to imports, if any, would require

infrastructure for efficient movement, handling, packaging and processing, and trade network and information dissemination systems. Building infrastructure is also important to improve production efficiency, which acquires greater relevance in a globally competitive environment and also because our existing productivity levels are awfully low compared to the competing countries.

The trade liberalization policy shows clear positive impact on export of non-Basmati rice, marine products and oilmeal. There were some relaxations such as abolition of minimum export price, decanalisation, and removal of bans and quotas for these commodities, particularly rice, which contributed to the emergence of non-Basmati rice as an important export item. Processed fruit products are also believed to have great potential for exports, and some incentives have been provided to the fruit processing industry to encourage the exports. Total agricultural exports more than doubled in a short span of three-four years after economic reforms. This is a clear indication that the indirect effect of trade liberalization, exchange rate adjustments and effects of relaxation in government controls and restrictions on agricultural exports are positive and significant.

Import of rice in value terms declined from $170 million in 1989-90 to nil in the last two years. However, India continued to be an occasional importer of sizeable quantities of wheat following poor domestic harvests. Among all agricultural commodities, oilseeds comprise the largest share in imports in most years during the last decade. This is happening despite a spurt in edible oilseed output in recent years. Nearly half of the agricultural imports consist of fertilizer imports in most years.

There is tremendous year to year variation in India's trading partners and the volume of trade with them for most agricultural commodities. The reason for this is that for most agricultural commodities exports are not planned; they are residual instead. Due to the lack of planned and sustained exports it has been difficult to maintain a hold on overseas markets.

India's exports increased steadily from 10,000 million dollars in 1986-87 to about 33 thousand million dollars in 1996-97. Imports also showed a rising trend throughout and reached a figure of 38.5 thousand million dollars. Since imports remained higher than exports throughout, the trade balance has remained negative. The trade balance was about 6 thousand million dollars in 1986-87 and again in 1990-91, when India suffered from serious BOP problems. The economic reforms initiated in mid 1991 improved the trade balance for a few years, but data for the most recent two years indicate that the trade balance has again started to deteriorate.

India continued to have a negative trade balance since the beginning of the era of planned development in 1950/51. The ratio of the trade balance to the country's GDP at current prices in the domestic economy was close to 3% in 1986/87 and it was 2.23% in 1990/91. The year 1991/92, when economic reforms were started and the rupee was devalued, witnessed a sharp drop in trade deficit to the level 0.69% of GDP. The trade gap further declined to 0.46% of GDP in 1993/94, but showed a sharp rise thereafter. In 1995/96 the trade deficit was 1.66% of GDP which showed further deterioration in the next year.

There has been a constantly rising trend during the last 11 years in the proportion of exports to GDP. From a modest level of 4.79%, the ratio of export to GDP rose to about 8% in 1991/92 and gained further momentum as economic reforms progressed. At present, India's exports account for 11.24% of its GDP.

The ratio of total imports to GDP also followed a rising trend, but growth in imports was lower than the growth in exports when we consider the entire period from 1985-86 to 1996-97. The ratio of imports to GDP has risen from 7.73% during 1986-87 to 13.10% in 1996-97. Between 1991-92 and 1996-97 the ratio of imports to GDP witnessed higher growth compared to the ratio of exports to GDP.

Agricultural exports comprised about 27% of the total exports from India during 1986-87 and the share dropped sharply during the following two years. Agricultural export in the

latest year comprised 20% of the total exports from India and the balance (80%) consisted of non-agricultural exports. The value of agricultural exports remained below 1.32% of the total export value until 1990/91, but thereafter the ratio showed some increase. In the latest year agricultural exports comprised 2.07% of total GDP. The proportion of agricultural exports in agricultural GDP remained below 6% until 1994/95 and in the next year it rose to 7.44%.

The share of agricultural imports in total imports was around 10% in 1986/87 and it rose to 13% in 1988-89. During 1989/90 to 1991/92 the ratio kept falling, and after that it fluctuated between 5.65 and 8.88%. Except in the year 1988/89, agricultural imports varied between 2 and 2.5% of GDP of the agriculture sector during the pre-reform period. During the economic reforms period the ratio of agricultural imports to agricultural GDP exceeded 3% in the latest two years.

India initiated the economic reform programme in a big way in June 1991 under great economic stress due to BOP problems and a fiscal crisis. There was a lot of opposition to the reforms at that time and also to trade liberalization in response to the GATT accord. However, an accelerated growth rate of the economy during the reform period, a comfortable BOP position, a decline in the rate of inflation and a smooth economic transition in adjusting to liberalization and globalization have won some admiration and support in the country for these policies. Hopes have been raised about the agricultural export potential and commercial producers are keenly waiting to reap benefits of higher prices in export markets. However, this will have implications for domestic consumers. Policies have to be designed to counter adverse impacts of diverting land and other resources to export-oriented production.

India is under great pressure to remove quantitative restrictions on imports as the western countries supported by Australia have moved to WTO against such restrictions. As a result of stringent measures undertaken under the reform process, the country has been able to accumulate relatively large foreign exchange reserves and maintain its balance of payments for some time. This is being used as a plea by the western world to stop India from seeking a concession from WTO to maintain QRs on selected items for some more years. This is a setback to the reform process as the country could dilute this gain easily by using foreign exchange reserves for infrastructure development, which is starving for funds. Moreover, the easy position of foreign exchange reserves for a short time should not be treated as a permanent feature. Another irritant to the liberalization process is the ban on Indian exports by some western countries on the grounds of sanitary and phyto-sanitary conditions, environmental safety, use of child labour in production, etc.

The impact of globalization of agriculture on natural resources, long-term productivity, crop pattern and nutritional intake of vulnerable sections of the society is another important issue. Liberalization should result in growth with a human face. There are also demands for a level playing field in agricultural support as some developed countries are providing far more subsidies to their farmers, which puts them in an advantageous position compared to their counterparts in countries like India.

For the success of external liberalization, internal liberalization is said to be essential. External liberalization may not produce its full impact if domestic reforms such as removal of excessive and unnecessary government controls, rationalization of domestic policies on land lease, land markets, produce movement, private sector participation in agriculture, etc. are not undertaken.

There is strong pressure on the country to liberalize agricultural imports. This would subject domestic producers to competition from international agriculture, which enjoys access to cheap capital, sound infrastructure and scale advantage. To face this situation there is a need to increase productivity and efficiency.

There are signals that the agricultural sector has started responding to economic reforms initiated in the country. The crop pattern is becoming diversified with a shift away from foodgrain crops towards high value, in some cases export-oriented, crops. This has implications

for food security in the country. The growth rate in foodgrain production in the post economic reform period has declined to 2.5%, which is lowest ever realized in the post independence period. This development is depressing when viewed in the light of the existing nutritional intake and future demand for foodgrains.

2. Effects of Trade Liberalization on Production, Marketing and Demand of Selected Commodities

Trade liberalization is expected to affect different commodities in different ways. Some commodities may be affected positively, some negatively, while some may not be affected to a significant extent. The impact of liberalization would not only be on import and export, but also on production and marketing aspects. Similarly, trade liberalization through its impact on crop prices would affect domestic producers as well as consumers. The present chapter, which analyses such aspects, is organized into four sections. The first section discusses selection of commodities for the study and presents methodology used in the analysis. Production, marketing and trade-related policy for the selected commodities are presented in the second section. Effects of trade liberalization on the selected commodities at the national level are estimated and analyzed in detail in the third section, including effects on production response, trade volume, trade competitiveness, domestic prices, consumers and producers. The last section discusses the impact of the financial crisis in East Asian economies on India's trade.

2.1 Selection of commodities and analytical tools

The study focuses on four crops namely paddy (rice), maize, chickpea and rapeseed-mustard. Each crop was selected based on different considerations. Rice is the most important from the food security point of view as it constitutes 44% of total foodgrain consumption in the country. Rice is also the most important crop for farmers as it occupies 23% of gross sown area of India, which is the highest among all the crops grown in the country. On the basis of available studies, rice is expected to be positively influenced by trade liberalization. Rice has emerged as significant export crop after liberalization of its trade.

Maize is one of the most important coarse cereals grown in India and it occupies a major share in the food basket of poor people. Maize is also important for animal feed, demand for which is growing fairly rapidly.

Rapeseed-mustard is the second most important oilseed crop grown in India. It is grown on about 6.66 million hectares, which constitutes 25% of the total area under all oilseeds in India. Rapeseed-mustard is mainly used as edible oil after crushing and its oil is the major edible oil consumed in the country. The cake is consumed domestically as livestock feed and it is also exported. There is a chronic shortage of edible oil in the country, which is met through large imports. In order to attain self-sufficiency in edible oils the government is emphasizing on increasing area as well as productivity of oilseed crops. According to some studies India does not have any comparative advantage in producing edible oilseeds. Therefore, liberalization of trade is expected to encourage imports and decrease domestic prices of rapeseed. Rapeseed-mustard represents the case where trade liberalization is going to have a negative effect on domestic production.

Chickpea is the most popular of all pulses in India. It is grown on about seven million hectares, which comprises about 30% of the area under pulses in the country. Its production varies around 5 million tons, which constitutes about 38% of pulse production in the country. There is a chronic shortage of pulses, which is met through large imports.

The effect of trade liberalization in respect of the four commodities has been studied at the national level as well as at the farm level.

2.1.1 Analytical tools

The effect of trade liberalization on selected commodities at the national level was studied in two ways, (i) by estimating changes in the level of protection given to each commodity, and (ii) by estimating the impact of free trade on domestic wholesale and farm level prices and on consumer surplus, producer surplus and net social welfare.

The level of protection and other impacts have been estimated under exportable or importable hypotheses depending upon whether the country is a net exporter or a net importer of the commodity. The level of protection given to a commodity has been studied by estimating the net protection coefficient (NPC) as:

$NPC_i = P_i^d / P_i^b$

Where:

P_i^d = Domestic wholesale price of 'i' th commodity

P_i^b = Border price (CIF or FOB) of 'i' th commodity

When there is no protection given to the commodity, its domestic price is equal to its border (CIF or FOB) price and NPC is equal to one. A NPC more than one indicates the extent of protection given to the commodity; trade liberalization in this situation would reduce the domestic price. Conversely, when NPC is less than one, it indicates that the extent of disprotection for the commodity and trade liberalization in this situation would raise the domestic price.

The impact of trade liberalization on domestic prices has been studied by computing reference prices that take into account costs of marketing, transport, etc. within the country between the port and the central market for the selected commodity.

The likely effects of trade liberalization on producers, consumers and net social welfare are estimated by following standard approaches of measuring consumer surplus and producer surplus. This has been done by first estimating domestic demand and supply functions for the selected commodities using the following model:

$D_i = f[P_{it}, P_{ot}, I_t]$

$S_i = f[P_{it}, P_{ot}, T_t, W]$

D_{it} = Quantity demanded for ith commodity in 't' th year

S_i = Supply of 'i'th commodity in 't' th year

P_{it} = Price of 'i'th commodity in 't' th year

P_{ot} = Price of other (substitute) commodity in 't' th year

I_t = Per capita income in 't' th year at constant prices

T = Time trend (T = 1……n)

W= Weather parameter.

P_{it}, P_{ot} used in the demand function refers to the wholesale price of the commodity in a central market, while prices used in the supply function refer to farm harvest prices.

In the second step, the impacts of trade liberalization such as change in tariff on consumer price (P_c) and producer price (P_f) are measured under using a price linkage equation:

P_c = International reference price (P^b) + Tariff + Transfer Cost

$P_f = a + b P_c$

To study the farm level effects of trade liberalization, partial budgets for each of the selected commodities have been prepared using the survey data for the chosen locations. The effect has been measured on crop income by substituting existing domestic prices by international reference prices for comparable quality of produce. Similarly, gain or loss in crop income due to trade liberalization has been compared with impact due to removal of domestic input subsidies.

2.2 Crucial production, marketing and trade-related policy on selected commodities

Among the selected crops, rice is the staple food for most of the Indian population and it is grown on about 23% of gross cultivated area of the country. During the last quarter of the century, area under rice cultivation has increased by about 14%, while its production has increased by about 90%, owing to a sharp increase in yield. Area under maize cultivation remained stagnant around 6 million hectares since 1970/71 (Table 2.1), while its production witnessed about 25% rise until 1996/97.

Area under rapeseed-mustard has witnessed tremendous increase during the last 15 years. At present this crop is grown on about 6.7 million hectares, which is double the area during 1970/71. In a short span of 16 years since 1980/81, mustard output has increased from 2.3 million tons to 6.9 million tons. Table 2.1 shows the annual compound growth rate of about 7%.

Table 2.1 Area and production of selected crops.

Particular	1970/71	1980/81	1990/91	1996/97
Area (million hectares)				
Rice	37.6	40.1	42.7	43.3
Maize	5.8	6.0	5.9	6.2
All cereals	101.8	104.2	103.2	101.3
Rapeseed-mustard	3.3	4.1	5.8	6.9
Chickpea	7.8	6.6	7.5	7.1
All Pulses	22.6	22.5	24.7	23.2
Foodgrains	124.3	126.7	127.8	124.5
Production (million tons)				
Rice	42.2	53.6	74.3	81.3
Maize	7.5	7.0	9.0	10.6
All cereals	96.6	119.0	162.1	184.9
Rapeseed-mustard	2.0	2.3	5.2	6.9
Chickpea	5.2	4.3	5.3	5.8
All Pulses	11.8	10.6	14.3	14.4
Foodgrains	108.4	129.6	176.4	199.3

Source: Agricultural Statistics at a Glance, March 1998, Government of India, New Delhi.

There was a sharp decline in area under chickpea between 1980/81 and 1970/71 mainly due to a shift in its area to wheat in the north-west states. In the subsequent decade there was some increase in area under chickpea. Productivity of chickpea also did not experience significant growth so its output remained almost stagnant during the last 25 years. In fact, green revolution technology in India has favoured cereals, mainly rice and wheat, and there has not been much technological improvement in the case of pulses. As a result, India observed sharp growth in cereal output, whereas output of pulses remained stagnant until 1989/90 and thereafter showed little increase. This has created an imbalance in foodgrain intake and protein deficiency in diets in the country. This can be seen from the data presented in Table 2.2, which shows that the per capita net availability of cereals and total foodgrains increased in the post green revolution period, but per capita pulse availability declined from 51 grams per person per day during 1971 to 38 grams recently. As a vast majority of the population in India is vegetarian, pulses are the main source of protein for the Indian population. The decline in availability of pulses is thus viewed as having an adverse impact on nutrition. Moreover, the proportion of pulses in foodgrain consumption has declined from more than 10.8% in the pre green revolution period to less than 7.5% in the 1990s, whereas the share of rice in foodgrain consumption has risen from less than 43% in the pre green revolution period to the level of 46% in recent years. Rapeseed/mustard oil constitutes more than 25 % share in total edible oil consumption in India in most years.

Table 2.2 Per capita net availability of important items of consumption (gram/day) and share of selected crops.

Year	Cereal	Pulses	Food Grains	Edible Oil	% Share of			
					Rice in Foodgrain	Maize in Foodgrain	Gram in Pulses	Mustard in Edible-oil
1951	334	61	395	na	40.2	2.8	41.2	na
1961	400	69	469	8.8	42.9	4.7	43.8	28.1
1971	418	51	469	9.6	41.1	7.0	39.1	30.3
1981	417	37	455	10.4	43.5	5.3	35.7	26.0
1985	416	38	454	15.1	41.6	4.6	33.8	21.9
1991	468	42	510	15.1	43.5	4.9	32.2	32.9
1995	470	38	508	17.3	45.4	4.5	38.1	29.4
1996	453	33	486	19.2	46.0	4.9	33.8	27.4
1997	474	38	512	22.2	na	na	na	26.8

Note: Percent share computed for domestic production only.
Sources of basic data: Economic Survey 1997-98, Government of India, New Delhi. Agricultural Statistics at a Glance, March 1998, Government of India, New Delhi.

2.2.1 Policy related to production

A lot of change has occurred in the geographic spread of rice cultivation in India since the onset of green revolution technology during the late 1960s. Before the green revolution period, rice cultivation was not common in the north-west plains region of India comprising the states of Punjab, Haryana and Western Uttar Pradesh (U.P.). Rice cultivation in this region was confined to a very small area, which used to grow aromatic varieties, mainly Basmati rice. Then came the high yielding cultivars of rice, adoption of which started during the late 1960s. The government provided strong support for adoption of high yielding varieties of wheat and rice in the form of subsidized credit for purchase of modern inputs and machinery, input subsidy, establishment of input distribution networks and investment in rural roads and power, agricultural research and extension besides price and marketing support (Kumar and Rosegrant 1994). This produced wonderful results in well-endowed regions like the north-west plains and delta region of south India.

HYVs of rice and wheat were quite remunerative under assured irrigation. Farmers responded to this by developing private sources of irrigation namely tubewells in large numbers (Bhalla and Singh 1997; Kumar 1998). In a short span of time, rice cultivation replaced a large area previously under other kharif crops in the north-west plains (Table 2.3). Increase in area under rice took place in several other states also, but the growth rate in area was small and productivity increase was the main source of growth (Singh et al. 1997).

Table 2.3 Area under rice and competing crops in north-west states of India during the post green revolution period.

Crop	Punjab		Haryana		Uttar Pradesh	
	1969/70	1995/96	1969/70	1995/96	1969/70	1995/96
Rice	384.0	2,161.0	241.0	837.0	4,534.0	5,575.5
Maize	563.0	171.0	109.0	24.0	1,505.0	1,068.4
Groundnut	189.0	9.0	11.7	2.1	339.0	138.5

Source: Indian Agriculture in Brief, Government of India, various issues, New Delhi.

The input subsidy regime was also more favourable to rice as this crop was given higher doses of inorganic fertilizer and irrigation (Table 2.4). While irrigation is applied to 22.6% of the area under maize, 48.6% of rice cultivation is in the irrigated area. Moreover, the number of irrigations required for rice is quite high compared to the other crops.

Crop-wise information on fertilizer use at the country level is not available for comparison. However, this information is available at the state level from "Comprehensive Scheme for Cost of Cultivation of Principal Crops" for the selected crops and states. This shows that fertilizer use in rice cultivation is far higher compared to the other crops.

Rice and wheat are considered the most important crops for food security of the country. Accordingly, a lot of attention has been devoted to raising the output of these two crops.

Table 2.4 Irrigation and fertilizer application to selected crops.

