Effects of Trade Liberalization on Agriculture in Pakistan: Commodity Aspects

Muhammad Ramzan Akhtar

The CGPRT Centre

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Abbreviations

ADB	:	Agriculture Development Bank
AMS	:	Aggregated Measurement of Support
APCom	:	Agriculture Prices Commission
CPI	:	Consumer Price Index
EPB	:	Export Promotion Bureau
EPZ	:	Export Processing Zone
FAO	:	Food and Agriculture Organization
FAQ	:	Fair Average Quality
FCA	:	Foreign Currency Account
FIBOR	:	Floating Inter-Bank Official Rate
GATT	:	General Agreement on Tariffs and Trade
HIES	:	Household Income and Expenditure Survey
HYVs	:	High Yielding Varieties
IMF	:	International Monetary Fund
IRRI	:	International Rice Research Institute
MEP	:	Minimum Export Price
MFA	:	Multifibre Arrangement
MFN	:	Most Favoured Nation
MTR	:	Maximum Tariff Rate
NTBs	:	Non-Tariff Barriers
NWFP	:	North-Western Frontier Province
OECD	:	Organization for Economic Co-operation and Development
PASSCO	:	Pakistan Agricultural Storage and Supply Corporation
REAP	:	Rice Exporter's Association of Pakistan
RECP	:	Rice Export Corporation of Pakistan
SPFS	:	Special Program of Food Security
SDR	:	Special Drawing Rights
TCP	:	Trading Corporation of Pakistan
UR	:	Uruguay Round
WTO	:	World Trade Organization

Foreword

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

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

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

I thank Dr. Muhammad Ramzan Akhtar of Pakistan for his intensive research and the National Agricultural Research Centre for allowing him to work with us and for providing continuous support. My special thanks go to Mr. Naseer Alam Khan, Director, Social Sciences Institute, for his initiative in the early part of this study. I am very much obliged to Dr. Boonjit Titapiwatanakun for his devoted contribution to the project as the regional advisor. I would also like to express appreciation to the Government of Japan for funding the project.

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Acknowledgements

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June, 1999   Social Sciences Institute
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Executive Summary

This country report is the second part of the Pakistan country study in the Asian regional project organized by the United Nations ESCAP CGPRT Centre, Bogor, Indonesia, entitled "Effects of Trade Liberalization on Agriculture in Selected Asian Countries with Special Focus on CGPRT Crops (TradLib)" launched in China, India, Indonesia, Japan, Malaysia, Pakistan, the Philippines, Thailand, Viet Nam, and South Korea. The report of the first part of this project entitled "Effects of Trade Liberalization on Agriculture in Pakistan: Institutional and Structural Aspects" has already been published. The major objective of the first part of the project was to highlight and analyse institutional aspects of trade liberalization, including a review/analysis on history of the trade regime, various trade-related government policies, infrastructure related to foreign trade, and analysis of trade-related indicators. The TradeLib project was completed in three years, and it is a continuation of the Centre's earlier project on "Market Prospects of Upland Crop Products and Policy Analysis in Selected Asian Countries (MPUPA)" implemented in seven Asian countries including, China, India, Indonesia, Pakistan, the Philippines, Thailand, and Viet Nam. The present study is the second part of the TradeLib project implemented in Pakistan, and it attempts to quantify the impact of trade liberalization on food commodities (wheat, rice and maize) at the national level. Also it includes a case study to determine the area specific impact of trade liberalization on these commodities in the rice-wheat areas of Punjab, Pakistan.

Being a signatory of WTO, Pakistan has accepted all the Uruguay Round trade agreements under the WTO. It is currently in the process of implementing the agreements and modifying legal and administrative rules to ensure their consistency with rules and practices under the WTO. For example, the maximum tariff rate has been reduced from 225% in 1986 to 35% in March 1999. Also, many NTBs have been removed, including import and export by government institutions, and the list of negative import items has been significantly reduced. There is widespread interest among the policy makers to see the impact of trade liberalization on various sectors of the economy including the agriculture sector, which is the main source of foreign exchange earnings and provides a livelihood to the majority of Pakistan's residents.

As in most developing countries, agriculture in Pakistan occupies an important position because of its major share (around one-fourth in GDP) in the economy in terms of its contribution to national income and employment. Although the share of agriculture has been slowly decreasing from around 60% in 1960 to only 24% in 1998. The agriculture sector is still one of the most important parts of the economy of the country employing more than 50% of the total labour force, and directly and indirectly making around two-thirds of the total export earnings. Crops remain the most important sub-sector (more than 40%), but livestock now accounts for more than 30% of agricultural GDP, and the share of minor crops, forestry, and fisheries has increased slightly. Among the major food crops, wheat is the staple food commodity, rice is one of the main export commodities, and maize is planted for both domestic and commercial purposes. Considering the importance of these three commodities, they were selected to study the impact of trade liberalization both at national and farm levels in Pakistan.

The impact of trade liberalization on wheat, rice (both Basmati and non-Basmati rice) and maize was estimated using simple welfare analysis. To conduct welfare analysis for these commodities, producer and consumer surpluses were determined using standard regression analysis based on demand, supply and price linkage equations. To estimate producer and consumer surplus and to estimate these equations, time series data from 1981 to 1998 were used. The study by FAO (1995a) entitled "Impacts of the UR on agriculture" was used as a base

to analyse the impact of increasing world prices of wheat, rice and maize on wholesale and farm level prices in Pakistan due to trade liberalization.

Wheat is the most important food crop as it is the staple food and the largest cereal crop in terms of area in Pakistan. However, its demand has often exceeded domestic production, and the country imports around 2 million tons of wheat per year (10-20% of total production). The impact of trade liberalization on wheat was estimated using the results of the FAO (1995a) study, and it was assumed that international prices of wheat would increase by 7% due to trade liberalization. In addition, it is assumed that the wholesale price of wheat would also increase by another 7% due to termination of the wheat subsidy on the issue price in Pakistan. The impact of this 14% increase in wheat prices on wholesale and farm level prices of wheat in Pakistan was estimated using elasticity coefficients from estimated supply, demand and price linkage equations. Due to this increase in wheat prices, it is estimated that wholesale and farm level prices of wheat in Pakistan would have increased by 14.295% and 13.58%, respectively during 1997-98. The increase in the farm level prices would have increased the total production of wheat from 18.69 million tons to 19.22 million tons (increased by 2.852%) during 1997-98. This increase in the production of wheat would have generated a gain of producers' surplus of Rs. 15,771 million. On the other hand, due to the increase in the wholesale price of wheat, domestic demand of wheat would have declined from 18.67 million tons to 18.40 million tons (1.49%) in 1997-98, and caused a loss of consumers' surplus of Rs. 19,482 million. Overall, the impact of the increase in the international price of wheat would have resulted in a net loss to Pakistan of Rs. 3,711 million during 1997-98.

After wheat, rice is the second most important staple food and it is also one of the major foreign exchange earning sources of Pakistan. In terms of area, rice is the third most important crop after wheat and cotton, occupying around 10% of the total cultivated area and producing around 19% of the total food grain in the country. The impact of trade liberalization on rice (both Basmati and non-Basmati types) was estimated using the results of the FAO (1995) study. It is assumed that international prices of rice will increase by 7%, and the impact on wholesale and farm level prices of rice was estimated using elasticity coefficients taken from estimated supply, demand and price linkage equations for both Basmati and non-Basmati rice. Due to the increase in the international price of rice, it is estimated that wholesale and farm level prices of Basmati rice in Pakistan would have increased by 7.763% and 8,377%, respectively. On the other hand, wholesale and farm level prices of non-Basmati rice would have increased by 7.889% and 7.02%, respectively. The increase in the farm level price would have increased the total production of Basmati rice from 1.539 million tons to 1.572 million tons (increase by 2.123%), and total production of non-Basmati from 2.799 million tons to 2.883 million tons during 1997-98. This increase in the production of Basmati and non-Basmati rice would have generated a gain of producers' surplus of Rs. 1,872 million, and Rs. 3,393 million, respectively. Due to the increase in the international price of rice, total production of rice would have increased from 4.338 million tons to 4.455 million tons, and generated a total gain in producers' surplus of Rs. 5,264.96 million. On the other hand, due to the increase in the wholesale price of Basmati rice in Pakistan (by 7.763%), its domestic demand would have declined from 894.28 thousand tons to 866.74 thousand tons during 1997-98, and caused a loss of consumers' surplus of Rs. 1,190.54 million. Due to the increase in the wholesale price of non-Basmati rice (by 7.889%), its domestic demand would have declined from 1,090.65 thousand tons to 1,080.23 thousand tons during 1997-98, and caused a loss of consumers' surplus of Rs. 841.66 million. Overall the impact of the increase in the international prices of rice, would have resulted in a gain to Pakistan by Rs. 3,232.76 million during 1997-98.

Maize is the third most important food crop in Pakistan, and occupies around 4% of the total cropped area and 7% of the total area under food crops. Pakistan is not a big trade partner in maize, and its import used to be restricted in the past. Prices of maize in Pakistan were considerably higher than the international prices. The impact of trade liberalization on maize

was also estimated using the FAO (1995a) study in which it is assumed that international prices of maize will increase by 4%. The impact of this increase in maize prices on wholesale and farm level prices of maize was estimated using elasticity coefficients from estimated supply, demand and price linkage equations. Due to the increase in the international price of maize, it is estimated that wholesale and farm level prices of maize in Pakistan would have increased by only 4.02% and 4.03%, respectively. The increase in the farm level price would have increased the total production of maize from 1.251 million tons to 1.254 million tons during 1997-98. This increase in the production of maize would have generated a gain of producers' surplus of only Rs. 387.87 million. On the other hand, due to the increase in the wholesale price of maize, the domestic demand of maize would have declined from 1.323 million tons to 1.315 million tons in 1997-98, and caused a loss of consumers' surplus of Rs. 452.73 million. Overall the impact of the increase in the international price of maize would have resulted in a net loss to Pakistan by Rs. 64.86 million.

To study the impact of trade liberalization on location-commodity-specific agriculture, the rice area of Punjab province was selected to analyse the effects on rice (Basmati and non-Basmati), wheat and maize. Partial budgets of these three commodities were estimated, and the impact of trade liberalization was analyzed at the farm level. The costs of production and net returns for these commodities were estimated for the scenario without trade liberalization (using base year 1993-94) and the scenario with trade liberalization (during 1997-98) at the 1997-98 yield and input levels. For without trade liberalization, 1993-94 prices of inputs and outputs were used. On the other hand with trade liberalization, 1997-98 farm level prices of inputs and outputs were used. The difference in cost of production and net returns among these two categories was assumed to be the effect of trade liberalization at the farm level.

Using the partial budgets before and after trade liberalization, the impact at the farm level is such that the cost of production of Basmati rice, non-Basmati (IRRI type), wheat and maize increased by Rs. 7,945/ha, Rs. 7,327/ha, Rs. 5,514/ha and Rs. 5,288/ha, respectively, during 1997-98. On the other hand, net returns in the case of Basmati rice and maize increased by Rs 630/ha and Rs. 2,152/ha, respectively, during 1997-98. In the case of non-Basmati rice and wheat, net returns decreased by Rs. 2,345/ha and Rs. 983/ha, respectively, during 1997-98 due to trade liberalization.

It is evident in the case of Pakistan that significant policy changes in the course of implementing the UR Agreement on agriculture are required. They include tariff reduction, elimination of the subsidy on wheat, phasing out all forms of price support policies and control and reducing custom duties, quantity restrictions, exemptions, non-tariff barriers, etc. Presently, Pakistan is in the process of implementing the UR agreement on agriculture, which is a very complex and comprehensive undertaking and its impacts can not be easily quantified mainly due to uncertainty in the agricultural sector. Therefore, extra precautions should be taken in the interpretation and adoption of its impacts on the agricultural sector. In the presence of the existing economic and political structure in Pakistan, it is expected that the country will face considerable policy challenges in the course of implementation of the UR agreement on agriculture. In the agricultural sector, presently most of the producers, exporters, and policy makers are not well aware about the UR Agreement on agriculture. There is an urgent need to pursue public awareness programs on the impact of trade liberalization on agriculture, including trade policy developments, priorities, and strategies of the major trading partners of Pakistan. For example, to further expand the export of agricultural commodities, Pakistan may have to adopt measures and programs that would ensure that its export products compete successfully with those exported by other LDCs, particularly producers of the same commodities in Asia.

It is expected that domestic prices of wheat, the main staple food in Pakistan will increase considerably and the country will have to spend a huge amount of foreign exchange on its imports. In the case of wheat, the best strategy would be to achieve self-sufficiency by considerably increasing the productivity of the local wheat crop, which is far below the

potential yield levels. Due to lower (or negative) net returns from planting food grains including wheat, the cropping pattern is becoming diversified with a shifting away from food grains towards high value crops or export oriented crops. This is a very serious issue, since with the existing population growth of around 3%, demand for food commodities is increasing at a faster rate. In such a situation there is a need to carefully consider policies such as whether or not to shift food grain area towards high value crops, since earnings from the high value crops or crops with the export potential may be used to import food grains to meet domestic requirements.

The productivity of all food crops is considerably below their potential in Pakistan, and as a result farm level returns from these commodities are not sufficient to cover the cost of production and to give a reasonable return on capital. Therefore, efforts must be made through extension to promote improved cultural and intensive management practices to increase the present yield levels. In addition, high quality seeds, cheap credit, and improved farm machinery (such as rice transplanter, zero tillage drill, etc) may be arranged specially for small farmers to increase their farm income. Also, government should promote the grow-for-export policy among rice growers, since it will help to improve the quality of rice and increase the export of rice from Pakistan.

1. Introduction

1.1 Background

After realizing the failure of highly protected trade policies to deliver economic prosperity, many developing countries in Asia are implementing substantial trade liberalization policies in their domestic and export markets. In Asia, Taiwan, South Korea, Hong Kong, and Singapore have been growing rapidly for decades and these countries maintained virtually 'free' trading regimes. Following these nations, Malaysia, Thailand and Indonesia initiated liberalized trade policy reforms during the last two decades. Considering the economic growth records of these Asian countries, other Asian countries including Philippines, India, Pakistan, Vietnam, and others also began their trade liberalization and are now in the process of gradually opening up their economies for the international business community. In many developing countries, the application of coherent, consistent and well-coordinated trade, macroeconomic, and structural policies have proven to be the primary determinant of successful and sustained trade liberalization efforts (OECD 1994). Almost all Asian countries including Pakistan have either implemented substantial trade liberalization programs or have begun the process of discarding existing trade-impairing policies as part of an effort to liberalize their economies. In the past, most of the countries had operated under an import substitution policy, but the characteristics of this policy varied widely among them. The import substitution policies are mainly characterized by quantitative restrictions or prohibitive tariffs for various commodities, strict and complex procedures for import of manufactured goods, over valued exchange rates, and frequently import prohibition or quite high tariffs to make imports uneconomic (Krueger 1985a).

At the time of independence on August 14, 1947, Pakistan inherited very little industry but a good agricultural resource base, and the government mainly followed import substitution policies. The main source of revenue was export taxes on agricultural products (mainly cotton and jute) and import duties on imported manufactured goods. Until 1970, Pakistan was basically characterized by an economy of free enterprise. However, in 1970, the government established the supremacy of the state and on a wider scale a nationalization program of key industrial units and financial institutions was initiated. Through it's various departments and corporations, the government-implemented controls on domestic markets, imports, exports, and trade inputs and commodities at pre-specified prices. The public sector intervened directly or indirectly by controlling producer and consumer prices of many commodities including food products though parastatals or border controls and taxes. Local producers of many manufactured products used to buy domestic agricultural raw material at prices considerably below the world prices and sell their products domestically above world prices. Such policies resulted in large production for import substitution and a tax on exports. Similarly, credit policy also favored import substitution and financial institutions extended credit for products expected to sell in the domestic market rather than for export (such as cement, fertilizer, sugar, and defense industries). The high level of domestic protection also discouraged improvement in the quality of products and exports were not able to compete in the international market. The large scale nationalization and government intervention proved to be highly undesirable for the national economy (Choudhary 1995). After realizing the inefficiency of the public sector, the new government again encouraged participation of the private sector in the early 1980s. Like many other developing countries, Pakistan in the 1980s was characterized by an economy of mixed enterprise, and economic liberalization started slowly in the early 1980s but expanded substantially during the late 1980s.

