IMPACT OF AGRICULTURAL TRADE LIBERALISATION ON CROPPING PATTERNS AND FARM INCOMES

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RICHA CHINTAN

International Trade and Development Division
Centre for Studies in Diplomacy, International Law and Economics
School of International Studies
Jawaharlal Nehru University
New Delhi-110067
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CENTRE FOR STUDIES IN DIPLOMACY, INTERNATIONAL LAW AND ECONOMICS
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI - 110 067

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CERTIFICATE

This is to certify that the dissertation entitled **"Impact of Agricultural Trade Liberalisation on Cropping Patterns and Farm Incomes"**, submitted by **Richa Chintan** is in partial fulfilment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY** of this University. This dissertation is her bonafide work and has not been submitted, in part or full, for the award of any other degree of this or any other University.

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(Prof. Manoj Pant)
Chairperson
Chairman
Centre for Studies In Diplomacy
International Law and Economics
School of International Studies
Jawaharlal Nehru University
New Delhi-110067

(Prof. Manmohan Agarwal)
Supervisor
Professor
Centre for Studies In Diplomacy
International Law and Economics
School of International Studies
Jawaharlal Nehru University
New Delhi-110067

Gram: JAYENU Tel: 26704338 (Direct), 26107676, 26167557/Ext. 4338 Fax: 91-011-26165886

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Contents

Chapter One

Introduction

The economic and trade policy reforms during the 1990s and the inclusion of agriculture in global trade negotiations have had a significant impact on Indian agriculture. The earlier policy emphasis on self-sufficiency in foodgrains to ensure food security is gradually shifting, albeit haltingly, towards an export orientation by exploiting the comparative advantage in various crops.

The commitments under the World Trade Organisation's (WTO) Agreement on Agriculture (AoA) have resulted in marked changes in Indian agriculture with the dismantling of non-tariff barriers (NTBs), especially quantitative restrictions on imports, and substantial scaling down of tariffs. But, as in most countries, the pace of these reforms in agricultural trade has been very slow due to resistance on the domestic front. Given the dependence of a large rural population on agriculture for their livelihood, the agricultural sector is accorded a strategic significance. Moreover, the earlier policy regime, which extended protection to farmers, particularly the large farmers, through the minimum support price (MSP) mechanism, subsidised electricity and irrigation facilities, etc., has given rise to entrenched vested interests in the continuation of such a policy. The studies on the possible welfare impact of agricultural trade liberalisation, too, have predicted an increase in the prices of food products with uncertain impact on the incomes of farmers. This has also led to apprehensions over the possible gains from the policy of agricultural trade liberalisation, especially for a developing country like India. Thus, the debate has continued on the course India should adopt as far as the policy framework of agriculture is concerned.

Ever since the Green Revolution days, there have been significant cropping pattern changes in line with the corresponding policy framework of Indian agriculture. During the 1960s and 70s, India pursued an inward-oriented import substitution strategy for development. Accordingly, the emphasis was on attaining self-sufficiency in foodgrain production. The technological developments ushered in the Green Revolution

Trends in NRP: As Figures 3 and 4 below show, the rate of nominal protection has been falling since 1995 in both the States. In the case of Punjab, as shown by Fig. 3, it rose to the highest of the decade in 1995 (1.21) to fall after that until it touched a low of - 0.21 in 1999. In Gujarat, similarly, as Fig. 4 shows, the NRP rose to a high of 1.45 in 1995 to fall to 0.04 in 1997. It rose after that consistently until 2000.

Figure 3: Punjab

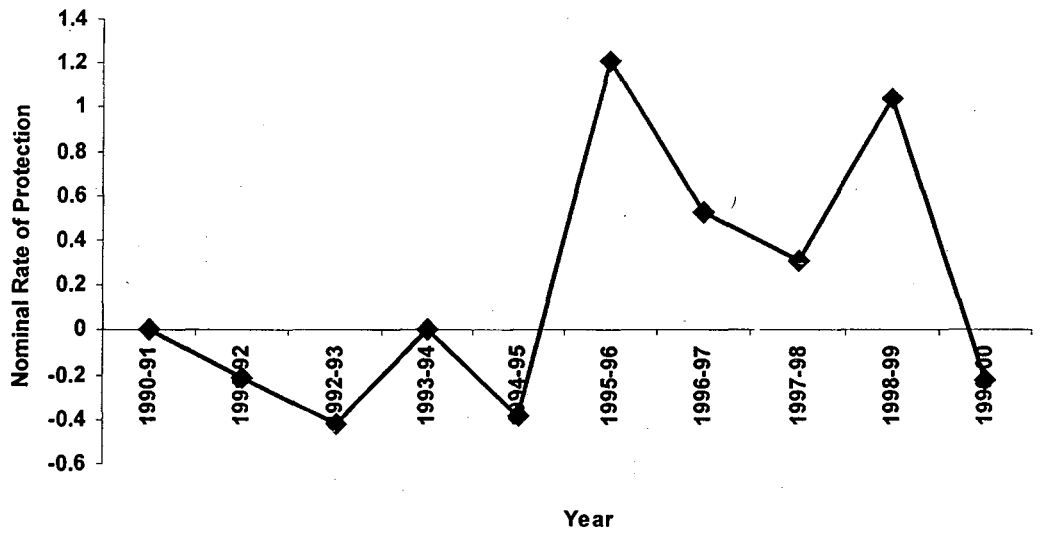
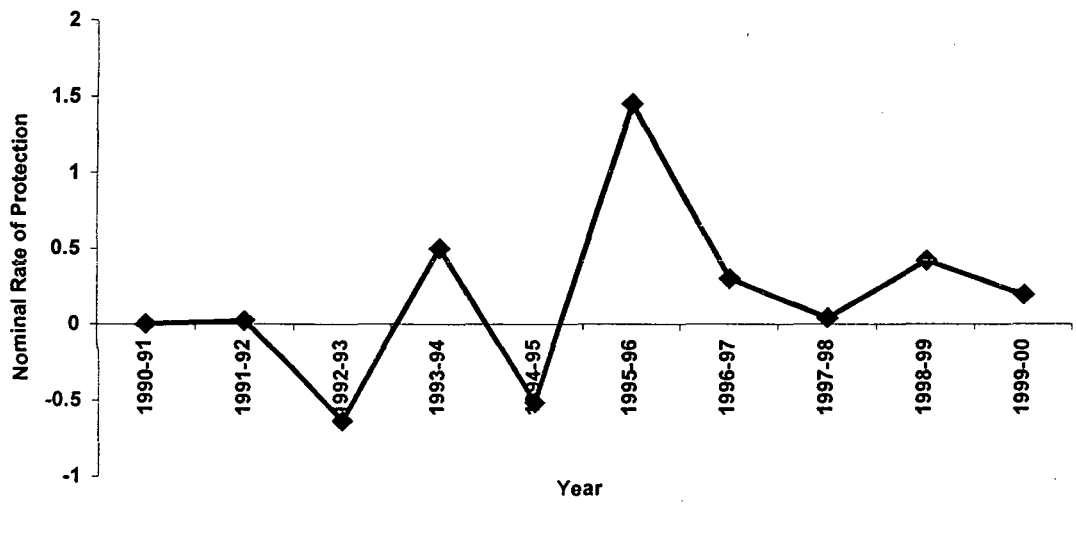


Figure 4: Gujarat



1986 to ensure the spread of oilseeds production. The imports of oilseeds were restricted through non-tariff regulations, which resulted in a rise in domestic market prices of oilseeds. In contrast to the Green Revolution, the Yellow spread to less-irrigated areas of low and erratic rainfall, namely the Semi-Arid Tropics (SAT) of India encompassing large parts of AP, Gujarat, Haryana, Karnataka, MP, Maharashtra, Rajasthan, Tamil Nadu and UP. As a result, the imports of edible oils declined by 1992-93 and about seven million hectares of additional area came under oilseeds, mainly through crop substitution [Gulati and Kelley, 1997].

The area under nine major oilseeds as a percentage of the country's 43-crop GCA increased from 10.90 per cent in 1980-83 to 15.3 per cent in 1992-95 along with marginal increases in percentage area under wheat and rice. The period saw a decline in the area under oilseeds in the northwestern region but a phenomenal increase in the central (from 12.02 per cent to 20.10 per cent) and southern (from 13.94 per cent to 23.04 per cent) regions. The total area under foodgrains, which had earlier remained constant, declined by 4.42 per cent, primarily due to decline in the area under coarse cereals. The area shifted towards oilseeds [Bhalla and Singh, 1997].

However, the cropping pattern shifts towards oilseeds also led to problems. Although the domestic production of oilseeds increased so much as to satisfy the domestic demand, foodgrain production fell short. As a result, cereals and pulses were imported during 1992-93. About three million tons of wheat was imported at an import parity price of more than Rs 5,000 per ton against the domestic procurement price of Rs 2250 per ton. In contrast, the domestic prices of edible oils were more than 60 per cent above their import parity price.

This changing scene of Indian agriculture has prompted debates over the issue of a correct policy framework and incentive structure for farmers in order to enhance their incomes, on the one hand, and assured food supply at reasonable prices to the consumers, especially the poor, on the other. These questions acquired all the more importance as India embarked on the path of liberalisation and alignment with the global markets. On the one side there are apprehensions about the impact of a liberal economic and trade

policy on the farmers' income and consumer welfare and the concern regarding food security and self-sufficiency. On the other, it is argued that the cropping patterns should be such as to exploit the comparative advantage in the production of foodgrains while importing the requirements of such products as oilseeds.

Objectives and rationale of the study

In the light of these developments in India's economic policies and the changing scenario the world over, it becomes imperative to study the developments in Indian agriculture, particularly since the launch of liberalisation. This study is an attempt to analyse the cropping pattern changes in India since 1991 and the factors that have been instrumental in bringing about these. The earlier works have studied factors like irrigation, road density, market density, rainfall, credit availability, rural literacy, electricity, etc. and assessed their impact on cropping pattern changes. Some crop specific analyses have also been undertaken to measure their competitiveness in the international market and look at the impact of trade liberalisation on them.

This study makes a modest attempt to analyse the impact of agricultural trade liberalisation on cropping pattern changes along with other factors like irrigation, road density and the proportion of small and marginal (S&M) holdings. It seeks to quantify the impact of these factors on the cropping pattern changes in 15 major States covering most of the country's GCA over the 10-year period from 1991 to 2000. A major factor in choosing a time period of only 10 years was the lack of availability of data on import and export quantities and values in respect of the period before 1990. The study also takes up a comparative analysis of the two States of Punjab and Gujarat with regard to cropping pattern changes and their impact on the incomes of the farmers.

We seek to capture the explicit impact of liberalisation in agricultural trade and accordingly, take the nominal rate of protection (NRP) as a proxy for trade liberalisation and assess the impact of this variable, besides others, on the cropping patterns across India.

Plan of the study

The study is divided into six chapters, including this one. The next chapter traces the beginnings of protection in agriculture and the multilateral trade negotiations since 1947, which led to the Agreement on Agriculture (AoA) in 1994 during the Uruguay Round. The chapter also presents a brief survey of the studies conducted to measure the possible welfare impact of trade liberalisation in agriculture on both developed and developing countries.

In Chapter Three, we briefly discuss the Indian trade policy since Independence, with particular emphasis on agricultural trade. It also surveys and discusses the different views on the impact of trade liberalisation on both the producers and the consumers. A survey of the studies specifically discussing the cropping pattern changes in India and the factors responsible for these is also included in this chapter.

In Chapter Four, we give a detailed account of the method employed and the sources of the data used to study and quantify the impact of trade liberalisation and some other traditional factors on the cropping pattern changes. It also gives the results of the regression analysis and their interpretation.

Chapter Five compares the cropping pattern changes in the States of Punjab and Gujarat during this period and their relationship with the incomes of the farmers.

Chapter Six summarises and concludes the study.

Chapter Two

Uruguay Round and Agricultural Trade Liberalisation

Conducted in the wake of the agricultural trade crisis during the 1980s, the Uruguay Round of multilateral trade negotiations that started in 1986 included for the first time the issue of trade in agriculture. The negotiations concluded in 1994 with an Agreement on Agriculture (AoA), among other decisions.

The crisis was an outcome of the economic policies pursued by developed and developing countries during the 1960s and 70s. The increased production of agricultural products in West European developed economies caused by their protective policies, combined with a slower income growth in developing countries, had led to a glut in the global market. Meanwhile, Japan and the newly industrialising developing East Asian (and other Asian) countries, too followed suit and changed their policy regime that discouraged agricultural production to a protectionist one [Anderson and Hayami, 1986].

The export subsidies the developed countries provided to dispose of the surplus only increased the supply of agricultural products in the world market. This, along with the low income growth (and lack of demand) in developing countries, depressed the world prices of these commodities. These and the developing countries' policies of taxing agriculture relative to industry discouraged farm output and, thus, reduced rural incomes [Hertel, 1990].

The situation, thus, was ripe for opening negotiations at the Uruguay Round to put agricultural trade liberalisation on the agenda. The process of trade liberalisation through multilateral negotiation began earlier with the signing of GATT in 1947 [Bhagwati, 1972]. The negotiations resulted in multilateral agreements for removing trade barriers among major countries outside the Eastern Bloc. The agreements seek to promote trade liberalisation and prevent the lapse into more protective trade policies that nations resort

to, especially during periods of war and economic depression, whether cyclical or long-term [Corden, 1972].

During the mercantilist period, for example, trade in certain agricultural products was regulated in the advanced nations. The most prominent example of this are the British corn laws of 1463, which included many devices to influence price and trade, like prohibition of exports, export taxes, export bounties or subsidies and import duties that varied with the domestic price [Smith, 1776]. There was a gradual move towards a more liberal trade policy with the beginning of the 19th century when export bounties were abandoned in 1814, the import duties were reduced in 1842 and later eliminated in 1846 with the repeal of Corn Laws.

In the US, on the other hand, the nineteenth century saw a rise in protectionism, which can be traced to the effects of the War of 1812. The infant American industries needed protection against British competition. The revenue requirements of the Government during the war, too, were met principally through the customs revenue.

The late nineteenth and early 20th centuries saw bilateral trade agreements to provide for easier flow of trade.[1] [Mikesell, 1972]

In particular, countries have often protected domestic agriculture. Britain in the period after the repeal of the Corn Laws in the mid-nineteenth century was an exception. Even in the GATT negotiations, until the Eighth, Uruguay Round (UR) in 1994, countries had refrained from negotiations on trade in liberalisation in agriculture at the insistence initially of the US. In the ongoing Doha Development Agenda, negotiations in the agriculture sector continue to focus on the same three issues of export subsidies, trade distorting domestic support and market access that had earlier been dealt with in the UR.

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[1] Under the Cobden-Chevalier Treaty of 1860, which governed trade between Britain and France until 1880, for example, all prohibitions against English goods were reduced and tariffs lowered to a 30% level until 1864 and to 24% thereafter. Britain, in turn, admitted all French goods duty-free with the exception of wine and spirits. In the US, the McKinley Tariff Act of 1890 authorised the President to negotiate concessions from other countries in return for duty-free treatment by the US.