Crop	Area under Irrigation in Whole Country (%)	State	NPK Fertilizer Use (kg/hectare)
Rice	48.6	Punjab	195
		Haryana	216
		Madhya Pradesh	62
		Orissa	67
Maize	22.6	Madhya Pradesh	22
Rapeseed/	59.4	Punjab	88
Mustard		Haryana	80
		Gujarat	67
		Madhya Pradesh	57
		Uttar Pradesh	6
		Rajasthan	47
Chickpea	23.9	Haryana	1
		Madhya Pradesh	28
		Rajasthan	5
		Uttar Pradesh	9
All crops	36.7	India	75

Source: Agricultural Statistics at a Glance, March 1997, Government of India, New Delhi.
Report of the Commission for Agricultural Costs and Prices for Crops Sown in 1997/98 season, CACP, Government of India, 1998, New Delhi.

Policy related to crop production is of two types, general policies for the agricultural sector as a whole and crop-specific policies. The main elements of the general policy are:

- Creation of irrigation facilities by tapping the potential and effective utilization of existing irrigation facilities,
- Promotion of fertilizer use by improving supply, increasing production and by reasonable pricing,
- Distribution of certified seed and spread of high yielding varieties,
- Supply of institutional credit at subsidized rate for purchase of inputs and for making investment in land improvement, farm power machinery and irrigation,
- Input subsidy on fertilizer, power, irrigation, fuel and some agricultural implements, and
- Investment in soil and water conservation, watershed development, etc.

The policy and programmes for different development activities are manifested in the 'five-year plans' of the country. Policy related to production of selected crops for about the last two decades beginning with the Fourth Five-Year Plan (1974-79) is discussed here. The production strategy and policy followed for rice, maize, chickpea and mustard over time are depicted in Table 2.5 to 2.8.

Table 2.5 Government policy related to production of rice in various five-year plans, 1974-1997.

Plan Period	Production Strategy and Policy
5th Plan (1974-79)	Major portion of additional output envisaged during the plan to be contributed by HYV programme. Breeding of pest and disease resistant varieties. Pilot project on biological control of paddy pests. Emphasis on breeding varieties for direct seeding under rainfed, upland as well as wetland conditions.
6th Plan (1980-85)	Increase in area under HYV and irrigation. Extensification of existing schemes.
7th Plan (1985-90)	Special rice production programme for eastern region launched to raise rice productivity by removing infrastructural constraints. Diversification of varieties, higher seed replacement, intensification of community nursery programmes, special foodgrain production programme launched following severe draught of 1987.
8th Plan (1992-97)	Special foodgrain production programme continued. The programme for eastern region merged into Integrated Programme for Rice Development. Emphasis on production of Basmati rice which a top foreign exchange earner.

Source: 5th, 6th, 7th and 8th Five Year Plans, Planning Commission, Government of India, New Delhi.

Table 2.6 Government policy related to production of maize in various five-year plans, 1974-97.

Plan Period	Production Strategy and Policy
5th Plan (1974-79)	Expansion of HYV area. Efforts to breed composite varieties which are disease resistant and early maturing. Introduction of dent varieties acceptable for livestock feed.
6th Plan (1980-85)	Increase in productivity through expansion of HYV area, ensuring adequate availability of hybrid seeds, encouraging adoption of recommended package of practices and plant protection measures.
7th Plan (1985-90)	No special policy for maize.
8th Plan (1992-97)	Special foodgrain production programme extended to cover maize and other principal cereal crops.

Source: Same as in Table 2.5.

Table 2.7 Government policy related to production of rapeseed-mustard in various five-year plans, 1974-97.

Plan Period	Production Strategy and Policy
5th Plan (1974-79)	Extension of oilseed cultivation to non-traditional areas. Big support to Intensive Oilseed District Programme. Evolution of drought resistant varieties and technology for rainfed areas.
6th Plan (1980-85)	National Oilseed Development Programme initiated in 1980/85 to achieve vertical integration of production, marketing and processing. Measures to reduce year to year yield and price variability. Introduction of high yielding and short duration varieties in the irrigated farming system.
7th Plan (1985-90)	National Oilseed Development Programme continued. Encouragement to growers' cooperatives for vertical integration of production, marketing and processing. State level Oilseed Growers' Federations organized. Technology Mission on Oilseeds (TMO) launched in 1986 to attain self-sufficiency in edible oils. An integrated oilseeds policy adopted in 1989 to support farmers with technology, inputs and remunerative prices.
8th Plan (1992-97)	Enlarge area under rapeseed-mustard in place of rainfed wheat or where assured irrigation is not feasible.

Source: Same as in Table 2.5.

The growth rates experienced in area, yield and production of the four selected crops are shown in Table 2.9. Rice witnessed robust growth in output. Although maize output did not grow during the green revolution period, this did not affect food security as the other cereals witnessed high growth rates. In recent years there has been growing concern about

sustainability of rice production, particularly of rice-wheat rotation in India's Gangetic region. This is because of problems of natural resource degradation (Kumar et al. 1996; Chand and Haque 1997).

Table 2.8 Government policy related to production of chickpea in various five year plans, 1974-97.

Plan Period	Production Strategy and Policy
5th Plan (1974-79)	Programme of intensive pulse district programme launched towards end of 4th plan to continue and to be intensified. Extension of area under pulses. Minikit programme.
6th Plan (1980-85)	Introduction of pulses in irrigated farming system. Promotion of use of phosphatic fertilizer and rhizobial culture, improved post harvest technology.
7th Plan (1985-90)	National Oilseed Development Programme initiated to achieve vertical integration of production, marketing and processing. Measures to reduce year-to-year yield and price variability. Introduction of high yielding and short duration varieties in the irrigated farming systems.
8th Plan (1992-97)	Programmes of previous plan to be continued.

Source: Same as in Table 2.5.

Table 2.9 All India compound growth rates (%) of area, production and yield of selected crops.

	1967/68 to 1980/81			1980/81 to 1995/96		
Crop	Area	Production	Yield	Area	Production	Yield
Rice	0.77	2.22	1.45	0.52	3.35	2.82
Maize	0.01	0.02	0.00	0.19	2.43	2.24
Coarse Cereals	-1.03	0.67	1.64	-1.96	0.39	2.19
Total Cereals	0.37	2.61	1.70	-0.34	2.94	2.77
Gram	-0.55	-1.02	-0.48	-0.51	0.61	1.13
Total Pulses	0.44	-0.40	-0.67	-0.02	1.21	1.14
Total Foodgrains	0.38	2.15	1.33	-0.28	2.86	2.74
Rapeseed/mustard	1.26	1.50	0.23	4.11	7.74	3.48
Total Oilseeds	0.26	0.98	0.68	2.43	5.81	2.49
All Crops	0.51	2.19	1.28	0.30	3.38	2.42

Source: Agricultural Statistics at a Glance, Government of India, March 1997, New Delhi.

Due to a shortage of chickpea and total pulses, India has to resort to huge imports of pulses. While India remains the leading producer of chickpea, its share of world production has declined from 80% in the early 1970s to 65% in the early 1990s (Kelly and Rao 1994). Due to poor performance of chickpea production, there is concern about India's ability to maintain per capita pulse consumption.

The demand for edible oils in the country has been growing rapidly, but the output between 1967/68 and 1980/81 only increased by about 0.98% annually (Table 2.9), which is about half of the population growth rate of the country. The gap between demand and supply was met through imports, which have been causing a serious drain on India's foreign exchange reserves. In order to attain self-sufficiency in edible oils, the Technology Mission on Oilseeds was constituted in 1986 as a step towards consolidation of government programmes designed to support rapid technological change in oilseed production and agro processing. As a part of this a three-year scheme called the Oilseeds Production Thrust Project was initiated in 1987/88 covering 246 districts in 17 states. In 1990/91 the National Oilseed Development Project and National Oilseed Technology Project (NOTP) were merged under a single programme called the Oilseeds Production Programme, which was spread to all major states. As a result of the changed policy environment, various incentives and institutional support given for the development of the oilseeds sector, India's oilseed output crossed 21 million tons during

1992/93 surpassing the target of 18 million tons fixed for the end of the seventh Five Year Plan (Ninan 1995). After 1980/81, oilseed production witnessed an annual trend growth rate of 5.81%, while rapeseed-mustard output experienced a growth rate of 7.74%. This helped the country to reduce its reliance on imported edible oil to a considerable extent. The most serious problem facing the oilseeds at present is year-to-year fluctuation in their output.

The growth rate achieved in rapeseed-mustard output resulted both from area expansion and yield increase, the underlying factor for which has been response of supply to technology and prices (Ninan 1995; Acharya 1993). However, this kind of response has been lacking in pulses (Acharya 1993; Bhatia 1994).

2.2.2 Policy related to prices

There are two types of price intervention in agricultural commodities. One relates to minimum support price (MSP) or guaranteed price and the other relates to procurement price at which certain commodities are purchased by public agencies. The minimum support prices as well as procurement prices are announced by government each year based on the advice of the Agricultural Costs and Prices Commission, which was constituted in 1965. All four commodities selected for this study are covered under the system of minimum support prices. However the real beneficiaries of this policy have been rice and wheat crops. Farm harvest prices of paddy have remained quite close to the minimum support price, but, this is not true for the other crops, particularly chickpea and rapeseed-mustard (Table 2.10).

In order to run its public distribution system, official agencies such as the Food Corporation of India procure huge quantities of rice and wheat. For want of procurement by official agencies, farm harvest prices of rice in several years would have fallen below the MSP. Thus government has helped to ensure that the farm harvest price of paddy in any year does not fall below MSP. The situation has been different in the case of other crops particularly chickpea and rapeseed-mustard. Market prices of oilseeds and pulses have always been higher than MSP and thus the guaranteed price was never relevant to these crops.

Table 2.10 Minimum support prices and farm harvest prices of selected crops in major producing states (Rs.).

Price	Paddy (Uttar Pradesh)	Maize (Uttar Pradesh)	Chickpea (Madhya Pradesh)	Rapessed-Mustard (Rajasthan)
Minimum support price				
1991/92	230	210	500	670
1992/93	270	245	600	760
1993/94	310	265	640	810
1994/95	340	290	670	830
1995/96	360	310	700	860
Farm harvest price				
1991/92	260	289	596	886
1992/93	263	254	742	861
1993/94	318	293	951	1,012
1994/95	334	327	830	971
1995/96	355	361	881	1,068

Note: Farm harvest prices pertain to the state mentioned in parentheses.

Source: Agricultural Statistics at Glance, Government of India, March 1997; Farm Harvest Prices in India, Government of India, various issues.

The main objective of the price policy for oilseeds until the early 1980s has been to check the volatile nature of prices, which owes as much to fluctuations in output as to the distortionary forces dominating the then imperfect oilseed marketing system (Kalon and Tyagi 1984). The National Agricultural Cooperative Marketing Federation (NAFED) and some state level official agencies used to procure small quantities of rapeseed-mustard to supply edible oil to urban consumers. Then under a scheme of Market Intervention Operations (MIO)

government provided price support from 1989 to 1994. NAFED was designated as a nodal agency to undertake price support operations for five years beginning 1985/86 under the TMO (Gulati et al. 1996). Subsequently, under market intervention operations, a price band policy was adopted, which sought to fix the procurement price of rapeseed-mustard at least 40% higher than the price recommended by CACP.

Due to a growing deficit between chickpea demand and supply, its real prices have risen sharply during the post green revolution period (Kelly and Rao 1994). However, this has not induced output growth because of technological constraints.

There has been a shift in direct consumption away from maize in favour of rice and wheat. This has happened for two reasons: first, maize is considered an inferior cereal and second, prices of rice and wheat relative to maize have shown a decline. Due to its reduced importance in the consumption basket, there has not been much price support given to maize.

2.2.3 Policy on marketing

Policy on marketing of selected commodities can be discussed under two types. First, general policy aimed at a group of commodities or the whole sector, and second, commodity-specific policy. The general policy on agricultural marketing followed since the early 1970s is summarized below:

- number of regulated markets increased to cover more area and markets,
- improvement and creation of storage and warehousing capacity; assistance for rural godowns,
- cooperative marketing agencies strengthened and promoted,
- streamlining of market infrastructure,
- improvement in logistics in movements and storage, and
- creation of grading facilities and promotion of grading.

The government monitors market conduct through several mandatory regulations. The most important of these is regulation of primary markets called 'regulated markets'. This involves construction of well laid out market yards and institutional innovations for smooth and efficient functioning of agricultural markets. The concept of regulated markets along with some legal instruments are used to regulate the activities of traders and processors pertaining to trading, stocking, maintenance of quality, grading, packing, processing, blending and movements (Acharya 1998).

Considerable public investment has gone into the construction of well laid out market yards and sub yards, creation of storage, transportation and communication facilities (Table 2.11).

Table 2.11 Status and progress of market infrastructure in India.

Wholesale markets in 1997	7,169
Value of agricultural commodities traded in wholesale market in 1992/93	620 billion rupees
Scientific storage capacity during 1996-97	39.1 million tons
Length of surface road	
1951	160 thousand kilometres
1997	1,200 thousand kilometres
Number of goods carriers	
1951	80 thousand
1997	1,800 thousand
Haulage of goods by railway	
1950/51	44.0 billion ton-km
1996/97	277.6 billion ton-km

Source: Acharya 1998.

Government is the major player in the marketing of rice. Most of the produce, except Basmati rice, that arrives in the markets, particularly in the surplus states of Punjab Haryana and U.P., is procured by official agencies and a small part is marketed by private traders (Table 2.12). This is for reasons of food security and price stabilization effected through PDS and to maintain the buffer stock.

Table 2.12 Marketed surplus of rice and its procurement by official agencies, 1992/93.

State	Market Arrivals		Market Arrivals Procured by Official Agencies (%)
	Total ('000 tons)	Share of Production (%)	
Andhra Pradesh	4,044	42.03	75.34
Bihar	880	15.20	ng
Gujarat	393	51.27	5.17
Haryana	1,261	70.77	81.13
Karnataka	604	23.80	21.40
Kerala	99	9.20	ng
Madhya Pradesh	738	14.30	80.28
Maharashtra	502	22.37	11.89
Orissa	356	5.87	84.01
Punjab	5,534	83.07	87.47
Rajasthan	38	27.50	60.72
Tamil Nadu	2,053	33.4.0	52.21
Uttar Pradesh	2,788	28.70	40.73
West Bengal	1,695	15.27	7.29
All India	22,452	30.27	55.72

Ng: negligible.
Source: Bulletin of Food Statistics 1992-93, Ministry of Agri. GOI, New Delhi.

Sometimes when there is a fall in production, movement of rice by private traders across states is not allowed, to ensure its procurement by official agencies. Until recently a license was required to set up a rice mill, but now the rice milling industry has been de-licensed. There is a system of levy under which a specified percent of the paddy purchased by rice millers/traders has to be returned to the government in the form of rice. Basmati rice is exempt from this levy.

In the case of maize there has been no direct market intervention by government. The case of chickpea is similar, except that some quantity at the prevailing market price is processed by official agencies for fair price shops in urban areas. There was no market intervention in oilseeds until 1988. Subsequently, market intervention operations were introduced in edible oils, including rapeseed-mustard, in April 1989, with the objective of establishing the wholesale prices of edible oils within a specified price band. The second objective of MIO was to build stocks during years of surplus production to reduce the need for heavy imports during the lean years (Acharya 1994). The National Dairy Development Board (NDDB) was entrusted the task of MIO. As a part of MIO, NDDB undertook buying, stocking, selling and importing of edible oils to stabilize edible oil prices in the country. The NDDB also introduced vegetable oil in common packs under the brand name of 'Dhara' to compete with and to keep a check on malpractice by private traders in edible oils.

Marketing channels

Due to the diverse nature of market development and agricultural growth patterns there is considerable variation in marketing channels across the country. In this section only major marketing channels for the selected commodities are presented.

Important marketing channels for paddy/rice are:

- producer - government agency - fair price shop - consumer
- producer - government agency - wholesaler - retailer - consumer

In both these channels paddy procured by government agencies is obtained processed from private millers and the rice is than sold to wholesalers, retailers or consumers.

- producer - wholesaler/ rice miller - retailer - consumer

In this channel a specified part of the produce (rice) is returned to a government agency (Food Corporation of India) in the form of a levy, which differs from state to state.

The above types of marketing channels are dominant in regions with large marketed surpluses. In other regions where the markets surplus is small the dominant channels are:

- producer - wholesaler/rice miller - retailer - consumer
- farmer - village trader - wholesaler - retailer - consumer
- farmer - village trader - consumer
- farmer - consumer

Important marketing channels for maize are:

- producer -wholesaler - retailer - consumer
- producer - village trader - consumer
- producer - village trader - wholesaler - retailer - consumer
- producer - processor - retailer - consumer

In the last channel the processor can convert the produce to poultry feed, industrial products or consumer products.

Consumer demand for chickpea is of three types viz. chickpea grain or seed, chickpea dal (split chickpea without seed coat) and chickpea flour (known as *basin*). Important marketing channels for these products are:

- farmer - consumer
- farmer - village trader - consumer
- farmer - village trader - wholesaler - retailer - consumer
- farmer – wholesaler - processor - dal or basin - wholesaler - retailer - consumer
- farmer - processor - wholesaler - retailer -consumer
- farmer - processor - retailer - consumer

Rapeseed-mustard is not consumed directly in India. It is the oil extracted from rapeseed-mustard which used for human consumption. Therefore, rapeseed-mustard is first crushed to extract oil and the remaining part known as cake is used as animal feed. Important marketing channels for rapeseed/mustard seed - oil are:

- producer - wholesaler - processor - oil wholesaler - oil retailer - oil consumer
- producer - wholesaler cum processor - oil retailer - oil consumer
- producer - village trader - wholesaler/processor - oil retailer - oil consumer
- producer - village trader - oil consumer
- producer - wholesaler - retailer - oil consumer

In the latter two channels consumers buy rapeseed-mustard, and get it crushed themselves to obtain the oil.

2.2.4 Policies related to trade

Until 1991 export as well as import of the selected commodities was subjected to various kinds of regulations and restrictions. In the case of rice, different policies were followed for common rice and Basmati rice (long grain aromatic varieties grown in small tracts in north-western states). Basmati rice is produced only in the Indian sub-continent, India and Pakistan, and most of the produce is exported. There has been no restriction on its export. However, a different policy has been followed for common rice. Until 1991 export of rice was subject to canalization, minimum export price and export quota. There were also restrictions on stocking rice beyond a limit unless an export order were in hand (Datta 1996). Imports of rice have been subject to quantitative restrictions and resorted to occasionally when domestic production dropped significantly.