The agricultural sector mainly suffered from the import substitution strategy. For example, farmers received considerably less than international prices of many commodities (wheat, cotton, rice, etc.). As a result substantial resources were transferred from the agricultural sector to help the industrialization drive in the country (Choudhary 1995; Akhtar 1998). Such policies of import substitution have insulated the country from foreign competition, generated a strong anti-export bias in resource allocation and increased inefficiency in the agricultural, manufacturing and other sectors of Pakistan. In addition to these policies, poor labor skills, low education and training levels, and poor infrastructure further constrained the ability of industry to compete in the international market.

Pakistan has pursued export promotion policies in various forms since the late 1950s, including the export bonus scheme from 1959 to 1972, devaluation and unification of the exchange rate system, duty drawback schemes, exemption of sales tax, credit, liberalization of exchange and trade system, foreign investment, etc. Up to the early 1980s, all these export promotion policies and incentives were not very effective and economic policies, in general, were biased in favor of import substitution policies (Ahmed and Amjad 1984; Hamid et al. 1990).

During the late 1980s, Pakistan turned from inward-looking policies towards trade liberalization and export promotion strategies. The government took a number of steps to liberalize the economy, for example, liberalizing the exchange rate and trade system, reforming the financial sector, encouragement in domestic and foreign investment policies, initiating the denationalization of various industries, institutions and programs, export promotion activities and incentive to exporters and importers, reduction in tariffs, etc. From the late 1980s onwards, the government changed frequently but all of them considerably liberalized the economy. Progress was made in the design and implementation of these policies, which was reflected in significant growth in exports and imports of various commodities. Major emphasis was given to moving towards greater reliance on market forces, opening of the economy to foreign competition and Pakistan sought to beat the country's obligation towards globalization of merchandize trade under the WTO. There is still room for improvement both in formulation and implementation of trade liberalization policies, and there is a need to remove the remaining distortions. Also, considerable progress needs to be made to improve the trade-related infrastructure, labor skills, market know-how, adoption of new technology, quality control management, etc.

Considering the present economic scenario and the speed with which Pakistan is opening its product markets, there is a widespread concern about the welfare effects of trade liberalization on various sectors especially on agriculture, which is the major economic sector in the country. To smoothly proceed towards a more liberalized economic environment, there is a need to analyze the effects of trade liberalization on producers, consumers, and society as a whole. In the present study, an attempt has been made to study the impact of trade liberalization on agriculture, which is still the backbone of the economy of Pakistan since it employs more than 50% of the labor force, and directly and indirectly earns around two-thirds of export revenue (Akhtar 1998).

1.2   Uruguay Round and WTO challenges to Pakistan

Pakistan has been a founding member of the General Agreement on Tariffs and Trade (GATT) since 1948. It has participated in most of the rounds of multilateral trade negotiations and formally signed the Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations in Marrakesh on April 15, 1994. Mainly the UR provided substantial new trading opportunities, strengthened international trading rules, and reinforced the institutional foundation of the world trading system. The WTO as an "umbrella" institution is assigned the responsibility of administering and implementing the new GATT charter (GATT 1995). Being a

founding member of GATT, Pakistan is a member of WTO and consequently a signatory to all the major accords established under the aegis of the UR, and now it is in the process of implementing the UR agreements. An overview of the agreements finalized during the UR negotiations is given in Appendix Table 1.

During the UR multilateral trade negotiations, Pakistan mainly emphasized (i) phasing out the MFA and fully integrating textile trade into the GATT, (ii) bringing the agricultural sector under GATT disciplines, (iii) maintaining the provisions of special and deferential treatment for developing countries, and (iv) strengthening the multilateral trade system. In addition, Pakistan showed interest in the liberalization of trade in services, especially freer mobility of workers involved in the service sector and flexibility for developing countries to adopt policy instruments regarding foreign investment and intellectual property rights protection.

Being a signatory of WTO, Pakistan has accepted both the opportunity and the challenge of trade liberalization. The UR agreement presents Pakistan with greater access to markets of developed countries and offers a variety of opportunities to expand its export base and diversify its export markets. With further trade liberalization and expansion of international markets, Pakistan may be rewarded in those areas for which it has comparative advantage (such as agriculture, textile, labor-intensive services, etc.). However, it is very clear that Pakistan will have to face tough competition from both developed countries and developing countries especially in products presently under quantitative restrictions and in those for which Pakistan has an advantage. Nevertheless, to succeed in this new global economic environment, Pakistan may have to improve the competitiveness of its exports, systematically diversify its products and markets, improve its related infrastructure and remain committed to its obligations to WTO. In addition to these measures to satisfy WTO, the country has to face increased pressure on the use of subsidies and a more accelerated program of decreasing tariffs. Considering Pakistan's present level of development, the WTO rules in general are more flexible with regard to the transition period. For example the least developed countries (as explained by the UN) and certain developing countries with GNP per capita less than US$1000 including Pakistan are exempted from the prohibition on export subsidies over a certain period of time (GATT 1995; Standard Poor's 1997). Schott (1994) determined the complex combination of potential benefits and challenges of WTO for all countries:

"The reductions in trade barriers negotiated in the UR create new opportunities to expand trade, but they do not guarantee increased sales. Companies have to be able to succeed in increasingly sharp global competition both to win new markets abroad and to maintain or increase their own domestic market shares. To that end, the UR reforms must be complemented by domestic economic policies that promote greater efficiency in the production of goods and services and higher labor productivity. Just as important as the removal of foreign trade barriers and unfair trade practices is the removal of domestic disincentives that constrain productivity growth, discourage efficiency, and thus undercut the global competitiveness of domestic firms." – (Schott 1994, p.38-39).

1.3 Implications of UR for Pakistan

The UR obligations have set a number of challenges and opportunities for countries like Pakistan. The specific implications for Pakistan can be analyzed in the following four major areas (Schott 1994):
- trade liberalization including tariffs and changes in agriculture and textiles,
- new issues related to services, investment, and intellectual property,
- trade rules, and
- institutional or systematic issues.

Possible implications of UR in the above four areas for Pakistan have been widely discussed in literature (Khan and Mehmood 1996; PIDE 1995; Ingco and Winters 1995; Low 1995).

Trade liberalization in goods mainly relates to the area of market access improvements offered through considerable tariff reductions, and gradual elimination of various non-tariff barriers including quantity restrictions. The UR agreement will benefit Pakistan from enhanced market access in addition to its earlier export markets. The enhanced market access means that exports from Pakistan will considerably increase due to a reduction in import prices through lower tariffs and access to export markets as a result of fewer quantitative restrictions. Low and Yeats (1994) determined that the portion of Pakistan's exports effected by existing non-tariff barriers will decrease from around 60% in 1992 to 8% in the year 2004 as a result of the UR agreement.

The Uruguay Round agreement on agriculture consists of four parts: concessions and commitments made on market access; domestic support and export subsidies; the Agreement on Sanitary and Phytosanitary Measures; and the Decision Concerning Least Developed and Net Food Importing Developing Countries (Goldin and van der Mensbrugghe 1995). The market access agreement contains commitments to convert all non-tariff border measures, such as import quotas, to tariffs that provide the same protection. These tariffs, as well as other tariffs on agricultural products, must then be reduced by an average of 36% for developed countries over six years and 24% for developing countries over 10 years. Under the agreement on domestic support and export subsidies, developed countries have committed to cut their total Aggregate Measurement of Support (AMS) by 20% during the implementation period from its level in the base period of 1986-88. Developing countries are required to reduce total AMS by 13.3%. On export subsidies, developed countries committed to reduce the value of direct export subsidies by 36% of the base period (1986-88) level over six years and to reduce the volume of subsidized exports by 21% over the same period. Developing countries have committed to reductions of two-thirds of those of the developed countries to be implemented over 10 years.

Pakistan has committed to bind around 33% of its tariff lines compared to earlier policies of no tariff binding at all. Around 81% of the country's agricultural import tariffs will be bound, most at ceiling rates of 100%. Tariffs on tea, wheat, maize and sugar are bound at ceiling rates of 150%. The ceiling rate for betel nuts is 200%. Various agricultural lines remain non-bound, mainly applying to alcoholic beverages, swine, and pig meat and its products since Pakistan is an Islamic country. Industrial products will be bound at 25% of tariff mostly at ceiling rates of 40 to 50%. Regarding non-tariff barriers, Pakistan is committed to abolishing import licensing for most goods, allowing foreign companies to engage in export trade, converting non-tariff barriers into tariffs, reducing maximum and increasing minimum tariffs, incorporating the various ad hoc import taxes into customs duties, and reducing the numerous duty exemptions and concessions.

Keeping in view the present economic situation, legal system, and administrative rules, Pakistan has to modify its legislation dealing with customs valuation, intellectual property rights and services, including banking and insurance. As a signatory of the Uruguay Round Agreements, so far Pakistan has undertaken a number of commitments made during the Uruguay Round multilateral trade negotiations, such as tariff reductions on both industrial and agricultural goods, opening of the services sector, protection of intellectual property rights, etc.

Pakistan is in the process of implementing a program of tariff reforms with a view to integrating the economy with the new global trading system and removing anti-export bias in the earlier tariff regime. The maximum tariff rate (MTR) has been reduced from 225% in 1986 to 45% in 1997. The present government has further reduced the MTR to 35% from March 31,

1999 (Table 1.1). The para-tariffs such as import fee, Iqra Surcharge* and flood relief fund have been merged into statutory rates of custom duties.

Table 1.1 Tariff reduction schedule in Pakistan.

F/Year	Maximum Tariff Rate (%)
1986/87	225
1988/89	125
1990/91	95
1993/94	80
	(92)
1994/95	70
1995/96	65
1996/97	45
March 1999*	35

Source: Pakistan Economic Survey (various issues).
Note: Number in parenthesis includes para-tariffs.
　　　Financial year is from July to June.
* Reported in "The News International" March, 1999".

It is the major focus of the trade policy of Pakistan to bring all the sectors, especially agriculture, under the Uruguay Round agreement. Based upon various research reports, discussions, and meetings regarding the possible impacts on developing countries like Pakistan (Goldin and van der Mensbrugghe 1995), it is expected that agreements on agriculture will make Pakistan's agricultural products more competitive in the long run, provided prevailing policies which discriminate against the agriculture sector are totally modified according to the requirements of the agreement, for example, abolishing the policy of fixing prices of various agricultural commodities below world markets. If market forces were allowed to act, such forces would result in increasing the price of domestic agricultural products to the level of world prices. This process would stimulate domestic production of almost all products. Presently the government fixes support prices of many crops and the public sector also intervenes through its institutions.

The general implication of UR agreement on agriculture for Pakistan is that it will enhance market access for exports. Reduction in agricultural protection may create several market access opportunities for Pakistan, including the following:

- It is expected that the value of raw cotton exports will increase considerably due to increased demand resulting from trade liberalization in textiles and clothing. However, Pakistan will face tough competition in the international market.
- Liberalization in the Japanese and Korean rice markets will enhance market access. However to take full advantage of this opportunity, Pakistan needs to diversify its rice production in line with consumer tastes in these Asian markets.
- There is also potential for non-traditional agricultural export products including fruits (mainly mango and citrus), vegetables, and cut flowers. These products have received substantial tariff reductions in developed markets (for example 44% in Europe). To take full advantage of these potential opportunities, Pakistan may be required to invest

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* Under the Finance Act of 1985, the following provision in regard to imposition of the Iqra surcharge with effect from 1-7-1985 on imported goods was made: "There will be levied and collected an additional customs duty as Iqra Surcharge on the importation of the goods specified in the first schedule to the Custom's Act 1969 (IV of 1969) at the rate of five percent of the value of said goods as determined under Section 25 of the said Act."

The levy of Iqra surcharge was part of the import tariff. Under Article 78 of the 1973 Constitution of the Islamic Republic of Pakistan, all receipts form part of the Federal Consolidated Funds. The Iqra Surcharge was therefore a component of the Federal Consolidated Fund. To be more specific, Iqra Surcharges as a general revenue, formed part of the overall balance in the Federal Consolidated Fund from which expenditure is authorized by the National Assembly.

more in packing, marketing facilities, storage, and transportation, and simplify the existing rules and procedures, etc. For rice and cotton, the major export commodities of Pakistan, it is expected that Pakistan will face tough competition in the international market.

- Wheat is the staple food and the country imports around two million tons of wheat every year at considerably higher prices compared to domestic prices. Therefore, it is expected that after abolishing the subsidy on wheat imports (as required by the UR agreement) and issue prices, the price of wheat in the country might increase significantly. However, Pakistan has been recognized by WTO as a food importing country at the meeting of the Committee on Agriculture on March 13-14, 1997. It was included in the WTO list of developing countries eligible as beneficiaries in respect of the measures concerning the possible negative effect of the reform programs. The list of net food import items on the basis of which Pakistan was declared a Net-Food Importing Country is given in Appendix Table 2. Pakistan's status as a net-food importing developing country qualifies it to receive outside assistance to meet the impact of agricultural liberalization, to which the developed countries agreed.

The trade and environment interface has been the subject of much debate between advocates of environmental protection and free trade, who are linking trade and the environment. Environmental degradation has been attributed to many factors, such as economic activity, trade policy, and the failure of product prices to reflect the cost of exploitation of resources, pollution, or environmental damage. In the light of such debate, most of the importing firms from developed countries are increasingly insisting on the exporting country's adherence to standards based on the environmental circumstances and priorities of the importing nations. Therefore, countries like Pakistan may be required to face such trade-related barriers on production and processing methods related to its exportable agriculture commodities including rice, cotton, fruits and vegetables, fish and fishery products. Pakistan's exports may be vulnerable to trade restriction on grounds that they have failed to comply with environmental standards based on non-product-related process and production methods (PPMS). Some developed countries are also banning imports from developing countries mainly on the basis of sanitary and phytosanitary conditions and child labor in production, which are also big concerns for countries, like Pakistan.

Pakistan is not a member of any free trade agreement, and generally applies its tariff on a MFN basis. However, preferential tariffs are extended to certain developing countries in the framework of the GATT Protocol Relating to Trade Negotiations Among Developing Countries. Meanwhile, Pakistan continues to pursue the goal of further liberalization. Tariffs on many industrial and agricultural goods have been reduced considerably (from a maximum of more than 90% to 45%) in recent years, together with the lifting of some bans and quantitative restrictions and non-tariff barriers.

The UR Agreement on agriculture is a complex and comprehensive undertaking and its impact can not be easily quantified mainly due to a number of climatic and other uncertainties in the agricultural sector. A substantial body of literature related to impact of the UR Agreement on agriculture in developing countries including Pakistan is available and provides a useful indication of the broad picture of trade liberalization. Both positive and negative effects of trade liberalization on agriculture in Pakistan have been widely discussed during the last more than ten years. Most of the studies on trade liberalization on agriculture in Pakistan have just discussed the possible effects, and did not quantify the impacts, which is more important to in countries like Pakistan. Those studies, which support the process of trade liberalization, argued that Pakistan has a strong comparative advantage in most of the agricultural commodities over developed countries mainly due to the low cost of production. They have shown high expectations in the long run and discussed that most of the agricultural export will be more profitable once the WTO is completely implemented. Due to a strong natural resource base,

Pakistan has a comparative advantage in high value crops including fruits and vegetables, Basmati rice, non-Basmati rice, cotton, and floriculture. There is significant potential in promoting the export of these crops. On the other hand, it is expected that globalization of Pakistani agriculture would destabilize prices of many agricultural products, especially wheat, which is the main staple food in the country. Also, some argue that opening up Pakistan's markets for foreign competitors and liberalization of agricultural exports would result in changing the existing cropping pattern; in particular, the area under wheat might decrease in favor of other high value and commercial crops. Furthermore, the import bill of wheat might increase many times, and it is already a big source of negative trade balance and budget deficit.