The AoA addressed the three main issues of market access, domestic support and export competition. Its market access commitments required all member countries to a) replace non-tariff barriers (NTBs) by tariffs; and b) reduce the levels of tariffs within a specific time period. While the developed countries were required to reduce tariff levels by 36 per cent within a period of six years, the developing countries were given a period of 10 years to lower tariff levels by 24 per cent. The least developed countries (LDCs) were exempted from these tariff reduction provisions.

A key aspect in the area of domestic support was the distinction between domestic policies that distort trade and those that do not. In WTO terminology, subsidies are classified into types that are given the colours of traffic lights: green (permitted), amber (slow down – i.e., be reduced), and red (forbidden).[2] This focussed attention on trade distorting policies, leading to negotiations to reduce their magnitude and provide an incentive for governments to re-instrument their domestic policies towards non-distorting measures. The AMS (aggregate measure of support) was designated to measure the total of all trade distorting domestic support policies. It was assigned the "amber box" in the AoA. The reduction commitments agreed to were supposed to measure domestic support, independent of that due to import barriers and export subsidies.

Countries are exempt from reduction commitments in domestic support if the AMS (including both product and non-product specific support) does not exceed 10 per cent of the total value of agricultural product in case of a developing country and 5 per cent in that of a developed country. However, if AMS exceeds 10 per cent in a developing country it has to be reduced by 13.3 per cent. For a developed country, if AMS exceeds 5 per cent of the total value of agricultural production, it has to be reduced by 20 per cent. Many commentators argue that this was the most innovative element of

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[2] The AoA, however, has no red box. But there is a blue box for subsidies that are tied to programmes that limit production. There are also exemptions for developing countries (sometimes called an 'S&D box', namely special and differential treatment for developing countries). The 'amber box' is for policies deemed to have the largest effect on production and trade and a 'green box' for policies that have minimal effects on trade. The (supposed) temporary 'blue box' is for amber box payments related to production limiting programmes or for payments based on no more than 85 per cent of the base level of production.

the agreement because trade distortions arising from domestic support policies were formally recognized.

However, most countries could circumvent their AMS commitments because of an extremely high value of AMS during the base period upon which commitments were made and because of the sector-wide nature of these commitments. Hence, the AMS reduction commitments have been the least binding element of the AoA commitments for most countries. [de Gorter and Ingco, 2002]

The provisions of the AoA for export subsidies require the volume of subsidised exports to be reduced by 21 per cent in the case of developed countries and by 14 per cent in that of developing countries. Furthermore, the budgetary outlays for direct export subsidies are to be reduced by 36 per cent by developed countries and by 24 per cent by the developing countries. The implementation period was six years (1995 – 2000) in the case of developed and 10 years (1995 – 2004) in that of developing countries. The LDCs are exempt from this reduction commitment also.

Thus, the AoA calls for tariffication of all measures on agricultural trade, and reductions in these tariffs, domestic support and export subsidies within a time period [Gulati and Kelley, 1999]. It aims to identify acceptable measures of support while doing away with the trade distorting support to farmers. It is argued that trade barriers help keep inefficient domestic producers in operation and thus lead to inefficient allocation of resources and a lower demand for the products of trade partners. Consequently, the agricultural trade barriers and producer subsidies inflict real costs on both the countries that use these policies and their trade partners [Burfisher, 2000].

In the post-AoA period, the emphasis since 1994 has primarily been on the removal of trade distorting border measures (tariffs and NTBs). The developed countries have been pushing for the reduction and removal of tariff barriers in developing countries and, thus, seeking to expand market access in these countries. The developing countries,

particularly the Cairns group[3] who are net exporters of agricultural products, have been demanding a phasing out of domestic support provided by the developed countries.

In the debate over this issue, the developed countries argue that the soaring prices of various agricultural commodities, including foodgrains, resulting from the reduction in their domestic support, would adversely impact the food security of many developing countries, particularly LDCs. The developing food exporting countries, on the other hand, argue that domestic support in the developed countries gives their farmers undue advantage and hurts the interests of developing countries. The debate has now led to the formation of G-20, a group of 20 developing countries in contrast to the Cairns Group that includes both developed and developing countries, which have asked for a complete removal of export subsidies by the developed countries within the next five years.

India's record on AoA implementation

India has easily met its AoA commitments. As for the market access clause, it has submitted high tariff bindings of 100, 150 and 300 per cent for most of its agricultural commodities. The exceptions are rice, maize, sorghum, millet, and skimmed milk powder, for which the ceiling binding tariffs are zero (under different earlier protocols), soya oil, olive oil, rapeseed-mustard oil, and colza for which the ceiling bindings are 45 per cent (compared to 300 per cent for other major oils); dairy products (0 to 40 per cent) and natural rubber (25 per cent). Most of these bindings are higher than actual tariffs or current and past implicit rates of protection. Domestic prices of some products, like copra and coconut oil (tariff binding 300 per cent), sugar (binding150 per cent), and some oilseeds (100 per cent) had in the past exceeded at times the border prices by even higher margins than these high ceiling bindings. Since India's AMS for the 17 major commodities for which India maintains market support programmes is negative, no reductions are necessary under the AoA. [Gulati and Kelley, 1999]. Indian exports of agricultural commodities do not get any direct export subsidy. The only subsidies

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[3] The Cairns group of 17 agricultural products exporting countries was formed in 1986 and consists of both developed and developing countries of Latin America, Africa and Asia-Pacific. Its members are: Argentina, Australia, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Malaysia, New Zealand, Paraguay, the Philippines, South Africa, Thailand and Uruguay.

available to them are in terms of a) income tax exemptions on profits from export sales, and b) subsidies on costs of freight of certain products like fruits, vegetables and floricultural products, which are exempt from reduction commitments for developing countries.

Impact of trade liberalisation: Survey of literature

The inclusion of agriculture in the WTO agenda has given a considerable fillip to research in the area of agricultural trade liberalisation, particularly in India. Studies have focussed increasingly on the impact of agricultural trade liberalisation on the developed and developing economies, particularly on the welfare of the rural community.

Since the conclusion of the AoA in 1995, agricultural trade economists have been mainly engaged in research in two broad areas. These are a) to determine whether and to what extent the distortionary policies of various countries meet the AoA norms; and b) to find ways to measure the distortionary effect of various policies and determine a scale to show the quantitative effects of the various policies on welfare.

In the developed countries, researchers have been concerned mainly with measuring the impacts of various trade-distorting support measures, trade-restricting tariffs, subsidies, etc., to determine and prepare scales of their relative efficacy. Many international organisations have commissioned quantitative analyses to measure the degree to which farm policies have contributed to the agricultural trade crisis. These are intended to serve as guidelines to help governments determine policy changes to implement the AoA provisions and negotiate further liberalisation of trade in agriculture. Many economists and research teams have been engaged in working out models, including both partial and general equilibrium models, to determine the impact of various tariffs, subsidies and other policies on production, trade, world prices and incomes.

In India, the main thrust of research has largely been on the first of the two broad areas. It has been established that this country meets most of the AoA conditions and it is only the developed economies that are required to cut domestic support and export subsidies in order to meet the specified limits.

In the developed countries, especially OECD countries, these studies have also analysed the implications of agricultural policy reforms among those countries for the developing countries. Most of the studies, especially those in the partial equilibrium framework, focus on the impact of liberalisation on the prices of agricultural commodities. The impact on consumer and producer welfare has been assessed essentially through the movement of prices. Thus, prices have been used as a rough proxy for the welfare and trade effects of liberalisation [Goldin and Knudsen, 1990]. The work of Valdes and Zietz (1980) is regarded as the first comprehensive analysis of the effects of developed country agricultural policies on developing countries. The approach is single commodity and partial equilibrium in nature. Valdes and Zietz first determine the world market price effects of a 50% reduction in protection by OECD countries in 99 different commodities. Next, they analyse the impact of these world price increases on 56 different developing countries individually, working out the resulting changes in export revenue and import expenditures and estimating subsequent changes in welfare.

The authors assume full transmission of the world price increases to the developing countries, leading critics to aver that the projected increases in developing country foreign exchange earnings and aggregate welfare may be too high. Another limitation of the study (identified by the authors) is the absence of cross-price effects in demand and supply, which leads to an exaggeration of the likely trade changes. They find that export earnings of developing countries, which are net exporters, increase by 11% over 1975-77 levels. They also find that import expenditures fall as a result of increased domestic production and reduced consumption of import commodities, which translates into a welfare loss of $ 580 million per year. They also note that, "in the lowest income developing countries, these welfare losses are primarily associated with increases in the world price of wheat."

Later studies introduce cross-price elasticities of various agricultural commodities and employ multi-country multi-commodity models to look at the impact on agricultural production, consumption and trade flows of both developed and developing countries. The analyses conclude that a reduction in support levels would increase the world prices

of sugar and beef, while those of wheat, coarse grains and soybean would continue to fall [Zietz and Valdes, 1990; OECD's Ministerial Mandate Model, 1987]. A complete elimination of the support levels, however, would cause a rise in the price of wheat and coarse grains [Tyers and Anderson, 1988].

As for the impact of liberalisation in the developed countries on the developing countries, some of these studies project that it would have a positive effect on the net exports of developing countries in all commodities except coarse grains and soybean. [Zietz and Valdes,1990; Tyers and Anderson,1988]. It would also improve the self-sufficiency levels of all developing countries in all commodities except soybean and cause a drop in their cereal import bill as a group [Tyers and Anderson, 1990; Valdes and Zietz, 1990].

The large negative protection rates provided to agriculture in developing countries, however, would have a more significant effect on world prices than the protection in industrialized countries [Valdes and Zietz, 1990]. [4]

Most of these models predict that world prices would increase with liberalisation by developed countries and conclude that this liberalisation results in gains for producers but overall welfare losses in developing countries, particularly the food importing ones. Reforms in developing countries, however, would stimulate strong production responses that would help in stabilising world prices.

The partial equilibrium analyses, however, suffer from severe limitations like treatment of commodities as homogeneous, ignoring the inter-sectoral linkages and being commodity and sector specific. The models are driven by reduced form of supply-demand elasticities which cannot be easily related back to specific assumptions about consumer preferences, production technology and factor mobility. This makes it difficult to interpret their results and leaves open the possibility of theoretical inconsistencies. As

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[4] Partial equilibrium models include the OECD's MTM model (using the producer and consumer subsidy equivalents to the effects of agricultural reform); an extension of this model by Moreddu, Parris and Huff, 1990; USDA's comparative static model, the Static World Policy Simulation (SWOPSIM) model developed by Roningen, et al, etc.

a result, these models tend to understate the impact of trade liberalisation for resource movement out of or into agriculture, aggregate supply response and welfare changes [Hertel, 1990]. A partial equilibrium analysis, however, does allow a detailed sector specific analysis and helps formulate a more precise policy [Winters, 1990].

The inter-sectoral linkages in the economy and the possible second round feedback effects are also analysed by a number of studies. They employ a general equilibrium framework that explicitly models the non-agricultural sector allowing the analysis of economy-wide efficiency and income effects. These analyses are considered to be more important in the case of developing countries because of the importance of agriculture to employment and GDP. Accordingly, the modelling of labour and factor movements becomes particularly important in assessing the effects of trade liberalisation [Goldin and Knudsen, 1990].

While partial equilibrium analyses show substantial variation in price effects, the general equilibrium analyses find a more consistent price response across commodities. Moreover, there is a more mutual price response in the latter as these allow for a far greater factor substitution and mobility. Assuming a unilateral liberalisation, some studies predict relatively small global efficiency gains owing to a better allocation of resources. The gains, by and large, accrue to the liberalising countries, whose farmers lose relative to those engaged in non-farming activities. The impact on growth in developing countries is small and has a lag of 15 years [Frohberg, Fischer and Parikh, 1990].

In the case of a worldwide elimination of all tariffs on agricultural imports, export subsidies and domestic support, however, world price levels would increase by 11.6 per cent relative to the level of world non-agricultural prices. Eliminating tariffs alone would raise the demand for imported agricultural goods while the supply contracts and, thus, place upward pressure on world agricultural prices [Diao, Somwaru and Roe, 2000].

The countries that are net exporters of agricultural products, however, would also experience terms of trade gains. As for the effects of public sector financing, the increase in tariff revenues when world agricultural prices increase might lead to a reduction in

excise tax rates and, thus, afford real income gains from increased consumption of the taxed products [Loo and Tower, 1990].

Even a 40 per cent reduction in post-Uruguay Round agricultural tariffs and export subsidies would cause an increase in global real income of about $60 billion per year. This would increase by an additional $10 billion if domestic support, too, is reduced by 40 per cent [Hertel, Anderson, Francois and Martin, 1999].

The demand side and supply side effects of agricultural trade liberalisation in OECD countries are predicted to have a positive impact on the trade volumes of agricultural commodities worldwide, thereby increasing agricultural production and factor prices in the food-exporting OECD countries and the rest of the world. Thus, while the food-exporting countries experience a real income gain, the net importer countries suffer lower real incomes. The studies also predict a reallocation of resources between agricultural and non-agricultural sector, though the specific effects vary region-wise depending on the relative importance of these sectors [Burniaux, Martin, Delarme, Lienert and Mensbrugghe, 1990; WALRAS model; Parikh et al, 1988, Loo and Tower, 1990; RUNS model].

In the case of worldwide liberalisation of agricultural trade, both trade volumes and value would increase, though the extent of increase would vary across developed and developing countries. Removing export subsidies or domestic support would increase world trade only marginally. However, effect on the overall agricultural production worldwide would be negative because the increase in the production of the developing countries would not make up fully for the fall in the production in the developed countries [Diao, Somwaru and Roe, 2000].

Some studies also conclude that that in all countries, especially those with little capacity for import substitution, some special programmes of assistance to the poorest people must be ensured to avoid a backlash on the welfare of the poor, particularly the urban poor [Sadoulet and de Janvry, 1990].

While the largest dollar gains accrue to developed countries, the percentage real income gains are the largest in developing countries such as South Asia (other than India) and South-east Asia (other than Indonesia). The gains from liberalisation are widely distributed amongst developing countries except for the heavily food-importing ones. Most of these gains arise from the efficiency gains from reducing their own tariff and domestic supports, although some food-exporting regions, like Australia, realise gains from terms of trade improvement. The impact of this liberalisation on agricultural trade volumes is mixed – while reducing tariffs tends to increase import values, reductions in production and export subsidies tend to reduce them. [Hertel and Martin, 2001].

As for dynamic welfare gains, if a developing country eliminates trade protection, it tends to increase its rate of learning new skills, organisational methods, and the more advanced product and process technologies embodied in the imports from developed countries. This process helps increase labour productivity and returns to land and social capital. The developed countries also benefit indirectly from this growth in productivity. This benefit results from the growth in the returns to increased capital flows induced by increased investment demand of developing countries [Diao, Somwaru and Roe, 2000].