Restrictions on export of common rice were somewhat relaxed during 1992 following initiation of the economic reform programmes in June 1991. Until March 1991 India's export of

common rice was not significant; the country exported a mere 25 to 30 thousand tons between 1987 and 1990 as our export price was not competitive against the world rice price. The devaluation of the Indian rupee in 1991 changed the situation dramatically. Subsequently, the quota system on export of rice was also abolished, which further improved the possibility of rice exports (Bhasin 1996). A major boost to the rice export occurred during 1995/96 when under a major policy change the government of India decided to release two million tons of rice from its stock for exports to reduce excess stock holding of the Food Corporation of India that was swelling at a fast rate (Bhasin 1996). Rice export at present is free. Due to the comfortable situation on the food front, quantitative ceilings on exports now have been abolished. To further enhance exports, the Food Corporation of India has been permitted to export or sell for export a larger quantity of rice (Government of India 1997-98). There is no duty on import.

There has been no special policy for import-export of maize, nor is this crop considered very important from the trade point of view. Like other cereals, maize export and import have been subjected to several restrictions, except for feed grade maize for poultry or animals. There is no duty on import of maize.

Due to the growing imbalance between demand and supply of edible oilseeds in the post green revolution period, India had to a import massive amount of edible oil which constituted 30% of total supply by the mid 1980s (Gulati et al. 1996). As this put a serious drain on scarce foreign exchange, India took several measures to attain self-sufficiency through import substitution strategy in edible oils. These measures include launching of a technology mission on oilseeds in the mid 1980s and market intervention operations in the late 1980s to ensure attractive prices to producers. To ensure attractive prices to domestic producers, imports were brought down. The National Dairy Development Board entrusted with task of MIO for edible oils was allowed duty free imports to support market intervention operations. NDDB incurred huge losses due to MIO so government funding of MIO was stopped in 1994 and NDDB was allowed to import edible oils at a concessional tariff.

Prior to 1994 the oilseed sector was protected through QRs on imports and exports. Imports were canalised through a state trading corporation and then sold through a public distribution system at a price fixed by government. Domestic prices of oilseeds were maintained at more than double the world prices (World Bank 1997). Tariff rates on imports were also quite high. On March 1, 1995 rapeseed-mustard oil was put under OGL at an import tariff of 30%. The tariff has been further reduced in stages to the present level of 15%. Quota restrictions on export of rapeseed-mustard seed were lifted in May 1995, while export of oil remains restricted to small packs of 5 kg.

Trade policy on rapeseed-mustard and edible oils has been caught between two opposing viewpoints. According to one viewpoint India would benefit by liberalizing import of rapeseed-mustard oil and other edible oils, as their domestic prices have been higher than world reference prices for several years. Accordingly, resource use efficiency in edible oilseed production is low and the oilseeds are protected at the cost of cereals (Gulati et al. 1996; Gulati and Sharma 1997). Further, due to restrictions on imports, the domestic price is kept high, which hits consumers and is leading to inefficient use of resources.

According to the second viewpoint, the policy of import liberalization would have an adverse impact on the oilseed sector and Indian producers. It is asserted that world prices of rapeseed-mustard are low because U.S. and Europe provide large direct and indirect subsidies to the producers so world prices are not an appropriate yardstick for comparison with Indian prices (Ninan 1995). Second, cost of production of edible oilseeds in India is not higher than landed costs of imported oil (Acharya 1997). Third, India's need for edible oils cannot be met by relying on imports. Thus, India's quest to be self-reliant in edible oil is said to be justified (Shenoy 1993; Acharya 1993; Bhalla 1995; Ninan 1995).

While India has been trying to become self-reliant in edible oilseed production, reliance on imports has remained.

Despite a highly favourable resource cost ratio (RCR), which is estimated around 0.49 (Gulati and Sharma 1997a), and high domestic profitability, chickpea area and production did not show any perceptible growth during the last 20 years except for the year 1995/96. Because of this, India has remained a big importer of pulses including chickpea to satisfy domestic consumption. While chickpea export is restricted, its import is free and is regulated mainly through tariffs, which are also quite low at present (Table 2.13).

Table 2.13 Current status of trade policy for selected crops as of March 31, 1999.

Commodity	Export Policy	Import Policy	Import Duty (%)	Bound Tariff (%)
Common rice	Free	Canalized	Free	0
Maize	Restricted	Canalized	Free	0
Rapeseed-mustard oil	Restricted	Canalized	15	100
Chickpea	Restricted	Free	10	100

2.3 Effect of trade liberalization on selected commodities at the national level

The effect of trade liberalization has two dimensions. One, the effect due to liberalization in the domestic economy and two, the effect due to liberalization in the rest of the world. The effect of the latter again depends to a large extent on the former. Coming to domestic trade liberalization, some effects are direct and some are indirect. Direct effect refers to the effect of changes in export-import and related policy, while indirect effect results from reforms in other sectors and in exchange rate.

The actual impact of trade liberalization would be reflected through changes in prices, area, production and quantity of export and import. This can be studied by comparing the situation before and after liberalization or the scenarios with and without liberalization.

It is too early to analyze the actual impact of trade liberalization on the selected commodities, except rice, as no significant liberalization decision has been implemented for them. The impact of trade liberalization in rice effected since 1995/96 can be seen from the data presented in Table 2.14. Traditionally, India used to export Basmati rice and only a small quantity of common rice. The share of common rice in the total rice export was below 10% until 1989/90. Things started changing from 1990/91 onward when for the first time the quantity of common rice exported by India witnessed a quantum jump and its share in the total rice export increased to 54% (Table 2.14). The devaluation of the Indian rupee in 1991 made it attractive to sustain the rice export above 0.5 million tons. The real boost to rice export was witnessed in 1995/96 when private trade was allowed to export rice without restrictions. Export of common rice in that year crossed the figure of 4.5 million tons, which surprised everybody. Although common rice export in the following year came down to about 2.0 million tons even this level is quite high compared to India's small presence in rice export in the past. This jump in export of rice trade is solely attributed to trade liberalization.

It would be of interest to see how the rise in rice export and the liberalization of the rice trade have affected producer's response in terms of rice area, productivity and output. As such, there is no discernible impact of liberalization of rice trade on area allocated to rice and its output. One reason for this could be that benefit of rice export has not percolated down to producers in terms of higher prices and income.

Table 2.14 Effect of trade liberalization on rice

Aspect	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Area under rice (million hectare)	41.7	42.1	42.6	42.6	41.7	42.5	42.8	42.8	43.2
Rice production (million tons)	70.4	73.5	74.2	74.6	72.8	80.2	81.8	76.9	81.3
Yield (kg/hectare)	1,690	1,740	1,740	1,750	1,740	1,890	1,910	1,800	1,880
Export ('000 tons)									
Basmati	314	384	232	266	325	527	442	373	523
Non-Basmati	35	37	272	412	256	240	448	4,540	1,988
Total	350	421	504	678	580	767	890	4,914	2,512

Source: Economic Survey, Government of India, New Delhi, various issues.

2.3.1 Impact on domestic prices

Some idea regarding the impact that trade liberalization would have on a particular commodity can be obtained by comparing domestic and international prices and by computing efficiency and protection indicators (Gulati and Sharma 1997b). Thus an exercise has been done to compare domestic and international prices and to estimate net protection coefficients for the selected commodities. A comparison between domestic and international prices of selected commodities during the recent four years can be obtained from the data presented in Table 2.15. International prices of rice of comparable grade have throughout been higher than domestic prices. The margin varied from 21% to 46% in different years. The average of 1994 to 1997 indicates that the international rice price is more than 30% higher than the domestic price.

There is no clear difference between international and domestic prices of maize. In some years the domestic price is lower and in some years it is higher than the international price. The position of rapeseed-mustard oil is the opposite of rice. Per ton prices of rapeseed-mustard in the country ranged between $839.3 and $962.3 during 1994 to 1997, while international prices varied between $557 and $617.

In the case of chickpea, international prices are found to be higher than domestic prices to the tune of 20% in recent years. However, there is tremendous inter and intra year instability in domestic prices, so it is difficult to say whether international prices are consistently lower or higher than the domestic prices.

Table 2.15 Domestic and international prices of selected commodities, US $/ton.

Commodity	1994	1995	1996	1997	Average
Rice: Thai 5% broken	267.6	321.0	338.9	303.5	307.7
Domestic	220.7	220.9	229.6	233.6	226.2
Maize: International (Red)	107.6	123.5	165.8	117.1	128.5
Domestic (Red)	126.7	130.0	128.4	121.9	126.7
Rapeseed Oil: FOB Dutch	617.0	613.0	557.0		595.7
Domestic	898.7	962.0	894.9	839.3	898.7
Chickpea: International	465.0		346.5		405.7
Domestic	396.4	281.0	306.5	370.9	338.7
Exchange rate Rs./$	31.40	33.45	35.50	37.15	

Source: For domestic prices: Agricultural Prices in India, Government of India, various issues.
For international prices: Monthly Review of the Indian Economy, Centre for Monitoring Indian Economy, various issues, (for rice and maize); Commodity Outlook 1996-97, FAO Rome (for chickpea); Commodity Market and the Developing Countries, World Bank Business Quarterly (for Rapeseed oil).
For exchange rate: Economic Survey, Government of India, various issues.

A comparison of international and domestic prices sometimes does not indicate trade possibilities. Proper comparison for trade purposes should also take into account trading costs, freight, insurance and related charges, which can make a significant difference to price.

Accordingly, the impact of trade liberalization on domestic production was studied by estimating nominal protection coefficients (NPC) using the CIF prices for importable commodities and FOB prices for exportable commodities (Table 2.16).

Table 2.16 Domestic wholesale price and import/export price of selected commodities, Rs./ton.

Year	Rice		Maize		Rapeseed/ Mustard oil		Chickpea (gram)		
	FOB Export Price	Domestic Price	FOB Export Price	Domestic Price	CIF Import Price	Domestic Price	FOB Export Price	CIF Import Price	Domestic Price
1988/89	5,480	3,918		2,282	7,506	19,280	10,071	4,774	7,497
1989/90	6,097	4,108		1,983	14,458	17,030	11,347	5,410	7,057
1990/91	6,018	4,813		2,129	11,982	23,670	11,512	3,560	6,770
1991/92	6,231	5,433		3,400	27,932	28,771	11,523	6,260	6,425
1992/93	6,703	5,913	5,483	3,104	27,153	24,896	11,269	6,872	6,400
1993/94	9,459	6,742	3,612	3,000	17,543	25,579	14,349	9,279	12,150
1994/95	7,390	6,908	4,302	3,964	30,491	29,954	11,736	14,869	11,620
1995/96	8,241	7,117	5,498	3,829	22,788	32,189	18,349	12,630	8,795
1996/97	9,871	8,678	6,280	4,225	38,650	30,660		10,607	10,654

Source: Monthly Statistics of Foreign Trade, Exports and Re-exports, Annual Number, Volume I, Ministry of Commerce, Government of India, various issues; Monthly Statistics of Foreign Trade, Imports, Annual Number, Volume II, Ministry of Commerce, Government of India, various issues; Agricultural Prices in India, Government of India, various issues.

Rice and maize are treated as exportables as India is a net exporter of these two commodities and chickpea and rapeseed-mustard have been treated as importables, as their net trade involves more imports. The NPC estimates for the last 10 years, based on domestic wholesale prices and CIF or FOB prices in domestic currency, are reported in Table 2.17.

Table 2.17 Nominal protection coefficients of selected commodities during the last decade under different hypotheses.

Year	Rice	Maize	Rapeseed-Mustard Oil	Chickpea (gram)	
	Exportable Hypothesis	Exportable Hypothesis	Importable Hypothesis	Exportable Hypothesis	Importable Hypothesis
1988/89	0.715		2.569	0.744	1.570
1989/90	0.674		1.178	0.622	1.304
1990/91	0.800		1.975	0.588	1.902
1991/92	0.872		1.030	0.558	1.026
1992/93	0.882	0.566	0.917	0.568	0.931
1993/94	0.713	0.831	1.458	0.847	1.309
1994/95	0.935	0.921	0.982	0.990	0.781
1995/96	0.864	0.696	1.413	0.479	0.696
1996/97	0.879	0.673	0.793		1.004

Source of basic data: same as in Table 2.16.

The NPC for rice under the importable hypothesis is below 1 implying that free trade would lead to higher exports. In fact, liberalization of the rice trade in recent years has led to a jump in rice trade.

India is a net exporter of maize but the quantity exported is not large. The NPC during the last five years ranged between 0.566 and 0.921. This shows that the FOB export price of maize was higher than its wholesale price in the country (Table 2.17).

India is deficit in pulses and the gap in demand and supply is met through imports. The same is true for chickpea. In some recent years India imported more than 100 thousand tons of chickpea (Appendix Table 7). Wholesale prices of chickpea in the country show tremendous volatility, caused by production instability. During the last six years domestic wholesale prices were higher than the CIF prices of imported chickpea in half of the years. In one year there was

no difference between domestic and CIF import prices, while in four years domestic prices were lower (Table 2.16). Thus there is no clear picture about the competitiveness of chickpea production in India.

Coming to rapeseed-mustard, India imports rapeseed-mustard oil, while it exports some quantity of rapeseed-mustard meal and cake. Rapeseed-mustard is highly protected against imports through tariffs as well as non tariff barriers. India imports both crude as well as refined rapeseed-mustard oil from various countries. Major sources for India's import of crude and refined rapeseed-mustard oil are Germany, Sweden, the Netherlands, Canada and USA.

Like other edible oils, prices of rapeseed-mustard oil in the country have been significantly higher than CIF world prices (Table 2.16). Accordingly, the NPC of crude rapeseed-mustard oil under the importable hypothesis has remained above 1 except in a few years when a very small quantity was imported. NPC was around 2.5 during 1988/89.

Comparison of domestic wholesale prices with CIF world prices for importables and FOB world prices for exportables and NPC reveals that liberalization of agricultural trade would lead to an increase in the export of rice and maize. On the other hand, trade liberalization would lead to large-scale import of rapeseed-mustard oil. Thus, one can expect that, because of trade liberalization, domestic prices of rice and maize would go up and that of rapeseed-mustard oil would go down. This may have further adverse effects on rapeseed-mustard area, output and its producers, whereas rice and maize area, output and producers may be affected favourably. In the case of chickpea, it appears that trade liberalization would not have significant impact on domestic prices and production. Import would continue to fill the gap between domestic demand and supply without seriously affecting domestic production.

Estimation of the impact of trade liberalization on domestic consumer prices and farm level prices was based on the following concepts:

- Under the exportable hypothesis
  - (i) Reference price = domestic price + handling / marketing charges to take produce to port + transport cost from wholesale market to port
  - (ii) NPC = reference price/FOB price at port
  - (iii) Domestic price under free trade = FOB price – handling/marketing/port clearance charges – transport cost
  - (iv) Change in domestic price under free trade (%) = (domestic price under free trade – existing price)/existing price
  - (v) Farm price under free trade = existing farm level price*[1+(proportionate change in domestic price)* elasticity of price transmission]
  - (vi) Change in farm level price (%) = (farm price under free trade – existing farm price)/Existing farm price
- Under importable hypothesis
  - (i) Reference price = the CIF price at port + handling / marketing charges + transport cost from port to domestic market
  - (ii) Domestic price under free trade = reference price
  - (iii) Change in domestic price = [(free trade price – actual price)/actual price]*100
  - (iv) Farm level price under free trade = actual farm level price [1+ proportionate change in domestic price * elasticity of price transmission]
  - (v) Change in farm level price (%) = [(actual farm price – farm price under free trade)/actual farm price] * 100

2.3.2 Impact on producer and consumer surplus

Another way to estimate the impact of trade liberalization is by measuring the impact of anticipated price changes due to liberalization on consumer surplus, producer surplus and net social gain. This has been accomplished in different steps by estimating demand elasticity, supply elasticity and price linkage functions for the selected commodities.

Elasticity of demand

There is fairly well established literature on elasticity of demand for important commodities. The demand studies in India have mainly made use of data from National Sample Surveys, which are carried out every quinquennium in almost all regions of the country. The estimates of demand elasticity derived from these data differ from study to study depending upon the technique employed to estimate the set of demand equations. The most commonly accepted set of elasticity is given in Table 2.18.

Table 2.18 Price elasticity of demand for selected commodities in India.

Commodity	LEDS[1]			FCDS[2]		
	Rural	Urban	Total[3]	Rural	Urban	Total[3]
Rice	-0.553	-0.276	-0.481	-0.282	-0.288	-0.283
Coarse cereal: maize	-0.821	0.104	-0.582	-0.268	-0.309	-0.279
Pulse: chickpea	-1.303	-0.537	-1.103	-0.524	-0.516	-0.522
Edible oil: rapeseed-mustard oil	-0.538	-0.388	-0.499	-0.567	-0.522	-0.555

1. Elasticity based on Linear Expenditure Demand System drawn from Radhakrishna and Ravi (1992).
2. Elasticity based on Food Characteristic Demand system drawn from Kumar (1998).
3. Own computations using population shares as weights.

The estimates of elasticity provided by Kumar (1998) have been criticized on the ground that they give very low and even negative income elasticity for some cereals particularly for wheat, which does not seem reasonable at the low level of consumption in the country (Bhalla and Hazell 1997). Therefore, the elasticity estimates by Radhakrishan and Ravi (1992) have been used in the present study for analyzing the impact on consumer's surplus.

Elasticity of supply

Output supply elasticity was estimated using data for the period 1975/76 to 1994/95:

$\text{Ln } Q_i = b_o + b_1 \text{ Ln } RFHP_i + b_2 \text{ Ln } RFHP_o + b_3 \text{ LnRain} + b_4 \text{ Time}$

where:

Q_i = Domestic output of commodity (i) in different years

$RFHP_i$ = Farm harvest price of 'i' th commodity deflated by the wholesale price index of all commodities, lagged one year

RHP_o= Farm harvest price of other competing commodity deflated by the wholesale price index of all commodities, lagged one year

Rain= Amount of rainfall during the period

Time = Time, 1 to 19, to represent effect of all other trend variables

Ln = Natural log

The supply equations estimated for selected crops are presented below.