Ingco and Winters (1995) analyzed the impact of tariff reductions and other concessions for Pakistan. Their analysis is based on MFN tariff reductions weighted by Pakistan's trade with the OECD and other developing countries and showed that Pakistan's major exports received considerable tariff reductions from the developing countries. Tariff reductions in the case of manufactures, agricultural products, mineral fuels and miscellaneous manufactures are 8.9, 5.1, 13.3 and 7.5%, respectively. On the other hand, in the case of OECD, tariffs are expected to be reduced on basic manufacture, agricultural and other miscellaneous manufactures by 2.2, 3.6 and 2.25%, respectively. As a result of these tariff reductions, Pakistan's total merchandise exports to the OECD and developing countries will benefit from weighted average tariff reductions of 2.4 and 6.9%, respectively. As a result, Pakistan's exports will face tariffs of 6.9% in OECD markets and 9.1% in developing country markets.

Low and Yeats (1994) determined the impact of reduction in non-tariff barriers, particularly due to phasing out of the MFA. They concluded that the proportion of Pakistan's exports affected by existing non-tariff barriers (NTBs) should fall from 60% in 1992 to 8% in 2004, which is the deadline to completely remove MFN status. The major challenge that Pakistan will face due to agricultural trade liberalization is the resulting impact of world prices on agricultural commodities. It is expected that in the case of Pakistan, prices of wheat, coarse grains and sugar will slightly increase. On the other hand, prices of Pakistan's major food exports are expected to decline slightly from the benchmark levels.

Goldin and Mensbrugghe (1995) estimated that by the year 2002, the prices of wheat, coarse grains, and sugar would increase from benchmark levels by 3.8, 2.3 and 1.8 % in Pakistan. Conversely, prices of rice and cotton will decrease by 0.9% and 1.2% by the year 2002 from the same benchmark levels.

Dorosh and Valdes (1990) discussed the direct and indirect effects of exchange rate and trade policies on agriculture in Pakistan using nominal and effective rates of protection for major agricultural commodities, using free-trade equilibrium real exchange rates. They concluded that production of most agricultural products in Pakistan was significantly lower during the last three decades mainly due to government intervention through support price and procurement policies. For example, due to the combined effects of trade and exchange rate policies and agricultural price policies, wheat production was 24% lower and Basmati rice 52% lower in the 1983-87 period than they would have been with no government intervention and free trade policies. Also, farm income from the five major crops in Pakistan would have been 40% higher during the same period.

FAO (1995a) studied the impacts of the Uruguay Round on selected world agricultural commodity markets. FAO World Food Models (WFM) were used to study the impact of specific policy changes, while simple single commodity models have been developed to cover some of the commodities not included in the WFM. For different countries and selected commodities, models have been developed which simultaneously determine production, consumption, imports, exports and world prices to the year 2000 under the Uruguay Round assumptions. The existing "baseline" projections to the year 2000 are driven by income growth, productivity changes and demographic trends. The prices in each country are linked to world market prices by tariffs and other policy effects and natural forms of protection. For the

"Uruguay Round scenario" the reduction in tariffs changes these price linkages. In the case of Pakistan under the Uruguay Round scenario, it is expected that producer prices of all major agricultural commodities will considerably increase and result in increased production and income of farmers.

Naqvi and Mahmood (1994) discussed the possible implications for different sectors of the economy mainly based on perception rather than on any data or facts. They argued that the Uruguay Round Agreement would make Pakistan's agricultural products more competitive in international markets. Prices of most of the commodities are likely to increase over the longer term with freer trade, but Pakistan will face increased competition from other LDCs. For rice, Pakistan will not be able to compete in the South East Asia market, because Pakistan does not produce the kind of rice, which is popular there. For raw cotton, the problem of market access is not critical. Pakistan will be able to get benefits in the category of "Other agricultural product", and will have to spend more on wheat imports.

Chaudhary (1995) suggested that increasing agricultural commodity prices in Pakistan to world levels is a prerequisite for creating a distortion-free market economy with increased agricultural production, self-sufficiency in food, reduced imports, more exports, rising industrial output, new employment opportunities and improvement of income distribution.

Faruqee (1995) emphasized bringing structural changes to various sections of the agricultural sector. He suggested that trade policy in Pakistan should be based upon comparative advantages, and protection for industry (which hurts agriculture) should be removed. It was recommended that the government of Pakistan aim at replacing the current distortionary system of high custom duties, exemptions, and non-tariff barriers with a uniform duty scheme. The government needs to consider removing taxes on cotton exports, duties on sugar imports, and quantitative restrictions on both. Also he emphasized liberalizing the agricultural input markets in the country.

Azhar (1995) emphasized that full exploitation of Pakistan's export potential for non-traditional commodities would require considerable streamlining in the areas of storage, transportation, and especially packaging, which must match standards of developed countries.

In the present scenario, it may be presumed that Pakistan will not benefit fully from such measures of free trade unless its exports become competitive with other countries producing similar goods. A breakthrough in exports largely depends on a distinct improvement in the quality of Pakistani products, strict adherence to delivery schedules, competitive, aggressive marketing, well-developed institutional and physical infrastructure, and so on. Presently, Pakistan has a narrow export base of agricultural commodities, the cost of production is very high, and exporters have certain traditional problems, such as cumbersome export procedures, poor post-harvest technology, inadequate packaging, inadequate market information, poor infrastructure, etc. Therefore, Pakistan needs to make such improvements on a priority basis to compete in the international market under the trade liberalization policy. In addition, there is a need to enhance the existing low productivity levels of almost all the major and minor crops, which are far below the potential levels (Akhtar 1998).

In order to fully understand the impact of trade liberalization on agriculture in a country like Pakistan, and how to fully benefit and minimize its adverse effects, there is a need to conduct a detailed study on "Impact of Trade Liberalization on Agriculture in Pakistan". Also, to smoothly proceed with the adjustment process towards a more a liberalized economic environment, the effects of trade liberalization, especially those on the smallholder sector, need to be analyzed and identified.

1.4   The agricultural economy of Pakistan: prospects and challenges

Since 1950, Pakistan's economic performance has been encouraging, with GDP growth averaging 5.1% per year. However, due to very high population growth (nearly 3% per year),

per capita GDP had increased only at a rate of little more than 2% per year. Despite the very fast population growth, the country was able to feed its people through increasing food production and average per capita calorie intake has increased. The main factors of increasing food production in the country were the green revolution through HYVs of wheat (the major staple food), around 30% increase in cultivation area, more than double the irrigation water supply, and various agricultural policies. However, the growth process has been accompanied by severe environmental degradation, for example, a high rate of deforestation has resulted in forest cover of less than 5% of the total land. Similarly, waterlogging and salinity are major factors effecting agricultural productivity in the country. Growth rates of various economic indicators related to agriculture are given in Table 1.2.

Table 1.2 Economic indicators of Pakistan.

Indicator	1947	1997	Growth/year (%)	Ratio of 1997/1947
GDP (1959-60 prices, Rs. billion)	11.5	127.7	5.1	11.1
Per capita GDP (1959-60 Rs.)	342	944	2.1	2.8
Population (millions)	33.6	135.3	2.9	4
Foodgrain production ('000 tons)	4,945	22,743	3.2	4.6
Cultivated area ('000 ha)	14,690	21,550	0.8	1.5
Forest area ('000 ha)	1,374	3,610	2	2.6
Exports (US$ million)	137	8,320	8.7	60.7
Imports (US$ million)	96	11,894	10.3	123
Wheat production ('000 tons)	3,301	16,651	3.4	5

Source: Pakistan Economic Survey (various issues).

As in many other developing countries, the agricultural sector occupies an important place in the economy of Pakistan. The importance of the agricultural sector in the economy of Pakistan may be determined in three ways. Firstly, the sector provides food to consumers and fiber to domestic industry. Secondly, it is a major source of foreign exchange earnings, and thirdly, it provides a market for industrial production. This sector has both strong backward linkages (by buying agricultural inputs including fertilizers, insecticides/pesticides, farm machinery, etc.) and forward linkages (by providing raw material to food and fiber processing industries in the industrial sector). Also it is the main source of around two-thirds of foreign exchange earnings in the form of raw and semi-finished products, it provides employment to over 50% of the labor force and is the main source of income in the rural areas which constitute about 70% of the total population. The crucial role of agriculture in contributing to GDP has remained almost unchanged since 1980. Its share in the economy has slowly declined and that of the non-agricultural sector has been slowly increasing. The contribution of agricultural and non-agricultural sectors in GDP is given in Table 1.3 and Figure 1.1. The agricultural sector contribution in the country's GDP is around one-fourth. The real agricultural GDP increased on average around 3.8% per year during the past three decades, which is almost close to population growth. Major crops remain the most important sub-sector in the agricultural sector and they provide a little less than half of the value added by the sector, but their share in agricultural GDP is declining slowly. The share of the livestock sub-sector in agricultural GDP is increasing slowly and now it accounts for around 40% of agricultural GDP. The contribution from fisheries and forestry has also increased slightly. Considering the importance of the agricultural sector in the economy of Pakistan, there is a need to accelerate growth in this sector to feed its fast growing population and generate enough supplies for exports in order to earn foreign exchange. Presently, the agricultural sector no longer enjoys the earlier environment conducive to growth in acreage and yields. This is due to many factors including the withdrawal of subsidies on inputs (mainly fertilizer), the decreased development of irrigation water and the deteriorating health of soils (mainly due to waterlogging and salinity). Besides this, no new technological breakthroughs have come so the previous growth rate patterns have become unsustainable, while population is still growing at a fast rate (Akhtar 1997a,b,c).

Figure 1.1 Agriculture's contribution to GDP in Pakistan.
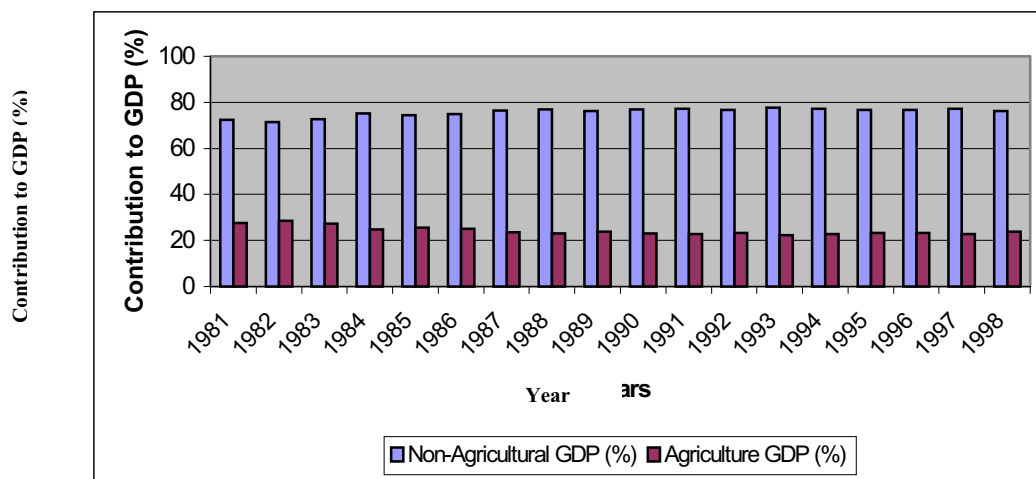
Table 1.3 National account of Pakistan at current market prices (million US$).

F/Year	Non-Agri GDP	Agriculture GDP					Total GDP
		Crops	Livestock	Fish	Forestry	Total	
1980/81	20,367	5,328	2,033	272	78	7,711	28,078
1981/82	23,410	6,638	2,302	283	84	9,307	32,718
1982/83	20,856	5,396	2,104	245	76	7,821	28,678
1983/84	23,380	5,091	2,328	248	86	7,754	31,134
1984/85	23,224	5,288	2,402	167	83	7,940	31,163
1985/86	23,900	5,132	2,532	235	82	7,981	31,881
1986/87	25,448	4,852	2,740	231	89	7,876	33,324
1987/88	29,490	5,273	3,264	255	94	8,885	38,376
1988/89	30,479	5,815	3,385	283	96	9,580	40,059
1989/90	30,706	5,366	3,462	270	109	9,207	39,913
1990/91	35,119	6,160	3,845	271	121	10,397	45,516
1991/92	37,394	6,922	4,054	288	102	11,366	48,759
1992/93	40,209	6,461	4,537	367	106	11,472	51,681
1993/94	40,286	6,728	4,697	335	106	11,866	52,152
1994/95	46,838	8,103	5,609	339	115	14,166	61,004
1995/96	49,651	8,690	5,910	343	88	15,030	64,682
1996/97	50,179	8,077	6,317	316	83	14,793	64,972
1997/98	49,042	8,301	6,742	304	69	15,416	64,458
Growth Rate/year (%)	5.31	2.64	7.31	0.66	-0.72	4.16	5.01

Source: Economic Survey of Pakistan, Government of Pakistan 1997-98.
Note: Financial year is from July to June.

Currently, the country is facing a shortage of some food commodities, and the increasing demand has to be met through imports. For example, Pakistan imports the following commodities for its people:

- On average Pakistan imports around 2 million tons of wheat every year. During 1997-98, the country spent around US$700 million on wheat imports.
- During 1997-98, US$227 million were spent on import of tea and coffee.
- On edible oil imports, US$768 million were spent during 1997-98.
- Imported milk powder cost around US$20 million during 1996-97.
- A considerable amount of foreign exchange is spent on wood and wood products and sugar every year.

The production of all these commodities was far below the domestic requirements of the population. Also, considerable border leakage is reported (Government of Pakistan 1997). During the last few years, Pakistan has become a net food importing country. During 1996-97, Pakistan's food exports totaled US$733.3 million while the imports were US$1,644.7 million, thus the net food imports valued US$911.4 million.

Food consumption has grown faster than the population, and per capita intake has increased from 2,301 calories per day in 1979-80 to 2,531 calories in 1996-97. Similarly during the same period, protein intake per day also rose from 61.5 to 67.89 grams. Wheat is the staple food and accounts for around 50% of total calorie intake and 55% of protein intake, and consumption has often out-stripped domestic supplies. The main cereals consumed in the country include wheat, rice, and maize, and their per capita annual availability was estimated at 130.85 kg, 17.22 kg and 6.42 kg, respectively, during 1996-97.

Pakistan is blessed with diverse agro-climatic conditions and one of the best irrigation systems in the world. Considering these conditions, various crops may be grown almost around the year. It is possible to grow tropical, sub-tropical and temperate crops in the country. Major crops grown in Pakistan are wheat, cotton, rice, sugarcane, gram, maize, sorghum, millet, rapeseed/mustard and tobacco. Minor crops include pulses, potato, onion, chili, garlic, etc. Upland crops (coarse grain, pulses, roots and tuber crops) occupy an important position in the agricultural sector of Pakistan. The performance in terms of area, production and yield of major crops and their growth rates from 1989-90 to 1996-97 are given in Table 1.4.

Table 1.4 Average area, production and yield of major crops in Pakistan, 1990-97.

Crops	Area		Production		Yield	
	('000 ha)	Growth Rate (%)	('000 tons)	Growth Rate (%)	(kg/ha)	Growth Rate (%)
Wheat	8,075.00	0.43	15,777.63	1.94	1,952.50	1.50
Rice	2,126.88	0.95	3,569.13	4.24	1,673.75	3.25
Maize	868.25	0.15	1,228.13	0.95	1,414.25	0.80
Gram	1,060.00	1.12	535.38	2.76	502.50	1.63
Sugarcane	927.38	1.76	40,903.75	2.43	44,006.25	0.66
Cotton	2,817.13	2.78	1,632.13	1.30	580.13	-1.41

Source: Pakistan Economic Survey (1997-98).

The average yields of almost all crops are much lower than the potential, and there is a need to considerably improve the present yield levels of almost all crops. It is expected that the demand for agricultural commodities will increase in the near future. The first source of increasing demand for food is the present population of around 140 million people, which is increasing at a rate of about 2.8% per annum. A second source of demand for agricultural commodities is the modest rising per capita income increasing at a real rate of around 5% per annum, which results in changing tastes and preferences of the people in Pakistan. For example, the demand for edible oils, fruits, milk, meat and other livestock products such as butter and cheese, is increasing and new products have been emerging. Another source of demand for

agricultural products is the international trade reforms, which have important implications for domestic demand and export of various raw and finished agricultural products. It is expected that these changes will bring quantitative as well as qualitative changes in the demand for agricultural commodities and their products.