The conclusions arrived at in the studies, thus, are that the liberalisation of agricultural trade would, among other things, lead to a) a rise in global prices of agricultural commodities which would have an adverse impact on the less developed countries; b) a rise in producer welfare, but a loss in net welfare in developing countries and c) a reallocation of resources between farm and non-farm sectors.

Chapter Three

Indian Agriculture and Trade Policy

During the colonial period, India's foreign trade policy was determined by the interests of the British economy, which changed from time to time. India's importance to England was as a supplier of some essential raw materials – hides, oil, dyes, jute and cotton – required for the industrial revolution as well as an expanding market for English manufactures of iron and cotton. Since the middle of the 19th century, the export of food grains, principally rice and wheat, was added as food exports rose 22 times in value from 858,000 pound sterling in 1849 to 19.3 million pound sterling in 1914.

India's tariff policy, too, was determined by "imperial" interests, which first lay in reducing and removing all import duties, except on salt and liquor, to discourage India's infant textile industry and support English manufacture exports to the country. Towards the end of World War I, selected Indian industries were protected from competition from other industrial countries, besides other reasons. But when more and more industries began to demand protective duties, the Tariff Board introduced a new principle of "imperial preferences", or favoured rates for the entry of British manufactured goods. This developed into a "general system of imperial preference" under the Ottawa agreements in 1932. [Dutt, 1940]

In the years following Independence, India followed a restrictive trade policy, because of restrictions on the utilisation of Sterling balances. Exports were also restricted because of domestic shortages.

During the Second and Third Plan periods from 1956-57 to 1966-67, the country adopted a restrictive import policy to channelise scarce foreign exchange to meet Plan priorities, while simultaneously launching a vigorous export promotion drive. The Mudaliar Committee (1962) reviewed the trade policy and recommended a restrictive import policy for non-essential goods, liberalisation of the imports of essential goods like raw material, components, etc., especially for power and transport industries, export-

oriented industries and industries producing raw materials and components then imported. The committee also recommended policies to boost exports through "import entitlement", removal of disincentives for exports, like drawback of duties on raw materials and a rebate of sales tax on exported goods, and increased allocation of raw materials to export-oriented industries.

Despite the implementation of these recommendations, however, exports failed to pick up, while imports of essential defence equipment and items needed for modernization, replacement and expansion of private and public industry, along with food imports, were growing. This created serious foreign exchange problems. In 1966, therefore, the Government devalued the rupee. Consequently, exports of coffee, tea, groundnut, cotton fabrics, fish, etc., increased in the early 1970s. But the oil price shock of 1973-74 created further problems. The BoP position, however, improved in the mid-seventies and the Government went in for a policy of liberalised imports with a view to raising the level of capacity utilisation and to promote exports.

During the 1980s, trade was further liberalized to some extent and export-oriented units were allowed to import capital goods, raw materials and components. The Open General Licence (OGL) list was substantially enlarged with the inclusion of such items as leather, automobiles, jute garments, etc.; import of 53 items on the OGL list was decanalised and about 200 items, whose import was earlier banned or restricted, were restored to the OGL.

Foreign trade flows in agricultural products have been perceived as a residual. For exportables, the difference between actual domestic production and estimated domestic consumption determines the surplus available. For importables, the difference between estimated domestic production and desired domestic consumption determines the volume of imports [Nayyar and Sen, 1994]. The trade flows in agriculture have been regulated through quantitative restrictions in the form of licences or quotas and canalisation through state trading organisations.

The rationale for such a trade policy for the agriculture sector was the concern about domestic prices. One of the objectives of the government policy has been to maintain domestic prices, particularly of wage goods and their inputs, at absolute levels commensurate with average income levels, as also to maintain stability in the price level. [Nayyar and Sen, 1994]

The process of liberalisation, initiated in 1991, marked a perceptible change in the trade policy of India. First, the canalisation of trade was abandoned except for the exports of onion and import of cereals, pulses and edible oils. Second, many of the quantitative restrictions on agricultural trade flows, especially on imports, were dismantled. Thirdly, there was a substantial reduction in tariffs on selected agricultural imports. Gradually, during the 1990s, there was further pressure on India under the WTO obligations for the deregulation of trade and accordingly there has been complete removal of all quantitative restrictions on imports and substantial reductions in tariff barriers.

Impact of liberalisation: Survey of Literature

Concerns about food security and domestic prices: Many scholars viewed agricultural trade liberalisation with concern and opined that it would have an adverse impact on food security and domestic prices. Some others argued, on the other hand, that liberalisation would increase export competitiveness, hence profitability, of Indian agriculture and lead to a natural shift towards specialisation in crops enjoying comparative advantage.

A comparison of domestic and border prices over the period 1960-61 to 1990-91 showed that divergence between the movements of these increased towards the 1990-91, more in the case of importables. It confirmed that the world market in agricultural commodities was less stable than the Indian domestic market. This supported the fears of many that liberalisation and integration with the world market may lead to increased volatility of agricultural prices.

The comparison showed that during the 1980s, the Indian prices for rice, cotton, coffee, tobacco, pepper and bananas were lower than world prices and those of sugar, rubber, oilseeds were higher while they were almost identical for tea and jute. Indian

prices, thus, were lower for the exportable crops but higher for crops where a policy of import substitution had been followed. Since the average Indian prices, with wheat as the numeraire, were lower, the exceptions being sugar, coconut and rubber, free trade would lead to an increase in the relative domestic prices of most crops and threaten the price stability of the Indian domestic market. [Nayyar and Sen, 1994].

An alignment of domestic prices with world prices is also opposed on the ground that it is likely to be an inoptimal policy for the under-developed agrarian Indian economy. A deviation from world prices is desirable even in the long run since it is the public investment in infrastructure, and not the shift in terms of trade that would determine higher private investment in agriculture [Prabhat Patnaik, 1996].

It is, however, difficult to agree with Patnaik that higher profitability in agriculture is inconsequential in determining the propensity of investment in the sector and that the role of the state is the only determining factor in this regard. An empirical analysis shows that the ToT between agriculture and industry did have a strong bearing on private investment in agriculture during the period 1960-61 to 1989-90 along with other factors like technology and public investment [Mishra and Hazell, 1996].

As regards the effect on food security, it is argued that liberalisation would increase the domestic prices in both absolute and relative terms, which would hurt the poor. Since world prices are more volatile, price instabilities in India would increase unless a wedge was maintained between the world and domestic prices [Nayyar and Sen, 1994]. An inverse relationship between food production and exportable production was shifting the cropping pattern and product-use away from basic necessities for local population and, thus, affecting adversely food security in many developing countries. The phenomenon had begun to emerge in India, too, for resource-use was shifting towards the production of cotton and fibre, tropical fruits, vegetables, cane sugar, etc., thus affecting food security [Utsa Patnaik, 1996].

This view is countered, however, on the grounds that India has a comparative advantage in superior cereals like rice and wheat and if adequate export incentives are not

provided for these crops and non-cereals are protected unduly, the farmers would shift away from the production of cereals. Liberalisation, thus, would not discourage these crops or threaten food security [Gulati, 1998]. Furthermore, it is not immediately clear why increased imports would worsen food security unless food security is defined as share of consumption from domestic production in which case it becomes a tautology. Food security may be considered to be worsened by imports if the world market can be manipulated so that circumstances arise when the manipulation worsens welfare. Alternatively, import dependence would worsen food security if the loss in welfare from price volatility is more than the gain from higher incomes due to appropriate specialisation, when an explicit utility analysis using mean and variance is undertaken.

The regional impact of liberalisation would be both equalizing and unequalising, with the rice growing regions, particularly in the south and the east, gaining and the oilseeds growing regions in Peninsular India losing. It is the rice growing regions, however, that have the highest concentration of poor casual agricultural labourers. With the declining elasticity of employment with respect to output, the direct employment potential of the agricultural sector was also decreasing.

Possible gains for Indian agriculture: The implicit taxation of Indian agriculture since Independence led to reduced resource generation in agriculture and the increasing diversion of the available surplus to industrial development. This was effected through the instrument of trade policy, high protection to industry and an overvalued exchange rate tilting the incentive environment against agriculture [Manmohan Singh, 1995].

India belonged to the 'category of representative taxers of agriculture' in the mid-1980s.[5] There has been large implicit discrimination against agriculture with aggregate measure of support (AMS) for Indian agriculture standing at (minus) 17.6 per cent for the triennium ending (TE) 1994-95. Even in the State of Punjab, which received fairly substantial input subsidies, the average AMS for the period 1981-82 to 1992-93 is estimated at (minus) 32.46 per cent of the value of agricultural production.

[5] Estimating the impact of government intervention on the growth of the economy of 18 developing countries, Schiff and Valdes (1992) show an inverse relationship between the rate of implicit taxation and the rate of agricultural growth, which adversely affects the overall GDP growth too.

The reduction of import duties on the manufacturing sector and freeing of agricultural exports as a result of trade liberalisation would shift the terms of trade in favour of agriculture and improve the relative incentive environment for agriculture and, thus, invite higher private investments to agriculture. The enhanced agricultural incomes would generate the demand for industrial products as also stimulate and sustain off-farm activities in the rural areas, reducing inter-sectoral and interpersonal inequalities [Gulati, 1998]. Liberalisation, however, could also have a negative impact because sugar and oilseeds production that was likely to decline had more vital industrial linkages than other crops. A positive outcome was possible if there was a take-off in fruit and vegetable production [Nayyar and Sen, 1994].

Changes in the cropping patterns to take advantage of the alignment of the domestic and world prices, however, may not always ensure profits to farmers. The experience of coffee growers of Kerala shows that international cartels can play havoc with the lives of small farmers. Wayanad district, which produces 82 per cent of Kerala's coffee, had been a huge income and foreign exchange earner until coffee prices became volatile in the 1990s. There was an increase in coffee prices in the late 1990s to as high as Rs.70-80 a kilogram for cherry and up to Rs. 130 a kilogram for the beans. But by 2004, coffee prices for raw cherry had dropped to Rs. 15-16 a kilogram. This price fall was a major factor behind the large number of suicides among farmers in the district, where over 70,000 hectares of land is under coffee with 60,000 small growers. With just four major companies dominating the world coffee markets, price rigging is used to dominate the cheap sources of supply [Sainath, 2005].

General impact on economy & income distribution: Some of the studies in a general equilibrium framework focus on the overall impact of trade liberalisation in agriculture on the Indian economy. One of the earliest analyses of the impact of trade liberalisation on India using a Computable General Equilibrium (CGE) framework confirms that industrial protection is responsible for most of the taxation of agriculture. Since processed agricultural commodities are highly protected compared to the unprocessed commodities, extending trade liberalisation to the former has a large adverse impact on

agriculture. The resulting decrease in agricultural prices fuels non-agricultural expansion and the combined effect of these is an increase in real incomes for all groups. But in the long run, these gains are smaller and become negligible for large farmers. When industrial protection is also removed, a large devaluation is needed to keep the balance of payments constant. GDP falls in the medium and long run. These gains are undone by the increase in food prices for all but the medium and large farmers. While liberalisation has the desired effect of improving farm incentives, it does little for the urban and rural poor [Subramanian, 1993].

The higher world agricultural prices resulting from worldwide agricultural liberalisation would have little effect if India's trade were not liberalized because the trade shares in agriculture are small. In fact, India would gain from higher world prices because she is a net exporter of agricultural commodities. However, the increase in domestic food prices skews the distribution of gains in favour of large and medium farmers and real incomes of the landless and small farmers fall.

A multi-market analysis establishes that the opening up of agriculture alone will raise the price of rice by 6.6%, wheat by 6.4% and sugar/sugarcane by 4.5%. The prices of coarse cereals would fall by about 10%, of pulses by 9% and of oilseeds by 38%. A combined index of gains in income, employment, wage rate and tax revenue -- the efficiency index shows an improvement of 45% over the base period resulting from agricultural trade liberalisation. [Sharma, Gulati, Pursell, 1996].

Distributional concerns are the single most important factor explaining the approach of developing countries to liberalisation. While the size of the efficiency gains and growth stimulus due to trade reform is disputed, it is generally accepted that trade liberalisation entails significant and generally regressive, shifts in income distribution [Storm, 2001].[6]

Although expected to raise agricultural prices, the trade reforms will have two conflicting effects on income distribution and poverty. The positive effect is that higher

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[6] Cf. Ocampo and Taylor (1998), Bourguignon et al (1992), Rodrik (1995), Rattso and Taylor (1999).

prices will raise agricultural output and employment, but these will be constrained by the low price responsiveness of aggregate agricultural supply and structural rigidities in the Indian countryside. The negative effect will be a real wage fall for most of India's poor (and even some of the non-poor), who are net purchasers of food. The trade reforms, thus, incur the risk of both transitional and permanent reductions in real wages, a deterioration of income distribution and increases in poverty.

Gradual reform is both contractionary and inflationary. It leads to a decline in GDP growth by one percentage point on average per annum. Although there is significant increase in export growth, the contraction is due to a decline in private consumption in real terms due to higher post-reform crop-prices. Consequently, non-agricultural consumption and income growth decline, negatively affecting private non-agricultural investment. On the other hand, the improved domestic terms of trade for agriculture increase private investment in agriculture, raising cropping intensity over time and accelerating crop output growth. However, the increase in agricultural income growth is not large enough to offset the non-agricultural contraction. The growth rates of real income of all income classes decline in varying degrees. The only exception is that of large farmers who remain almost insulated from the contractionary effect due to crop price increases and output growth.

A policy of close integration, where protection as well as domestic agricultural input subsidies are reduced over four years, turns out to be contractionary and deflationary. Annual real GDP growth declines, while the consumer price inflation falls. The agricultural income declines because although trade reform improves relative prices for farmers, the incentive structure for farmers deteriorates because of domestic reforms. The worst hit, however, are the urban self-employed, urban capitalists and urban marginals. The urban workers suffer a relatively modest income growth decline, helped by deflation. In the rural sector, the trade and domestic reforms are distributionally regressive. The relative income growth decline of rural labourers and small farmers is significantly larger than that of medium and large farmers.

Arguing for strategic integration with the world markets in which state intervention may vary across commodities and over time, it is emphasised that more intervention by the government is required to achieve rapid and equitable agricultural growth. The study undertakes two experiments in strategic integration involving more public investment and maintenance of a price wedge between domestic and world prices. The simulation results under both experiments are expansionary and distributionally progressive [Storm, 2001].

Studies on Indian agriculture based on computable equilibrium (CGE) models, thus, give broadly similar results and conclude that agricultural liberalization, by itself, has little impact on agricultural growth. However, the growth in agriculture is accelerated when it is combined with industrial or manufacturing sector liberalisation. Agricultural liberalisation adversely affects the poor in the short run due to rise in agricultural prices without commensurate increase in production whereas reduced tariffs on manufacturing help in reducing poverty levels. The reduction in tariffs also improves domestic terms of trade for agriculture, raising private investment as well as productivity and crop outputs. However, the additional supply growth is not enough to meet the increase in export demand. And the end result is a combination of higher crop outputs and exports, higher crop prices and lower domestic foodgrain consumption.