Paddy

ln Paddy = 6.9505 + 0.4035 ln PPaddy – 0.2974 ln PMaize + 0.5947 ln Rain + 0.0323 Time
(1.903)*** (-2.468)** (4.837)* (15.236)*

$R^2 = 0.9524$; DW = 1.746; N = 19

Maize

ln Maize = 4.62 + 0.4508 ln PMaize – 0.1832 ln PP. Millet + 0.6002 ln Rain + 0.0217 Time
(1.994)*** (-1.181) (2.845)** (4.883)*

$R^2 = 0.8307$; DW = 2.014; N = 19

Rapeseed-mustard

ln R/Mustard = 1.0202 +0.4014 ln PR/mustard – 0.5660 ln PWheat + 0.8628 Rain +0.0756
(2.604)** (-2.108)*** (3.881)* (16.632)*
Time
$R^2 = 0.9707$; DW = 1.903; N = 19

Chickpea

ln Ckpea = 2.5613 + 0.1393 ln PCkpea – 0.2646 ln PR/mustard + 0.9256 Rain – 0.0067
(0.568) (-1.132) (2.722)** (-0.747)
Time
$R^2 = 0.3894$; DW = 1.869; N = 19

Values in the parentheses are "t" values.
* indicates significant at 1%, ** indicate significant at 5% and *** indicate significant at 10%.
(In the above equations P preceding the variable designates price)

In the estimated supply functions maize was considered as the competing crop of paddy. For the maize supply function both paddy as well as pearl millet were tried as competing crops of which pearl millet was found to give better results. As for chickpea, both wheat and rapeseed-mustard were considered as the competing crop and the latter was found to give better results in terms of the sign of the price variable, value of R^2, and significance of coefficients. Wheat was considered as the competing crop of rapeseed-mustard. As two-thirds of the cultivated area in India is rainfed and amount of rainfall also affects performance of irrigated crops, it was considered appropriate to include amount of rainfall as one of the explanatory variables in explaining year to year variation in output. Three kinds of rainfall variables were tried, viz. amount of rainfall during the crop season, annual rainfall and rainfall during the monsoon period (i.e. during the months of June to September). Out of these, the quantity of rainfall during the monsoon period was found to have significant impact on output of all the crops. Estimates of supply elasticity with respect to own price are presented in Table 2.19.

Price linkage equation

Two types of linkage equations have been used. The first, linking the impact of trade liberalization with the wholesale price in the central market, which is used to estimate impact on demand and consumer surplus, is given by:

$PC_i = PB_i$+Tariff+Transfer cost

where:

PCi = Price of 'i' the commodity in central wholesale market of the country

PB_i = Border (international reference price) of ith commodity

The second, impact of changes in PC_i due to trade liberalization on farm or producer's price (PF) is estimated using following equations:

$\ln PF_i = a+b \ln PC_i$

Where 'b' directly gives elasticity of price transmission. The estimated equations for the period 1976/77 to 1994/95 are:

ln (Farm price of paddy) = -0.96+1.04 ln (central market price of rice)
(21.34)*

$R^2 = 0.96^*$; n = 19; DW = 1.05

ln (Farm price of maize) = - 0.29+1.03 ln (central market price of maize)
(21.82)*

$R^2 = 0.93^*$; N= 19; DW = 2.68

ln (Farm price of chickpea)= 0.75 + 0.86 ln (central market price of chickpea)
(13.15)*

$R^2 = 0.91^*$; N= 19; DW = 2.02

ln (Farm price of rapeseed-mustard) = -0.16+ 0.88 ln (central market price of the oil)
(10.50)*

$R^2 = 0.88^*$; N = 19; DW= 1.77

Figures in parentheses are respective "t" values. * indicates that the estimate is statistically significant at the 1% level.

Table 2.19 Supply elasticity with respect to own price and elasticity of price transmission.

Crop	Own Supply Elasticity	Elasticity of Price Transmission between Domestic Wholesale and Farm Level
Rice	0.4035	1.04
Maize	0.4508	1.03
Chickpea	0.1393	0.86
Rapeseed-mustard	0.4014	0.88

The price linkage equations indicate that a 1% change in mustard oil price in the central market (Kanpur in our case) results in 0.88% change in the farm level price of rapeseed-mustard seed. The elasticity of transmission is 1.04 in the case of paddy, 0.86% in the case of gram and 1.03% for the maize crop.

Impact on consumer and farm level prices

In order to estimate the impact of trade policy changes on domestic demand and supply, first we computed the impact on domestic wholesale prices in the central market and the resulting impact on farm level price. This involves several steps like computing CIF or FOB border reference prices, cost of handling, marketing and transportation between port and the domestic market (region). The impact of trade liberalization was studied for the past as well as for the future. The analysis for the past (ex post impact) reveals what the impact of trade liberalization could have been if domestic prices were allowed to become equivalent to CIF or FOB prices.

The second type of analysis reveals the impact on the baseline scenario, which is taken as the triennium ending 1996/97 (TE 1996/97), due to two kinds of trade liberalization: (i) when trade liberalization takes place at existing international prices, and (ii), when base level international prices are raised/lowered according to the growth rate in prices projected to hold under free trade when there is full effect of the Uruguay round. The latter scenario refers to the situation when world agriculture implements all the provisions of WTO such as withdrawal of subsidies, etc.

The ex post impact of trade liberalization on prices of the selected commodities for the six years from 1991/92 to 1996/97 is presented for rice (Table 2.20), for maize (Table 2.21), for rapeseed-mustard (Table 2.23) and for chickpea (Table 2.24). Since there is wide variation in prices of different grades of produce, it is desirable to use prices of the same quality of produce while comparing domestic and export/import prices. Accordingly, rice in this analysis refers to non-Basmati milled rice that is not parboiled. Maize refers to red maize and chickpea refers to dry and shelled gram (other than white gram). The import price of rapeseed-mustard oil includes crude mustard oil and refined rapeseed oil.

The domestic price of rice during the last six years shows a rising trend. In contrast to this the export price shows sharp year-to-year fluctuations. The FOB export price of rice was below Rs. 7,000/ton in 1991/92 and 1992/93 and then rose to Rs. 9,459 in 1993/94. In the subsequent years it dropped by more than 20%. This shows there is considerable volatility in the international price of rice, whereas the domestic price has maintained a steady trend line

(Table 2.20). Thus, the attractiveness of rice exports would vary considerably from year to year depending upon the behaviour of international prices.

Since India is a net exporter of rice, the impact of trade liberalization on domestic prices of rice has been analyzed under the exportable hypothesis. Delhi is considered as the central market for rice as it is the big market located in north-west India that makes a substantial contribution by way of its marketed surplus of rice. Export rice is mainly shipped from Kandla port, but some is shipped from Mumbai port. The transport cost in both cases is almost the same. In order to compare international prices with domestic prices, the costs of transport, marketing and handling to take the produce from the wholesale market to the port are added to the domestic price.

Table 2.20 Ex post impact of trade liberalization on domestic consumer and farm level prices of rice, Rs./ton.

Particular	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
1. Domestic price in Delhi market	5,433	5,913	6,742	6,908	7,117	8,714
2. Handling/marketing charges @ 5% of domestic price	272	296	337	345	356	436
3. Transportation cost to port	363	416	483	534	589	647
4. Reference price (1+2+3)	6,068	6,624	7,562	7,788	8,062	9,796
5. F.O.B. price at port	6,231	6,703	9,459	7,390	8,241	9,871
6. NPC (4/5)	0.974	0.988	0.799	1.054	0.978	0.992
7. Domestic price under free trade (5-2-3)	5,596	5,991	8,639	6,511	7,296	8,788
8. Change in domestic price under free trade % [(7 -1)/1*100]	3.00	1.33	28.14	-5.76	2.52	0.86
9. Farm level price of paddy	3,619	3,220	3,680	3,922	4,079	4,386
10. Farm price under free trade [9+9*(8/100)ET]	3,732	3,265	4,763	3,686	4,186	4,425
11. Change over farm price % [(10 –9)/9*100]	3.14	1.40	29.43	-6.02	2.64	0.90

Source of basic data: Monthly Statistics of Foreign Trade, Exports and Re-exports, Annual Number, Volume I, Ministry of Commerce, Government of India, various issues; Monthly Statistics of Foreign Trade, Imports, Annual Number, Volume II, Ministry of Commerce, Government of India, various issues; Agricultural Prices in India, Government of India, various issues; Reports of the Commission on Agricultural Costs and Prices, CACP, Government of India, various issues.

The domestic reference price turns out to be lower than the FOB price of rice exports at port in all the years except 1994/95. In other years, the domestic price was lower by 1 to 28% compared to the net price received from the export after reckoning all the internal as well as external costs. This analysis reveals that free trade would have brought about 28% higher prices of rice during 1993/94. The difference was negative during 1994/95 due to low international prices, but in the subsequent two years a positive margin again emerged between domestic and the FOB export price.

The impact on farm level prices is obtained by multiplying the wholesale price by the elasticity of price transmission from wholesale to farm level prices. Except for the year 1994/95, farm level paddy prices would have witnessed a rise under free trade of 1 to 29% in different years.

Table 2.21 Ex post impact of trade liberalization on domestic and farm level prices of maize, Rs./ton.

Particular	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
1. Domestic price in Kanpur market	3,400	3,104	3,000	3,964	3,829	4,225
2. Handling/marketing charges @ 5% of domestic price	170	155	150	198	191	211
3. Transportation cost to port	363	416	483	534	589	647
4. Reference price (1+2+3)	3,933	3,675	3,633	4,696	4,610	5,083
5. F.O.B. price at port		5,483	3,612	4,302	5,498	6,280
6. NPC (4/5)		0.670	1.006	1.092	0.838	0.809
7. Domestic price under free trade (5-2-3)		4,912	2,979	3,570	4,718	5,422
8. Change in domestic price under free trade % [(7 -1)/1*100]		58.23	-0.70	-9.95	23.20	28.33
9. Farm level price of maize	2,890	2,540	2,930	3,270	3,610	4,517
10. Farm price under free trade [9+9*(8/100)ET]		4,063	2,909	2,935	4,473	5,834
11. Change over farm price % [(10 -9)/9*100]		59.98	-0.72	-10.25	23.90	29.18

Source of basic data: same as in Table 2.20.

The trade in maize is quite small and India is a net exporter of this commodity. The FOB price of maize at port was higher than the wholesale price in Kanpur market in all the years. However, when the export price is adjusted for internal marketing and transport costs, the net export price turned out to be lower than the domestic price by 10% in 1994/95 and by 0.7% in 1993/94. In other years the net export price was 23 to 58% higher than the domestic price indicating that free trade in maize would have led to a substantial increase in its domestic price.

Except in the years 1993/94 and 1994/95, free trade in maize could have raised domestic farm level prices in the range of 24 to 60% (Table 2.21). Unlike rice, the domestic price of maize shows oscillations in price. The volatility in FOB export price was found to be much larger than in the domestic price.

In the case of rapeseed-mustard the impact has been studied on the price of rapeseed-mustard seed at the farm level and on the edible oil price at the wholesale level. India is a large importer of edible vegetable oils, which consist of palm oil, groundnut oil and also rapeseed-mustard oil in some years. The CIF price of rapeseed-mustard oil imported by India has shown violent fluctuations. In fact this fluctuation is not present in the international price. The actual CIF price paid by India for imported rapeseed-mustard oil is found to be quite high compared to the imputed CIF price derived by adding freight charges to international prices (Table 2.22). There are a couple of reasons for this. First, India is not a stable importer of rapeseed-mustard oil and the quantity imported varies considerably depending upon the domestic supply situation. The country does not have a stable trading source or partner for the import and there is not sufficient planning about imports. As a result when a shortfall in the domestic market is felt, the country resorts to panic buying for fear of a violent rise in domestic prices. The data presented in Table 2.23 show that with proper advance planning the country can have access to imports at a cheaper price compared to what it has been paying.

The CIF price of rapeseed-mustard oil at port was lower than the domestic wholesale price in Kanpur market in four out of the six years. However, when internal costs of taking produce from the port to the central market were accounted for, then the import price was lower than the domestic price in only two years. In these two years, free imports could have resulted in 23.46 and 25.84% decline in domestic prices (Table 2.23). Similarly, under free trade the farm price of rapeseed-mustard in these two years would have been reduced by more than 20%.

Table 2.22 Actual CIF import price and imputed CIF import price of rapeseed-mustard oil in India, Rs./ton.

Year	Actual[1] CIF price	International price Rotterdom [2]	Imputed CIF price[2]
1988-89	7,506	5,961	6,710
1989-90	14,458	6,915	7,575
1990-91	11,982	7,589	8,378
1991-92	27,932	10,022	11,201
1992-93	27,153	11,277	12,520
1993-94	17,543	15,570	17,045
1994-95	30,491	18,226	19,701

Source: 1. Monthly Statistics of Foreign Trade, Annual Number, Vol II, Import, Min. of Commerce, Govt. of India, various issues.
2 Taken from India, The Indian Oilseed Complex: Capturing Market Opportunities, Vol. II, Report No. 15677_IN, World Bank.
Note: The imputed on CIF price is derived from the CIF price Rotterdam by subtracting freight from Rotterdam to US Gulf and adding freight from US gulf to India (Mumbai).

There has been a lot of year to year variation in the unit price of rapeseed-mustard imported by India. In some years the import price turned out to be higher than the domestic price. This could be due to couple of reasons, some of which have been discussed above. This can also happen due to advance contract for purchase when the domestic price is not known or due to import of superior quality produce in small quantity. Such import prices are not relevant in studying impact of trade liberalization as they characterize only special cases. The normal situation of import implies that domestic prices are lower than import prices. In order to take care of yearly fluctuations in prices, the triennium weighted averages of domestic as well as international prices were taken using the quantity of import as a weight for import price and domestic production as a weight for domestic prices (see discussion on Table 2.27).

Table 2.23 Ex post impact of trade liberalization on domestic and farm level prices of rapeseed-mustard, Rs./ton.

Particular	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
1. C.I.F. price Mumbai port	27,932	27,153	17,543	30,491	22,788	38,650
2. Handling/marketing charges @ 5% of CIF price at Mumbai port	1,397	1,358	877	1,525	1,139	1,933
3. Transportation cost to Mumbai	440	480	550	640	710	780
4. Reference price (1-2-3)	29,769	28,991	18,970	32,656	24,637	41,363
5. Domestic price in Kanpur market	28,771	24,896	25,579	29,954	32,189	30,660
6. NPC	0.966	0.859	1.348	0.917	1.307	0.741
7. Domestic price under free trade (4)			18,970		24,637	
8. Change in domestic price under free trade % [(7-5)/5*100]			-25.84		-23.46	
9. Farm level price of mustard seed	8,862	8,610	10,120	9,710	10,680	11,030
10. Farm price under free trade [9+9*(8/100)*ET]			7,819		8,475	
11. Change in farm price % [(10 - 9)/9*100]			-22.74		-20.64	

Source of basic data: same as in Table 2.20.

India is a large importer of pulses including chickpea. However, domestic prices of chickpea in the wholesale market of the biggest producing state were lower than the CIF prices

at port in three out of the six years (Table 2.24). When the internal cost is added to the landed cost, the import price turns out to be higher than the domestic price in only one out of six years.

Table 2.24 Ex post impact of trade liberalization on domestic and farm level prices of chickpea, Rs./ton.

Particular	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
C.I.F. price at Mumbai port	6,260	6,872	9,279	14,869	12,630	10,607
2. Handling/marketing charges @ 5% of domestic price	313	344	464	743	632	530
3. Transportation cost to Jabalpur	363	416	483	534	589	647
4. Reference price (1+2+3)	6,936	7,632	10,226	16,146	13,851	11,784
5 Domestic price in Jabalpur	6,425	6,400	12,150	11,620	8,795	10,654
6. NPC (4/5)	1.080	1.192	0.842	1.390	1.575	1.106
7. Farm level price of chickpea	5,959	7,420	9,510	8,300	8,810	9,273

Source of basic data: same as in Table 2.20.

It may appear ironical that import of chickpea to India was attractive when the domestic price was lower than the CIF import price. This kind of situation is also observed by other studies. For instance, a CGPRT study reported that the landed cost of chickpea (which refers to white gram, locally known as *Kabuli* gram) in 1995 was Rs. 37,785 per ton and the local wholesale price was Rs. 32,000 (Kyi et al. 1997). One explanation for this seems to be that there is considerable intra year and inter market variation in chickpea prices in the country and imports are undertaken to keep a check or to take advantage of peak prices in the lean months in some of the markets. Second, in a big country like India, if some demand centres are located at a large distance from the producing points, it may involve the same or greater cost to deliver domestic produce to such consumption points than the cost involved in movement of an imported consignment. In such a situation comparison of the CIF import price with the wholesale price in the market of the producing area does not indicate profitability of imports. The imports would be profitable if the CIF price plus internal cost of carrying produce to some areas is lower than the wholesale price in producing areas plus the cost of moving produce to such consuming areas. Similarly, imports would be profitable if the wholesale price in some markets is higher than the CIF reference price. This kind of situation seems to hold true for chickpea in India as can be observed from the data on monthly prices in some markets during 1993, 1994 and 1995, reported in Table 2.25. The wholesale price of chickpea in Coimbatore market was higher than the CIF import price in all the three years. The average price in all four markets was higher than the CIF price in 1994. In 1995, although the average annual price was lower than the CIF price, there are months when the local price was higher than the CIF price. This seems to explain why import was taking place when the average annual price in the central market was lower than the CIF price.

In the ex ante analysis we have estimated the impact of trade liberalization on prices in the baseline scenario, which is taken as the average of the triennium ending 1996/97. The impact is studied in two ways; the first assumes unilateral free trade by the country in which there is no restriction on imports and exports. This would imply that domestic prices would be equated to corresponding CIF or FOB prices during TE 1996/97, adjusted for internal marketing and transport cost. This has been termed the baseline scenario with liberalization. The second scenario refers to the year 2000 and assumes multilateral trade liberalization with full Uruguay Round impact, in which subsidies, etc. are removed as envisaged in the Uruguay round. This would entail an increase in international prices by 7% in the case of rice and 4% in the case of maize and rapeseed-mustard oil (FAO 1995). The changes in domestic wholesale and farm level prices resulting from liberalization in the base run and full Uruguay effect are computed in Table 2.26 for rice and maize and in Table 2.27 for rapeseed-mustard oil.

Table 2.25 Regional and temporal variation in chickpea prices in selected markets, Rs./100 kg.