The government announces support or guaranteed minimum prices of the major crops on a regular basis. The major objective of this policy is to inspire farmers to grow a specific commodity and to protect the minimum prices they get for their products. The main objectives of this price policy in Pakistan are:

- to protect the interests of farmers against an undue drop in prices during the post-harvest period,
- to stabilize the prices of major agriculture commodities, and
- to improve the production of major crops through inter alia, price intervention, particularly those crops which are either exported or need import substitution.

The support prices of the major agriculture crops fixed by the government from 1986-87 to 1997-98 are given in Table 1.5.

Table 1.5 Support prices of major agricultural commodities (Rs/100 kg).

F/Year	Paddy Basmati	Paddy IRRI	Wheat	Seed Cotton	Sunflower Seed	Potato	Gram
1986/87	255	133	200	518	425	111	401.25
1987/88	325	138	205	518	425	111	401.25
1988/89	338	150	213	525	443	125	450
1989/90	358	165	240	563	513	138	500
1990/91	375	183	280	650	563	138	525
1991/92	388	195	310	725	625	163	575
1992/93	438	213	325	775	700	168	587.5
1993/94	463	225	400	813	788	193	687.5
1994/95	525	258	400	1,058	788	210	787.5
1995/96	555	280	433	1,058	788	210	875
1996/97	638	320	600	1,350	1,125	288	1,000
1997/98	775	382.5	600	1,550	1,125	362.5	1,062.5

Source: Pakistan Economic Survey, 1997/98.
Note: Financial year is from July to June.

In Pakistan, agriculture is mainly dependent on a canal irrigation network. Around 82% of the total cultivated area (21.5 million ha) is irrigated and the rest is rain-fed. Presently, around 20% of irrigated area is affected by waterlogging and salinity to varying degrees, and an additional 2.8 million hectares suffers from sodicity. This considerable problem needs the special attention of the government.

Owner-operated farms smaller than 5 ha play an important role in the development of the agricultural sector in Pakistan. According to the Agricultural Census of Pakistan, out of the total 6.21 million farms during 1997-98, around 85% of total farms were under 5 ha (Table 1.6). The total number of farms increased from 3.8 million in 1970-71 to 6.21 million in 1997-98. Average size of farm decreased from just over 5.28 ha in 1970-71 to 3.2 ha in 1997-98. Farms are cultivated under three general tenure systems including owners, owner-cum-tenants, and tenants. Besides smallholdings, the fragmentation of farms into two or more separated holdings is another major constraint to agricultural productivity in Pakistan. Fragmentation comes about mainly through sub-division of inheritance and acquisition though marriage. Several efforts have been made to increase land consolidation, but no improvement has been achieved. The cropping intensity index has increased from 120% in 1961 to 149% in 1998.

Table 1.6 Number of operational holdings by farm size in Pakistan.

F/Year	Number of Farms (millions)					Average Size of Farm (ha)	Cropping Intensity (%)
	<2ha	2-5ha	5-10ha	>10ha	Total		
1960/61	2.40	1.34	0.73	0.39	4.86	4.07	120
1970/71	1.06	1.50	0.79	0.41	3.76	5.28	111
1980/81	1.39	1.60	0.71	0.37	4.07	4.68	122
1990/91	2.40	1.70	0.62	0.35	5.07	3.78	137
1997/98	3.54	1.77	0.57	0.33	6.21	3.26	149

Source: Agricultural Census of Pakistan, 1990.
Note: Financial year is from July to June.

Keeping in view the present global economic scenario and the speed with which Pakistan is opening its product markets, there is widespread concern about the effects of trade liberalization on agriculture. Improving the economy of the agricultural sector, achieving self-sufficiency in food, and improving farmer's income are the top priorities of the country. Considering the present structure of the agricultural sector, natural resource base, policy environment, trade-related infrastructure, political economy, etc., the country is gradually moving towards trade liberalization in agriculture, and is taking certain steps to support the domestic agricultural sector to compete in the international market. For example, the government has considerably reduced tariff rates, increased the support prices of major commodities, opened up markets for many traded goods, provided credit to small farms, accelerated the privatization process of public institutions, etc. To fully implement all the requirements of the UR agreement on agriculture, the country has a long way to go, especially in terms of improving the trade infrastructure, quality of products, environmental issues and issues related to sanitary and phytosanitary requirements of the agreement. To smoothly proceed towards a more liberalized economic environment, the expected effects of trade liberalization related to various agricultural products, especially those in the smallholder sector, need to be identified in a country like Pakistan.

1.5 Objectives

The present study is the second part of the larger study on the impacts of trade liberalization on agriculture in the Asian region by the United Nations ESCAP CGPRT Center, Bogor, Indonesia. The project is being conducted in ten Asian countries, including China, India, Indonesia, Japan, Malaysia, Pakistan, the Philippines, Thailand, Republic of Korea and Viet Nam under the title "Effects of Trade Liberalization on Agriculture in Selected Asian Countries with Special Focus on Upland Crops (TradeLib)". The first part of this project has been completed and the report entitled "Effects of Trade Liberalization on Agriculture in Pakistan: Institutional and Structural Aspects" has been published by the CGPRT Centre (Akhtar 1998). The present study mainly focuses on the following objectives:

- To present an overview of the impact of the UR agreement on agriculture in Pakistan, trading policies and international trading patterns for rice, wheat and maize.
- To analyze the effects of trade liberalization on major food commodities including rice, wheat and maize in Pakistan.
- To determine the impact of trade liberalization on rice, wheat and maize at the farm level in Punjab, Pakistan.
- To identify problems, prospects, strategies and recommendations for a smooth adjustment process of trade liberalization on agriculture in Pakistan.

1.6 Commodity coverage

The impact of trade liberalization on agriculture in Pakistan is analyzed and the following food commodities are covered: wheat, rice, Basmati rice, non-Basmati rice (mainly IRRI-type coarse rice), and maize.

1.7 Conceptual and analytical approach

1.7.1 Conceptual framework

Governments intervene in agriculture and influence product and input markets. Frequently used measures include tariffs, quotas and subsidies designed for trade protection or enhancement, and price supports designed to increase farm income.

The social welfare effects of an import tariff have impacts in both the importing and the exporting country. Prior to the imposition of the tariff, the trade relationships between the two countries are as diagrammed in Figure 1.2. In this Figure, P_i represents the pre-trade equilibrium price in the importing country while P_e represents the pre-trade equilibrium price in the exporting country. P_w represents the world price after trade is equal in both countries. ED and ES represent the excess demand and supply curves, while the quantity demanded and supplied in the importing and exporting countries are represented by D_i and S_i and D_e and S_e respectively.

Figure 1.2 Price, production, and quantity traded under free trade.
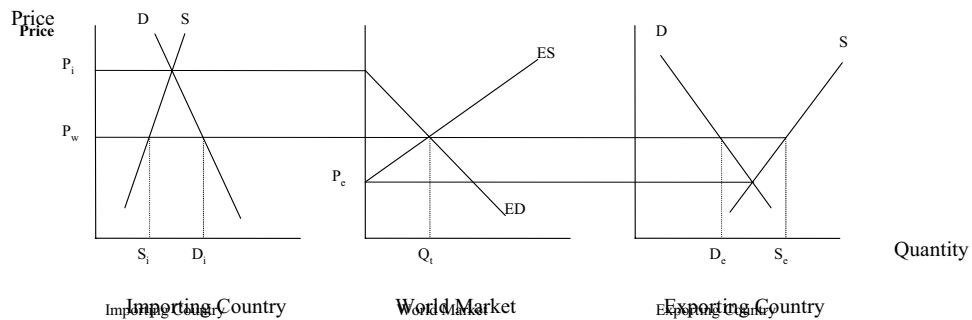
The introduction of a tariff is shown in Figure 1.3 by the downward shift of the excess demand curve to ED′, as the tariff acts as a tax on consumption. The new quantities demanded and supplied in the importing and exporting countries are represented by $D_i{'}$ and $S_i{'}$ and $D_e{'}$ and $S_e{'}$ respectively. The impacts on the importing and exporting countries are shown in more detail in Figures 1.4 and 1.5.

Price

| D | S | | ES | | D | S |

P_t
P_w

ED
ED$_t$

P_t

$S_i{'}$ $D_i{'}$ Q_t $D_e{'}$ $S_e{'}$

Importing Country   World Market   Exporting Country

Fi

Price

e

D_i S_i

P_t A

B   C   D

P_w

E   F

0   S_i $S_i{'}$ $D_i{'}$ D_i Quantity

15
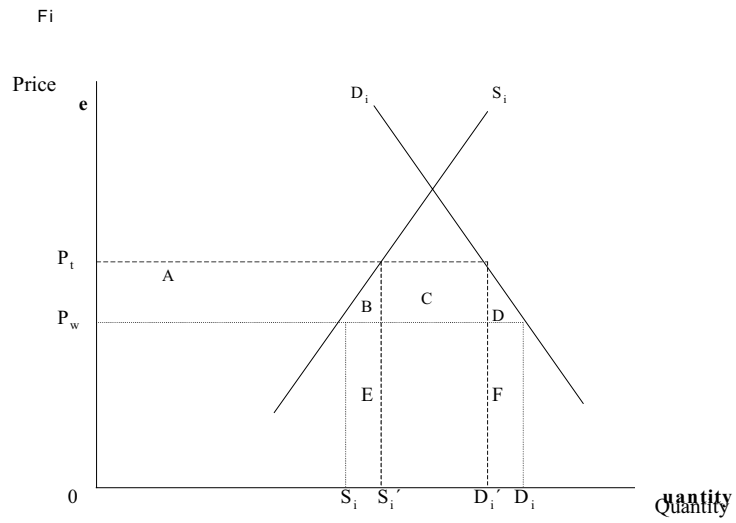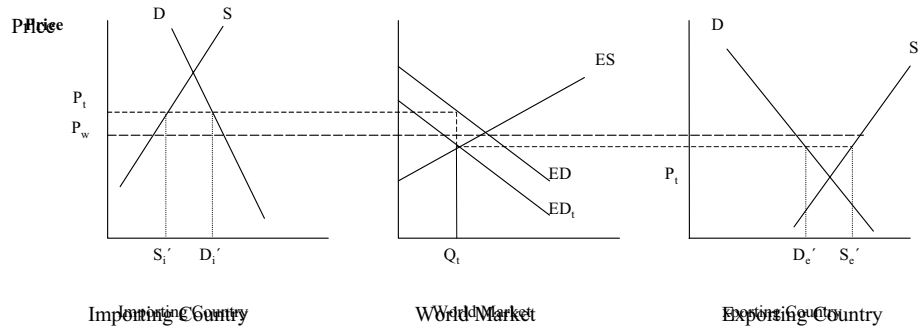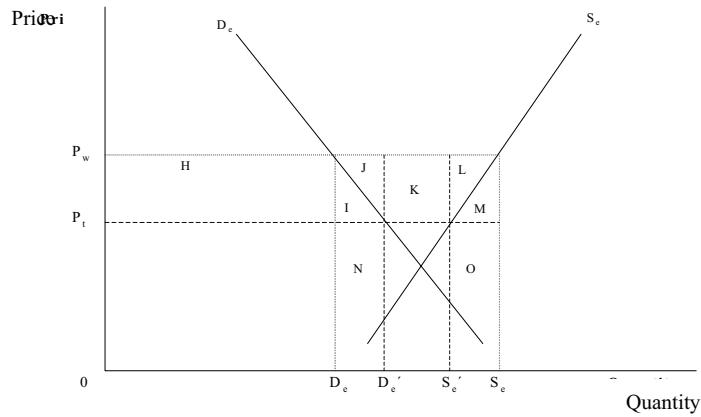
As shown in Figure 1.4, the impact of the tariff in the importing country is to raise domestic prices to P_t, to increase quantity supplied to S_i' and to decrease quantity demanded to D_i'. This results in a decrease in imports from S_i - D_i to S_i' - D_i'. The welfare effects can be identified by the geometric areas A-F.

- A is an increase in producer surplus, as producers produce more with the higher price Pt. This area is a transfer from consumers as they pay more for the increase in quantity supplied.
- B is the extra cost to produce the increase in supply above what it would cost to import the same quantity, and represents a dead weight social welfare loss to society, since the resources represented in area B could have been used to produce something else in the country.
- C is revenue that is collected by the importing government from domestic consumers. The final benefit of area C depends on how the government uses the taxes.
- D is the loss in consumer surplus when consumers reduce their consumption because of the higher price Pt. This area represents a dead weight social welfare loss because it is not a transfer to another group in society.
- E and F represent savings in foreign exchange for the importing country and losses in foreign exchange to the exporting country. They are not social welfare losses to the importing country because they represent the opportunity cost of buying the imports.

Figure 1.5 shows the remaining impacts of the tariff in the exporting country. In the exporting country, the tariff reduces the domestic price to P_t, increases the domestic quantity demanded to D_e', and decreases quantity supplied from S_e to S_e'. This results in a decrease in exports from $D_e - S_e$ to $D_e' - S_e'$. The welfare effects can be identified by the geometric areas H-O.

- H and I together represent an increase in consumer surplus, as domestic consumers buy more of the item when its price falls to Pt.
- H-L together represent a loss in producer surplus as producers produce less and receive a lower price.
- J is a dead weight social welfare loss, as no other group captures this area.

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- K represents the revenue obtained by the importing country from the exporting country producer. This is a social welfare loss in the exporting country but not a dead-weight social welfare loss because it is transferred to the importing government.
- L is a dead weight social welfare loss, as others do not recapture this area.
- M and O represent the opportunity cost of resources that are saved by the reduced production. These resources may be used for other activities in the exporting country and therefore do not represent a net social welfare loss.
- N is the additional cost that consumers must pay for their increased quantity demanded, and therefore is not a social welfare loss.
- N and O together represent losses in foreign exchange to the exporting country and savings in foreign exchange in the importing country.

1.7.2 Analytical framework

Using the welfare analysis, for simplicity the effect of trade liberalization on major agricultural commodities was assessed. The following equations were estimated to conduct the quantitative analysis:

- In Figure 1.4, consumer surplus and producer surplus is:

  Consumer surplus = $(P_t - P_w)[D_i' + (D_i - D_i')*0.5]$

  Producer surplus = $(P_t - P_w)[S_i + (S_i' - S_i)*0.5]$

- Simple models to estimate domestic demand and supply, and price linkage equations are:

  a) Domestic demand $(QD_i) = f(PC_i, I)$

  Where QD_i = Total quantity demanded of commodity i;

  PC_i = Domestic market price of commodity i;

  I = Income

  Elasticity of demand $(E_{pc}) = (\%\Delta QD_i) / (\%\Delta PC_i)$

  b) Domestic supply $(QS_i) = f(PF_i, T)$

  Where QS_i = Total quantity supply of commodity i;

  PF_i = Price of commodity i at farm level;

  T = Trend.

  Elasticity of supply $(EP_f) = (\%\Delta QS_i) / (\%\Delta PF_i)$

  c) Price linkage

  $PC_i = P_{cif} + Tariff + Transfer Cost$

  $PF_i = \alpha + \beta * PC_i$

  Elasticity of price transmission $(E_t) = (\%\Delta PF_i) / (\%\Delta PC_i)$

1.8 Organization of the report

The first chapter contains the background, WTO challenges and implications for Pakistan, the prospects and challenges of the agricultural economy of Pakistan, objectives, and the conceptual framework for the welfare analysis of the impact of trade liberalization on agriculture. The next chapter presents a review of trade policy reforms, monetary and exchange rate policies, the impact of nuclear test sanctions and the East Asian crises, and trade

performance. Chapter 3 presents a welfare analysis of the effects of trade liberalization at the national level on wheat, rice (Basmati and non-Basmati) and maize. Chapter 4 discusses case studies of the effects of trade liberalization on wheat, rice and maize at the farm level including explanations of the study area, major cropping systems in Pakistan, farm practices, marketing and partial budgets of wheat, rice (both Basmati and non-Basmati) and maize. The last chapter of the report summarizes the main findings and suggests strategies and policy measures in order to proceed smoothly with the adjustment process towards a more liberalized agricultural economic environment in Pakistan.