Impact on cropping pattern changes: A detailed survey of literature

Notwithstanding understandable apprehensions about the adverse impact of agricultural trade liberalisation, it also seems to have thrown up opportunities at a time when South Asian agriculture is facing a shrinking of the size of holdings, deceleration of technological advances in staple crops, declining investment and increasing degradation of natural resources. [Joshi, Gulati, Birthal and Tiwari, 2003]

Many studies argue that diversification of agriculture, if carried out appropriately, can augment farm incomes, generate employment, alleviate poverty and conserve resources. Diversification in agriculture in this study implies a movement of resources

from low value commodity mix to a high value commodity mix, especially at the farm level, indicating a way to augment income.

The authors use Generalised Least Square (GLS) technique with fixed effect model to examine how different forces have influenced crop and livestock diversification in India. Pooled cross section and time series data from major States in India were taken for the period 1980-81 to 1998-99. The independent variables explaining the diversification include Technology, Infrastructure, Relative profitability, proportion of small and marginal holdings, rainfall and demand-side factors.

The proxy variables for infrastructure development are market density (number of markets/1000 ha of gross cropped area, GCA) and road length (square kms/ 1000 ha of GCA), both of which yield positive and significant influence on diversification. The technology variable was defined by area under HYV of cereals, irrigated area and extent of mechanisation but only irrigated area was found to be significant. This showed negative relationship with diversification indicating that the crop diversification in favour of horticultural crops was declining with increasing irrigated area. Relative profitability of horticultural commodities against cereals, pulses, oilseeds, sugarcane is also a significant factor in diversification with a positive coefficient. However, uncertain prices and high yield instability limit the widespread cultivation of horticultural crops.

The study also finds a positive relationship between growth of horticultural commodities and the proportion of small holders. This indicates that diversification in favour of these crops is more confined to small farmers, a trend which is expected to increase their income. The variable of rainfall is also significant with a negative sign implying that crop diversification in favour of horticultural crops is less in higher rainfall areas. The demand side factors like urbanization and per capita income show positive and significant impact on crop diversification.

The trend shows that non-foodgrain crops like oilseeds, fruits, and vegetables, spices and sugarcane, which mainly substituted for coarse cereals, have replaced the foodgrain crops. Regional patterns of diversification reveal that the southern region was

highly diversified followed by the western region. Moreover, these were the only regions that accomplished higher agricultural growth during the 1990s over the preceding decade. These regions swiftly moved towards non-cereal crops, especially pulses and oilseeds that require low water. These regions also witnessed substantial increase in area under fruits and vegetables, the cultivation of which was also supported through government programmes. Among cereals, maize production picked up in both southern and western regions. The northern region, on the other hand, saw diversification towards rice and wheat replacing coarse cereals and pulses with only marginal diversification to non-cereal crops. This kind of cropping pattern has had an adverse impact on soil and water resources affecting total factor productivity in the region. The eastern region is basically food-based with a relatively low extent of diversification.

The analysis concludes that the food security is not adversely affected by agricultural diversification. Moreover, some studies show that the consumption basket is changing over time with food consumption shifting from cereals to non-cereals in both rural and urban areas. The per capita cereal consumption in both has declined while that of milk, milk products, vegetables and fruits have increased significantly. [Kumar, 2002]

The effects of diversification on employment are also shown to be positive as the labour use for cultivation of non-cereals is substantially higher than in cereals (except rice). Rough estimates suggest that one-hectare shift in area from wheat to potato would generate 145 additional man-days. Similarly, one-hectare shift from coarse cereals (sorghum and pearl millet) to onion would generate 70 man-days more employment opportunities in rural areas. Also, the decade of the 1990s has witnessed a rise in exports of non-traditional items like fruits, vegetables, livestock and fish indicating that the diversification of agriculture can substantially contribute to export earnings.

Studying the magnitude of diversification in Indian agriculture and the factors responsible for it for the period 1968-69 to 1998-99, Chand and Chauhan (2002) maintain that the 'agricultural diversification' must be seen in a dynamic context. Although it connotes changes in crop mix, enterprise mix and/or activity mix, the study uses it specifically to mean changes in crop choices or changes in land allocated to various

crops. It, therefore, measures it in terms of change in the level of resource (land) allocated to different production activities (various crops) as a proportion of total resource (land) used for the purpose.

Arguing that agricultural diversification is an important instrument for economic growth in India, they note that new opportunities that make agricultural diversification beneficial result from technological breakthrough, changes in demand pattern, changes in government policy, development of irrigation and other infrastructure and development of new trade arrangements.

Separating the specified period into two phases, the analysis shows that Punjab experienced highest diversification in phase I (1968-69 to 1982-83) with 26 per cent of the total area shifting in crop choices. The extent of diversification was also high in Haryana and Uttar Pradesh; the lowest being recorded in Kerala (about 5 per cent) and Maharashtra (about 5.2 per cent). Crop diversification during the first phase was driven primarily by technology (HYVs).

During the second phase (1983-84 to 1998-99), the pace of diversification slowed down in Punjab and UP while it increased further in Haryana to about 19.5 per cent. Market forces driven by demand factors played an important role in triggering diversification towards food, vegetables, and other cash crops as was evident in large crop shifts in MP, Karnataka, AP, Kerala, West Bengal and Rajasthan.

The study analyses the impact of various factors – irrigation, road density, market density, supply of institutional credit, supply of electricity to agriculture and the proportion of total area operated by small and marginal farmers – on agricultural diversification across 17 States, using the technique of multiple regression.

The final results show that the availability of irrigation and network of roads and markets promote agricultural diversification in a very significant way whereas the smaller size of land holdings acts as a significant constraint. All other factors like power supply and institutional credit do not exert significant influence on diversification.

Changes in cropping patterns, in fact, represent responses to changing economic, technological, and institutional factors. Farmers allocate their land among alternative crops to maximise their expected returns. A State's cropping pattern reflects the rational decisions of an aggregate of farmers, subject to technical and institutional constraints, including those imposed by the nature of subsistence farming most of the country's farmers. Most subsistence farmers grow foodgrain crops to meet their families' requirements of foodgrains. The changes they are willing to make in cropping patterns are conditioned by this requirement, along with their inability to take risks inherent in exclusively relying on returns from a single crop. Thus, there is a tendency among farmers to stick to the stable cropping pattern of their agro-climatic region. They do not shift much from it except to the extent dictated by price factors in adjusting acreage [Kumar, 2001].

An earlier study [Nerlove, 1958] considered actual and expected normal price for explaining the farmer's response to price variations and found that expected normal price played an important role in determining the long run equilibrium acreage. Other studies have found the farmers responding to such factors as relative prices, irrigation facilities, soil conditions, government's price policies, crop yields, technology, infrastructure, etc.

A quinquennial analysis of the period 1967-68 to 1996-97, comparing average area under different crops and the corresponding relative share of each crop in gross cropped area, shows that changes have been in favour of rice, wheat, soybean and sugarcane while there has been a move away from sorghum, maize, barley and gram [Kumar, 2001].

The study reveals the emergence of regional patterns in crop specialisations. Distinguishing between the substitution effect and the expansion effect, the study shows that in the States of the eastern region, the area under non-foodgrain crops has increased while that under coarse grains has declined. Among these States, a shift in cropping patterns is observed mainly due to the substitution effect in Bihar while in the States of Assam and West Bengal cropping pattern changes took place via expansion of crop area.

In Orissa, the expansion effect dominated in the first period while the cropping pattern shift in the second was in favour of substitution of low-profit crops by high return ones.

Similarly, the States in the northern region experienced a decline in the area under coarse grains and pulses while the area under wheat and rice increased substantially. In Punjab, in both the periods 1967-81 and 1982-96, there was expansion in the area under rice, wheat, cotton and sugarcane. In Jammu and Kashmir, too, the area under rice, maize, wheat and rapeseed-mustard expanded. In Uttar Pradesh, however, the shift was towards rice, wheat, potato and sugarcane from coarse cereals and oilseeds. In Madhya Pradesh, the changes towards rice, maize, wheat, gram were due to the expansion effect.

The western region experienced an increase in area under non-food grains and a substantial decline in area under coarse grains. The share of wheat, rice and pulses has been stable. While in Rajasthan, in both the periods, there was an expansion in the area under rice, wheat, maize, bajra, cotton, and groundnut, in Gujarat there was a substitution towards rice, maize, wheat, arhar and oilseeds in both the periods.

In the southern region, a strong substitution effect in both periods increased the area under non-food grains at the expense of coarse grains.

The study finds that the observed changes in cropping patterns were brought about by such factors as the level of yield, irrigation, and area under high yielding varieties.

Singh and Sidhu (2004) analyse the recent decline in agricultural diversity in Punjab in the backdrop of increasing rice-wheat specialization since the Green Revolution. This decline in diversity has been one of the major factors behind the increase in the variability of the gross value of production. The cropping pattern in the State was very diverse before the use of high-yielding varieties of wheat and paddy during the Green Revolution. The crop-mix grown earlier comprised wheat, cotton, maize, groundnut, rapeseed and mustard, gram, barley and guar. The dominance of the wheat-paddy system in the post-Green Revolution period, however, has caused

deceleration in productivity growth, drop in agricultural employment, overexploitation of groundwater resources and decline in soil fertility.

It is argued that if a particular crop enterprise yields significantly higher and assured returns than others, a larger area is brought under it, substituting other alternatives, subject to land, water, market and other resource constraints. The DI for the State as a whole declined from 0.707 in 1970-71 to 0.591 in 2001-02. The varietal diversity within rice and wheat crops has also narrowed down, apart from other problems of groundwater depletion at the rate of 24 cm./annum during 1973-2003 and removal of nutrients by crops.

De (2003) examines the basic reasons for crop diversification in West Bengal during the period 1970-71 to 1994-95. The areas under boro rice, potato and oilseed grew faster than other crops not only due to expansion in net area under cultivation but also due to substitution of area under other crops. The change indicates a cropping pattern shift in favour of high remunerative crops at the cost of lower value crops.

The analysis uses two-stage least square (2SLS) method to analyse the impact of different factors like irrigation, rainfall, chemical fertilisers, yield of the particular crop, yield of the competing crop, price of the *i*th crop and price of the *j*th competing crop lagged one year as explanatory variables. A dummy variable is also used to differentiate between the pre and post land reform periods. The dependent variable is the proportion of acreage of the *i*th crop to gross cropped area in *t*th year.

Results show that development of irrigation and technology are the main factors behind the relatively rapid expansion of cultivation of boro rice, potato, and mustard in West Bengal, along with the use of chemical fertilisers. Relative profitability expected by the farmers from different crop combinations ultimately guides them in planning the allocation of their land holdings.

Gulati and Kelley (1999) study specifically the cropping pattern changes in the Semi-Arid Tropics (SAT) region, encompassing large parts of Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu and Uttar

Pradesh characterised by their harsh environment, low and unpredictable rainfall and infertile and fragile soils. During 1968-70 to 1992-94, there was a distinct shift in the region from coarse grains to wheat, paddy and oilseeds. The loss in the area under coarse cereals almost equals the gain in area under wheat and rice. The absolute area under pulses also increased but their relative share remained almost constant.

In identifying the determinants of changes in cropping patterns, numerous specific determinants were found interacting in complex ways. These include bio-physical determinants like soils, topography, temperature, rainfall, etc.; socio-economic factors like institutions, markets, farm size, price policies and technological factors. It is argued that changes in cropping patterns, at least those occurring rapidly within short temporal spans, are likely to be governed more by factors constituting the socio-economic environment. These factors are, in turn, influenced by government policies and programmes for crop production in the form of subsidies, support prices, tariffs and speed of infrastructural development.

All decisions about allocation of land to crops are made at the farm household level. There are different views regarding the motivation behind farmers' decision of land allocation among crops. On the one hand, it is argued that farmers behave as profit maximisers and will respond to changes in crop prices. The considerations determining crop profitability include prices of the crop in consideration and that of competing crops, input prices, and the quantum of yields.

However, cropping decisions may also be primarily guided by subsistence considerations. Thus, the degree of price responsiveness of farmers may be low in economically backward areas characterised by subsistence agriculture and in areas with underdeveloped markets. Studies show that agricultural areas that have better access to market tend to be more dynamic with respect to cropping pattern changes.

Studying the impact of price and non-price factors in different crop zones in the SAT areas, the scholars conclude that profit motivated factors on the whole better explain changes observed in cropping patterns, though in some crop specific areas both profit and

consumption related factors are important. The study also finds irrigation as the most consistently important non-price factor but it is negatively associated with coarse cereals.

The authors apply a multi-market model using simultaneous equation framework to measure efficiency gains from trade liberalisation and the likely changes in demand and supply of commodities when international price vector is imposed on domestic prices. The results show substantial increases in the production as well as export volumes of wheat, cotton and rice, and decline in the production and increase in import volumes of oilseeds, pulses and sugarcane.

Chand (1999) quantifies the impact of globalisation on producer surplus, consumer surplus and net social welfare in respect of four crops – rice, maize, chickpea and rapeseed-mustard. He notes that the impact of trade liberalisation would vary from commodity-to-commodity. However, there is scope for increasing its benefits by reducing domestic marketing costs and tapping better supplies for imports. The effect of trade liberalisation is studied by estimating the impact of free trade on domestic wholesale and farm level prices.

The results of the analysis show that liberalisation of trade would raise domestic wholesale and firm level prices of rice and maize whereas the prices of edible oil and oilseeds would decline. Further he notes that "... there should not be a major policy shift for important crops like foodgrains and oilseeds based on global price signals, as these prices may not be realised in actual trade."

An earlier study examining the crop specific impact of liberalisation [Gulati, Sharma, Kohli, 1996] assessed the allocative efficiency of various crops by using the measure of resource cost ratio (RCR) as its indicator. It shows that during 1987-88 to 1992-93 under the importable scenario, wheat had the lowest RCR (the amount of domestic resources used in production to save one rupee worth of foreign exchange) of 0.49, followed by gram (0.49), rice (0.54), cotton (0.66) and jowar (0.76). Oilseeds, on the other hand, showed high RCRs of 1.47 for groundnut and 1.66 for rapeseed-mustard. There was, thus, a possibility of gaining from trade by exporting resource efficient crops

like wheat, rice, and cotton and importing oilseeds. Policy decisions in the 1980s to promote self-sufficiency in edible oils through the Technology Mission in Oilseeds and other measures to insulate domestic markets from world prices, however, caused a shortfall in cereal production with self-sufficiency in edible oils in 1992-93. But while wheat was imported at almost double the procurement price for the domestic farmer, edible oils in the domestic market were priced 50% higher than their corresponding import parity price.