State/market	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave-rage
Bihar – Patna	1993	870	940	925	825	950	960	970	1,250	1,240	1,300	1,300	1,400	1,078
	1994	1,350	1,450	1,100	1,150	1,140	1,180	1,100	1,450	1,410	1,425	1,400	1,360	1,293
	1995	1,210	1,210	1,210	920	920	1,000	1,100	950	850	850	840	830	991
Tamilnadu – Coimbatore	1993	1,606	1,400	1,000	1,000	1,230	1,440	1,560	1,650	1,800	1,850	1,900	2,100	1,545
	1994	2,100	1,100	1,350	1,313	1,250	1,150	1,510	1,510	1,726	1,894	2,024	1,764	1,558
	1995	1,540	1,320	1,300	1,300	1,300	1,252	1,364	1,414	1,313	1,313	1,263	1,263	1,329
Delhi	1993	980	975	825	790	900	975	975	1,200	1,225	1,400	1,400	1,300	1,079
	1994	1,525	1,375	1,250	1,120	1,185	1,170	1,285	1,380	1,440	1,530	1,425	1,370	1,338
	1995	1,150	1,120	985	980	950	940	940	900	900	880	850	775	948
West Bengal – Calcutta	1993	975	970	970	860	950	1,015	1,080	1,200	1,290	1,325	1,500	1,475	1,134
	1994	1,475	1,300	1,200	1,175	1,170	1,200	1,450	1,500	1,525	1,525	1,400	1,250	1,348
	1995	1,275	1,125	1,060	940	960	940	925	900	880	870	890	900	972

Source: Agricultural Prices in India 1993 to 1995, Government of India.

For rice, the reference price in the baseline scenario arrived at by adding internal costs to domestic price works out to be Rs. 8,548 per ton while the FOB price was Rs. 8,653. Corresponding to this FOB price, the domestic price works out to be Rs. 7,684. This shows that if trade is liberalized the domestic rice price would go up by 1.39% and the farm level price of paddy would rise by 1.45% in the base scenario. The impact is quite strong in the free trade scenario with full Uruguay impact, which envisages a 7% rise in international prices and thus makes exports more attractive. Under free trade this would result in a 9.38% increase in the rice price and a 9.81% rise in the farm level price of paddy in India.

The impact of on maize prices of freeing export is very strong. In the base scenario trade liberalization involves about a 21% increase in domestic wholesale and farm level prices. Multilateral free trade with full Uruguay impact would raise the base level wholesale price by 26.46% and the farm price by 27.25% (Table 2.26).

The impact of trade liberalization on rapeseed-mustard oil and seed prices is presented in Table 2.27. The domestic price of rapeseed-mustard oil during TE 1996/97 was Rs. 30,934 per ton. Compared to this the landed cost at port was Rs. 23,499, which is 75% of the domestic price in the central market. When the marketing/handling and transport costs are added to landed cost of the oil, the reference price turns out to be Rs. 25,384 which is 18% lower than the domestic price (Table 2.27). This implies that free import of rapeseed-mustard oil in the base scenario would have rendered this edible oil cheaper by 18%. Similarly, prices received by farmers for rapeseed-mustard seed would go down by about 16%. In the second scenario, the international price increases by 4%, which would make imports costlier and reduce the difference between the domestic and landed or reference price of import. In this scenario the domestic price of edible oil falls by 14.75% and the farm level price of seed declines by 13%.

Table 2.26 Likely impact of free trade on domestic consumer and farm level prices of rice and maize.

Particular	Base Scenario TE 1996/97 Rice	Multi lateral Liberalization In Year 2000 Rice	Base Scenario TE 1996/97 Maize	Multi lateral Liberalization in Year 2000 Maize
1. Domestic price in Central market Rice (Delhi), maize (Kanpur) Rs./ton	7,579	7,579	4,006	4,006
2. Handling/marketing charges @ 5% of domestic price	379	379	200	200
3. Transportation cost to port	590	590	590	590
4. Reference price (1+2+3)	8548	8,548	4,796	4,796
5. F.O.B. price at port	8,653	9,259	5,631	5,856
6. NPC (4/5)	0.988	0.923	0.852	0.819
7. Domestic price under free trade (5-2-3)	7,684	8,290	4,841	5,066
8. Change in domestic price under free trade % [(7 -1)/1*100]	1.39	9.38	20.84	26.46
9. Farm level price	4,129	4,129	3,799	3,799
10. Farm price under free trade [9+9*(8/100)*ET]	4,189	4,534	4,614	4,834
11. Change in farm price % [(10 -9)/9*100]	1.45	9.81	21.46	27.25

Source of basic data: same as in Table 2.20.

Table 2.27 Likely impact of free trade on domestic and farm level prices of rapeseed-mustard oil and seed.

Particular	Base scenario TE 1996/97	Multi lateral Liberalization in year 2000
1. C.I.F. price Mumbai port	23,499	24,439
2. Handling/marketing charges @ 5% of domestic price	1,175	1,222
3. Transportation cost to Mumbai	710	710
4. Reference price (1-2-3)	25,384	26,371
5. Domestic price in Kanpur market	30,934	30,934
6. NPC (5/4)	1.219	1.173
7. Domestic price under free trade (4)	25,384	26,371
8. Change in domestic price under free trade % [(7-5)/5*100]	-17.94	-14.75
9. Farm level price of mustard seed	10,473	10,473
10. Farm price under free trade [9+9*(8/100)*ET]	8,819	9,114
11. Change in farm price % [(10 – 9)/9*100]	-15.79	-12.98

Source of basic data: same as in Table 2.20.

Impact on consumer and producer surplus and net social gain

As discussed above, trade liberalization would have opposing effects on domestic producers and consumers, because, for instance, a decline in price due to liberalization enables consumers to pay less and so producers receive less. In this trade-off situation, net social gain to a country due to policy change is computed by comparing consumer surplus and producer surplus. Changes in consumer surplus and producer surplus in the case of rice, maize and rapeseed-mustard are estimated in Table 2.28.

Liberalization of rice exports in the base scenario would have a very small impact on producer price and hence on supply. This would result in an increase in producer's surplus by Rs. 7,237 million. The impact on consumer's surplus is Rs. 7,545 million, which shows there would be a decline in net social gain due to liberalization in the base scenario. Under multilateral free trade the difference in producer's gain and loss in consumer's surplus would

increase further. These calculations demonstrate that free trade in rice would lead to a small net social loss to India. In the case of maize, liberalization of trade is found to be highly beneficial to the country. The gain to producers is almost double the loss to consumers due to the price rise.

The impact of import liberalization in rapeseed-mustard oil is estimated through change in consumer surplus due to the change in oil price and the change in producer surplus due to the change in the price of rapeseed-mustard seed (Table 2.28). Per capita consumption of rapeseed oil is 2.01 kg per year, which when multiplied by the population figure gives an aggregate demand for the country of 1.873 million ton. Under the free import scenario, the rapeseed-mustard seed price is estimated to decrease to Rs. 8,819 per tons from the level of Rs. 10,473 in the base scenario. This would shrink supply by 39 thousand tons resulting in a loss of producer surplus of Rs. 9,834 million. The positive impact on demand is greater compared to supply. Free trade leads to an increase in oil demand by 8.93% and a corresponding gain in consumer surplus by Rs. 10,397 million. Thus, under free trade, when the domestic price of oilseeds is equated to the relevant import price and the required change is incorporated in the seed price, the net social welfare improves by Rs. 563 million. In the second scenario international prices increase by 4% and the difference between the CIF price and the domestic price narrows. The net social gain still remains positive but compared to base scenario it is smaller.

Table 2.28 Impact of trade liberalization on producers, consumers and net social gain under scenarios.

Particular	Rice/paddy			Rapeseed/mustard	
	Rice	Paddy	Maize	Oil	Seed
1. Domestic production million tons (Q1)	80.17	120.26	9.72		6.14
2. Wholesale price in central market rupee/ton	7,579		4,006	30,934	
3. Farm level price in the country (P1)		4129	3,799		10,473
4. Supply elasticity		0.4035	0.4508		0.4014
5. Farm level price under free trade:					
Base scenario (P2)		4,189	4,614		8,819
Multi lateral free trade scenario (P3)		4,534	4,834		9,114
7. Supply at different prices:					
Existing price (P1) Q1	80.17	120.26	9.72		6.14
Free trade base scenario price (P2) Q2		120.97	10.66		5.75
Multi lateral free trade price (P3) Q3		125.02	10.91		5.82
8. Change in producer's surplus due to:					
Change in price from P1 to P2		7,237	8,305		-9,834
Change in price from P1 to P3		49,669	10,678		-8,127
Change in price from P2 to P3		42,432	2,373		1,707
9. Per capita demand kg/year	77.36		6.23	2.01	
10. Aggregate demand million tons D1	72.100		5.806	1.873	
11. Price elasticity of demand	-0.481		-0.582	-0.499	
12. Existing domestic market price (R1)	7,579		4,006	30,934	
13. Market price under free trade:					
Base scenario (R2)	7,684		4,841	25,384	
Multi lateral free trade scenario (R3)	8,290		5,066	26,371	
14. Demand at different prices					
Existing price (R1) D1	72.10		5.56	1.79	
Free trade base scenario price (R2) D2	71.62		4.88	1.95	
Multi lateral free trade price (R3) D3	68.85		4.70	1.92	
15. Change in consumer's surplus due to :					
Change in price from R1 to R2	-7,545		-4,359	10,397	
Change in price from R1 to R3	-50,107		-5,437	8,483	
Change in price from R2 to R3	-42,561		-1,078	-1,914	
16. Net social gain due to trade liberalization					
Existing level of international prices	-309		3,946	563	
Prices with WTO implementation	-437		5,241	356	
Shift from existing to full liberalization	-129		1,295	-207	

Note: Prices are rupees/ton. Other quantities are in million tons and values are in million rupees.

Two important conclusions emerge from these results. First, results based on a single year price can yield misleading conclusions because of considerable year-to-year variation in domestic as well as international prices. Therefore, study of the impact of trade liberalization should not be based on single year prices; it is appropriate to use at least a triennium average. Second, the impact of trade liberalization is not uniform across commodities.

The analysis shows that implementation of WTO would have a mixed impact on net social welfare of India. The country would be a net winner in some commodities and it would be net loser in some other commodities.

Estimation of producer and consumer surplus and net social gain was based on the following concepts:

Table 2.29 Symbols in estimation of producer and consumer surplus.

Scenario	Producer level		Consumer level	
	Price	Quantity supplied	Price	Quantity demanded
1. Base scenario TE 1996/97	P1	Q1	R1	D1
2. Base scenario with trade liberalization	P2	Q2	R2	D2
3. Free trade scenario with full WTO impact	P3	Q3	R3	D3

Let the demand elasticity be designated by η and supply elasticity be designated by ξ. Different quantities are computed as:

- Supply at P2 = Q1+ Q1 [ξ (P2 - P1)/P1]
- Supply at P3 = Q1+ Q1 [ξ (P3 - P1)/P1]
- Demand at P3 = D1+ D1 [η(R2 - R1)/R1]
- Demand at R3 = D1+ D1 [η(R3 - R1)/R1]
- Change in Producer's surplus due to trade liberalization in base scenario = (P2 - P1) [Q1+(Q2 – Q1)/2]
- Change in producer's surplus due to free trade and full effect of WTO = (P3 - P1) [Q1+(Q3-Q1)/2]
- Change in producer's surplus due to change in international prices from base scenario to full WTO effect = (P3 - P2) [Q2+(Q3 - Q2)/2]
- Change in consumer's surplus due to liberalization in base scenario = (R1 - R2) [D2+(D2 - D1)/2]
- Change in consumer's surplus due to free trade with full WTO effect = (R1 - R3) [D3+(D3 - D1)/2]
- Change in consumer's surplus due to change in international price from base scenario to full WTO effect = (R2 - R3) [D3+(D3 - D2)/2]
- Net social gain = Change in producer surplus + change in consumer surplus

2.4 East Asian crisis and the Indian economy

The financial crisis that hit Southeast Asian economies in 1997 has caused concern the world over. It has directly affected trade with various countries as well as global trade. As far as India is concerned the crisis has two types of effects, a direct effect on trade between India and the crisis hit economies, and an indirect effect due to effects of the world economy on India's economy.

A look at India's agricultural exports to the four crisis hit economies clearly brings out the setback to India (Table 2.30). India's agricultural export to these countries had been growing rapidly until 1997. In value terms these exports increased from Rs. 6,641 million in 1992/93 to Rs. 26,433 million in 1996/97. During 1997/98 after the crisis hit these economies,

India's agricultural exports plummeted to 21,182 million showing a drop of 22% over the previous year. Agricultural exports to the southeast Asian economies had not only been growing in absolute terms, but even their shares in India's farm export increased rapidly until 1996/97. In the first year following the crisis, the share fell to 8.9% from 11.20% in 1996/97. This decline is a result of both very high devaluation of currencies of the crisis-hit countries and worsening of their economic conditions.

Table 2.30 India's export of agricultural and allied products to East Asian economies and other countries, million Rs.

Country	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98
Indonesia	1,421	3,297	3,966	14,292	11,546	7,477
Malaysia	2,070	3,253	3,377	5,158	6,805	5,930
South Korea	1,064	1,358	1,542	3,800	4,723	4,374
Thailand	2,086	3,621	3,385	3,183	4,210	3,400
Sub total	6,641	11,530	12,270	26,433	27,284	21,183
Other countries	81,054	114,563	120,424	177,991	216,342	216,801
World	87,695	126,092	132,694	204,423	243,626	237,984
Share of East Asia in total export to world (%)	7.57	9.14	9.25	12.93	11.20	8.90

Source: Monthly Review of Indian Economy, Centre for Monitoring Indian Economy, various issues.

Like agricultural exports, there has been marked a decline in total exports from India to all the four South East Asia countries, whereas imports from these countries increased significantly due to exchange rate developments. Exports to the four countries during the period April-December 1998 declined by almost half over the corresponding period in 1997. There has also been a slowdown in India's exports to other countries, which can be partly attributed to indirect effects of the crisis on rest of the world (Table 2.31).

Table 2.31 India's export and import to East Asian countries during the last three years, $ million.

Country	Import			Export		
	1996	1997	1998	1996	1997	1998
Indonesia	433	551	612	370	387	109
Malaysia	796	934	1,255	384	391	221
South Korea	625	588	896	363	369	172
Thailand	137	171	196	303	259	219
Sub total	1,991	22,43	29,58	1,420	1,406	720
Other countries	25,425	27,279	28,599	22,775	23,543	23,547
World	27,417	29,522	31,558	24,195	24,949	24,267

Note: All figures are from April – December.
Source: same as in Table 2.30.

Thus the large depreciation of South East Asian currencies has adversely affected India's export and balance of payments. Due to this depreciation competition for exports from India has increased, which has implications for export and the economy.

3. Effects of Trade Liberalization at the Farm Level

The effects of trade liberalization at the farm level have been studied using farm level data from the major producing regions. The farm level data have been drawn from the states of Punjab for paddy, Madhya Pradesh for maize and Chikpea, and from Rajasthan for rapeseed-mustard. Madhya Pradesh is the biggest producer of chickpea and Rajasthan is the biggest rapeseed-mustard producing state of India. Uttar Pradesh is the biggest maize producing state, but the data for this state were not available for the latest year so the neighbouring state of Madhya Pradesh was selected for studying the farm level impact of trade liberalization on maize. Although Punjab is not the biggest rice producing state, it generates the highest marketed surplus of rice among all the states because of its smaller size.

The effect of trade liberalization on the four commodities was analyzed using primary data on input use, output, cost of inputs and returns from a sample of representative farmers as shown in Table 3.1.

Table 3.1 Sites for studying farm level effects of trade liberalization.

Commodity	Site	Sample Description
Paddy/rice	Punjab state	Totally irrigated, mechanized farming
Maize	Madhya Pradesh	Mainly rainfed but some irrigated
Rapeseed	Rajasthan	Partly irrigated, partly rainfed
Chickpea	Madhya Pradesh	Mostly rainfed

Paddy samples were taken from Punjab state, which is agriculturally the most developed state. Paddy in this state is grown purely for commercial purposes and about 84% of production is sold in the open market. This state alone contributes about one-third of the total rice procured by various official agencies to run public distribution systems, maintain buffer stocks and to meet demands of deficit states.

The sample consists of about 300 farmers in each state spread over the entire state. The impact of trade liberalization at the farm level was studied by preparing partial budgets for each of the selected crops. The impact was measured by comparing gross and net income from crop production in the sample year, under the base scenario, base scenario with liberalization, free trade scenario with full WTO impact, and free trade scenario with full WTO impact and removal of input subsidies.

3.1 Farm level production, marketing and trade policy

Institutional intervention of various kinds in the agricultural sector is an old concern. Until Independence this concern was confined to undertaking import-export, research, generation of revenue, revenue settlements and to a limited extent to development of infrastructure and to give desired direction to the crop pattern (Chopra 1981). With the beginning of the era of planned development in 1950/51, the government started playing an important role in the creation of infrastructure for long term growth and development of the agricultural sector. After the mid 1960s, which is a landmark for Indian agriculture as it marks the beginning of green revolution technology in India, government began to play a considerable role in transformation of the agricultural and rural economy. This led to the involvement of the state in diverse activities such a provision of subsidies of different kinds, procurement of large

agricultural outputs, supply of inputs and credit, promotion of agronomic research for adaptation of exotic varieties and development of infrastructural facilities (Krishnaji 1990). According to Krishnaji the agricultural price policy which evolved subsequently must then be seen as an essential part of a large package of policies designed to promote rapid growth in a few regions endowed well with irrigation facilities and to encourage private investment in the necessary means (modern input, tubewells, farm machinery, etc.) for the production for new varieties.

Government support to some commodities, which favoured a few states, was used as an argument for extending the benefit of government intervention to more and more commodities and regions/states. For the specific commodities in which the central government did not have much interest, the concerned state governments, either under pressure from farmers groups or at their own initiative to win popular support, extended benefits of price support and subsidy on inputs.

3.1.1 Input subsidies

Subsidies on farm inputs were initially meant to induce farmers to adopt new technology. It was with this intention that since the mid 1970s central and state governments have followed a policy of supplying fertilizer, irrigation, power and credit at prices which do not fully cover costs. No doubt input subsidies have helped in large-scale adoption of new technology and output growth. However, their level has risen to proportions which cannot be sustained, and their beneficial effects are said to be outweighed by the adverse effect in terms of macro economic imbalances, slowing down of public investments in agriculture, inefficient use of resources, degradation of environment and reduction of employment (Rao 1994b).