2. Trade Policy Regime

2.1 Trade policy reforms

At the time of independence in 1947, Pakistan had inherited a very poor industrial base and was predominantly an agricultural economy. To develop a strong industrial base, an import substitution policy was emphasized although efforts were also made to promote exports. The government imposed restrictions and bans on imports of industrial products, devices like quotas, licensing, and bans were used to protect domestic producers from their foreign competitors. However, as a result of following this inward looking trade policy, until recently, the country's participation in international trade has been marginal (0.15% in 1995), and exports comprised only 13.5% of GDP while imports represented 18.3% during 1995-96 (Akhtar 1998).

Realizing the inefficiency of the inward looking trade policy, the government took a number of steps towards a freer economy and gradually introduced comprehensive macroeconomic and structural reforms in the country, for example, shifting from a fixed exchange rate to a flexible exchange rate, removal of subsidies on various agriculture inputs, privatization of many financial institutions and other trade institutions, tariff reductions, etc. The main objective of the government was to move towards greater reliance on market forces, opening up of the economy to foreign competition as it sought to meet the country's obligation to globalization of merchandized trade under WTO.

In the agriculture sector, the government did not intervene directly in the production and investment decisions of the farmers, but indirectly intervened through the legal, material and economic environment in which farmers operate. The public sector intervened directly or indirectly by controlling producer and consumer prices of important crops and food products through parastatals or border controls and taxes. Farmers received considerably less then the international prices of cotton and rice, but on the other hand sugarcane was highly protected. Similarly, the government fixed the domestic support price of wheat considerably below the world price and subsidized its imports. All these price stabilization policies in the country actually led to balance of payment problems, and resources were shifted from the agricultural sector to the industrial sector (Faruqee 1995). In the trade sector, government had enjoyed a full monopoly in the export of cotton and rice, the major export commodities of Pakistan.

During the late 1980s, a broad program of economic reforms was introduced in the country, a major component of which was to liberalize the trade sector. The government pursued extensive liberalization of the trade regime and introduced a wide range of export promotion strategies. Tariff and non-tariff barriers on agricultural commodities were considerably reduced during the 1990s. For example, from 1988-89 to 1996-97, the maximum tariff on agricultural commodities decreased from 100% to 65%, and further decreased to 45% during 1997-98. Tariffs and quantitative restrictions on various agricultural commodities are given in Appendix 3. The simple average tariff was 55%, with half of the tariff lines subject to the 80% maximum for agricultural imports. In 1994, the average tariff rate on agricultural commodities was reduced to 49%. On most agricultural commodities, the tariff rate is zero. During 1997, the tariff on cereal was less than 25%. Pakistan has already bound all agricultural commodities with the exception of fish, tobacco and cotton which are major export commodities of Pakistan. Like other developing countries, Pakistan has also bound its tariffs on the higher side as non tariff restrictions will be removed during the coming years. NTBs include import and export by government institutions (such as the Trading Corporation of Pakistan to control imports) and the negative list of import items. However, like reduction in tariff rates,

trade barriers on imports of agricultural commodities have been significantly reduced. For example, the items in the negative list (import items banned mainly due to religious, cultural, and balance of payment factors) have been reduced from 29 in 1989 to 17 in 1997, and import items banned on the basis of health and safety have declined from 29 in 1989 to only 5 in 1997.

Pakistan also imposes export restrictions on a variety of products, mainly agricultural commodities, whose exports are subject to ad volarem, specific or compound duties, either for revenue reasons or to act as a disincentive to export raw materials (Khan and Mehmood 1996). The statutory ad volarem duty rates ranged from 10 to 45%. During 1993, 0.25% export development cess on all exports was introduced to establish the training institute for export based industries and to promote research and development. Export restrictions are applied to 29% of export categories mainly for health and social reasons, and others to ensure the domestic supply at reasonable prices. For some products, exports are subject to export licensing, mainly for environmental, cultural, health, or safety reasons. There are some products whose export is subject to special procedures based on economic considerations. For example, export of rice by the private sector is subject to registration of contracts with the EPB and pre-shipment inspection by internationally recognized inspectors. Similarly, export of cotton by the private sector is subject to procedures as may be specified by the government in the Gazette. Exports of food products of animal origin, fruits, vegetable, oilseed products, and some other commodities are subject to quality control restrictions. Exports of fertilizers are permitted only after determining the exportable surplus.

The current status of compliance of Pakistan's agricultural policies with the provisions of the UR agreement on agricultural and structural adjustment programs is given in Appendix 4. In this appendix, five types of agricultural policies are discussed including domestic agricultural policies (output prices, traded input prices, non-traded input prices, marketing interventions and non-price measures), trade policy instruments (export and import policies), public investment and food security measures. The current status of these policies, information on whether and to what extent policy is compatible with the UR agreement on agriculture, and possible efficiency and equity measures are also discussed in detail.

Presently, the private sector is allowed to export rice and cotton. Before the 1990s, rice and cotton exports were fully under government control and the private sector was not allowed to export these commodities. Also, now the export ban on dairy products, edible vegetables, spices, cereals, or vegetable fats has been lifted. At present, only live animals, meat, and edible meat offal, cereals, and products of the milling industry are subject to export restrictions. Pakistan does not impose any export tax on agricultural commodities. Pakistan has already considerably improved its market access for international traders.

Qureshi (1996) analyzed the aggregate measure of support for agriculture (AMS), which each country participating in the UR agreement is required to quantify and submit as an incentive on agriculture. AMS is measured by the difference in domestic and international prices and is adjusted for input and other subsidies used in the agricultural sector. It is determined in the UR agreement for agriculture that if the AMS does not exceed by 10% of the total value of agriculture products in developing countries (and 5% in the case of developed countries), the specific country is not required to reduce either product specific or non-product specific measures. AMS submitted by Pakistan for the base year 1986-87 to 1993-94 is given in Appendix 5. From 1990-91 to 1993-94, the aggregate amount of product specific support, non-product specific support and aggregate support was -19,387 +1,767 and -17,620 million rupees, respectively. As a percentage of the total value of agricultural production, the measures of support were -6.90%, +0.63% and -6.27%, respectively. These figures show that Pakistan is not required to reduce its support level as per the requirement of the UR agricultural agreement.

Presently, Pakistan provides two types of supports to its farmers, namely minimum support prices of major crops and input subsidies on irrigation, credit, electricity, etc. The type

of support known as non-exempt direct payment in the Agriculture Agreement is not provided to farmers in Pakistan.

The recent trade policy (1997-98) was established on July 16, 1997, as a component of the present government's policy of economic revival through export led growth to reduce the prevailing trade deficit in merchandise trade. Pakistan operates a number of export incentive schemes to promote an export culture in the business community. Under these programs, exporters are compensated for taxes levied on inputs and provided easy access to trade and investment finance. To offset the anti-export bias in the tax and incentive structure, exporters are offered custom duty and central excise drawbacks schemes, export refund of sales tax, export processing zones, bonded manufacturing schemes, export re-finance facilities, export promotion measures, etc.

To promote exports of Pakistani products abroad, the EPB sponsors trade delegations to and from Pakistan, participates in international trade affairs, settles trade disputes, conducts market information projects, seminars and workshops, provides export market information, and registers export houses in other countries. In addition to these services, the EPB also arranges services to exporters related to quality control, display centers, promotional publicity, library, and other related information to domestic exporters.

Under the Export Processing Zone Authority Ordinance, 1990, the government plans to establish EPZs in the major cities of Pakistan. The regular import and export restrictions enforced in Pakistan are not applicable in these EPZs. Exporting firms operating in these zones are exempt from foreign exchange control regulations and insurance regulations, exempt from domestic labor laws, and also benefit from tax holidays up to the year 2000.

2.2　Monetary and exchange rate policies

Monetary and exchange rate policies are major components of liberalized trade policies in a country. Pakistan's monetary policy refers to the measures which the State Bank of Pakistan (SBP) takes in controlling the money and credit supply to bring about desired changes in the economy. During the early 1990s, the government had introduced market oriented monetary and credit policies to achieve the planned growth, anticipate inflation, and bring about expected changes in net foreign assets of the banking system. One of the main problems created in financial markets has been the lack of autonomy of the SBP. The principle financing entity in the system has often been held captive to the political governments. Under the financial sector reform program of the government, the SBP was given full authority to conduct the monetary policy of the country in May 1997. It is expected that the increased autonomy of the SBP will bring greater economic stability in the country and help to further liberalize the trading sector in Pakistan.

Before 1981, like many other countries, Pakistan's rupee was linked with the US dollar for a long time. It was constant (fixed by the government) at the rate of Rs. 4.762/US$ up to 1971-72. In May 1972 the rupee was devalued by 131% from Rs. 4.762/US$ to Rs. 10.59/US$. Subsequently, when the US dollar was devalued against all other currencies the new rate was fixed at Rs. 9.9/US$ in March 1973. Pakistan maintained a constant nominal exchange rate throughout the 1970s. In January 1982, the rupee was de-linked from the US dollar and the government followed a managed floating exchange rate policy. Initially the government planned to peg the value of the rupee to an index, which was a weighted average of currencies of Pakistan's major trading partners. This policy allowed the exchange rate to fluctuate against the US dollar. However, this resulted in a gradual devaluation of the rupee in terms of the US dollar. Since then, the rupee has been steadily devalued significantly over time. The government mainly de-valued the rupee to improve the persistent negative trade balance. However, this

policy did not help much to improve the negative trade balance. From 1980-81 to 1990-91, the rupee was devalued by more than 125%. Similarly again, the rupee was devalued by another almost 100% up to May 28, 1998. Exchange rates in Pakistan are given in Figure 2.1. Up to May 1998, the exchange rate arrangements were very liberal and the country followed a managed floating system. Under this system the SBP set the daily exchange rate which it used to purchase and sell US dollars (the intervention currency) in business with other authorized banks and foreign exchange authorized dealers. Considering the competitiveness of the tradable sector and to control inflationary pressures, the SBP was adjusting the exchange rate on a frequent basis for various currencies. The official exchange rate of Pakistan rupees to other major trading partners is given in Table 2.1.

Table 2.1 Official average exchange rates of major currencies in terms of Pakistani rupees.

F/Year	US Dollar	UK Pound	Japan Yen	Germany Mark	France Franc	India Rupee
1986/87	17.18	26.21	0.11	8.92	2.7	1.34
1987/88	17.60	30.85	0.13	10.19	3.02	1.33
1988/89	19.21	32.91	0.15	10.36	3.05	1.26
1989/90	21.44	34.92	0.15	12.12	3.58	1.26
1990/91	22.42	41.58	0.16	14.12	4.18	1.28
1991/92	24.84	43.74	0.19	15.08	4.44	0.96
1992/93	25.96	42.03	0.22	16.57	4.89	0.94
1993/94	30.16	45.16	0.28	17.90	5.20	0.96
1994/95	30.85	48.69	0.33	20.68	5.96	0.98
1995/96	33.57	51.92	0.33	22.97	6.69	0.98
1996/97	38.53	62.05	0.33	24.69	7.29	1.08
1997/98	43.10	70.42	0.35	23.89	7.12	1.14

Note: Financial year is from July to June.
Source: Pakistan Economic Survey, 1997-98.

The government took a number of measures to move towards the ultimate goal of having market-determined rates of foreign exchange during 1997-98. For example, the SBP abolished the mandatory control of exchange rate determination on foreign currencies with effect from February 5, 1998. All commercial banks and authorized foreign exchange dealers were allowed to determine and undertake transactions of their own exchange rates for various currencies (other than the US dollar) in terms of the rupee depending on the demand and supply situation in the market. However, the US dollar to rupee exchange rate was still being determined by the SBP. Subsequently, from May 24, 1998, banks and authorized dealers were also permitted to fix their own buying/selling rates for US dollars.

To maintain the flexible exchange rate policy and safeguard the competitiveness of Pakistan's exports, three adjustments were made in the exchange rate during 1997-98 (aggregating Rs. 5.54/US$). A minor adjustment of Rs. 0.06/US$ was made on July 11, 1997 and other devaluations of Pakistan's rupee of 8% and 4.2% were made on October 15, 1997 and June 27, 1999, respectively. The rupee/dollar exchange rate (spot buying) stood at Rs. 46/US$ at the end of June 1998 depicting a total devaluation of 12.0% during 1997-98 compared to 13.2% in 1996-97 (SBP 1998).

Figure 2.1 Exchange rate in terms of Rs./US$.
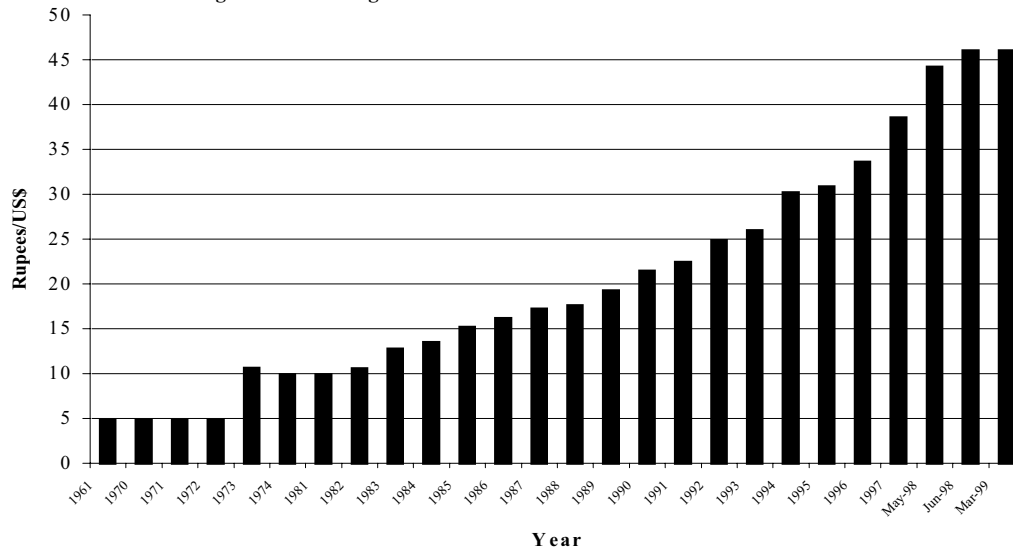
2.3   Impact of nuclear test sanctions and the East Asian financial crisis

Pakistan conducted nuclear tests on May 28, 1998, and in order to combat/encounter anticipated negative impact from international financial sanctions, Pakistan had made changes in its exchange rate and payment policy, and imposed certain restrictions on foreign transactions. With effect from May 29, 1998, in order to conserve foreign exchange in the country, withdrawals from foreign currency accounts (FCAs) were suspended except accounts of diplomatic missions, independent power projects, etc. Withdrawals from FCAs were only allowed in Pakistan rupees at the official rate of Rs. 46.00/US$. So far FCA holders are still not allowed to withdrawal in US$ and other major currencies including the UK pound, German mark, and Japanese yen. The payment of profit in foreign exchange was also suspended until further notice. However, FCA holders were allowed to cash profit in rupees at the rate of Rs. 46/US$. The government announced a number of incentives for FCA holders if they convert those accounts into rupees at the official rate, including exemption from probe by tax authorities, banking confidentiality, and six year wealth tax exemption from income tax on interest or profit earned on dollar accounts before conversion.

To strengthen the foreign exchange reserves, the SBP introduced a multiple exchange rate system, which includes the official exchange rate, composite exchange rate, the floating inter-bank official rate (FIBOR) and open market exchange rate in the country. The composite exchange rate and FIBOR rates are slightly higher than the official exchange rate of Rs. 46/US$.