A macro study by Bhalla (1995) earlier analysed agricultural policy in India in the context of globalisation and concluded that though "liberalisation would enable large number of rich farmers specially in well endowed irrigated regions to diversify their production structure and start producing for exports", this may not be the case with small and marginal farmers, specially in underdeveloped areas. Excessive export optimism ought to be tempered by ground realities as price increases and high inflation in Indian economy have reduced the comparative advantage enjoyed by many crops. The large fluctuations in international prices of agricultural commodities may accentuate the variability in domestic prices, which might affect food security of the poor adversely.

Criticising some "enthusiastic liberalisers" who argue that India should export foodgrains, in which she has a distinct comparative advantage, Bhalla notes that one must bear in mind the implications of such sudden changes for regional income distribution. In some regions of India (some States in the central region), there has been an acceleration in oilseed output while the productivity of foodgrains is extremely low. Thus, instead of importing all oilseeds, as is argued because of lower border prices, efforts are required to increase the productivity of oilseeds in such areas. And in case the production is non-competitive, efforts must be made to evolve some other cropping pattern, which gives the areas an equivalent comparative advantage vis-à-vis, the rest of the country.

Chapter Four

Model Specification and Estimation

As is evident from the survey of literature in the previous chapter, the primary emphasis of research on the impact of agricultural trade liberalisation in developed and developing countries so far has been on quantifying the impact of the removal of trade restrictions and trade distorting policy measures. Prices have generally been used as a rough proxy for measuring the impact of liberalisation on welfare through the effect on production and consumption. [Goldin and Knudsen, 1990]. In economy-wide analyses, the effect on resource allocation between agriculture and non-agriculture sectors has also been looked into [Frohberg, Fischer and Parikh, 1990]. The impact on production as well as on terms of trade has also been assessed both for developed and developing countries [Whalley and Wigle, 1990; Diao, Somwaru and Roe, 2000].

However, as the negotiations in the key area of agriculture are still in progress, the analyses have only been in terms of projections. The impact of the limited measures of trade liberalisation initiated in various economies is also not yet visible as these are still in the process of implementation and the trends have just begun to show.

In India, too, the process started in 1994 when she became a signatory to the AoA. Amidst domestic opposition against liberalisation and the commitment under the multilateral AoA, India has been gradually moving towards a freer trade regime. The quantitative restrictions, other non-trade barriers have been completely removed and the tariffs drastically reduced. The reform measures at the domestic level, viz., integration of markets, removal of domestic subsidies, etc., have not been worked out, though a partial policy framework has come up. The research in India, too, has largely been on the potential impact of liberalising trade in agriculture. Studies focussing on economy-wide impacts have shown concerns over the distributional aspect of the gains from liberalisation, with the poor – both in the rural and urban areas – experiencing a decline in income [Subramanian, 1993; Storm, 2001]. The analyses have basically been in terms

of studying the impact through the changes in the prices of agricultural products and resultant impact on producer earnings and consumer welfare.

The Econometric exercise

To examine the effect of trade liberalisation on cropping patterns we pool the cross-section and time series data for 15 States[7] over a period of 10 years and use the technique of panel estimation. The following regression equation is fitted for the purpose:

$$CP_{it} = \alpha + \beta_1 IR_{it-1} + \beta_2 RD_{it-1} + \beta_3 SMH_{it} + \beta_4 NRP_{it-1} + \beta_5 TD + \varepsilon_{it}$$

where CP_t is a measure of cropping pattern change, defined as the ratio of the change in area under different crops to the Gross Cropped Area (GCA);

IR_{t-1} is the ratio of gross irrigated area to the gross cropped area lagged one year;

RD_{t-1} is the ratio of total road length (in kms.) to the gross cropped area (in 1000 ha) lagged one year;

SMH_t is the ratio of the number of small and marginal holdings to the number of total holdings;

NRP_{t-1} is the nominal rate of protection measured as (domestic prices/world prices – 1) lagged one year; and

TD is the time dummy separating the period into two blocks of five years each so that

TD = 0 if year = 1991 to 1995, and

TD = 1 if year = 1996 to 2000.

Selection of Crops: This model is estimated separately for exportable and importable crops. For example, coffee and tea are considered only as exportable crops while natural rubber is taken only as an importable crop. Many of these crops, like rice, wheat, pulses, etc., are common to both sets. However, only a few crops from each State have been included in the study, although ideally all traded crops should have formed part of it.

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[7] The States are: Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, UP and West Bengal.

Moreover, the crops selected are different for each State, depending upon its cultivation pattern. The selection had to be made on the basis of the availability of data for all variables in respect of the exported and imported crops. On this basis, only the following crops were selected:

For the exportables case: Wheat, rice, other cereals, pulses, tea, coffee, tobacco, spices, sugar, sesame and niger seeds, groundnut and raw cotton;

For the importables case: Wheat, rice, other cereals, pulses, spices, sugar, oilseeds, natural rubber, cotton and raw jute.

Description of Variables

The Dependent Variable: The dependent variable (CP) is a measure of cropping pattern change, which is the same as the 'diversification index' formulated by Chand and Chauhan (2002). Diversification in agriculture can be broadly defined as a shift of resources from farm to non-farm activities or from one crop (or livestock) to a larger mix of crops and livestock to achieve an optimum portfolio of income. It may also be defined to include the movement of resources from low value commodity mix to a high value one [Vyas, 1996]. In the context of the present study, the diversification has been taken to mean a change in the allocation of land to different crops as a proportion of total land used [Chand and Chauhan, 2002], or simply the change in cropping patterns. Numerically, the measure can be put as:

$$DIV_{mk} = \frac{1}{2}\sum\left|(A_{im} - A_{ik})\right| / GCA$$

where

DIV_{mk} is diversification in crop pattern between years m and k

A_{im}, A_{ik} are areas under ith crop in years m and k, and

GCA is gross cropped area.

This measure captures the dynamic aspect of cropping pattern change in terms of the area allocated to different crops in a State. Other measures of diversification include the Hirschman-Herfindahl index, Simpson index, entropy index, ogive index.

The Simpson index is defined as:

$SID = 1 - \sum_{i=1}^{n} P_i^2$ where p_i is the proportionate area (or value) of i^{th} crop/ livestock/ fishery activity in the GCA (or total value) of output.

One application of this measure to capture the diversification did not show statistically superior results and therefore this measure was discarded in favour of an index of output of values of horticultural commodities [Joshi, Gulati, Birthal, Tiwari, 2004]. Moreover, it may be noted that the Simpson Index as a measure of crop diversification does not capture the dynamic effects, or more precisely, the annual changes in the area under various crops.

Singh and Sidhu (2004) use the following index to calculate diversification (DI):

DI = 1 – H, where H is the Hirschman-Herfindahl index measured by $\sum(P_{it}/\sum P_{it})^2$, P_{it} being the value of production of the *i*th crop in year t (at 2001-02 prices). A higher DI indicates greater crop diversity in production patterns

However, it may be noted that this measure of diversification gives weight only to the price factor by defining the measure in terms of prices itself. If due to some reasons, only the price variable changes without any change in the production of or area under a crop, the diversification measure would treat it as shift in production pattern. This change in prices may or may not result in an expansion of area under the crop due to other factors like infrastructure, irrigation facilities, etc.

The Independent Variables: Based on earlier studies, the independent variables included the domestic structural variables and also a proxy measure for trade liberalisation. These are discussed below:

1) Irrigation: The measure used to capture the impact of irrigation facilities is defined as the proportion of gross irrigated area (GIA) to the gross cropped area (GCA). The data on gross instead of net irrigated area is used because the former captures the year-round use of irrigation facilities. If on a piece of land, three crops are grown in a year, one after the other, then the gross irrigated area includes area irrigated under all the three crops. Thus, it measures the total area irrigated in a State, and not just the physical area irrigated.

2) Road Density: This variable is used to capture the impact of a vital part of the infrastructural development on cropping patterns in the States. This is measured as the ratio of total road length in a State per 1000 ha of gross cropped area (GCA). The total road length includes all the surfaced and unsurfaced roads in a State as well as both urban and rural roads. Thus, this variable measures the connectivity of the rural areas with the marketing centres of the State and other developed centres. It must be noted that the data for some States shows a physical decrease in the road length from one year to another. This decrease is due to the fact that if a shorter connecting road/ highway/ flyover is built then the longer route (which is more length-wise) is not in use any longer.

3) Proportion of Small & Marginal Land Holdings: Indian agriculture is characterised by the presence of a large number of small (1 to 4 ha) and marginal holdings (below 1 ha) which constitute about 60 per cent of the total holdings. There has been a long debate on the issue of the viability of small holdings, wherein it was earlier shown that there is an inverse relationship between the farm size and productivity [Khusro, 1973]. However, it has also been argued that the consolidation of land holdings leads to increased efficiency as benefits can be derived from the economies of scale and use of improved scientific and technological methods of agriculture.

In terms of crop diversification, too, it is argued that small and marginal farms hold the key to diversification of cropping patterns towards more remunerative ones like horticultural and floriculture [Joshi, Gulati, Birthal, Tiwari, 2004; Vyas, 1996]. However, some other studies have found a negative relationship between the number of small and marginal holdings and crop diversification [Chand and Chauhan, 2002]. Practically

speaking, in the absence of efficient agricultural credit disbursal and the impoverished rural peasantry, and the unviable size of small and marginal land holdings, it may be noted that the small and marginal farmers would be relatively risk averse as compared to the large farmers. A small/ marginal farmer would, in fact, tend to stick to the existing cropping pattern of the traditional crops, especially foodgrains, as his primary consideration is subsistence.

The measure taken to represent this variable is the proportion of the number of small and marginal land holdings to total holdings. The data on these numbers is available only on a quinquennial basis. The annual data, therefore, have been obtained by interpolation on the basis of compound annual growth rate (CAGR) between the quinquennial periods for each State.

4) Nominal Rate of Protection: The measure, which has been used to capture the impact of trade liberalisation on Indian agriculture, is the Nominal Rate of Protection (NRP). It is defined as the ratio of domestic prices to world prices minus one $[(P_d / P_w) - 1]$. It may also be defined as NPC-1 where NPC is the nominal protection coefficient used extensively to measure competitiveness. The NRP is calculated separately for the exportable and the importable crops and for each state.

The choice of NRP was made because it captures the effect of all tariff and non-tariff distortions on prices [Greenaway, 1983]. The non-tariff instruments of intervention include the domestic production subsidies to the agricultural sector, export subsidies, etc. Thus, the NRP includes the effect of almost all kinds of distortions (both domestic and international) that might affect the trade and, in turn the cropping patterns in a country.

The Haberler Report (1958) also suggested that a rough approximation of the price distorting effect of non-tariff interventions could be gauged by examination of international price differentials.

Since a different number of crops (the principal traded ones) are taken for the analysis across each State, the study constructs State-wise indices of domestic prices and

the corresponding indices of import (c.i.f.) and export (f.o.b.) prices for the importable and exportable scenarios respectively.

$$\text{NRP (exportables case)} = \frac{\text{Index of domestic wholesale prices}}{\text{Index of export (fob)prices}} - 1$$

$$\text{NRP (importables case)} = \frac{\text{Index of domestic wholesale prices}}{\text{Index of import (cif) prices}} - 1$$

The index of domestic prices has been constructed using the wholesale prices for agricultural crops. The wholesale prices represent payments for approximately the same marketing services as are embodied in export or import prices [Anderson and Hayami, 1986]. In each state the wholesale prices are reported for a number of markets. At times, the varieties of the crops are the same across all marketing centres while the varieties differ in some States. However, we have adopted a standardised procedure of taking an average across all markets in a state. Moreover, the corresponding import or export price data for various crops are not reported for different varieties of a crop. Therefore, averaging across markets at the state level without regard to the differences in the varieties of a crop apparently remains the only viable option, though rather a crude one.

In the exportables case, the world prices taken are those calculated from the DGCIS (Director General of Commercial Intelligence and Statistics) data on export quantity and value of principal commodities. The values conform to the f.o.b. (free on board) in the case of exports. Similarly, in the importables case the values conform to the c.i.f. (cost, insurance and freight) as provided by the DGCIS in their publication, *Foreign Trade Statistics of India (Principal Commodities and Countries).* The fob or per unit export prices have been obtained by dividing the value of exports by the total quantity of exports for each crop. Similarly, the c.i.f. or import prices per unit have been arrived at.

Method for constructing index numbers

The cropping decisions of the farmers are largely based on the previous year's prices and production, but there are wide year-to-year fluctuations in both. Keeping these

considerations in view, the study uses the chain-base method to construct the index numbers. The formula chosen for constructing the index numbers is the Laspeyre's index number = $\frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$ where p_1 is the current year price; p_0 the base year price and q_0 the base year quantity.

First the link relatives are constructed by taking the previous year as the base year for each successive year. These link relatives are then converted into a chain index by taking 1990 = 100 (the base year).

5) Time Dummy: A time dummy has been introduced in the model to separate the 10-year period between 1991-1995 (assigned the value of 0) and 1996-2000 (assigned the value of 1). The reasons for this are that first, this divides the 10-year period between two pre- and post-AoA periods. Secondly, the data show that the change in the cropping pattern was more marked in the latter half of the decade of the 1990s.

Although we proposed initially to include Market Density, too, as an independent variable because markets play an important role in the sale of the farm produce, we dropped the idea on examining the available data. The data were found rather unreliable and inadequate because different criteria are applied for different States. In Kerala, for example, they cover only the four regulated markets, whereas in some States, the number of regulated markets also includes storage facilities. Secondly, the data do not include the number of rural primary markets, for which the Directorate of Marketing and Inspection furnish data since 2001 only. However, these rural primary markets are a very important part of the rural infrastructure and their numbers have been increasing considerably. These rural primary markets include the haats, shandies, weekly or monthly markets, etc., where farmers, especially the small and marginal ones, sell their produce. Thirdly, the APMR Act for the primary regulated markets has not been enacted in some of the States.

Data Sources

The variables have been computed from the data obtained from the publications of the concerned ministries of the Government of India and the statistics maintained by them.

The data on area under different crops have been computed from various issues of *Area and Production of Principal Crops in India* while the gross cropped area and gross irrigated area of each State have been obtained from various issues of *Land Use Statistics*, both published by the Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi.

The data on total road length for each State have been obtained from different issues of *Basic Road Statistics,* published by the Ministry of Transport, New Delhi.

The quinquennial data on the number of small and marginal holdings and total holdings for each State has been obtained from *The Agricultural Census of India.*

The data on the domestic wholesale prices for different crops in various States have been obtained from various issues of *Agricultural Prices in India*, published by the Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi. The f.o.b. and c.i.f. prices have been derived from the data for quantity and value of exported and imported commodities provided in *Foreign Trade Statistics of India (principal countries and commodities)*, published by the DGCIS, Ministry of Commerce, Calcutta.