The level of fertilizer subsidy accruing to the agricultural sector has risen from Rs. 2,680 million during 1980-81 to Rs. 27,040 million in 1994-95 (Table 3.2). As a percentage of GDP the agricultural fertilizer subsidy jumped from 0.63% during 1980-81 to 1.17% in recent years. Total input subsidies in agriculture have risen from 3.67% of GDP agriculture in 1980-81 to around 8% during the nineties (Mahendra Dev 1997). This shows the magnitude of input subsidies in Indian agriculture.

The enormous increase in input subsidies has several deleterious effects. In terms of resource availability for the sector, subsidies appear to have hit public investment in agriculture, which has declined from peak level of Rs. 17,960 million at 1980-81 prices to below Rs. 13,000 million during the nineties. This is affecting the production base of agriculture and has adverse implications for long term growth prospects of the sector. The fertilizer subsidy is also causing concern because of an adverse impact on natural resources degradation and imbalanced use of plant nutrients at the farm level.

Irrigation and power subsidies are extended by state governments. Due to competitive populism, successive governments in various states have lowered the tariffs on power used for agriculture and in some case the tariff has been totally waived on scarce electric resources. Similarly, water rates on public irrigation works continue to be low, and have not seen upward revision recently with the rise in cost of maintaining and constructing such works. As a result, it is becoming increasingly difficult to maintain these public systems, which ultimately affects their availability in terms of quantity and quality to ultimate users. Due to inappropriate prices, electricity and water resources are not being used judiciously. In some places this is causing overexploitation of groundwater and degradation of land due to indiscriminate use (Dhawan 1995) and bias in crop pattern in pattern in favour of water-intensive crops.

Table 3.2 Input subsidies in Indian agriculture since 1980-81, Rs. Million.

Year	Electricity Subsidy	Irrigation Subsidy	Fertilizer Subsidy	Credit Subsidy	Total Subsidy	Subsidy as % of GDP Agriculture
1980-81	3,400	4,340	2,680	5,170	15,590	3.67
1981-82	4,150	4,600	1,990	6,530	17,270	3.62
1982-83	6,130	5,260	3,210	7,490	22,090	4.37
1983-84	7,510	5,970	5,520	9,020	28,020	4.57
1984-85	9,830	7,100	10,210	10,580	37,730	5.79
1985-86	13,250	8,450	10,200	12,280	44,180	6.31
1986-87	18,350	11,090	10,050	14,020	53,510	7.19
1987-88	26,130	15,180	11,470	16,180	68,960	8.26
1988-89	29,730	20,550	16,970	18,700	85,950	8.26
1989-90	37,970	20,420	24,070	18,990	101,450	8.79
1990-91	48,440	21,860	23,260	19,870	113,430	8.39
1991-92	61,240	24,870	25,440	22,290	133,840	8.40
1992-93	75,090	19,000	30,720	23,970	148,780	8.36
1993-94	92,100	16,090	23,320	25,440	156,950	7.61
1994-95	113,490	17,680	27,780	27,040	185,990	7.83

Source: Gulati and Sharma 1997.

Similarly, subsidized credit and waiving of farm loans is affecting the supply of funds to agriculture and has affected viability of credit institutions. How should we reform the regime of subsidies in agriculture? Although the approach would vary for different inputs, subsidies have to be targeted and gradually phased out.

In the case of fertilizer, price distortions have crept in after decontrol of phosphatic and potassic fertilizer. This distortion has led to imbalance in the use of the plant nutrients, N, P and K, as their consumption ratio has changed to 8.3 : 3.0 : 1.0 in 1998-99 from 6.0 : 2.4 : 1 in 1990-91 against the optimum ratio of 4:2:1 for the country (Economic Survey 1998-99).

Some suggestions to deal with the fertilizer subsidy and for appropriate fertilizer use are listed here:

- Phase out the Retention Price Scheme (RPS) and make the fertilizer industry competitive.
- Follow a regionally differentiated fertilizer price and subsidy policy (Reddy and Desphande 1992). The fertilizer subsidy should be slowly withdrawn from agriculturally-developed states, while it should be continued in low productivity states for some more time until fertilizer use reaches a specified minimum level. Withdrawal of the subsidy in developed states, particularly the north-western region, along with appropriate water pricing would bring some shift in area away from paddy, which is causing a strain on natural resources in this region.
- Fertilizer use efficiency should be promoted by encouraging the use of manure from organic sources.

Subsidy and free supply of power to agriculture are leading to huge losses and in some cases bankruptcy of state electricity boards. Indian farmers are reported to be paying 15-30 paise per KWH of power actually consumed by them, although the true cost of supplying power to them could be Rs. 3.50-4.00 per KWH (Dhawan 1997). Even agriculturally prosperous states like Punjab are supplying power free for agricultural use. Besides causing financial losses and lack of resources to generate power, the current power pricing policy is resulting in degradation of the natural resource base.

It has been suggested that legislation against the "free electricity approach" be passed and the institutional framework to end un-metered electricity supply be developed. It has also been suggested that electricity dues be collected from users by private parties on a commission basis (Gulati and Sharma 1997b). We feel that the collection of power charges does not pose any serious problem and tariffs can be collected by public agencies also. The real problem rests with the pricing of power, in which public agencies hardly have a role to play.

In the case of irrigation, the subsidy on canal irrigation alone is reported to have increased from Rs. 4,730 million during the triennium ending 1982/83 to Rs. 20.930 million during the TE 1994/95. The water rates charged to farm users are so low that they do not even cover operational and maintenance expenses let alone investments in irrigation (Gulati and Sharma 1997b). The actual gross receipt per hectare of area irrigated by major and medium projects is barely 2% of the gross output per hectare of irrigated area compared to the recommended level of 5% of gross income for food crops and 12% for cash crops (Government of India 1992). According to the report of this committee gross receipts covered only 41% of working expenses of the irrigation system during 1984-86 compared to 78% a decade ago. Low revenue from irrigation systems is not only affecting operation and maintenance of these systems but also the prospects of extending benefits of irrigation to new areas. It is argued that user of public irrigation can be asked to pay much more for water, provided they are assured of better service and are not asked to bear the burden of high costs resulting from inefficiency and waste in the government. Thus, along with price reforms, some institutional reforms for managing irrigation systems are also needed. Specific suggestions in this regard are:

- Rationalization of water rates to recover operational and maintenance (O & M) charge plus at least a little interest on capital invested in the system.
- Switching to volumetric pricing of water for the group of beneficiary farmers. It may not be possible to measure water supplied to each user. However, there is no problem in measuring supplies at the distribution outlet level for which charges can be recovered from the group of beneficiaries.
- Involvement of group of beneficiaries in organization and management of irrigation tasks and systems. Water users associations should be encouraged and strengthened for increase involvement in irrigation management (Moloney and Raju 1994; Datye and Patil 1987).
- Grating of financial autonomy to the irrigation departments. This will provide incentive for collection of revenue from users and more effective irrigation performance by suppliers of water leading to efficient management of system (Mitra 1996).

Credit requirements of the agricultural sector are expected to grow rapidly as the sector becomes commercialized in the new liberalized environment (Johl 1995; Rao 1994a). However, rural financial institutions do not seem to be in a position to meet the growing demand for credit as they are facing problems of heavy overdue, loans, losses and a resource crunch. This is a result of the policy environment and political culture, which encourage lending at subsidized rates and promote default through waiving of loans. This has choked the rural credit system by reducing the availability of resources for recycling.

Studies have shown that demand for credit in agriculture is less sensitive to interest rate and more sensitive to factors such as cost of borrowing, formalities and time spent in processing the loan and timely availability of credit in desired quantity and form. It thus appears that a small increase in interest rate would not have an adverse effect on demand for credit. Farmers would be helped more by providing ready access, quick and timely delivery of credit than by a concessional interest rate involving cumbersome loan procedures. Rural financial institutions should extend a facility of credit limits to more and more genuine farmers so that they can meet their cash needs for their farm businesses promptly. Similarly, the current practices of forcing borrowers to use credit to buy inputs from specific dealers, formalities like approval of livestock by a veterinarian and rampant corruption with different functionaries in the loan system cause a lot of exploitation of the borrowers. Borrowers would prefer to pay market interest rates rather than suffer exploitation in the loan process.

Subsidies are available on purchased inputs, which has led to crop and regional imbalances. The regional dimension in input subsidy is particularly important because a major burden of the subsidies is borne by the central government, which results in a pervasive way in

uneven distribution of benefits by the federal government to states. Similarly, input subsidies have produced distortion in cropping pattern against the crops which use more traditional inputs and less purchased inputs. Traditional farm technologies, which are sustainable in the long run and do not require external subsidization, have fallen victim to subsidy-based farm technologies. Variation in use level of subsidized inputs is the main source of variation in cost of production of important crops across states. The market price based on such costs is generally remunerative for regions, which make higher use of subsidized inputs and less or unremunerative to the regions with the use lower levels of subsidized inputs. As a consequence, the area under fallow land is increasing in agriculturally less developed regions.

Reduction in subsidies and getting input prices right may initially cause a small reduction in the use of inputs, but it would be beneficial for the agricultural sector in the long run. This would improve the quality of inputs and their delivery, promote input use efficiency and would reduce degradation of land and water resources.

Estimation of input subsidies

Estimates of subsidies on inputs used in crop production were derived from different sources. Per hectare power subsidy is estimated from the total power subsidy to agriculture sector in the selected states as reported by Srivastava and Sen (1997). The power subsidy is the difference between the average cost of supplying power (electricity) by the state electricity departments and tariffs paid by farmers multiplied by the electricity consumed. Per hectare power subsidy has been calculated by dividing the total power subsidy to the agricultural sector by the total cropped area.

The irrigation subsidy is the difference between operation and maintenance costs of irrigation schemes in the public sector and net proceeds from these schemes. Estimation of the total irrigation subsidy was taken from Sharma (1998) to arrive at the per hectare subsidy as:

$$\text{Per hectare subsidy for "i" th crop} = \frac{\text{Total irrigation subsidy}}{\text{Total irrigated area}} * \text{Proportion of "i" th crop under irrigated}$$

The fertilizer subsidy is reported by government on a regular basis in the budget and has been taken from the Economic Survey 1998-99 (Government of India). The country follows a system of retention prices for which government fixes an ex factory retention price for each fertilizer manufacturing plant based on cost norms. The government also fixes a retail price of fertilizer charged to farmers. Manufacturers are reimbursed the difference between ex factory retention price and consumer price net of distribution margin. This is termed the fertilizer subsidy (Gulati 1991). The per hectare fertilizer subsidy has been estimated as:

$$\frac{\text{Total subsidy on fertilizer}}{\text{Total quantity of fertilizer Used in the country}} * \text{Quantity of fertilizer applied to the crop}$$

3.1.2 Production or acreage control

There is no direct government intervention to control acreage or production of agricultural crops, but there are indirect measures used to encourage or discourage production of specific commodities. Since agriculture is under state control in India, this intervention differs from state to state and an exact picture can only be ascertained by analyzing the situation at the state level. For the purpose of illustration we would like to mention that in some states there is a heavy tax on production of certain cash crop like tobacco an in some states the area under horticultural crops is exempt from the land-ceiling act to encourage orchard farming. There is no system of acreage control or deficiency payment in the country.

3.1.3 Price intervention and parastatals

The government interferes by way of providing guaranteed prices and procuring some commodities, if prices fall below the minimum guaranteed price level. This is the most significant form of government intervention in agriculture in India. Guaranteed output prices serve as a surety to farmers that a bumper harvest, market malpractice or any other factor cannot force prices to fall below the floor level. Price guarantee in India is provided through a system of minimum support prices (MSP) or statutory minimum prices. If the market price falls below the guaranteed level, the government is under obligation to procure the quantity offered for sale at the guaranteed price. Besides establishing regulated markets, the government also set up temporary market yards during the peak procurement season.

The two main objectives of administered prices for foodgrains, meant mainly for rice and wheat, have been to ensure guaranteed prices to producers and food security. The latter objectives is achieved by supplying foodgrains through a public distribution system (PSD) at issue prices announced by government and by maintaining a buffer stock to take care of inter year fluctuations in output. FCI and other official agencies procure foodgrains from the market for the said purpose at a procurement price, which is invariably the same as the minimum support price. This blurring between MSP and procurement price creates several problems. Some economist have suggested that the distinction between support and procurement prices must be maintained for effective intervention (Ray 1994; Vyas 1994). It is argued that in order to procure the required quantities for PSD and buffer stocks, such market conditions are created wherein prices are artificially forced down to the level of procurement prices by measures such as setting stock limits, denial of credit, not supplying railway wagons and restrictions on movement of commodities (Johl 1995). The second consequence of this is that governments is forced to buy whatever produce comes in the market irrespective of its requirements. Thus government has to carry excessive stocks, which are again sold back after some time for free sale in the market. In this process government has to bear the losses due to quantity and quality deterioration and inefficient handling and transportation of the produce by official agencies. It is thus argued that the procurement price and MSP should be different. Under this kind of dispensation government should announce MSP which provides for only variable cost plus a small margin and protects farmers against seasonal price slumps due to gluts. The procurement of the quantity required by government should be done at open market price determined by supply and demand in a distortion-free market environment. This would have the advantage of buying only the quantity needed, whereas in the present policy government has been buying whatever is offered for sale (Mahendra Devi 1997).

3.1.4 Marketing policy and regulations

Government intervenes in agricultural markets in several ways such as (i) applying regulatory measures, (ii) administering prices, and (iii) intervening directly as in maintenance of buffer stock (Acharya 1998). Under the regulatory measures various legal instruments are enforced to influence market conduct. Some of these instruments come in the way of healthy and efficient marketing in the current economic environment.

There are formal as well as informal restrictions on inter state movement of agricultural produce, stocking and trading. The consequences of this are slow movement of produce from surplus to deficit markets, low market integration, depressed prices in producing areas and high prices for consuming areas.

There are several government regulations such as the Essential Commodities Act (1956), stock limit, credit control, etc. which are meant to deal with scarcity situations and to curb activities of hoarders. These regulations need to be modified to encourage increased participation of the private sector in agricultural trade and commerce. The idea is to not allow a free ride to the private sector, but to allow more room for market maneuvering. Licensing provisions for different activities should also be liberalized to increase the number of market

players. Some steps have already been taken in this direction and these are yielding positive results.

The seed sector has shown impressive growth over the last four decades. The Indian seed industry is dominated by the public sector and the share of organized private trade in total turnover of the seed industry is 16%. The participation of the private sector is, however, increasing (Singh and Asokan 1997). In the last 5-6 years multinational companies have shown keen interest to enter into the Indian seed industry, particularly in the area of hybrid seeds.

It appears essential to increase the role of the private sector in the seed industry. In case domestic private companies do not venture into the area, the seed sector has to be opened to multinational seed companies. In order to keep a check on the MNC activities, their operations should be subject to clearance by a group of experts from scientific bodies such as the Indian Council of Agricultural Research and Council for Scientific and Industrial research.

3.2 Effect of trade liberalization at the farm level

Partial budgets for all the selected crops based on the sample data are presented in Table 3.3. These provide information on prices and quantities of inputs and output, operational costs and fixed costs for each crop. Gross and net returns have been computed at farm harvest prices in the state for the sample year and at prices under the other scenarios.

The impact of different levels of trade liberalization and removal of subsidies on farm level income for the selected crops is presented in Table 3.4. As already discussed trade liberalization would lead to an increase in farm harvest prices of paddy and maize, whereas it would result in a decrease in the price of rapeseed/mustard. Per hectare input subsidies are estimated to be Rs. 2,974 for paddy and Rs. 719 to 729 for the other three crops. Detailed procedures and sources used in estimation of input subsidies are described at the end of this chapter.

Gross returns from paddy production increased from Rs. 19,006 per hectare in the bse scenario to Rs. 19,282 under free trade prices of the base scenario. The gross returns increased to Rs. 20,870 in the free trade scenario with full Uruguay impact. However, when subsidies are removed with free trade, then gross returns without liberalization are higher than the gross returns under free trade. Similarly, this pattern holds for the net income. This shows that reduction in income due to removal of input subsidies in rice production would not be compensated for by access to international prices under free trade.

The impact of trade liberalization is quite sharp on returns from maize cultivation. Trade liberalization in the base scenario increased net returns by Rs. 1,007 while the increase due to free trade with full WTO impact is Rs. 1,279. The domestic subsidy for maize is Rs. 729 which shows that trade liberalization would provide a higher gain to maize growers compared to the loss due to removal of the subsidy (Table 3.4).

Table 3.3 Estimates of cost cultivation/production and related data per hectare, 1995/96.

Particular	Paddy Punjab	Maize Madhya Pradesh	Chickpea Madhya Pradesh	Rapeseed/ Mustard Rajasthan
1. Return				
Yield (kilogram)	4,603	1,235	723	1,143
Price Rs./ton	3,800	4,050	9,210	10,160
Gross return	17,491	5,002	6,659	11,613
2. Material and labour inputs				
Seed				
Amount kg	-	21.47	80.21	5.39
Unit price	281.21	5.44	9.43	20.35
Fertilizer				
Amount kg of nutrients	156.99	29.98	28.45	51.70
Unit price	8.47	8.34	15.16	13.46
Manure				
Amount 100kg	29.45	2.04	0.03	1.04
Unit price/100 kg	3.05	28.85	21.00	17.66
Human labour				
Amount hours	493.62	444.54	262.37	365.29
Wage rate/hour	6.26	4.24	4.47	5.52
Animal labour				
Amount hours	4.77	67.10	42.56	16.92
Wage rate/hour	14.77	9.39	9.79	12.02
Machine labour charges Rs.	1,260	117	517	837
Insecticide Rs.	609		88	7
Irrigation charges Rs.	1,480		421	519
Interest on working capital Rs.	215	51	98	86
Rental value of owned land Rs.	4,600	1,368	1,627	1,891
Rent paid for leased-in land Rs.	1,453	--	--	73
Land revenue, cesses & taxes Rs.	3	6	7	11
Depreciation on implements &		101		
farm buildings Rs.	193		251	113
Interest on fixed capital Rs.	851	215	497	827
3. Operational costs	8,424	3,109	3,901	4,492
4. Fixed costs	7,100	1,690	2,381	2,915
5. Total cost	15,524	4,800	6,283	7,408
6. Net return over operational cost	9,067	1,892	2,757	7,121
7. Net return over total cost	1,967	202	376	4,205

Source of basic data: Report of the Commission on Agricultural Costs and Prices, 1997 and 1998, CACP, Government of India, New Delhi.