Exporters and importers were allowed to convert their earnings at an 80:20 formula, which means they may convert 80% of earnings at the FIBOR and the rest at the official rate. Just after the economic sanctions by the G-7 countries, the open market rate went up as high as Rs. 67/US$ in September 1998. It gradually decreased to Rs. 52/US$ in March 1999. The government is planning unification of the exchange rates from July 1, 1999, when the existing inter-bank rates will be modernized to initiate a market based exchange rate system. In March 1999 banks were authorized to quote their own rupee/US$ rate and the spread between buying and selling rates of the SBP was widened. The existing inter-bank market rate was also a step forward towards free floating of the rupee (SBP 1998).

The nuclear explosion and subsequent sanctions by the G-7 countries had large fall-out effects on the economy; particularly it adversely affected investor confidence. In addition to sanctions, Pakistan's exports, imports and access to foreign capital have become more vulnerable after the East Asian financial crisis. Also the IMF, World Bank, and ADB delayed their obligations of foreign capital inflow, which was a severe blow to Pakistan's ability to meet its external obligations. The government had delayed payments of its obligations of debt servicing to almost all donor institutions including the World Bank, ADB and IMF. The country was very close to default on foreign debt obligations. Foreign aid received in the form of project financing and program lending of multi-lateral agencies was also scaled down leading to a widening of the financial gap in the balance of payments. Home remittances also declined considerably resulting in a significant drop in the foreign exchange reserve in the country (Table 2.2). In October 1998, foreign exchange reserves decreased to only US$430 million. Also, these financial shocks contributed to increasing pressure on the balance of payments. Both exports and imports decreased considerably during the last 6-9 months. The country has felt negative effects of the East Asian financial crisis in terms of loss in export earnings, and withdrawal of swap dollar funds and access to international capital markets (SBP 1998).

Table 2.2 Foreign exchange reserves of Pakistan from January 1998 to March 1999 (million US$).

Month	Gold	S.D.R.s	Foreign Exchange	Total
January 98	633	11	1,277	1,921
February	633	n/a	1,416	2,049
March	632	1	1,531	2,164
April	632	12	1,533	2,177
May	633	2	1,370	2,005
June	612	3	1,122	1,737
July	614	12	834	1460
August	614	2	1,058	1,701
September	614	n/a	821	1,435
October	614	2	430	1,046
November	614	2	n/a	n/a
December	614	2	1,021	1,637
March 99	614	2	1,610	2,226

Source: Statistical Bulletin State Bank of Pakistan December 1998.

Spillover effects of the currency turmoil contributed to the more than 10% depreciation of Pakistan's currency against the US dollar during 1997-98. However, the massive devaluation of East Asian currencies did not threaten Pakistan's exports beyond manageable limits, because Pakistan mainly exports value added cotton products to these countries. Pakistan did not suffer severely from the contagion effects of the Asian financial turmoil mainly because its foreign capital inflows consisted of direct investment, limited portfolio inflows and build-up of foreign short term debt, which is mainly concentrated in the public sector (SBP 1998). During 1998, Pakistan's economy was mainly effected by the nuclear test sanctions of the G-7 countries and international financial institutions. However, the economic situation is improving in 1999 as developed countries and financial institutions are easing the economic sanctions. For example, foreign exchange reserves in Pakistan had increased to over US$1.6 billion by March 1999.

2.4   Trade performance

Pakistan's total trade fluctuated widely during the last two decades or so, and reached a record of US$20.5 billion in 1995-96 from only US$8.4 billion in 1980-81 (increase by 142%).

Total exports increased significantly from only US$2.96 billion in 1980-81 to US$8.7 billion in 1997-98, increasing at a growth rate of 6.5% per annum. Total exports, imports and trade balance are given in Table 2.3. Despite overall improvements, exports suffered a setback during the 1990s mainly for the following reasons (Government of Pakistan 1997; Akhtar 1998):

- Levy of Regulatory Duty on imports resulted in increased cost for exports.
- Due to leaf-curl virus attack, cotton production in the country significantly declined.
- Exports of sports goods declined due to child labor propaganda abroad against Pakistan.
- With the internationalization of cotton prices and gradual rise in labor costs, textile exports suffered.
- With increased cost of raw material of synthetic textiles, coupled with the fact that export rebates were delayed, exports were affected.
- Antidumping and countervailing charges and duties created obstacles and uncertainties for example in the case of cotton export.
- An increase in air and sea freight charges made exports from Pakistan less competitive.
- Higher rates of inflation affected export products.
- Political instability in the country affected production.
- The East Asian financial crisis also affected export earnings.

Table 2.3 Balance of trade in Pakistan (US$ million).

F/Year	Exports	Imports	Trade Balance	Exports as % of imports
1980/81	2,958	5,409	-2,451	54.69
1981/82	2,464	5,622	-3,158	43.83
1982/83	2,694	5,357	-2,663	50.29
1983/84	2,768	5,685	-2,917	48.69
1984/85	2,491	5,906	-3,415	42.18
1985/86	3,070	5,634	-2,564	54.49
1986/87	3,686	5,380	-1,694	68.51
1987/88	4,455	6,391	-1,936	69.71
1988/89	4,661	7,034	-2,373	66.26
1989/90	4,654	6,935	-1,981	67.11
1990/91	6,131	7,619	-1,488	80.47
1991/92	6,904	9,252	-2,348	74.62
1992/93	6,813	9,941	-3,128	68.53
1993/94	6,830	8,541	-1,711	79.97
1994/95	8,162	10,376	-2,214	78.66
1995/96	8,803	11,815	-3,012	74.51
1996/97	8,363	11,895	-3,532	70.31
1997/98	8,667	10,070	-1,403	86.07
Growth Rate/year (%)	6.53	3.72	-3.23	2.70

Source: Pakistan Economic Survey 1997-98.
Note: Financial year is from July to June.

The government introduced a number of trade related policies to improve exports, such as devaluation of the Pakistan rupee in terms of the US dollar by more than 100% in the 1990s; introduction of a package of incentives together with improvement in the export finance scheme; privatization of trade-related public institutions; and increased participation of the private sector. However, all these measures did not improve exports greatly (compared to other developing countries) and did not control the trade balance. Trade performance would have been better, had the leaf curl virus not affected cotton in 1993.

Like exports, imports also fluctuated during the last 20 years or so (Table 2.3). Total imports rose sharply from only US$5.41 billion in 1980-81 to US$10.10 billion in 1997-98, with an annual growth rate of 3.7% during this time. The slowdown in import growth during the 1980s was mainly due to a fall in world prices of Pakistan's major imports (mainly petroleum products and edible oils). During the 1990s, imports were mainly increased due to the extraordinary increase in machinery imports, chemicals and transport equipment. The other main causes of increased imports were the adoption of liberal import policies, considerable reduction in import tariffs and improvements in foreign and domestic investment policies. Imports also increased considerably during the early 1990s, mainly due to a surge in oil prices caused by the Gulf crisis. The share of the imports in GDP was 16-19% in the 1990s.

Despite all the efforts by government to improve the trade balance, it increased from US$2.45 billion in 1980-81 to US$3.6 billion in 1996-97, and decreased to US$1.1 billion in 1998. The trade balance in 1997-98 was the lowest, mainly due to record low prices of petroleum products. Also, the sharp reduction of imports was the result of a decline in imports of machinery and transport equipment during this period. The contraction in trade balance also resulted from a 3.6% rise in exports. The ratio of exports to imports also improved from 82% to 86% during the same period.

Overall, Pakistan is not a major trading partner in world trade. The share of Pakistan's exports in total world exports was marginal ranging between 0.13% to 0.21% and 0.20% to 0.28% of world imports during 1980 to 1995. However, Pakistan is a major trading partner in some commodities. For example, Pakistan accounted for 2.13, 13.67, 1.55 and 0.3% of the world export markets of textile and clothing, carpets and rugs, leather and leather products, and fish and fish preparations, respectively, during 1995. The share of Pakistan's external trade in the world market is given in Table 2.4.

Table 2.4 Share of Pakistan's external trade in the world market.

Year	Share in the World Market (%)		Share of Major Exports in World Exports (%)			
	Exports	Imports	Textile & Clothing	Carpets & Rugs	Leather & Leather Goods	Fish & Fish Preparations
1980	0.13	0.28	1.19	23.14	2.26	0.42
1985	0.14	0.31	1.16	20.73	3.11	0.60
1990	0.16	0.21	1.64	17.34	2.83	0.37
1991	0.18	0.23	2.25	19.32	2.54	0.34
1992	0.20	0.24	2.26	15.16	2.16	0.41
1993	0.21	0.25	2.34	10.97	1.89	0.61
1994	0.20	0.20	2.35	15.42	1.84	0.39
1995	0.18	0.20	2.13	13.67	1.55	0.36

Source: Ministry of Commerce 1997.

2.4.1 Major export and import commodities

Pakistan's exports are mainly concentrated on cotton and cotton-based products, which alone accounted for around 56% of total export earnings during 1997-98. In the cotton group, textiles and clothing constituted around 97% of the total earnings in this group. This means that Pakistan is mainly dependent on exports of the cotton group. However, cotton is subject to pest and climatic hazards year after year in Pakistan. For example, export of raw cotton was as high as US$930 million in 1988-89, and as low as only US$62 million in 1993-94, mainly due to cotton leaf-curl virus and climatic factors. Excluding raw cotton, exports of cotton based products (mainly cotton yarn and fabrics) declined in 1997 compared to 1996-97 owning largely to weak demand conditions in East Asian countries. The other major export commodities include rice, fish and fish preparations, leather products, synthetic textiles, sports

goods, carpet and rugs, and surgical instruments. The value of major exports of Pakistan is given in Table 2.5.

The value and share of exports by economic classification is given in Table 2.6. A breakdown of the exports in terms of economic classification shows that the share of exports of manufactured products increased considerably from 66% to 70% of the total value of exports from 1993-94 to 1997-98. On the other hand, the share of semi-manufactured products decreased from 24% to 17%, while the share of primary commodities increased from 10% to 13% in the same period.

The structure of exports suggests that the export promotion and diversification drive undertaken most recently has improved the composition of the country's exports, which is reflected in the increased share of manufactured goods, and decreased the share of raw cotton and rice in the total exports during the 1990s. Similarly, the share of semi-manufactured goods, which had fluctuated between a low of 19% in 1988-89 and a high of 25% during 1994-95, came down to 17% during 1997-98 mainly due to a fall in the share of cotton yarn.

The structure of Pakistan's imports also indicates that these are concentrated on a few products. The value of major imports during the last five years is given in Table 2.7. During 1997-98, the share of food and machinery groups in the total value of imports was 18.5% and 19.2%, respectively. Machinery, petroleum and its products, chemicals, edible oils, and transport equipment are the major imports. The shares of fertilizer, petroleum and its products, electrical goods, and transport equipment in total imports have decreased over time mainly due to the rise in domestic production of these items and a fall in the world prices of some of these items. On the other hand, the shares of machinery, edible oils, chemicals and electrical goods in total imports have increased due to expansion of the industrial sector, increasing per capita income and the high population growth rate in Pakistan.

Pakistan is trading with a large number of countries; however, its exports and imports are highly concentrated in a few countries. The Asian region is the largest market for Pakistani products. However, its share in total exports decreased from 37% in 1996 to 35% in 1997-98 mainly due to the East Asian financial crisis. The reduction in market share of the Asian region in exports resulted largely from decline in exports to Hong Kong (-US$169.9 million), Japan (-$118.8 million), South Korea (-US$38.4 million) and Singapore (-US$24.3 million). The share of Africa and Eastern Europe has marginally improved from 1.8% to 5.5% from 1996-97 to1997-98. Data on the direction of exports indicate that the US remained the largest market for Pakistan accounting for 21% of total exports, followed by Hong Kong (7.1%), UK (6.9%), Germany (6.3%), Dubai (5%), Japan (4.2%), the Netherlands (3.2%), France (2.9%), Italy (2.7%), and Belgium (2.7%) during 1997-98. The combined share of these ten countries decreased from 63.8% in 1996-97 to 61.5% in 1997-98 (SBP 1998).

Similarly, Pakistan mainly imported transport equipment from Japan, petroleum and its products mainly from the Middle East (around 70%). Machinery was mainly imported from Eastern Europe (about 40%), followed by Japan (20%) and other Asian countries (about 16%) and the rest from North America. EU is the largest chemical supplier to Pakistan. Malaysia has been the single largest supplier of edible oil (80%). Wheat is mainly imported from US, followed by Canada and Australia.

Table 2.5 Value of Pakistan's major exports (US$ million).

Commodities	1993-94	1994-95	1995-96	1996-97	1997-98
A. Cotton & Cotton Based Products	**3,822.2**	**4,623.6**	**5,458.7**	**4,909.3**	**4,828.9**
1. Raw cotton	79.2	62.5	520.3	31.9	127.3
2. Cotton Based Products	**3,743**	**4,561.1**	**4,938.4**	**4,877.5**	**4,701.5**
i. Cotton yarn	1,265.5	1,533.5	1,557.9	1,420.1	1,161.1
ii. Cotton fabrics	823.9	1,084.5	1,292.6	1,268.8	1,254
iii. Bedwear	286	341.2	425.4	458.3	511.1
iv. Readymade garments	614	643.5	656	738.7	748.9
v. Tarpaulin and other canvas goods	29.3	38.3	39.5	36.5	58.8
vi. Hosiery	510.8	690.5	707.7	689	699.5
vii. Towels	129.4	145.1	175.3	194.7	201.1
viii. Cotton bags & sacks	17.3	19.2	24.9	27.7	23.2
ix. Others*	66.4	65.4	59.2	43.7	43.9
B. Major Food Items	**454.2**	**661.4**	**707.5**	**704.8**	**826.9**
1. Rice	243.3	455.8	511.9	474.4	570.5
2. Fish and fish preparations	154.4	154.7	140.4	149.1	171.3
3. Fruits	44.4	41.2	44.6	71.4	65.3
4. Vegetables	12.2	9.8	10.5	9.9	19.8
C. Leather & Manufactures	**614.5**	**622.2**	**595.3**	**604.1**	**551.4**
1. Leather	225.1	273	260.6	239.6	208.4
2. Leather manufactures	389.4	349.2	334.7	364.4	343
D. Other Major Exports	**1,939.4**	**2,254.7**	**2,041.1**	**2,145.1**	**2,460.1**
1. Synthetic textiles	651.8	576.7	461	515.4	620.8
2. Sports goods	200.4	265.3	250.1	311.9	385.4
3. Carpets and carpeting rugs	152.3	198.8	213	201	202.3
4. Surgical instruments	93.7	114.2	128.2	127	125.7
5. Molasses	83.2	90.9	71.3	52	59.1
6. Raw wool	6	10.8	12.3	13.6	6.8
7. Guar and guar products	30.5	29.3	43.2	32.2	32.7
8. Chemicals, drugs and medicines	24.3	39.7	46.1	36.9	44.3
9. Petroleum and petroleum products	53.9	81	67	82.6	35.4
10. Cutlery	15.2	20.7	19.2	20	17.6
11. Others	682	827.4	729.6	752.5	930
Total Exports	**6,830.2**	**8,161.9**	**8,802.6**	**8,363.3**	**8,667.3**

Source: Federal Bureau Statistics.

* Includes cotton waste and cotton thread.

Table 2.6 Economic classification of Pakistan's exports (US$ million).

Economic Category	1993-94		1994-95		1995-96		1996-97		1997-98	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
Primary Commodities	708.7	10.4	9,13.5	11.2	1,429.1	16.2	937.1	11.2	1,101	12.7
Semi-Manufactures	1,620.2	23.7	2,035	24.9	1,905.5	21.6	1,720	20.6	1,502	17.3
Manufactured Goods	4,501.3	65.9	5,213.4	63.9	5,468	62.1	5,707	68.2	6,065	70
Total Exports	6,830.2	100	8,161.9	100	8,802.6	100	8,363	100	8,667	100

Source: Federal Bureau of Statistics.