The data on farm harvest prices and cost of production, used in the comparison of the States of Punjab and Gujarat have been obtained from various issues of *Farm Harvest Prices in India* and *Cost of Cultivation of Principal Crops in India*, respectively, published by the Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi.

Results and Analysis

Exportables Case: Running a panel regression on the pooled data in the Econometric program "Stata, Version 8", we obtained the following results:

Hausman specification test

---- Coefficients ----

Dependent Variable	Fixed Effects	Random Effects	Difference
irrigation	-.0603541	-.0091778	-.0511763
road density	-.0003582	-.0002416	-.0001166
s&m holdings	-.0059284	-.0091117	.0031833
NRP	-.0009908	-.0014037	.000413
TD	.0048743	.0039033	.0009711

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[S^(-1)](b-B), S = (S_fe - S_re)
= 5.35
Prob>chi2 = 0.3747

The Hausman specification test revealed a random effect model (with chi sq. = 5.35 < the tabulated value). Correcting for heteroskedasticity in the model by running an FGLS regression, all the independent variables were significantly affecting the dependent variable of cropping pattern change.

Cross-sectional time-series FGLS regression

Coefficients: generalised least squares

Panels: heteroskedastic

Correlation: no autocorrelation

Estimated covariances	=	15	Number of obs	=	150
Estimated autocorrelations	=	0	Number of groups	=	15
Estimated coefficients	=	6	Time periods	=	10
			Wald chi2(5)	=	88.58
Log likelihood	=	475.0034	Prob > chi2	=	0.0000

Dependent Variable	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
irrigation	-.015187	.0039838	-3.81	0.000	-.0229951	-.0073788
road density	-.000317	.0000866	-3.66	0.000	-.0004868	-.0001471
s&m holdings	-.014524	.0059513	-2.44	0.015	-.0261884	-.0028596
NRP	-.0018689	.0005277	-3.54	0.000	-.0029031	-.0008347
TD	.003932	.0014962	2.63	0.009	.0009995	.0068646
cons	.0401595	.0045148	8.90	0.000	.0313107	.0490083

The significant value of the wald statistic in the exportables case confirms the result of the Hausman specification test that it is a random effect model. It also shows that the model is a fairly good fit and is structurally stable.

The irrigation variable (the ratio of GIA and GCA) is highly significant but with a negative coefficient (- 0.015). This is in contrast to the result arrived at by an earlier study [Chand and Chauhan, 2002] which show irrigation to be positively related with diversification. Another study that deals with diversification in horticultural crops, on the other hand, finds an inverse relationship between irrigation and diversification [Joshi, Gulati, Birthal, Tiwari, 2004]. One possible reason for the highly negative coefficient in

the present study may lie in the choice of crops. Since only a few crops in each State have been chosen, keeping in view the list of exported principal commodities, some crops where irrigation facilities play a crucial role may have been left out.

Another possible explanation of a negative relation between irrigation and crop diversification may be that as the irrigation facilities improve, there is a kind of inertia on the part of farmers to switch over to some new crop. There would be a tendency to stick to the existing cropping patterns [Kumar, 2001]. This has been the case in the State of Punjab where, on the one hand, the irrigation facilities have improved considerably while, on the other, the diversification in crop cultivation has reduced with a wheat-paddy cropping pattern specialisation. Moreover, a study separating the period subjected to analysis into two phases – 1968-69 to 1982-83 and 1983-84 to 1998-99 – has shown that the pace of diversification slowed down during the second phase in Punjab and UP [Chand and Chauhan, 2002]. Since the period covered by the present study forms part of the second phase, it is quite possible that the fall in the rate of cropping pattern change, irrespective of an increase in the irrigation facilities in certain States, led to the negative relationship between irrigation and cropping pattern change.

It has also been shown that the foodgrain production is positively related to the expansion in the irrigation facilities [Dhawan, 1993]. Thus, with the expansion in gross irrigated area there would be move towards specialisation in the production of foodgrains, and this has been observed in the state of Punjab.

The variable of road density, a proxy for infrastructural development, too, is highly significant but with a negative coefficient of (-0.0003). This indicates that the road network, too, is inversely related with crop diversification. The inverse relation may again point towards a tendency to specialise in the traditionally cultivated crops rather than experimenting with new crops.

The explanatory variable of small and marginal holdings also acts as a significant constraint on crop diversification (- 0.014). A similar result has been reported in the study by Chand and Chauhan (2002). This indicates that as the proportion of small and

marginal holdings increases, the capacity to undertake crop diversification decreases. However, in the case of horticultural crops, this relationship is seen to be positive [Joshi, Gulati, Birthal and Tiwari, 2004].

In the analysis, one of the most significant variable that is affecting cropping pattern changes is the nominal rate of protection [(Domestic Price/World Price) – 1]. This variable, too, is inversely related to the crop diversification measure (- 0.0020). This indicates that as the price wedge between domestic and world prices increases, that is, as the protection levels are increased, the crop diversification reduces under the exportable scenario. It also implies that that the farmer is quite price responsive and his decisions on resource allocation are influenced by prices. An inverse relationship indicates that as the trade barriers are reduced, the farmers tend to become more competitive, export-oriented and open to experimentation with respect to cropping patterns. There is a tendency to move towards a more remunerative crop rather than pursuing the cultivation of traditional crops.

However, it must also be noted here that this tendency may not always yield positive outcomes as far as the income of farmers is concerned. Such has been the experience of Kerala's coffee growers who have actually suffered due to violent fluctuations in world prices.

Thus, the results are not a comment on the desirability of alignment to world markets but only an indication that the farmers do tend to change their existing cropping patterns as the trade barriers are reduced.

The significant coefficient of time dummy shows that in the exportables case, there have been significant changes in the cropping patterns in the post-AoA period (1996-2000) period. This implies that the increasing emphasis on export-oriented growth in the Indian policy framework has yielded results.

Importables Case: A similar exercise of panel data estimation applied to the pooled data yielded the following results.

Hausman specification test

---- Coefficients ----

Dependent Variable	Fixed Effects	Random Effects	Difference
irrigation	.0706501	.0003284	.0703217
road density	.0003723	-.0000774	.0004498
s&m holdings	-.0817383	-.0164056	-.0653328
NRP	.0003571	-.0003906	.0007477
TD	-.0007076	.0005493	-.001257

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[S^(-1)](b-B), S = (S_fe - S_re)
= 3.81
Prob>chi2 = 0.5770

The Hausman specification test revealed a Random Effect Model (with chi sq. = 3.81 < the tabulated value). Correcting for heteroskedasticity in the model by running an FGLS regression, all the independent variables except the variable capturing the impact of trade liberalisation were significantly affecting the dependent variable of cropping pattern change.

Cross-sectional time-series FGLS regression
Coefficients: generalised least squares
Panels: heteroskedastic
Correlation: no autocorrelation

Estimated covariances	=	15	Number of obs	=	150
Estimated autocorrelations	=	0	Number of groups	=	15
Estimated coefficients	=	6	Time periods	=	10
			Wald chi2(5)	=	43.61
Log likelihood	=	474.0371	Prob > chi2	=	0.0000

Dependent Variable	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
irrigation	-.0088562	.0040443	-2.19	0.029	-.0167829	-.0009296
road density	-.0002242	.0000753	-2.98	0.003	-.0003718	-.0000765
s&m holdings	-.0207768	.0058187	-3.57	0.000	-.0321814	-.0093723
NRP	-.0001793	.0015121	-0.12	0.906	-.003143	.0027844
TD	.0005098	.0017329	0.29	0.769	-.0028867	.0039062
cons	.0399083	.0046441	8.59	0.000	.030806	.0490107

The significant value of the wald statistic in the importables case also confirms the results of the Hausman specification test that the model is a random effect model. It also shows that the model is a fairly good fit and is structurally stable.

The results of this regression are quite similar to those of the exercise for the exportable scenario in respect of all Independent Variables except NRP. The irrigation variable is significantly affecting the cropping pattern change inversely (- 0.009). The reasons for this are the same as those in the exportables case.

The variable RD (road density), used as a proxy for infrastructural development, too, is significantly affecting the cropping pattern changes but with a negative coefficient (- 0.0002), as in the case of the exportable scenario.

The proportion of small and marginal holdings (SMH) is also acting as a significant constraint (- 0.021) on the extent of crop diversity. Thus, as the proportion of SMH increases the cropping pattern changes tend to decrease indicating that the small and marginal farmers are risk averse and do not change their cropping patterns easily. Practically, this stands to reason because only the larger farmers, with better facilities and easy availability of investment, can undertake the risk associated with diversification.

The proxy variable of trade liberalisation, however, is insignificant and thus does not help explain the cropping pattern changes that have occurred in India in the decade. This result indicates that the cropping pattern changes have been caused more by export considerations than by import factors because the liberalisation of imports since 1995 has been gradual and its effects have yet to crystallise. This is also borne out by the insignificant coefficient for the time dummy in contrast to the case for exportables.

An insignificant time dummy coefficient in this case also shows that the measures taken for removing trade barriers have not yielded results as yet. In fact, the quantitative restrictions (QRs) on agricultural products were removed completely only in the year 2000, that is, after the period of this study.

The difference between the exportable and importable scenarios as far as the impact of NRP is concerned, is due to the difference in the relative structure of incentives for exports and imports. The government policies generally have been more instrumental in promoting exports than imports. It also shows that the Indian farmer, given the incentive, is export-oriented and does respond to price factors.

Since most of the crops covered in the two cases are common, with the exception of coffee and tea as exportables and natural rubber as importable, a comparison of the two results shows that these crops are surplus to the local needs and, therefore, led more by export considerations.

Chapter Five

Cropping Pattern Changes: A Comparison Between Punjab and Gujarat

The analysis of a cross-section of 15 states over a period of 10 years in the previous chapter has revealed a macro picture for India as a whole. As discussed in the previous chapter, the nominal rate of protection (NRP) has emerged as a very significant factor in explaining the cropping pattern changes and is related inversely with the variable under the exportables case. In the importables case, on the other hand, this factor is not significant and the technological and infrastructural variables like irrigation, road density, and proportion of small and marginal holdings emerge as the factors explaining cropping pattern changes.

However, this kind of an analysis gives only a broad conclusion and general trends. In a country like India with diverse agro-climatic conditions, diverse cropping patterns, socio-cultural influences and differential levels of socio-economic and infrastructural development, undertaking a generalised analysis is a gross underassessment of this diversity. This may bias the analysis and may lead to incorrect conclusions. Thus, a detailed analysis at the disaggregated levels of states and crops is necessary to arrive at more meaningful conclusions.

Accordingly, in this study we attempt to compare the two states of Punjab and Gujarat in terms of cropping pattern changes over the period 1990 to 2000.

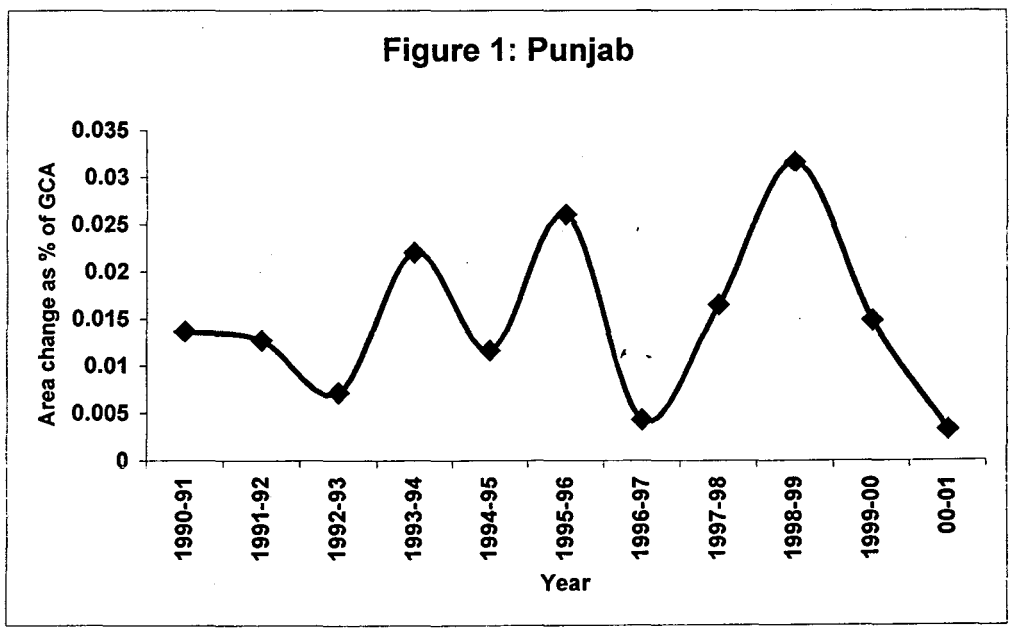
Punjab has been chosen for this analysis because it is one of the most developed States as far as agriculture is concerned. The farmers benefited greatly from the Green Revolution initiated in the late 1960s. However, the State has also witnessed a wheat-paddy specialisation in the cropping pattern, which has been a direct result of the policies, pursued since the Green Revolution. The diversification across crops has, thus, declined

tremendously over the years and has also led to environmental degradation [Singh and Sidhu, 2004].

The state of Gujarat has been chosen because the data on area change under the selected crops shows fast cropping pattern changes, especially in respect of oilseeds. This acquires significance because it has been argued that India should specialise in the production of foodgrains, in which she has a comparative advantage, and import products like oilseeds and oil [Gulati, 1998]. It is also argued, on the other hand, that since some regions are suited more for the production of oilseeds, adequate attention need be given to the production of these rather than relying on imports [Bhalla, 1995].

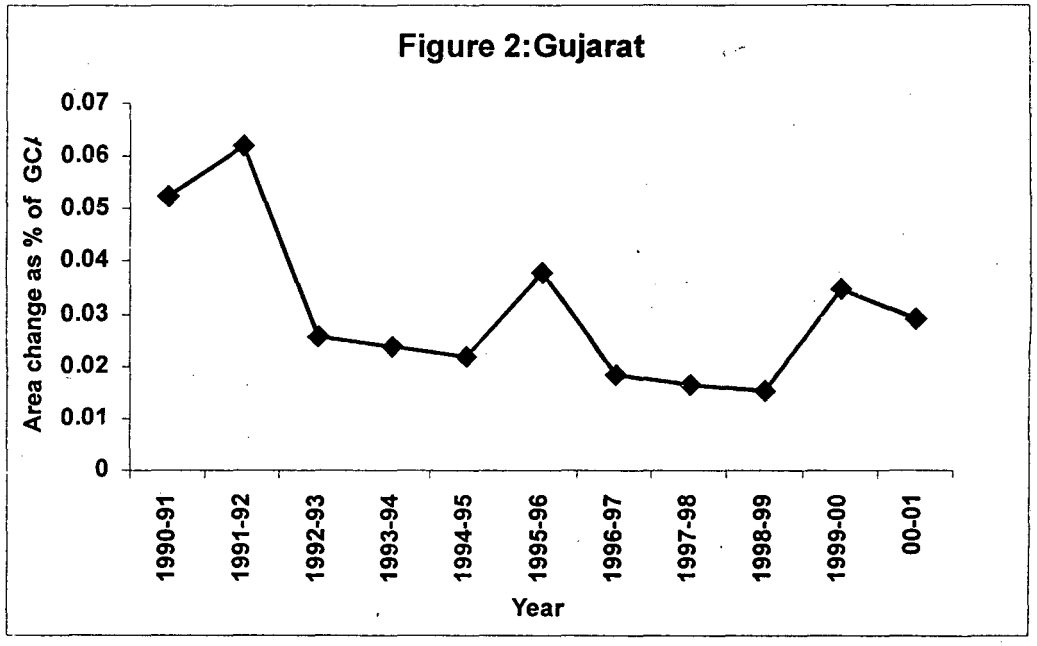
In the light of these, we try to assess the rationale behind the cropping pattern changes in the selected States.