The impact of trade liberalization on returns from rapeseed-mustard is negative. Per hectare net returns over variable costs from this oilseed crop are Rs. 7,478 in the base scenario. When imports are liberalized this would decline to Rs. 5,588. In the other scenario with free trade and full WTO impact, net returns are estimated to be Rs. 5,925 per hectare. Withdrawal of domestic input subsidies would decrease per hectare returns by Rs. 719.

The percentage change in gross and net returns from the selected crops due to liberalization and withdrawal of subsidies is presented in Table 3.5. In the case of paddy cultivation liberalization in the base scenario will raise gross returns by 1.45%, whereas withdrawal of subsidies will cause a 14.2% decline in gross returns. In the free trade scenario with full WTO impact gross returns in the base scenario increase by 8.24%. When both the free trade policy and removal of subsidies are effected then gross returns decline 5.84%. The net return, which is more relevant from the farm income point of view, exhibits a stronger effect due to policy change. Trade liberalization in the base scenario increase net return by only 2.6% but free trade with full Uruguay effect leads to a 17.62% increase. However, when the latter scenario is combined with removal of subsidies net income declines by 0.5%.

Table 3.4 Impact of trade liberalisation on gross and net returns.

Particular	Paddy Punjab	Maize Madhya Pradesh	Gram Madhya Pradesh	Rapeseed/ Mustard Rajasthan
1. Yield (100 kg)	46.03	12.35	9.81	11.43
2. Farm level output price under different scenarios rupees/ton:				
a. Base scenario TE 1996/97	4,129	3,799	8,794	10,473
b. Base scenario with trade liberalization	4,189	4,614		8,819
d. Free trade scenario with full WTO impact	4,534	4,834		9,114
3. Input subsidies/hectare: total*	2,974	729	722	719
a. Irrigation	344	81	81	95
b. Power	1,946	517	517	399
c. Fertilizer	684	131	124	225
4. Gross returns under different scenarios:				
a. Base scenario TE 1996/97	19,006	4,692	8,627	11,971
b. Base scenario with trade liberalization	19,282	5,698		10,080
c. Base scenario with trade liberalization and removal of input subsidies	16,307	4,970		9,361
d. Free trade scenario with full WTO impact	20,870	5,970		10,417
e. Free trade scenario with full WTO impact and removal of subsidies	17,896	5,241		9,698
5. Net return over op. cost under different scenarios:				
a. Base scenario TE 1996/97	10,581	1,582	4,726	7,478
b. Base scenario with trade liberalization	10,858	2,589		5,588
c. Base scenario with trade liberalization and removal of input subsidies	7,883	1,860		4,868
d. Free trade scenario with full WTO impact	12,446	2,861		5,925
e. Free trade scenario with full WTO impact and removal of subsidies	9,471	2,132		5,206
6. Net return over total cost under different scenarios:				
a. Base scenario TE 1996/97	3,482	-108	2,344	4,563
b. Base scenario with trade liberalization	3,758	898		2,672
c. Base scenario with trade liberalization and removal of input subsidies	783	170		1,953
d. Free trade scenario with full WTO impact	5,346	1,170		3,010
e. Free trade scenario with full WTO impact and removal of subsidies	2,371	441		2,290

* Procedure adopted in estimation of input subsidies and sources of the same are explained in Section 3.1.1.

Trade liberalization is found to be highly beneficial to income from maize production. Net returns over variable cost in the base scenario go up by 63.6% with liberalization. Further liberalization of trade towards full Uruguay round raises the net returns by 81%. The negative income effect of removing subsidies is more than offset by liberalization.

In the case of rapeseed-mustard, liberalization of oil imports would reduce the net returns to farmers by one-fourth of the existing net returns. Along with this if subsidies are removed the net returns decline by about 35%. As multi lateral trade liberalization takes place leading to a rise in international price, the adverse impact on net returns would be reduced.

In the selected crops, free trade is estimated to have a sharp positive impact on net returns from production of exportables like maize and rice, whereas it is going to have a small negative impact on net return from the importables like rapeseed-mustard. In rice where level of input subsidy is high, free trade would not be sufficient to counter the adverse impact on income due to withdrawal of subsidies. It can be concluded from the above analysis that trade liberalization is a mixed bag and its impact would vary from commodity to commodity.

Table 3.5 Percent change in farm level prices and crop income under different trade liberalization scenarios.

Particular	Paddy Punjab	Maize Madhya Pradesh	Rapeseed/ Mustard Rajasthan
1. Change in price due to:			
a. Trade liberalization in base scenario	1.45	21.45	-15.79
b. Free trade with full WTO impact	9.81	27.24	-12.98
2. Change in gross return due to:			
a. Trade liberalization in base scenario	1.45	21.45	-15.79
b. Trade liberalization in base scenario and Removal of subsidies	-14.20	5.92	-21.80
c. Free trade with full WTO impact	9.81	27.24	-12.98
d. Free trade with full WTO impact and removal of subsidies	-5.84	11.71	-18.99
e. Shift from base scenario with liberalization to free trade (no change in domestic subsidies).	8.24	4.77	3.35
f. Shift from base scenario with liberalization to free trade (with removal of domestic subsidies)	9.74	5.47	3.60
3. Change in net return over operating cost due to:			
a. Trade liberalization in base scenario	2.61	63.61	-25.28
b. Trade liberalization in base scenario and Removal of subsidy	-25.50	17.56	-34.90
c. Free trade with full WTO impact	17.62	80.78	-20.77
d. Free trade with full WTO impact and removal of subsidies	-10.49	34.73	-30.39
e. Shift from base scenario with liberalization to free trade (no change in domestic subsidies)	14.63	10.49	6.03
f. Shift from base scenario with liberalization to free trade (with removal of domestic subsidies).	20.14	14.61	6.93

Source: same as in Table 3.4.

4. Prospects and Strategies

The economic reforms initiated in India during 1991 have focussed mostly on non-agricultural sectors and the approach towards the agricultural sector has remained gradual and cautious. During the last 4 - 5 years, trade in agricultural commodities has been somewhat liberalized with relaxation or removal of control and restrictions on import of some commodities and on export of most commodities. Apart from these small changes the agricultural sector has not witnessed any major policy change.

There are several reasons for the agricultural sector remaining outside the realm of direct reforms. First, the opinion in the country about the desirability and impact of reforms in agriculture has been sharply divided. On one hand reform was seen as the prime mover behind accelerated and sustainable growth of Indian agriculture (Rao and Gulati 1994); on the other hand reform was seen to pose a danger to food security, domestic producers, growth prospects and price stability. Second, reforms were based on the recognition that Indian industry is highly protected, which has hurt agriculture in several ways (Manmohan Singh 1995). It was thus thought that reforms in industry, by reducing protection to it, would indirectly create a more favourable policy environment for agriculture. Third, notions about reforms in the agricultural sector differed widely, which resulted in different perceptions about their gross and net impact. For some people reforms mean only globalization of agriculture implying free import and export, and for others reforms encompass domestic input-output markets, pricing, infrastructure, subsidy, regulations and institutional mechanisms and interventions. Although perceptions about the nature of reforms and their impact still differ considerably, there is a growing realization about the desirability of some kind of both external and domestic reforms to meet emerging challenges and opportunities within the country and outside.

There are three main factors for reforms in trade policy pertaining to agricultural produce. One, India is signatory to the Uruguay Round of the General Agreement on Trade and Tariff and is one of the founder members of WTO. This requires the country to adjust its policy as envisaged in the "Agreement on Agriculture". The main concern in this is liberalization of agricultural imports and exports, because Indian agriculture has to face competition from the rest of the world. The second factor, which is related to the first factor, is the changed global environment for trade. Like India, other member countries of WTO also have to adjust their policies to meet WTO obligations, which would imply more opportunities for export. How Indian agriculture can best take advantage of these opportunities would depend largely upon domestic policies. The third factor for trade policy changes is related to the terms of trade for agriculture. It is contended that since Independence India has protected its industrial sector through trade policy by insulating it from foreign markets and has net protected its agriculture (Manmohan Singh 1995). Trade policies during the green revolution period in particular are reported to have favoured industry and discriminated against agriculture (Rao and Gulati 1994). It is felt that under free trade, prices of industrial goods in the country would come down and prices of agricultural commodities would go up from their existing levels, which would lead to more favourable terms of trade for agriculture.

Trade in agricultural commodities has been governed mainly through quantitative restrictions, tariffs, canalization and licensing. Restrictions on most agricultural commodities have been either removed or relaxed during the last seven years following economic reforms. Tariffs are now the main instrument governing imports and the exports. The issue of reducing tariffs and further liberalization of trade is still being debated.

According to one point of view complete liberalization of trade would improve resource use efficiency by shifting area from less competitive crops to more competitive crops (Gulati

and Sharma 1997a). It is further urged that, in the case of India, it would be beneficial to go for export of superior foodgrains such as rice and wheat and allow freer import of edible oils. As the comparative efficiency in oilseed production is very low, the policy of attaining self-sufficiency in edible oilseeds is questionable (Gulati and Sharma 1997a).

On the other hand, a policy of total liberalization and reliance on trade to meet domestic demand and to reap major gains is believed to pose many dangers and risks for a large country like India. It is contended that the possibility of crop substitution with a view to increasing exportable crops may not be as bright as it appears at first sight (Rao 1994a). Rather than promoting export of foodgrains, it is suggested that if India is able to meet domestic demand and there is a possibility of surplus then the strategy should be to divert resources to commercial crops or to non-agricultural sectors. Rather than foodgrains, potential areas for export growth are said to be fruits, vegetables, flowers, herbs, etc (Vyas 1994).

As a member of WTO India has to liberalize trade in agriculture and India will be facing a world where other countries would also be moving towards liberalization. There is great interest to know how trade liberalization and implementation of WTO provisions will affect the country. Since liberalization would be for exports as well as for imports, it would lead to an increase in exports of some commodities and an increase in imports of some other commodities depending upon domestic and international prices, cost of production and other relevant factors. Accordingly, trade liberalization would result in raising domestic prices of some commodities and lowering prices of some other commodities. This would in turn affect prices, production, consumption and crop income. The present study is an attempt to systematically analyze the impact of trade liberalization on selected commodities at the national level and in representative crop growing locations. It focuses on four crops namely paddy (rice), maize, chickpea and rapeseed-mustard.

There are three ways to obtain some idea regarding the impact of trade liberalization on domestic prices and commodities. These involve comparing domestic prices with (i) price in the international market, (ii) international price net of freight, insurance and other marketing charges between the trading countries and (iii) international prices net of freight, insurance and other marketing costs between trading countries and within the country. In recent years international prices of rice of comparable grade have been 21 to 46% higher than domestic prices. Domestic prices of maize in some years are lower and in some years higher than international prices. The position of rapeseed-mustard oil is the reverse of rice. Per ton prices of rapeseed-mustard in the country ranged between $839.3 and $962.3 during 1994 to 1997, while international prices varied between $557 and $617. In the case of chickpea, international prices are found to be higher than domestic prices to the tune of 20% in recent years. However, there is tremendous inter and intra year instability in domestic prices so it is difficult to say whether international prices are consistently lower/higher than domestic prices.

A comparison of international and domestic prices sometimes does not indicate trade possibilities since trading costs, freight, insurance and related charges make a significant difference to the price. Accordingly, the impact of trade liberalization on domestic production was studied by estimating nominal protection coefficients (NPC) using the CIF price for importable commodities and the FOB price for exportable commodities. Rice and maize are treated as exportables as India is net exporter of these two commodities, and chickpea and rapeseed-mustard have been treated as importables, as their net trade involves more imports than exports.

The NPC (computed by taking the ratio of domestic to border prices) for rice under the importable hypothesis is below 1 implying that free trade would lead to higher exports. Maize also has strong advantage in export. The domestic price of chickpea was lower than the CIF import price in most years, but despite this India has been importing chickpea. Rapeseed-mustard is highly protected against imports through tariff as well as non-tariff barriers. The price of rapeseed-mustard oil in the country has been significantly higher than CIF world prices.

There is considerable volatility in the international price of rice, whereas the domestic price has maintained a steady trend line. This shows that attractiveness of rice exports would vary considerably from year to year depending upon the behaviour of international prices.

Even after border prices were adjusted for cost within the country, domestic reference prices of maize and rice remained lower than FOB export prices. The difference was quite high in the case of maize, but the margin for rice exports was small. Rice exporters face stiff competition from exporters in other countries. Results of the study show that free trade in rice and maize would raise their domestic prices and farm level prices. In the case of rapeseed-mustard, the impact has been studied on the price of rapeseed-mustard seed at the farm level and on edible oil price at the wholesale level. The CIF price of rapeseed-mustard oil imported by India showed violent fluctuations. In fact this fluctuation is not present in the international price. The actual CIF price of rapeseed-mustard oil imported by India is found to be quite high compared to the imputed the CIF price derived by adding freight charges to the international price. India does not have a stable trading source or partner for the import and there is not sufficient planning about imports. As a result, when a shortfall in the domestic market is felt, the country resorts to panic buying for fear of a violent rise in domestic prices. With proper advance planning, the country can have access to import at a cheaper price compared to what it has been paying.

It may appear ironical that despite domestic prices being lower than the CIF import price India has been importing a large amount of chickpea. This seems to be due to considerable intra year and inter market variation in chickpea prices in the country, and imports are undertaken to check or to take advantage of peak prices in the lean months in some markets.

In the ex ante analysis we have estimated the impact of trade liberalization on prices in the base scenario, which is taken as the average of the triennium ending 1996/97. The impact is studied in two ways; one, assuming unilateral free trade by the country in which there is no restriction on imports and exports and domestic prices are equated to the corresponding CIF or FOB prices, adjusted for internal marketing and transport costs. This has been termed the base scenario with liberalization. The other scenario refers to year 2000 and assumes multilateral trade liberalization with full Uruguay impact, in which subsidies, etc. are removed as envisaged in the Uruguay round. In this scenario international prices are assumed to be higher by 7% for rice and by 4% for maize and edible oils.

The analysis reveals that trade liberalization in the base scenario would raise the domestic rice price by 1.39% and the farm level price of paddy by 1.45%. This shows that rice exporters have to operate in a very competitive environment as the price margin is quite thin. Multilateral free trade would result in a 9.38% increase in the rice price and a 9.81% rise in the farm level price of paddy in India.

The impact of freeing exports on maize prices is very strong. In the base scenario trade liberalization involves about a 21% increase in domestic wholesale and farm level prices. Multilateral free trade with full Uruguay impact would raise the base level wholesale price by 26% and the farm price by 27%.

Free import of rapeseed-mustard oil in the base scenario would have rendered the oil price cheaper by 18% and lowered prices received by farmers for rapeseed-mustard seed by about 16%. The second scenario with 4% increase in world prices would lower prices in the range of 13-15%.

The net impact of trade liberalization was measured by estimating changes in consumer surplus, producer surplus and net social welfare. Liberalization of rice export in the base scenario would have a very small impact on producer prices and hence on supply. This would result in an increase in producer's surplus by Rs. 7,237 million. The impact on consumer surplus is Rs. 7,545 million, which shows there would be a decline in net social gain due to liberalization in the base scenario. Under multilateral free trade, the difference in producer's gain and loss in consumer surplus would increase further. Thus, free trade in rice would lead to

a small net social loss to the country. In the case of maize, liberalization of trade is found to be highly beneficial to the country. The gain to producers is almost double the loss to consumers due to the price rise. In the case of rapeseed-mustard, free import would shrink supply by 39 thousand tons resulting in a loss of producer surplus of Rs. 9,834 million. The positive impact on demand is greater compared to supply. Free trade leads to an increase in oil demand by 8.93% and corresponding gain in consumer surplus by Rs. 10,397 million. Thus, under free trade, the net social welfare improves by Rs. 563 million. In the second scenario international prices increase by 4% and the difference between the CIF price and the domestic price narrows down. The net social gain still remains positive, but it is less than the base scenario.

The study shows that implementation of WTO would have a mixed impact on the net social welfare of India. The country would be a net gainer in some commodities and it would be a net loser in some other commodities.

The study analyzed, with the help of partial budget methods, impacts of trade liberalization and removal of domestic subsidies on crop income using farm level data. In the case of paddy cultivation, liberalization in the base scenario raises gross returns by 1.45%, whereas withdrawal of subsidies causes a 14.2% decline in gross returns. In the free trade scenario with full WTO impact, gross returns in the base scenario increase by 8.24%. With both the free trade policy and removal of subsidies, then gross returns decline by 5.84%. The net return, which is more relevant from the income point of view, exhibits a stronger effect due to policy change. Trade liberalization in the base scenario increases the net return by merely 2.6%, but free trade with full Uruguay effect leads to a 17.6% increase in the net return. When the latter scenario is combined with removal of subsidies, net income declines by 10.5%. It was found that the reduction in income due to removal of input subsidies in rice production would not be compensated for by access to international prices under free trade.

Trade liberalization is found to be highly beneficial to income from maize production. Net returns over variable costs in the base scenario go up by 63.6% with liberalization. Further liberalization of trade towards full Uruguay impact raises the net return by 81%. The negative income effect of removing subsidies is more than offset by liberalization.

In the case of rapeseed-mustard, liberalization of oil imports would reduce the net return to farmers by one-fourth of the existing net returns. Along with this if subsidies are removed, the net return declines by about 35%. As multi lateral trade liberalization takes place leading to a rise in international prices, the adverse impact on net return would be reduced.

In the selected crops, free trade is estimated to have a sharp positive impact on net returns from production of exportables such as maize and rice, whereas it is going to have small negative impact on net return from importables such as rapeseed-mustard. In rice, where the level of input subsidy is high, free trade would not be sufficient to counter the adverse impact on income due to withdrawal of subsidies. Trade liberalization is a mixed bag and its impacts would vary from commodity to commodity. There is considerable scope for increasing benefits due to trade liberalization by reducing domestic marketing costs and by tapping proper markets for imports.

In our opinion, signals from ratios of domestic to global prices should not be stretched too far. There should not be major policy shifts for important crops like foodgrains and oilseeds based on global price signals. Agriculture should be subject to world competition, but domestic policy support must continue. The policy of attaining self-sufficiency in oilseeds should also emphasize improvement in resource use efficiency through technological improvements.