2.4.2 Pakistan's agricultural trade

In Pakistan, agriculture is an important source of foreign exchange earnings through exports of agricultural raw and base products. Raw cotton and its manufactured products, rice, leather and its products, fruits and vegetables, spices, and fish and its preparations are the major export commodities of Pakistan. The value of agricultural exports of major commodities is given in Table 2.8. Agriculture directly accounts for more than one-fourth of total exports. If

one takes into account all the agro-based manufactured exports, agriculture's share would be around two-thirds of total exports. Pakistan is mainly dependent on the export of raw cotton and textile-related products, which are subject to climatic hazards every year. Export earnings from cotton and rice fluctuated considerably due to climatic factors. Export earnings from fruits and vegetables did not increase significantly during the last ten years or so. Export earnings from fish and fish preparations more than doubled during the last two decades.

Imports of agriculture commodities contribute considerably to the negative trade balance of Pakistan. The major agriculture import commodities are edible oil, grains, pulses, and flour, tea and coffee, and milk and its products. These commodities accounted for more than half of the negative trade balance. The value of major agricultural imports from 1980-81 to 1997-98 is given in Table 2.9. In addition to the drain of foreign exchange on import of food-related agricultural commodities, Pakistan also spent a considerably amount of foreign exchange on the import of agricultural inputs which include fertilizers (mainly DAP), seeds, pesticide/insecticides and agricultural machinery.

Pakistan's agriculture products are traded almost globally. Major trade partners of agricultural commodities from Pakistan include Indonesia, Dubai, Iran, Thailand, Hong Kong, some African countries, Japan, China, Bangladesh and Saudi Arabia. Middle East countries mainly purchase Pakistani fruits and vegetables and rice. The industrialized countries mainly buy raw cotton and its products, and fish and its preparations. Asian countries are the major export partners of agricultural products from Pakistan.

The sources of Pakistan's major agricultural imports are also spread all over the world. The principal source countries for the bulk of the agricultural commodities include USA (mainly wheat), Malaysia (palm oil), Indonesia (edible oil and tea), Kenya (tea), Argentina, Brazil, Germany, Canada, Sri Lanka (tea), Singapore, Australia, and Bangladesh. More than 75% of agricultural commodities were purchased from the USA, Malaysia and Indonesia during the 1990s. USA continues to be the main supplier of agricultural imports, which include wheat and edible oil (Akhtar 1998).

Table 2.7 Value of Pakistan's major imports (US$ million).

Commodities	1993-94	1994-95	1995-96	1996-97	1997-98
A. Food Group	**1,038.7**	**1,760.2**	**1,668.9**	**1,599.5**	**1,861.8**
1. Milk & cream incl. milk food for infants	28.3	26.8	48.4	27.9	31.9
2. Wheat unmilled	239.3	412.3	451.4	484.1	699.4
3. Dry fruits	25.6	27.8	33.1	35.5	33
4. Tea	185.8	187.3	169.6	133.5	226.6
5. Spices	10.2	31.5	13.3	13.1	12.6
6. Edible oil	486.1	995.3	852.1	611.5	768.6
7. Sugar	14.8	2.2	1.6	252.3	38.9
8. Pulses	48.6	77	99.3	41.6	50.7
B. Petroleum Group	**1,394.9**	**1,583.6**	**2,001.1**	**2,260.1**	**1,558**
1. Petroleum crude	444.8	494.1	508.4	582	463.8
2. Petroleum products	950	1,089.6	1,492.7	1,678.1	1,094.1
C. Machinery Group	**1,905.5**	**2,388.8**	**2,572.5**	**2,762**	**1,929.3**
1. Power generating machinery	255	504.5	736	1007	457.8
2. Office machinery	67.7	75.9	66.9	48.4	73.3
3. Textile machinery	352.7	294.9	167	129	212.8
4. Construction & mining machinery	180.9	201.7	167.9	154	164.7
5. Electrical machinery & apparatus	294.4	276.8	440.3	422.7	305.5
6. Agricultural machinery & implements	10.9	68.8	51.5	36.7	27.2
7. Other machinery	743.9	966.1	922.9	964.2	688
D. Transport Equipment*	**805.3**	**593.5**	**538.5**	**534**	**457.6**
E. Chemical Group	**1,490.4**	**1,583.5**	**2,188.8**	**1,970.2**	**1,788.6**
1. Fertilizer	265.2	127.8	349.7	382.4	209.5
2. Insecticides	56.4	96.3	151	134.9	110.8
3. Plastic materials	262.1	312.1	415.4	326.3	303.5
4. Medicinal products	231.2	263.4	327.1	272	248
5. Others	675.4	783.9	945.6	854.6	916.8
F. Miscellaneous Group	**835**	**930**	**1,168.6**	**1,059.5**	**849**
1. Synthetic fibre	115.5	168.7	145.7	116.7	118.3
2. Synthetic & artificial silk yarn	58.3	43.8	58.3	49.9	38.2
3. Worn clothing	19.6	20.1	38.2	34	34.3
4. Iron and steel scrap	37.5	19.8	35.8	39.2	20.1
5. Iron and steel	326.2	371.9	483.7	464.3	318.8
6. Aluminium wrought & worked	41.9	44.9	81.6	46.6	31.9
7. Rubber crude	38.3	47.8	65.9	59.4	48.1
8. Rubber tyres & tubes	44.9	52.1	64.8	68.6	74.2
9. Wood & cork	11.3	10.4	14.1	23.1	20
10. Jute	17.5	23.3	25	29.9	23.9
11. Paper, paper board & manufactures	124.2	126.6	155.6	127.7	121.2
G. Other Imports	**1,071.1**	**1,536.5**	**1,676.4**	**1,709.6**	**1,625.9**
Total Imports	**8,540.8**	**10,375.6**	**11,814.8**	**11,894.9**	**10,070.3**

Source: Federal Bureau of Statistics.
*Excluding railway vehicles.

Table 2.8 Agricultural exports of principal commodities of Pakistan (US$ million).

F/Year	Raw Cotton	Rice [1]	Fruits & Vegetables	Fish & Products	Others [2]
1981/82	275.6	387.2	31.24	74.1	28.28
1982/83	304.9	288.1	42.04	70.20	32.10
1983/84	132.4	422.5	39.70	75.1	31.56
1984/85	297.2	222.1	37.93	81.7	39.35
1985/86	513.3	342.3	41.84	82.6	35.70
1986/87	446.3	299.7	42.95	112.5	38.49
1987/88	610.0	363.1	50.31	124.3	47.25
1988/89	929.6	303.6	46.99	110.3	46.73
1989/90	443.0	239.2	53.60	94.4	42.94
1990/91	411.8	346.3	49.02	114.9	32.88
1991/92	518.3	415.7	47.28	114.7	45.50
1992/93	270.8	317.1	52.72	181.7	35.90
1993/94	79.5	242.2	56.30	154.7	33.37
1994/95	62.2	454.2	50.81	154.3	35.22
1995/96	520.3	511.9	54.14	140.7	22.26
1996/97	31.9	474.4	81.30	149.1	39.79
1997/98	127.3	570.5	85.10	171.3	45.43
Growth Rate/year (%)	-4.71	2.45	6.46	5.38	3.01

Note: Financial year is from July to June.
[1] Rice includes Basmati and non-Basmati rice.
[2] Seeds of coriander, poppy, cumin and castor, natural honey, chillies and raw wool.
Source: International Trade Organization Wing, Ministry of Commerce, Islamabad, Pakistan, 1997.

Table 2.9 Agricultural imports by principal commodity in Pakistan (US$ million).

F/Year	Edible Oil	Wheat	Tea & Coffee	Milk & Products
1980/81	264.86	63.91	119.47	39.54
1981/82	341.38	80.81	110.06	39.61
1982/83	288.46	68.69	131.84	45.83
1983/84	530.73	63.71	190.36	42.96
1984/85	458.98	181.56	231.47	34.32
1985/86	379.88	292.4	134.84	29.44
1986/87	236.45	68.91	154.26	31.78
1987/88	441.59	105.14	127.79	23.29
1988/89	446.24	364.82	154.89	31.55
1989/90	384.89	400.61	180.96	23.77
1990/91	401.89	139.06	166.53	31.55
1991/92	403.86	341.56	173.31	34.50
1992/93	585.11	465.34	207.85	31.1
1993/94	487.58	239.86	186.46	20.86
1994/95	998.03	413.44	187.99	17.75
1995/96	854.22	452.53	170.79	31.41
1996/97	611.5	485.36	134.2	17.29
1997/98	768.6	707.87	226.7	n.a.
Growth Rate/year (%)	6.47	15.20	3.84	-5.04

Note: Financial year is from July to June.
Source: International Trade Organization Wing, Ministry of Commerce, Islamabad, 1998.

3. Effects of Trade Liberalization at the National Level

An overview of production, marketing and demand of wheat, rice, and maize and effects of trade liberalization at the national level on these commodities is given in this section of the report.

3.1 Wheat

Wheat is the most important food crop as it is the staple food, and the largest cereal crop in terms of area in Pakistan. It occupies around 67% of the total area under food crops and about 37% of the total cultivated area in Pakistan. Since 1960-61, the wheat area increased by almost 75% up to 1997-98. The area under wheat during 1960-61 was only 4.64 million ha, but it increased to 6.98 million ha in 1980-81 and to 8.35 million ha during 1997-98. Similarly, wheat production has increased considerably during the same period. Wheat production increased from only 3.8 million tons in 1960-61 to 18.69 million tons during 1997-98. However, most of the increase in wheat production is attributed to increase in area. Improved wheat technology including HYVs, a greater use of inputs (mainly fertilizer and improved seed), irrigation water supply, and government policy have played an important role in increasing wheat production in Pakistan. Wheat yields increased by more than 60% from 1960-61 to 1975-76 (during the green revolution period), and after that until 1990, they were stagnant around 1.8 tons/ha. During 1990, the government considerably increased the support price of wheat, which resulted in significant improvement in wheat yields from 1.84 tons/ha to 2.2 tons/ha (15% increase) during 1997-98. Wheat area, production and yields are given in Table 3.1. Wheat is grown all over the country. Around 72% of the total wheat area is planted in Punjab province, 14% in Sindh, 10% in NWFP, and the rest is in Baluchistan province. More than 90% of the wheat area in Pakistan is sown under high yielding varieties. Area, production and yields of wheat by province are given in Appendix Table 5. The area expansion, production and yields over the last 50 years clearly show the regular and steady development of the wheat sector in Pakistan. These past trends are themselves to a large extent the result of the wider use of the new seed technologies, greater use of fertilizer, irrigation water supply and the government policies which induced farmers to produce more wheat.

Total food consumption has grown faster than the population (almost 3% per annum which is the highest among the nine most populous countries) in Pakistan, and per capita food consumption, as measured by calories consumed, has increased from 2,301 calories/day in 1979-80 to 2,532 calories/day in 1996-97. During the same period, protein intake also increased from 61.5 to 67.89 grams per day (SPFS 1998; Akhtar 1997a). Wheat is the major food item and accounts for more than 50% of total calorie and protein intake. It is estimated that by the year 2010, per capita food demand will rise to 3,055 calories/day and protein intake would reach 80 grams/day (SPFS 1998). It is expected that the changing composition of food demand (greater demand for higher value foodstuffs, such as livestock products, vegetables, pulses, edible oil) will result in a decline in cereal consumption. In spite of these changing food habits, wheat would continue to be an important component of food demand. Per capita consumption of wheat per annum decreased from 134 kg in 1978-79 to 130 kg in 1997-98 (Figure 3.1).

Due to high population growth in Pakistan, the food situation has always been fragile. The demand for wheat, the main staple food, often exceeded the domestic production. Despite all efforts by the government to achieve self-sufficiency in wheat, the domestic supply of wheat

met only 80-90% of the requirements and the rest was imported to meet the requirements of the country. Demand composition of wheat is given is Table 3.2. The growth rates of wheat consumption, production and population were more than 3% from 1979 to 1998. During the last 5 years, wheat production increased considerably. If trends during this time in area and yields can be maintained, self-sufficiency will indeed be within reach in the near future. To achieve this goal, the government has already taken many revolutionary steps, which include significantly increasing the support prices, providing credit to small farmers under a one window scheme, making fertilizer and improved seed available in a timely fashion etc.

Table 3.1 Area, production and yield of wheat in Pakistan.

F/Year	Area		Production		Yield		Wheat Area as % of Total Food Crops Area	Wheat Area as % of Total Cultivated Area
	'000 ha	increase %	'000 ton	increase %	kg/ha	increase %		
1970/71	5,977	28.84	6,476	69.80	1,083	31.75	62.46	31.11
1975/76	6,111	2.24	8,691	34.20	1,422	31.30	62.83	30.83
1980/81	6,984	14.29	11,475	32.03	1,643	15.54	65.00	34.40
1985/86	7,403	6.00	13,923	21.33	1,881	14.49	66.15	35.82
1986/87	7,706	4.09	12,016	-13.70	1,559	-17.12	65.99	36.84
1987/88	7,308	-5.16	12,675	5.48	1,734	11.23	67.15	35.37
1988/89	7,730	5.77	14,419	13.76	1,865	7.55	65.85	36.77
1989/90	7,845	1.49	14,316	-0.71	1,825	-2.14	65.80	37.46
1990/91	7,911	0.84	14,565	1.74	1,841	0.88	66.30	37.74
1991/92	7,878	-0.42	15,684	7.68	1,990	8.09	67.52	37.41
1992/93	8,300	5.36	16,157	3.02	1,946	-2.21	68.08	38.79
1993/94	8,034	-3.20	15,213	-5.84	1,893	-2.72	67.40	37.35
1994/95	8,170	1.69	17,002	11.76	2,081	9.93	66.44	37.91
1995/96	8,377	2.53	16,907	-0.56	2,018	-3.03	67.47	38.87
1996/97	8,085	-3.49	16,377	-3.13	2,026	0.40	66.86	35.26
1997/98	8,351	3.29	18,690	14.12	2,238	10.46	68.45	37.42
Growth Rate/year (%)	1.25		4.00		2.72			

* Food crops include wheat, rice, bajra, jowar, maize, and barley.
Note: Financial year is from July to June.
Source: Pakistan Economic Survey (various issues).

Figure 3.1 Per capita comsumption of wheat.
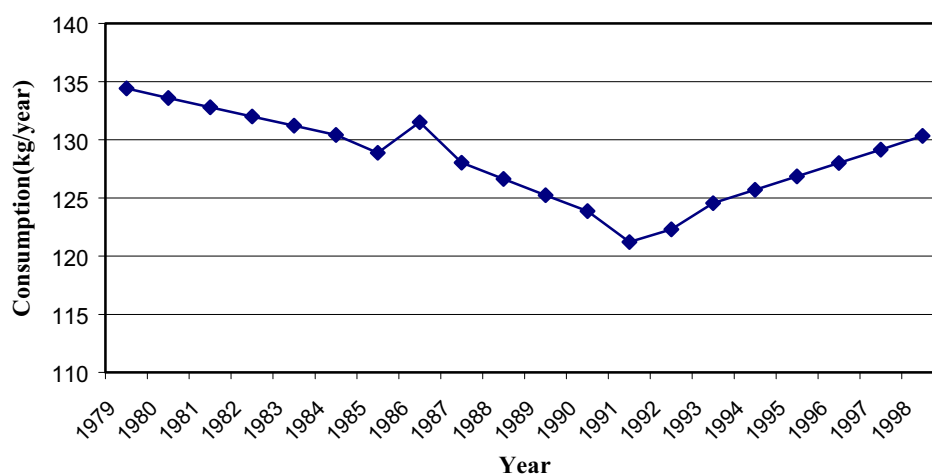
Source: Household Integrated Economic Survey (various issues).

Table 3.2 Production and consumption of wheat in Pakistan.