Trends in Cropping Pattern change: As Figures 1 and 2 below show, the changes in the cropping pattern fluctuated wildly in both Punjab and Gujarat during the period 1990 to 2000.



As Figure 1 above shows, the cropping pattern changes in Punjab after 1996 fell sharply after touching a high of 0.026 to 0.005 in 1997 and rose to a new high of 0.032 in 1998 and again fell sharply in 2000 to touch the lowest level of the decade. This is explained by the fact that while the proportionate area under wheat and rice remained almost constant, that under cotton and sugar declined with sharp fluctuations and the area under pulses, especially gram and moong, fell sharply during the period.

In Gujarat, too, fluctuations can be seen in Fig. 2, though in this case fluctuations are not so violent and the trend is downwards. The area change in the State rose in 1991



to a high of 0.062 but has been declining since with some exceptional years. After touching a low of 0.015 in 1998, it rose to 0.035 in 1999 and fell again to 0.03 in 2000. The trend is explained by a decline in the proportionate area under coarse cereals and gram, while the area change fluctuated sharply in the case of wheat. The shift in the cropping pattern was only towards cotton, despite fluctuations, with a decline in the area under almost all other reported crops which could not be included in the study because of inadequate data to calculate their respective NRP.

Trends in NRP: As Figures 3 and 4 below show, the rate of nominal protection has been falling since 1995 in both the States. In the case of Punjab, as shown by Fig. 3, it rose to the highest of the decade in 1995 (1.21) to fall after that until it touched a low of - 0.21 in 1999. In Gujarat, similarly, as Fig. 4 shows, the NRP rose to a high of 1.45 in 1995 to fall to 0.04 in 1997. It rose after that consistently until 2000.

Figure 3: Punjab

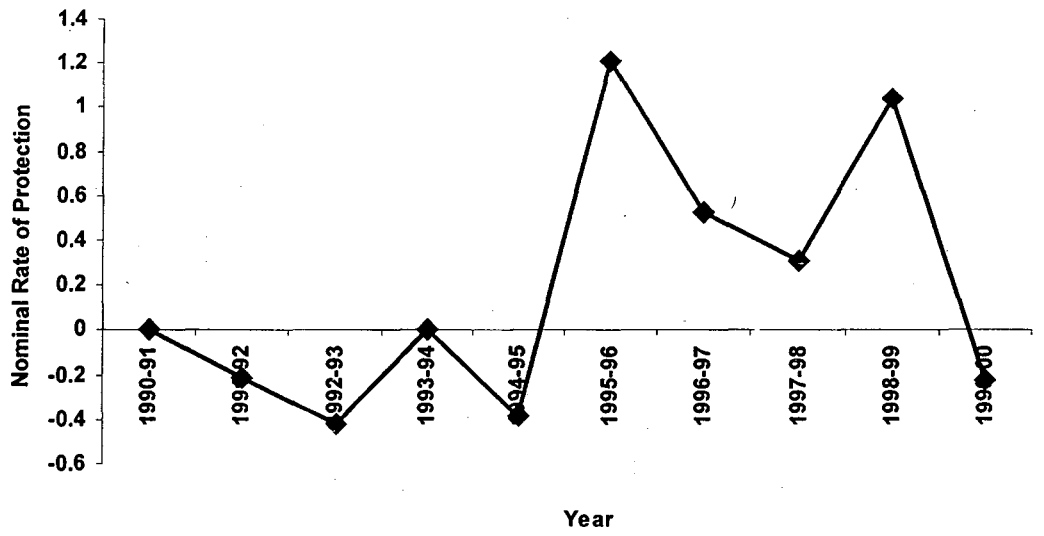
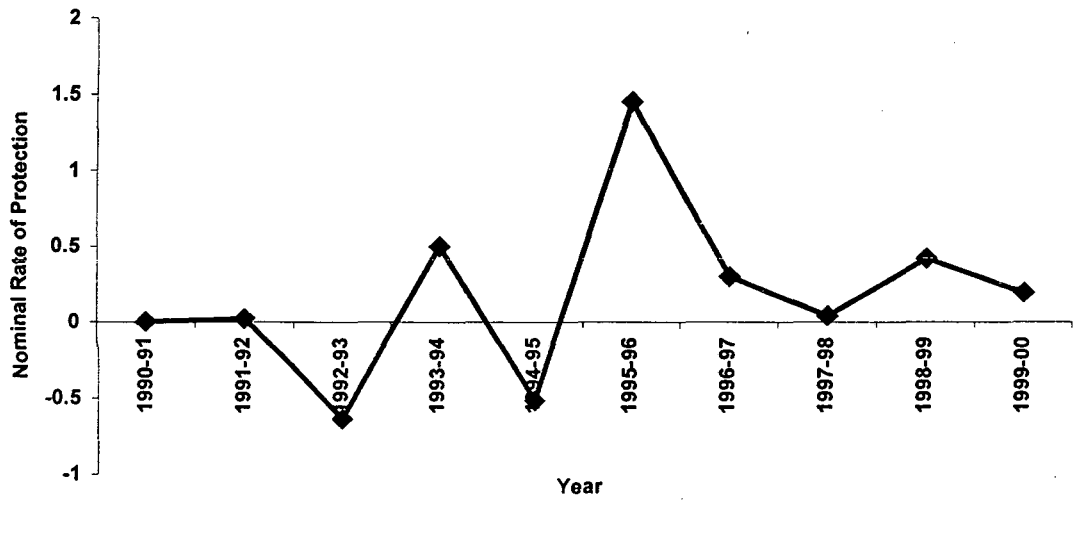


Figure 4: Gujarat



Juxtaposing the trends in cropping pattern change and the NRP shows that during the decade, there have been fluctuations in both the variables. Since the regression analysis in the previous chapter reveals NRP as a significant factor affecting cropping pattern changes, it may be concluded that the fluctuations in the cropping pattern have been affected by the variations in NRP, too.

Trends in income: To look at the trends in income in the two States, we look at the differences between the cost of production (rupees per quintal) and the farm harvest prices (rupees per quintal) in Table I below. The crops covered are, however, only three in each State. For the State of Punjab the crops taken are wheat, cotton, and paddy (the total number of crops covered for the analysis of cropping pattern changes was eight). For Gujarat, the crops taken are wheat, cotton, and groundnut (out of a total of nine crops taken for the cropping pattern analysis). The crop coverage for this analysis is limited due to the non-availability of data on the cost of production. However, the selected crops in both the States can be taken as representative of those crops among which cropping pattern change has occurred.

The measure, which has been taken for the cost of production variable, is the cost C2. Cost C2 = cost A1 + interest on value of owned fixed capital assets + rental value of owned land and rent paid for leased-in land + imputed value of family labour.[8] This concept of cost is a comprehensive one as far as the costs to a farmer are concerned. Hence the choice.

The farm harvest prices have been chosen because it is the prices that a farmer receives at the farm-gate level which are more relevant while measuring his income. The wholesale prices include other costs like transportation costs and the middleman's profit margin also.

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[8] Cost A1 comprises value of hired human labour, value of hired and owned bullock labour, value of owned machinery and charges of hired machinery, value of seeds (purchased and farm produced), value of insecticides and pesticides, value of manure, value of fertilisers, depreciation charges, irrigation charges, land revenue, other taxes, interest on working capital, misc. charges.

As Table I below shows, wheat has shown a rising trend in incomes in both Punjab and Gujarat. While the prices received by farmers have risen in both the States, the cost of production has been declining in Punjab but has been generally constant in Gujarat. This trend in incomes partly explains the trend in the area under wheat in the two States. While the area under wheat shows a slightly increasing trend in Punjab, the area under the crop is fluctuating in Gujarat, though maintaining a generally increasing trend.

The same table shows a sharp declining trend in the incomes of farmers in the case of cotton cultivation. The decline is observed in both the States, though it is sharper in Punjab, where the difference between the farm harvest prices and cost of cultivation becomes negative in the years 1998 and 1999. In Gujarat, the trend in incomes is fluctuating but declining. In Punjab the decline is due to a substantial rise in the cost of production, though prices, too, have been increasing. In Gujarat, there are fluctuations in both prices and costs but generally the prices have been decreasing while the costs have been rising. In the case of cotton, too, the trend in the incomes of the farmers explains the trend in area change in both the states. In Punjab, the area under cotton cultivation has been declining over the 1990s decade. In Gujarat, the area has been fluctuating but generally declining.

An analysis of Table I further shows that in the case of paddy cultivation (taken for Punjab only), incomes have been fluctuating over the selected period but there is a declining trend. This trend is due to the fact that the prices of the crops have been rising, and the cost of production has been fluctuating but rising. However, the absolute area under paddy cultivation has been rising. This inconsistency in the trends in incomes and the area may be due to several reasons. Paddy has been the traditional crop of Punjab with a large area under its cultivation. The government policy has been such as to encourage the cultivation of crops like wheat and paddy. Paddy cultivation is also labour intensive. Therefore, farmers would not shift from paddy cultivation to other crops that easily. Moreover, the period of nine years taken for this analysis is too short a period for trends to be visible clearly.

In the case of groundnut cultivation, which has been analysed only for Gujarat, the incomes have been slightly fluctuating but there is a declining trend. Both prices and cost of production have been fluctuating but both have maintained a rising trend. In this case the area under groundnut cultivation more or less follows the trend in incomes. The area is fluctuating but with a declining trend.

Table I: Trends in Cost of Production, Farm Harvest Prices and Incomes

PUNJAB				GUJARAT			
	Wheat				Wheat		
Years	Cop	Fhp	Income	Years	Cop	Fhp	Income
1990	190.79	n.a	-	1990	n.a	363.15	-
1991	210.41	242.42	32.01	1991	n.a	441.64	-
1992	250.72	321	70.28	1992	280.84	416	135.16
1993	n.a	353	-	1993	386.91	488	101.09
1994	298.68	365	66.32	1994	n.a	487	-
1995	342.83	387	44.17	1995	435.31	531	95.69
1996	362.5	429	66.5	1996	402.89	699	296.11
1997	411.97	502	90.03	1997	n.a	584	-
1998	398.58	550	151.42	1998	427.46	690	262.54
	Cotton				Cotton		
Years	Cop	Fhp	Income	Years	Cop	Fhp	Income
1990	849.52	n.a	-	1990	660.65	1252.57	591.92
1991	803.62	797.4	-6.22	1991	n.a	1430.94	-
1992	831.56	1124	292.44	1992	901.07	1635	733.93
1993	1107.38	1607	499.62	1993	1017.9	1690	672.12
1994	1421.08	2018	596.92	1994	n.a	2053	-
1995	1643.83	1766	122.17	1995	n.a	1794	-
1996	1703.04	1753	49.96	1996	1375.5	1433	57.46
1997	n.a	1569	-	1997	n.a	1754	-
1998	3170.99	1967	-1203.99	1998	1399.4	1585	185.65
	Paddy				Groundnut		
Years	Cop	Fhp	Income	Years	Cop	Fhp	income
1990	194.69	n.a	-	1990	492.77	940.27	447.5
1991	206.77	361.88	155.11	1991	n.a	1060.27	-
1992	224.38	322	97.62	1992	832.09	999	166.91
1993	266.87	368	101.13	1993	1090.5	1112	21.51
1994	290.36	390	99.64	1994	788.74	1189	400.26
1995	330.81	418	87.19	1995	1209.4	1326	116.62
1996	344.81	430	85.19	1996	903.46	1266	362.54
1997	356.4	446	89.6	1997	n.a	1369	-
1998	407.9	482	74.1	1998	995.73	1360	364.27

Disaggregated view of the cost of cultivation: On a closer examination of the cost of cultivation increase, we find that a big part of the increase is under the head, "imputed rent of owned land" (henceforth imputed rent). Through Tables II and III below, we have tried to compare the movement during the period of study in the cost of cultivation (per ha) for four items: human labour, fertilisers, machine labour and imputed rent of own land.

Table II shows that in Punjab, in the case of wheat, all the four costs have increased substantially over the period. While the cost of "human labour" has increased by 133 per cent over the 10 years from Rs 1288.59 in 1990 to Rs 3006.72 in 1999, that of imputed rent has risen sharply by 255 per cent over the period from Rs 2363.88 in 1990 to Rs 8401.65 in 1999. The increase in the cost of fertilisers has been the least – from Rs 1072.91 in 1990 to Rs 2316.98 in 1999, an increase of 116 per cent.

In the case of cotton, however, human labour charges have increased by 183 per cent while the rise in imputed rent has been only 108 per cent. The cost of fertilisers, on the other hand, declined by 2.57 per cent from Rs 686.54 in 1990 to Rs 668.88 in 1999.

Even in the labour-intensive crop of paddy, the cost of human labour has increased rather modestly by only 96 per cent (lower than the other two crops), and that of imputed rent has risen by 156 per cent over the 10 years. The increase in the fertiliser cost was only 78 per cent, while that of machine labour rose by 145 per cent, implying that rice cultivation has been getting more mechanised.

The comparison of the four costs shows clearly that by far the most determining factor in the increase in the cost of cultivation has been the 'notional' cost on imputed rent, which, in effect, means an increase in the notional wealth of the farmers in terms of the prices of land.

It also shows that fertiliser cost has seen the lowest increase of the four costs. In the case of cotton, in fact, it has fallen by 2.5 per cent over the period. This only shows that although the impact of agricultural trade liberalisation is yet to be noticeable, the

earlier economic reforms have already begun to bring dividends to the farmers by making the prices of manufactured inputs competitive.