The challenges due to import liberalization cannot be met through trade policy changes alone, nor can trade policy in itself help in taking advantage of export in a liberalized world. Both these would depend on the growth rate in domestic output and production efficiency built into the cost of production. If domestic output does not grow to keep pace with domestic demand, then domestic prices would go up, which would be attractive for imports and unfavourable for exports. Similarly, if the cost of production in domestic markets is sufficiently

higher than competing countries, this would attract imports and discourage exports. The best strategy to face the challenge of import liberalization and to take advantage of export potential would be to ensure (i) growth in aggregate domestic supply higher than 2.75%, which is estimated to be the growth rate in domestic demand, and (ii) continuous improvement in efficiency of production to keep the cost of production low.

Along with trade policy reforms, attention needs to be given to domestic market reforms to improve competitiveness of India's agriculture and to improve long term growth prospects. These would require rationalization of subsidies on certain inputs and improvement in the performance of domestic markets.

There are formal as well as informal restrictions on inter state movement of agricultural produce, stocking and trading by private traders. Similarly, there are government regulations such as the Essential Commodities Act (1956), stock limit, credit control, etc. which were meant to deal with scarcity situations and to curb activities of hoarders. These regulations need to be modified to encourage increased participation of the private sector in agricultural trade and commerce to face the challenges as well as to take advantages of liberalization of trade. Licensing provisions for different activities should also be liberalized to increase the number of market players. Some steps which are yielding positive results have already been taken in this direction. Under the provision of levy, millers are required to sell a part of the rice and sugar they mill to the government at a price derived from the procurement price. The levy on rice is as high as 75% in agriculturally progressive northern states. Millers often complain that after contributing as much as 75% of their rice at a price, which is often below the open market price, they are left with little produce to run their business. Similarly, it is alleged that, due to the obligation to supply a large proportion of their produce at a subsidized price to meet the levy requirement, Indian exporters are in a disadvantageous position compared to their counterparts in other countries. Thus, to have a level playing field, domestic exporters seek exemption of all kinds of rice export from levy, and their demands appear justified.

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Appendix Tables

Appendix Table 1 Distribution of land holdings.

	1960/61	1970/71	1980/81	1990/91
1. No. of operational holdings: million	48.88	70.49	88.88	106.63
2. Per cent distribution of holdings by size class				
Marginal less than 1 hectare	40.70	50.60	56.40	59.40
Small 1 to 2 hectare	22.30	19.10	18.10	18.80
Semi medium 2 to 4 hectare	18.90	15.20	14.00	13.10
Medium 4 to 10 hectare	13.40	11.20	9.10	7.10
Large above 10 hectare	4.70	3.90	2.40	1.60
3. Average size of holdings: ha				
Marginal less than 1 hectare	0.44	0.41	0.39	0.39
Small 1 to 2 hectare	1.47	1.44	1.44	1.43
Semi medium 2 to 4 hectare	2.84	2.81	2.78	2.76
Medium 4 to 10 hectare	6.10	6.08	6.04	5.90
Large above 10 hectare	17.48	18.07	17.41	17.33
All holdings	2.69	2.30	1.84	1.57
4. Area share of size class %				
Marginal less than 1 hectare	6.70	9.00	12.10	15.10
Small 1 to 2 hectare	12.20	11.90	14.10	17.40
Semi medium 2 to 4 hectare	20.00	18.50	21.20	23.20
Medium 4 to 10 hectare	30.40	29.70	29.60	27.00
Large above 10 hectare	30.70	30.90	23.00	17.30

Source: Agricultural statistics at a Glance, Government of India, various issues.

Appendix Table 2 Trends in production of major crops, million tons.

Year	Rice	Wheat	Cereals	Pulses	Food-grains	Oilseeds	Cotton	Sugar-Cane
1949/50	23.54	6.39	16.83	8.16	54.92	5.23	2.75	50.17
1950/51	20.58	6.46	15.38	8.41	50.82	5.16	3.04	57.05
1951/52	21.30	6.18	16.09	8.42	51.99	5.03	3.28	61.63
1952/53	22.90	7.50	19.61	9.19	59.20	4.73	3.34	51.00
1953/54	28.21	8.02	22.97	10.62	69.82	5.37	4.13	44.41
1954/55	25.22	9.04	22.82	10.95	68.03	6.40	4.45	58.74
1955/56	27.56	8.76	19.49	11.04	66.85	5.73	4.18	60.54
1956/57	29.04	9.40	19.87	11.55	69.86	6.36	4.92	69.05
1957/58	25.53	7.99	21.23	9.56	64.31	6.35	4.96	71.16
1958/59	30.85	9.96	23.18	13.15	77.14	7.30	4.88	73.36
1959/60	31.68	10.32	22.87	11.80	76.67	6.56	3.68	77.82
1960/61	34.58	11.00	23.74	12.70	82.02	6.98	5.60	110.00
1961/62	35.66	12.07	23.22	11.76	82.71	7.28	4.85	103.97
1962/63	33.21	10.78	24.63	11.53	80.15	7.39	5.54	91.91
1963/64	37.00	9.85	23.72	10.07	80.64	7.13	5.75	104.23
1964/65	39.31	12.26	25.37	12.42	89.36	8.56	6.01	121.91
1965/66	30.59	10.40	21.42	9.94	72.35	6.40	4.85	123.99
1966/67	30.44	11.39	24.05	8.35	74.23	6.43	5.27	92.83
1967/68	37.61	16.54	28.80	12.10	95.05	8.30	5.78	95.50
1968/69	39.76	18.65	25.18	10.42	94.01	6.85	5.45	124.68
1969/70	40.43	20.09	27.29	11.69	99.50	7.73	5.56	135.02
1970/71	42.22	23.83	30.55	11.82	108.42	9.63	4.76	126.37
1971/72	43.07	26.41	24.60	11.09	105.17	9.08	6.95	113.57
1972/73	39.24	24.74	23.14	9.91	97.03	7.14	5.74	124.87
1973/74	44.05	21.78	28.83	10.01	104.67	9.39	6.31	140.81
1974/75	39.58	24.10	26.13	10.02	99.83	9.15	7.16	144.29
1975/76	48.74	28.84	30.41	13.04	121.03	10.61	5.95	140.60
1976/77	41.92	29.01	28.88	11.36	111.17	8.43	5.84	153.01
1977/78	52.67	31.75	30.02	11.97	126.41	9.66	7.24	176.97
1978/79	53.77	35.51	30.44	12.18	131.90	10.10	7.96	151.66
1979/80	42.33	31.83	26.97	8.57	109.70	8.74	7.65	128.83
1980/81	53.63	36.31	29.02	10.63	129.59	9.37	7.01	154.25
1981/82	53.25	37.45	31.09	11.51	133.30	12.08	7.88	186.36
1982/83	47.12	42.79	27.75	11.86	129.52	10.00	7.53	189.51
1983/84	60.10	45.48	33.90	12.89	152.37	12.69	6.39	174.08
1984/85	58.34	44.07	31.17	11.96	145.54	12.95	8.51	170.32
1985/86	63.83	47.05	26.20	13.36	150.44	10.83	8.73	170.65
1986/87	60.56	44.32	26.83	11.71	143.42	11.27	6.91	186.09
1987/88	56.86	46.17	26.36	10.96	140.35	12.65	6.38	196.74
1988/89	70.49	54.11	31.47	13.85	169.92	18.03	8.74	203.04
1989/90	73.57	49.85	34.76	12.86	171.04	16.92	11.42	225.57
1990/91	74.29	55.14	32.70	14.26	176.39	18.61	9.84	241.05
1991/92	74.68	55.69	25.99	12.02	168.38	18.60	9.71	254.00
1992/93	72.86	57.21	36.59	12.82	179.48	20.11	11.40	228.03
1993/94	80.30	59.84	30.82	13.30	184.26	21.50	10.74	229.66
1994/95	81.81	65.77	29.88	14.04	191.50	21.34	11.89	275.54
1995/96	76.98	62.10	29.03	12.31	180.42	22.11	12.86	281.10
1996/97	81.31	69.27	34.27	14.46	199.32	24.96	14.25	277.25

Source: Agricultural statistics at a Glance, Government of India, various issues.

Appendix Table 3 Trend in input use in Indian agriculture.

Year	% of NSA Under Irrigation	Fertiliser Use NPK (kg/ha)	Pesticide Use (gr/ ha)	Cereal Area Under HYV (%)	Net sown Area per Tractor (ha)	Terms of Trade Base 1981/82=100
1950/51	17.56				13,808	
1951/52	17.63	0.55				
1952/53	17.11	0.53				
1953/54	17.25	0.83				
1954/55	17.28	0.95				
1955/56	17.62	1.01	18.22		6,150	
1956/57	17.22	1.17	19.56			
1957/58	17.94	1.42	16.42			
1958/59	17.75	1.70	42.78			
1959/60	18.08	2.29	42.88			
1960/61	18.51	2.19	64.71		4,296	
1961/62	18.38	2.50	76.07			
1962/63	18.82	3.32	72.54			
1963/64	18.97	3.99	80.82			
1964/65	19.26	5.60	87.32			
1965/66	19.34	5.76	107.42		2,522	
1966/67	19.61	8.02	124.90	2.02		
1967/68	19.95	11.00	149.41	6.11		
1968/69	21.13	12.82	154.40	9.37		
1969/70	21.76	14.29	148.81	11.24		
1970/71	22.17	15.52	173.38	15.11		
1971/72	22.58	19.02	211.39	18.09	942	
1972/73	23.21	20.18	256.38	22.69		
1973/74	22.85	19.93	354.11	25.25		
1974/75	24.46	18.68	415.34	27.60		
1975/76	24.42	20.43	403.48	30.74		
1976/77	25.20	24.45	372.23	33.10	505	
1977/78	25.75	30.19	415.50	37.43		
1978/79	26.62	35.79	391.00	38.10		
1979/80	27.73	37.84	400.04	37.28		
1980/81	27.66	39.39	390.58	41.34		
1981/82	28.50	42.54	428.27	44.15	273	
1982/83	28.90	45.37	416.92	46.44		103.70
1983/84	29.29	53.84	474.90	49.93		110.60
1984/85	29.91	58.28	487.93	52.09		109.90
1985/86	29.86	60.13	439.12	53.49		103.80
1986/87	30.32	61.68	480.41	53.99	191	110.50
1987/88	32.14	65.58	499.40	54.97		116.80
1988/89	31.66	77.71	518.20	57.51		112.70
1989/90	31.71	81.27	504.77	59.18		103.50
1990/91	33.41	87.74	524.71	62.98	115	108.50
1991/92	35.21	89.87	509.31	65.16		116.40
1992/93	35.24	85.16	496.03	64.89		113.20
1993/94	36.05	86.83	446.92	66.66		111.60
1994/95	37.11	94.97	429.63	70.35		114.40
1995/96	37.62	97.56	430.74	72.11		112.80

Source: 1. Agricultural statistics at a Glance, Government of India, various issues.
2. Economic Survey, Ministry of Finance, Government of India, various issues.

Appendix Table 4 Trend in labour and capital (in 1980-81 prices) in Indian agriculture.

Year	Number of Agricultural Workers per 100 ha	Workforce in Agriculture (%)	Gross Fixed Capital Stock In Agri (Rs/ha)	Gross Fixed Capital Formation In Agriculture (Rs. Crores)		
				Public	Private	Total
1950/51	117.89	69.40				1,272
1951/52						1,482
1952/53						1,290
1953/54						1,476
1954/55						1,440
1955/56						1,587
1956/57						1,613
1957/58						1,588
1958/59						1,521
1959/60						1,367
1960/61	141.67	69.50	2,752.33	622	1,072	1,694
1961/62			2,765.07	632	1,136	1,768
1962/63			2,808.13	734	1,150	1,884
1963/64			2,877.20	763	1,270	2,033
1964/65			2,922.31	808	1,429	2,237
1965/66			3,048.38	849	1,579	2,428
1966/67			3,105.08	740	1,710	2,450
1967/68			3,140.33	738	1,966	2,704
1968/69			3,289.56	819	1,881	2,700
1969/70			3,356.99	818	2,081	2,899
1970/71	128.61	69.70	3,409.85	833	1,915	2,748
1971/72			3,517.03	901	2,001	2,902
1972/73			3,683.54	1,091	1,982	3,073
1973/74			3,636.15	1,032	2,016	3,048
1974/75			3,831.70	956	1,901	2,857
1975/76			3,811.37	1,084	2,020	3,104
1976/77			4,001.51	1,442	2,404	3,846
1977/78			4,060.23	1,604	2,341	3,945
1978/79			4,183.73	1,774	2,670	4,444
1979/80			4,466.81	1,850	2,790	4,640
1980/81	174.70	60.50	4,589.03	1,937	2,828	4,765
1981/82			4,656.56	1,897	2,690	4,587
1982/83			4,834.60	1,863	2,813	4,676
1983/84			4,850.08	1,901	2,358	4,259
1984/85			5,044.85	1,841	2,574	4,415
1985/86			5,137.24	1,657	2,423	4,080
1986/87			5,241.03	1,615	2,557	4,172
1987/88			5,570.74	1,576	3,001	4,577
1988/89			5,357.64	1,482	3,169	4,651
1989/90			5,442.74	1,301	3,313	4,614
1990/91	219.65	59.00	5,516.22	1,313	3,612	4,925
1991/92			5,672.03	1,135	4,012	5,147
1992/93			5,759.39	1,185	4,585	5,770
1993/94			5,876.56	1,299	4,250	5,549
1994/95			5,988.24	1,448	4,626	6,074
1995/96			6,151.10			6,765

Source: 1. Agricultural statistics at a Glance, Government of India, various issues.
2. National Account Statistics, Central Statistical Organisation, GOI, various issues.

Appendix Table 5 Farm harvest prices of selected crops in representative markets, Rs/100 kg.

Year	Paddy	Maize	Gram	Rapeseed/ Mustard	Pearl Millet
1976/77	84	67	122	332	98
1977/78	90	73	175	314	110
1978/79	98	78	172	323	94
1979/80	86	109	202	335	113
1980/81	95	114	310	423	137
1981/82	105	131	228	414	141
1982/83	112	147	217	348	152
1983/84	123	140	284	468	149
1984/85	133	118	396	353	148
1985/86	147	145	379	431	168
1986/87	151	155	335	651	165
1987/88	201	189	435	681	195
1988/89	177	190	435	550	177
1989/90	184	188	520	675	192
1990/91	215	186	577	851	237
1991/92	246	289	596	886	294
1992/93	276	254	742	861	278
1993/94	322	293	951	1,012	321
1994/95	368	327	830	971	350
1995/96	392	361	881	1,068	401
1996/97	439	452	927	1,103	

Source: 1. Farm Harvest Prices in India, Ministry of Agriculture, Government of India, various issues.
2. Agricultural Situations in India, Ministry of Agriculture, Government of India, various issues.

Appendix Table 6 Wholesale prices of selected crops in representative markets, Rs/100 kg.

Year	Rice	Maize	Gram	Rapeseed-Mustard Oil	Wholesale Price* Index Base 1981/82=100
1976	163	81	124	592	62.80
1977	175	105	156	1031	66.10
1978	167	101	204	942	66.10
1979	169	102	196	951	77.40
1980	203	141	301	1235	91.50
1981	255	145	371	1,313	100.00
1982	278	147	265	1,190	104.30
1983	311	186	247	1,384	110.80
1984	305	136	408	1,451	118.50
1985	307	146	472	1,184	124.00
1986	313	178	376	1,513	130.90
1987	339	184	386	2,265	140.00
1988	386	227	750	1,928	152.20
1989	408	211	764	1,703	162.50
1990	459	194	667	2,367	177.20
1991	527	308	649	2,946	201.40
1992	580	349	638	2,577	224.70
1993	651	255	1,164	2,700	242.10
1994	693	376	1,245	2,822	274.70
1995	690	396	940	3,218	295.80
1996	849	423	983	3,066	314.60

* WPI refers to financial year

Source: 1. Agricultural Prices in India, Ministry of Agriculture, Government of India, various issues.
2. Agricultural Statistics in India, Ministry of Agriculture, Government of India, various issues.
3. Reports of the Commission for Agricultural Costs and Prices, Ministry of Agriculture, various issues.

Appendix Table 7 Import of selected commodities into India.

Year	Rice		Maize		Chickpea		Mustard oil	
	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)
1987/88	5.37	21.50			214.90	774.50	345.05	1,605.00
1988//89	523.17	1,583.30	81.01	181.50	207.01	1,027.00	185.31	1,390.90
1989/90	468.63	2,346.30	94.79	233.80	66.98	442.00	2.08	30.10
1990/91	66.03	391.80	0.01	0.02	160.11	1,074.10	2.53	30.30
1991/92	12.11	109.40			98.75	792.30	2.68	74.90
1992/93	102.37	733.20			77.01	709.50	0.48	13.00
1993/94	75.52	552.60			150.33	1,597.50	1.10	19.30
1994/95	6.90	85.50			58.12	850.10	1.91	58.40
1995/96					13.76	413.84	ng	Ng
1996/97	2.04	0.18			122.06	1,469.10	0.79	30.60

Source: Monthly Statistics of Foreign Trade, Annual Number, Volume II, Ministry of Commerce, Government of India, various issues.

Appendix Table 8 Export of selected commodities from India.

Year	Rice		Maize		Chickpea		Mustard oil		Rapeseed Oil	
	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)	Qty ('000 tons)	Value (Rs. million)
1986/87	248.30	1,973.00					0.005	0.100		
1987/88	371.60	3,246.00	0.15	0.60	3.40	26.00				
1988/89	349.60	3,310.00	Ng	Ng	2.92	29.00	0.001	0.002		
1989/90	421.80	4,270.00			3.48	39.50				
1990/91	505.00	4,620.00			1.85	21.00				
1991/92	678.20	7,560.00			3.42	39.00	0.003	0.014	0.003	0.013
1992/93	580.44	9,760.00	0.42	2.30	3.56	40.00	0.040	0.150		
1993/94	767.70	12,870.00	26.60	96.50	0.85	12.00	0.032	0.081		
1994/95	890.60	12,060.00	18.89	82.90	0.17	2.00	0.006	0.032	0.048	0.150
1995/96	4,914.00	45,680.00	18.75	109.80	0.44	8.10	0.059	0.210	0.050	0.210
1996/97	2,512.00	31,720.00	55.36	371.20	--		0.230	0.480	0.630	2.570

Source: Monthly Statistics of Foreign Trade, Annual Number, Volume II, Ministry of Commerce,