Table II: Cost Comparison in Punjab

PUNJAB								
				WHEAT				
Years	Human Labour	Variation%	Fertilisers	Variation%	Machine Labour	Variation%	Land Rent(Imputed)	Variation%
1990	1288.59	-	1072.91	-	974.35	-	2363.88	-
1991	1349.88	4.756	1344.64	25.326	1093.65	12.244	2795.65	18.265
1992	1910.91	41.561	1554.9	15.637	1157.69	5.856	3350.55	19.849
1993	n.a	-	n.a	-	n.a	-	n.a	-
1994	2354.99	-	1912.61	-	1182.02	-	4538.22	-
1995	2480.58	5.333	2124.67	11.087	1384.67	17.144	3947.29	-13.021
1996	2892.53	16.607	2307.45	8.603	1586.4	14.569	6942.73	75.886
1997	3048.47	5.391	2315.34	0.342	1692.07	6.661	5894.3	-15.101
1998	3013.7	-1.141	2162.07	-6.620	2067.73	22.201	7445.7	26.320
1999	3006.72	-0.232	2316.98	7.165	2621.4	26.777	8401.65	12.839
10yr.Variation		133.334		115.953		169.041		255.418
				COTTON				
Years	Human Labour	Variation%	Fertilisers	Variation%	Machine Labour	Variation%	Land Rent(Imputed)	Variation%
1990	2226.14	-	686.54	-	535.24	-	2448.67	-
1991	2938.85	32.016	527.67	-23.141	787.99	47.222	5019.37	104.98
1992	3101.65	5.540	670.38	27.045	623.36	-20.892	3838.64	-23.523
1993	3411.24	9.981	696.25	3.859	641.2	2.862	4558.42	18.751
1994	4099.58	20.179	882.2	26.707	682.2	6.394	5863.37	28.627
1995	4915.13	19.894	710.94	-19.413	936.13	37.222	4990.84	-14.881
1996	5665.78	15.272	776.11	9.167	1477.98	57.882	5591.52	12.036
1997	n.a	-	n.a	-	n.a	-	n.a	-
1998	4967.56	-	506.83	-	1446.9	-	3034.77	-
1999	6305.05	26.924	668.88	31.973	2450.95	69.393	5096.18	67.926
10yr.Variation		183.228		-2.572		357.916		108.12
				PADDY				
Years	Human Labour	Variation%	Fertilisers	Variation%	Machine Labour	Variation%	Land Rent(Imputed)	Variation%
1990	1851.09		1144.07		990.8		2923.86	
1991	1946.76	5.168	1045.92	-8.579	925.49	-6.592	3071.16	5.038
1992	2216.83	13.873	1392.58	33.144	1087.17	17.470	4051.94	31.935
1993	3072.22	38.586	1340.07	-3.771	966.85	-11.067	4993.88	23.247
1994	2999.51	-2.367	1581.19	17.993	1053.54	8.966	5104.96	2.224
1995	3088.88	2.979	1329.86	-15.895	1259.76	19.574	4599.77	-9.896
1996	3407.69	10.321	1724.63	29.685	1789.07	42.017	5948.2	29.315
1997	3342.09	-1.925	1547.43	-10.275	1816.41	1.528	6877.07	15.616
1998	3716.7	11.209	1675.13	8.252	2164.17	19.145	6124.14	-10.948
1999	3635.14	-2.194	2041.69	21.882	2432.86	12.415	7482.86	22.186
10yr.Variation		96.378		78.458		145.545		155.924

Table III below shows a similar analysis for the State of Gujarat. The rise in the four items in this case been comparatively modest than that in Punjab, though a clear trend is not brought out because of the non-availability of data for a number of years.

Table III: Cost Comparison in Gujarat

GUJARAT								
				WHEAT				
Years	Human Labour	Variation%	Fertilisers	Variation%	Machine Labour	Variation%	Land Rent(Imputed)	Variation%
1990	n.a	-	n.a	-	n.a	-	n.a	-
1991	n.a	-	n.a	-	n.a	-	n.a	-
1992	1696.22	-	1108.92	-	519.21	-	1798.54	-
1993	1968.88	16.075	1098.93	-0.901	707.78	36.319	2098.44	16.675
1994	n.a	-	n.a	-	n.a	-	n.a	-
1995	3050.79	54.951	1368.36	24.517	662.61	-6.382	2324.39	10.768
1996	2657.53	-12.890	1224.24	-10.532	1053.08	58.929	3228.87	38.913
1997	n.a	-	n.a	-	n.a	-	n.a	-
1998	3351.75	26.123	1488.74	21.605	1358.47	29.000	3222.78	-0.189
1999	n.a	-	n.a	-	n.a	-	n.a	-
Variation(92-98)		97.601		34.251		161.642		79.189
				COTTON				
years	Human Labour	Variation%	Fertilisers	Variation%	Machine Labour	Variation%	Land Rent(Imputed)	Variation%
1990	n.a	-	n.a	-	n.a	-	n.a	-
1991	n.a	-	n.a	-	n.a	-	n.a	-
1992	3223.5	-	991.63	-	234.3	-	2233.96	-
1993	2273.48	-29.472	670.03	-32.431	323.72	38.165	2203.3	-1.372
1994	n.a	-	n.a	-	n.a	-	n.a	-
1995	n.a	-	n.a	-	n.a	-	n.a	-
1996	3906.58	71.833	903.94	34.910	786.27	142.886	2901.22	31.676
1997	n.a	-	n.a	-	n.a	-	n.a	-
1998	4978.11	27.429	976.21	7.995	939.47	19.484	3835.13	32.190
1999	4422.27	-11.166	923.43	-5.407	818.52	-12.874	2532.44	-33.967
Variation(92-99)		37.188		-6.878		249.347		13.361
				GROUNDNUT				
Years	Human Labour	Variation%	Fertilisers	Variation%	Machine Labour	Variation%	Land Rent(Imputed)	Variation%
1990	n.a	-	n.a	-	n.a	-	n.a	-
1991	n.a	-	n.a	-	n.a	-	n.a	-
1992	1345.09	-	346.34	-	215.33	-	1529.48	-
1993	1543.96	14.785	596.73	72.296	269.19	25.013	1230.04	-19.578
1994	2147.2	39.071	725.6	21.596	418.27	55.381	2244.06	82.438
1995	2680.46	24.835	657.8	-9.344	287.04	-31.374	1737.68	-22.565
1996	2992.21	11.630	702.98	6.868	531.91	85.309	2881.07	65.800
1997	n.a	-	n.a	-	n.a	-	n.a	-
1998	3933.32	31.452	818	16.362	634	19.193	3585.01	24.433
1999	3310.39	-15.837	872.71	6.688	737.98	16.401	1955.55	-45.452
Variation(92-99)		146.109		151.981		242.720		27.857

In the case of wheat, the increase in the cost of human labour over the period has been 98 per cent, while that in fertilisers is just 34 per cent and in imputed rent only 79.19 per cent. The increase in the cost of machine labour, on the other hand, has been a sharp 161 per cent.

For cotton, the fertiliser costs have decreased over an eight-year period from Rs 992 in 1992 to Rs 923 in 1999. Most of the increase in the cost of cultivation in this State has been in machine labour costs (249 per cent).

In the case of groundnut, human labour costs (146 per cent) have increased much more than the other crops and so have those of fertilisers (152 per cent) and machine labour (243 per cent). The rise in the imputed rent has been a modest 27 per cent.

This analysis shows clearly discernible trends indicating more mechanised farming in the State. The rise in fertilisers costs, though lower as compared to Punjab, show an exceptional increase in the case of groundnut.

The above analysis shows that cropping patterns as well as farm incomes have changed in the two States during the period under study. In Punjab there have been sharp year-to-year fluctuations in cropping pattern changes but over the total period the index of cropping pattern change has remained more or less constant with a marginal decrease. This is because there is still a wheat-rice specialisation, though there has been a shift towards horticultural crops, which this study does not capture.

In Gujarat, the index of cropping pattern change has declined over the 10-year period. This has been affected due to the heavy imports of cheaper edible oils. While during the early 1990s there was a surge in domestic production of oilseeds, in the late 1990s there has been a drop in oilseed production due to the import of cheaper substitutes.

As far as incomes are concerned, the trends vary across crops. While in wheat cultivation incomes have followed a rising trend in both Punjab and Gujarat, in cotton cultivation the incomes have generally declined in both the States over the 10-year

period. In groundnut cultivation in Gujarat and paddy cultivation in Punjab the incomes have been fluctuating but have a declining trend. It is also observed that the prices of crops like wheat, paddy and groundnut have generally been rising while the costs of production have been rising at a slower rate. In case of cotton, however, costs have been rising at more or less the same rate as prices.

The disaggregated analysis of cost of cultivation shows that the rise in fertiliser costs has been the least and these have actually decreased in case of cotton. It is the imputed rent of the own land which is mainly responsible for the rise in costs. This, however, is only notional. The human labour costs, on the other hand, have shown a relatively modest increase in case of almost all the crops in both the States.

This analysis, thus, emphasises evidently a need for a similar detailed study of all the States to get a complete picture of the impact of agricultural trade liberalisation.

Chapter Six

Conclusion

Trade liberalisation in agriculture has remained a contentious issue all along. It was only in the Uruguay Round (UR) that it was included in the agenda of the multilateral trade negotiations under the World Trade Organisation (WTO). Consequently, an Agreement on Agriculture (AoA) was concluded in 1994, which addressed the issues of market access, domestic support and export subsidies, besides approving a time-bound programme for reduction and elimination of various trade barriers.

However, negotiations are still continuing on these issues, where developing countries are pressing for complete elimination of domestic support and export subsidies being extended by the developed countries to their farmers. The developed countries, on the other hand, are demanding market access in the developing countries.

A number of studies have been and are being conducted to assess the welfare impact of trade liberalisation in general and in agriculture, in particular. While gains have been predicted for the producers in developing countries, there are concerns over gains to the consumers on account of the predicted rise in the prices of agricultural products. There is profound concern over the distributional impact of liberalisation across countries and across different income groups in individual countries. Thus, the debate continues, the negotiations continue and the research continues, while liberalisation in agricultural trade slowly, painfully slowly, but surely inches ahead.

The issue of agricultural trade liberalisation and its impact on the various aspects of an economy that relate directly to the welfare of the people has prompted a number of studies. Most of these efforts have projected the likely impact of the liberalisation policy. The present study has made a modest attempt to look at the actual changes in cropping patterns in India that have occurred since the initiation of the policy of liberalisation in 1990-91 and their impact on farm incomes. The study confirms the view that agricultural

trade liberalisation does have a significant impact on cropping patterns, particularly for the export crops.

The analysis studies the contribution of various factors, viz., irrigation, road density, the proportion of the number of small and marginal holdings and the nominal rate of protection (NRP) to the cropping pattern changes. The analysis is conducted separately for exportable and importable crops. It shows that in the case of exportables, almost all the factors have affected the cropping pattern changes significantly. The most important result is the highly significant impact of the proxy variable for trade liberalisation – the Nominal Rate of Protection – on cropping pattern changes and the inverse relationship between the two. This implies that a reduction in the trade barriers and an integration of domestic and world prices have resulted in increased cropping pattern changes.

Other factors, too, have influenced the cropping pattern changes significantly. All the remaining three variables are inversely related to the dependent variable. Similar is the case with the importable crops, where the three variables of irrigation, road density and small and marginal holdings have affected cropping pattern changes negatively. The NRP, however, does not affect the cropping pattern changes significantly in this case because the period taken in the study does not include the period when the impact of the removal of import barriers like quantitative restrictions (QRs), etc., would have been visible.

Thus, an attempt to look at the actual impact of agricultural trade liberalisation is fraught with problems due to the availability of but a short time-span for the study. The impact of liberalisation, particularly in respect of importables, is yet to crystallise and only some trends can be discerned. The scope of the present study was further limited to the year 2000 only because of the non-availability of data, especially on wholesale prices.

While the pace of external trade reforms has been relatively faster under WTO commitments, the pace of domestic reforms has been slower because of the domestic pressures from the strong farm lobby of big farmers and the entrenched vested interests of the beneficiaries of the various curbs and controls. Moreover, the continued fear of food

security being threatened by liberalisation has led to the continuance of the policy of encouraging the cultivation of food crops by providing minimum support prices (MSPs), subsidised inputs, etc. Thus, the cropping pattern changes have been slow during the early 1990s but with export incentives being provided for horticultural and floricultural produce, there has been a gradual shift towards these, too. It must, however, be noted here that the exclusion of these crops is one of the major limitations of this study.

The analysis shows that farm incomes have changed over the period. The change can be attributed to trade liberalisation, though only trends can be discerned at this stage and nothing can be concretely stated in absolute terms. The output prices in wheat, paddy and groundnut have increased during the period, while the corresponding costs of cultivation have either increased at a slower rate or remained more or less constant. In both the States of Punjab and Gujarat that have been compared with regard to farm incomes, for example, the income from wheat cultivation has been rising generally, with the rise in exports.

The incomes from cotton cultivation, however, have been fluctuating sharply and showing a declining trend. This can be related to the sharp fluctuations in the cotton prices in the world markets. While the costs in Punjab have been increasing at a higher rate than the increase in output prices, the costs in Gujarat have displayed a rising trend while the output prices have shown a declining trend.

In the case of groundnut cultivation in Gujarat, too, incomes have been fluctuating with a declining trend in the wake of imports of cheaper oilseeds and a decline in the domestic production of oilseeds.

It must, however, be appreciated that such a macro-level analysis comprising all States in a diverse developing country such as India gives only very general trends in which inter-State differences may get diluted. Accordingly, what is required is a more specific analysis of regions and possibly crops as well. An attempt in this context has been made in the present study, where we compare the States of Punjab and Gujarat in terms of changes in cropping patterns, movement of nominal rate of protection (NRP)

and farm incomes. The analysis is limited to three crops in each State since the choice of crops was restricted by data constraints, particularly on the cost of cultivation.

As for the cost of cultivation, it may be noted that with the liberalisation of trade, there has not been much increase in the cost of manufactured inputs like fertilisers. In some cases, like cotton, it has actually decreased. In the two States studied, some increase has been seen in human labour costs, while a huge comparative increase is due to the rising 'notional' cost of "imputed rent for owned land". Some rising trends can also be seen in the case of machine labour costs, especially in Gujarat, indicating increased mechanisation of agriculture during the period under study.

Despite all these limitations, the analysis does bring out clearly that the farmers are price-responsive and that there have been cropping pattern changes in an export-oriented environment due to the policy of liberalisation in agricultural trade. The Indian farmer, however, responds to the price changes with a lag. That is, the land allocation decision is taken by the farmer on the basis of past prices whereas the increasing integration of the domestic economy with the world market has caused domestic prices to vary rather quickly in response to changes abroad. In the process, the farmers may suffer, as has been the case in the cultivation of some export-oriented crops in the southern States in India. The recent development of a futures market in agricultural crops may yield positive results in such a scenario.

To comment concretely on the welfare implications of these changes, a more disaggregated and specific analysis needs to be undertaken.

Further Research Prospects

The present study clearly shows the need for a broader and deeper research, including horticultural and floriculture crops as well as those of medicinal plants, into the questions requiring to be studied with regard to the impact of agricultural trade liberalisation. In view of the data constraints faced by us, this would require painstaking efforts to construct data from the material reportedly available from State and district headquarters.

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