F/Year	Population (millions)	Per capita Consumption (kg/year)	Total Consumption ('000 tons)	Total Production ('000 tons)	Production as % of Consumption
1978/79	78.94	134.40	10,609.54	9,950	93.78
1979/80	81.36	133.59	10,869.18	10,857	99.89
1980/81	83.84	132.79	11,133.28	11,475	103.07
1981/82	86.44	132.00	11,409.67	11,304	99.07
1982/83	89.12	131.20	11,692.84	12,414	106.17
1983/84	91.88	130.42	11,982.63	10,882	90.81
1984/85	94.73	128.88	12,208.80	11,703	95.86
1985/86	97.67	131.52	12,845.56	13,923	108.39
1986/87	100.70	128.04	12,893.63	12,016	93.19
1987/88	103.82	126.63	13,146.89	12,675	96.41
1988/89	107.04	125.24	13,405.54	14,419	107.56
1989/90	110.36	123.86	13,669.30	14,316	104.73
1990/91	113.78	121.20	13,790.14	14,565	105.62
1991/92	117.31	122.30	14,347.36	15,684	109.32
1992/93	120.83	124.56	15,050.58	16,157	107.35
1993/94	124.48	125.69	15,646.33	15,213	97.23
1994/95	128.01	126.84	16,236.44	17,002	104.72
1995/96	131.63	127.99	16,847.52	16,907	100.35
1996/97	135.30	129.16	17,474.84	16,377	93.72
1997/98	143.26	130.33	18,671.30	18,690	100.10
Growth Rate/year (%)	3.19	-0.16	3.02	3.37	

Note: Financial year is from July to June.
Source: Pakistan Economic Survey (various issues).

To increase wheat production, generally the government announces the minimum support prices of wheat before the planting season and this is set on the recommendation of the Agricultural Prices Commission (APCom). The minimum support prices of wheat are given in Table 1.5. The commission sets the support prices of wheat on the basis of following factors (Government of Pakistan 1998):

- domestic requirements to be met from the previous crop,
- domestic demand, supplies and price situation,
- world situation of wheat production, consumption, stocks and trade,
- international prices,
- import parity prices of wheat,
- cost of production of wheat,
- nominal and real support prices of wheat,
- comparative economics of wheat and competing crops,
- support prices of wheat in selected countries,
- impact of increase in the support price of wheat on CPI and average household expenditure, and
- parity between prices of fertilizers and wheat support price.

PASSCO and the provincial food departments are entrusted with implementing the support prices of wheat in the country. These agencies procure wheat from the farmer at the support price. Wheat procurement during the last ten years is given in Table 3.3. Generally, the government procures around 20% of the total production to develop its stocks for the whole year. The provincial food department provides wheat to flour mills at the fixed issue price. The issue price is a uniform price fixed by the government at which wheat is supplied to flour mills from government stocks to run the food security program to deficit areas, urban populations and defense forces. Generally, the issue price of wheat does not cover the entire cost of procurement

by the food departments (procurement price and incidentals). For example, during 1997-98, the issue price was fixed at Rs. 6,500 per ton. The incidental cost determined by PASSCO and provincial food departments was about Rs. 1,000 per ton. Therefore, the total cost of around Rs. 7,000 per ton for the domestically procured wheat is not covered by the issue price, and accordingly in the provision of wheat from the government stores to the flour mills a subsidy of about Rs. 500/ton is involved. This subsidy on the issue price of wheat is borne by the provincial governments.

Table 3.3 Production and procurement (public sector) of wheat in Pakistan.

F/Year	Production ('000 tons)	Procurement ('000 tons)	Procurement as % of production
1985/86	13,923	2,533.3	18.2
1986/87	12,015.9	5,035.1	41.9
1987/88	12,675.1	3,975.2	31.36
1988/89	14,419.2	3,494	24.23
1989/90	14,315.5	4,134.9	28.88
1990/91	14,565	4,412.4	30.29
1991/92	15,684.2	3,159	20.14
1992/93	16,156.5	3,249	20.11
1993/94	15,213	4,120	27.08
1994/95	17,002.4	3,644	21.43
1995/96	16,907.4	3,740	22.12
1996/97	16,650.5	3,448	20.17
Growth Rate/year (%)	1.64	2.84	

Note: Financial year is from July to June.
Source: Agriculture Statistics of Pakistan, 1996-97.

The government also imported wheat at a much higher rate then the domestic support prices of wheat and provided the imported wheat to flour mills at the same fixed issue prices as for the domestically procured wheat. The unit subsidy involved in the imported wheat, which is generally quite high due to very high expenses involved in wheat import, is born by the federal government. During 1997-98, the average cost of wheat imports was Rs. 9,000/ton, while the same wheat was supplied to mills through provinces at Rs. 6,500/ton. This shows a net loss of Rs. 2,500/ton to government. This cost is born by the federal government because of the government policy to provide wheat flour to people, especially in cities, at controlled rates. The amount of federal and provincial subsidy varies from year to year mainly due to variable international prices of wheat and issue prices. Total federal and provincial subsidies on wheat from 1990-91 to 1996-97 are given in Table 3.4. The wheat imports, domestic procurement and provision of wheat at uniform issue prices to flour mills involve a huge subsidy. The total subsidy on wheat increased from Rs. 2.75 billion in 1990-91 to Rs. 9.53 billion during 1996-97. The average subsidy during this period was around Rs. 5.147 billion. The total subsidy on wheat import increased at a growth rate of 23% per year during this period, which is quite high and an alarming situation for a developing country like Pakistan. However, it is expected that with the recent increase in issue and procurement prices, and decline in international wheat prices, the amount of subsidy will considerably decrease. The minimum support prices of wheat in Pakistan have been considerably lower than the international prices. However, the government is gradually increasing the prices of wheat to the international level, and planning to phase out the subsidy on wheat import and discourage the smuggling of wheat out of the country to neighboring countries.

Table 3.4 Provincial and federal subsidies on wheat 1990-91 to 1996-97.

F/Year	Provincial Subsidy (Rs. million)	Federal Subsidy (Rs. million)	Total Subsidy (Rs. million)	Share in Total Subsidy	
				Federal (%)	Provincial (%)
1990/91	1,988	762	2,750	22.7	72.3
1991/92	1,831	2,175	4,006	54.3	45.7
1992/93	1,325	2,148	3,473	61.8	38.2
1993/94	2,760	354	3,114	11.4	88.6
1994/95	1,890	1,449	3,339	43.4	56.6
1995/96	3,169	6,648	9,817	67.7	32.3
1996/97	3,769	5,761	9,530	60.5	39.5
Average	2,390	2,737	5,147	53.6	46.4

Note: Financial year is from July to June.
Sources: For provincial subsidies: Pakistan Economic Survey, 1996-97.
   For federal subsidies: Ministry of Food, Agriculture and Livestock, Government of Pakistan 1998.

The government imported around 2 million tons of wheat during the 1990s. The foreign exchange spent on wheat imports was only US$64 million in 1981 but it increased to US$708 million in 1997-98 (Table 3.5). USA, Australia and Canada were the major suppliers of wheat to Pakistan during the last more than 15 years (Table 3.6).

During 1978-79 to 1997-98, the per annum growth rate of wheat production in the country was 3.37% which was marginally above the population growth rate of around 3.0%. Wheat consumption in Pakistan is increasing at a faster rate than production, and therefore, achieving self-sufficiency is questionable due to the increase in wheat imports and the low wheat yields compared to potential levels. To assure food security and meet domestic needs of the country, and to save scarce foreign exchange resources, domestic wheat production has to be increased either by expanding area or improving wheat yields. There is little scope for further increase in area under wheat, because of its competition for area with sunflower, canola and sugarcane. These competing crops are all high value crops and under such circumstances, horizontal expansion is neither desirable nor possible due to the economic value of these crops. Therefore, self-sufficiency can only be achieved through improving the wheat yield, which is significantly lower than the potential yield level in Pakistan.

Table 3.5 Wheat imports of Pakistan.

F/Year	Quantity ('000 ton)	Value (US$ million)	Imports as % of production
1980/81	20	63.91	0.17
1981/82	136	80.81	1.20
1982/83	396.01	68.69	3.19
1983/84	290.8	63.71	2.67
1984/85	544.6	181.56	4.65
1985/86	1,562	292.4	11.22
1986/87	377.71	68.91	3.14
1987/88	600.87	105.14	4.74
1988/89	1,802	364.82	12.50
1989/90	1,603	400.61	11.20
1990/91	627.3	139.06	4.31
1991/92	1,640.4	341.56	10.46
1992/93	2,356.6	465.34	14.59
1993/94	1,408	239.86	9.26
1994/95	2,273	413.44	13.37
1995/96	1,931	452.53	11.42
1996/97	2,383	485.36	14.31
1997/98	4,088	707.87	24.55
Growth Rate/year (%)	36.74	15.20	

Note: Financial year is from July to June.
Source: Agricultural Statistics of Pakistan.

Table 3.6 Country specific import of wheat in Pakistan (US$ million).

Year	USA	Germany	Canada	Australia	France	U.K.	Belgium	Philippines	Others*	Total
1982	30.45	11.29	16.50	10.36	10.48	0.00	1.70	0.00	0.00	80.78
1983	30.19	2.86	0.00	1.82	8.26	2.74	0.54	4.79	17.49	68.69
1984	29.20	6.04	0.00	0.00	5.84	1.84	0.00	5.11	15.63	63.67
1985	50.22	8.58	11.60	89.36	11.68	0.00	0.00	0.00	10.08	181.53
1986	140.64	18.70	7.20	97.63	0.00	0.00	8.59	0.00	19.70	292.45
1987	38.66	2.26	9.61	8.69	3.20	5.49	0.00	0.00	1.01	68.92
1988	67.45	3.25	9.36	3.50	15.90	0.00	0.00	5.13	0.56	105.15
1989	310.68	4.36	3.95	25.43	14.27	0.00	1.15	0.00	4.98	364.81
1990	290.26	5.71	13.51	75.79	0.00	0.00	0.00	0.00	15.42	400.69
1991	110.41	0.00	12.06	3.09	4.66	0.00	8.87	0.00	0.00	139.09
1992	213.16	4.65	34.00	62.08	22.54	0.00	0.00	0.00	5.06	341.49
1993	228.79	4.07	57.40	41.35	7.90	0.00	0.00	0.00	65.88	465.38
1994	225.11	7.76	6.54	0.42	0.00	0.00	0.00	0.00	0.00	239.83
1995	348.45	16.11	4.53	19.47	0.00	2.84	0.00	0.00	22.04	413.44
1996	393.42	0.00	2.10	55.53	0.00	1.40	0.00	0.00	0.00	452.45
1997	369.91	1.37	0.19	113.89	0.00	0.00	0.00	0.00	0.00	485.36
1998	386.78	0.00	47.55	273.54	0.00	0.00	0.00	0.00	0.00	707.87

* Albania, Argentina, China, Cyprus, Eastern Europe, Greece, Italy, Japan, Norway, Panama, South Korea, Saudi Arabia, Turkey.

Source: Federal Bureau of Statistics, Islamabad.

3.1.1 Impact of trade liberalization on wheat at the national level

The impact of trade liberalization on wheat at the national level was determined by statistical and simple marketing and price analysis. The conceptual frame of impacts of trade liberalization on agricultural commodities was discussed in Chapter 1. The statistical analysis of the impact of trade liberalization is based on regression analysis of demand, supply and price linkage equations for wheat. From these estimated equations, elasticity of supply, demand and price linkages were estimated to analyze the impact of trade liberalization.

Wheat is the staple food of Pakistan and the country imports around 2 million tons of wheat every year. The federal government subsidizes the imported wheat and provides it to flour mills at the same issue price at which the provincial governments provide wheat to flour mills. The subsidy on the issue price is around 7%. The subsidy on imported wheat varies from year to year depending on the international price of wheat. As a signatory of the WTO, Pakistan has to open up its market for wheat and it is expected that prices of wheat will increase. Also, the government has to terminate the subsidy on wheat. FAO's World Food Model (WFM) shows that implementation of the Uruguay Round is projected to raise international prices of wheat by 7% in real terms, compared with a scenario without the Round where wheat prices would have fallen by 3% (FAO 1995). Using the FAO (1995) results and assuming that Pakistan will discontinue subsidizing wheat, it is expected that prices of wheat will increase around 14% in the country after opening up its market for wheat. The impacts of trade liberalization on wheat supply, demand and prices were analyzed in the case of Pakistan, assuming prices of wheat will increase by a total 7% in the international market and 7% in the local wholesale market. Under the market access commitment of WTO member countries, it is assumed (using the FAO study and assuming discontinuation of the wheat subsidy in Pakistan) that the import prices of wheat may increase by 14% after full implementation of the UR agreement.

It is assumed that the world price for wheat is the value of imported wheat in Pakistan, which is c.i.f. Karachi and converted into Rupees using the average exchange rates for the particular time period. In estimating the supply, demand and price linkage equations for wheat, time series data from 1981 to 1998 were used.

To assess the impact of trade liberalization on wheat at the national level in Pakistan, supply, demand and price linkage equations were estimated using standard regression analysis. To get more reliable estimates, all the equations were also corrected for autocorrelation. All the

equations were used to assess the impact of a 7% increase in the international prices and a 7% increase in the wholesale price of wheat on domestic supply, demand and farm level and wholesale prices, and estimating the producer and consumer surplus. The estimated equations are given below:

- Estimated supply equation for Pakistan wheat (QSW):

$$\text{Log (QSW)} = 7.796 + 0.210*\text{Log (PFW)} + 0.012*\text{TREND} \qquad \text{(Equation I)}$$
$$\quad\quad\quad (6.066) \quad (1.774) \quad\quad\quad\quad (0.791)$$

$$R^2 = 0.90 \qquad\qquad E_{sw} = 0.210 \quad DW = 2.48$$

Where,
Log (QSW) = Natural log of total production of wheat in Pakistan ('000 tons)
Log (PFW) = Natural log of farm level prices received by wheat growers in Pakistan in Rs./ton
TREND= 1981=1, 1982=2,……….., 1998=18
E_{sw} = Elasticity of supply with respect to farm level price of wheat

- Estimated domestic demand equation for wheat in Pakistan:

$$\text{Log (PCCW)} = 2.988 - 0.104*\text{Log (PWW)} + 0.323*\text{Log (PCI)} - 0.026*\text{TREND}$$
$$\quad\quad\quad (3.318)\ (-1.827) \quad\quad\quad\quad (3.322) \quad\quad\quad (-2.437)$$
$$\text{(Equation II)}$$

$$R^2 = 0.82 \qquad E_{dw} = -0.104 \quad DW = 1.86$$

Where,
Log (PCCW) = Natural log of per capita consumption of wheat (kg)
QD_w = Total consumption of wheat (PCCW * Population in '000 tons)
Log (PWW) = Natural log of wholesale price of wheat in Lahore, Pakistan (Rs/ton)
Log(PCI) = Natural log of per capita income in Pakistan (Rs.)
TREND= 1981=1, 1982=2,……….., 1998=18
E_{dw}= Elasticity of demand of wheat with respect to wholesale price of wheat

- Price linkage equations: there are two sets of price linkage equations which represent the relationship between the price of wheat at farm level and price of wheat at various market channels.

- Wholesale price of wheat at Lahore versus world price of wheat:

$$\text{Log (PWW)} = -0.53 + 1.042*\text{Log(PIW)} \qquad\qquad \text{(Equation IIIa)}$$
$$\quad\quad\quad -(0.68)\ (10.916)$$

$$R^2 = 0.88 \qquad\qquad E_{ww} = 1.042 \quad DW = 1.82$$

Where,
Log (PWW) = Natural log of wholesale prices of wheat at Lahore, Pakistan in (Rs./ton).
Log (PIW) = Natural log of world price of wheat (Rs./ton)
E_{ww} = Elasticity of wholesale price of wheat at Lahore with respect to international prices of wheat or Elasticity of price transmission.

- Price of wheat received by farmers versus wholesale price of wheat at Lahore:

$$\text{Log (PFW)} = 0.244 + 0.95* \text{Log (PWW)} \qquad\qquad \text{(Equation IIIb)}$$
$$(0.546) \; (17.194)$$

$$R^2 = 0.98 \qquad\qquad E_{fw} = 0.95 \qquad DW = 1.90$$

Impact on domestic prices of wheat in Pakistan

From Equation IIIa, the elasticity of price transmission of the wholesale price of wheat at the Lahore market with respect to the international price of wheat (c.i.f. Karachi) is 1.042. This means that a 1% increase in the international price of wheat would increase the Lahore wholesale price of wheat by 1.042%. Therefore, the increase in world prices of wheat by 7% would have caused an increase in the 1997-98 wholesale price of wheat in Pakistan by 7.294%. In addition, the wholesale price of wheat will also increase by another 7% due to discontinuation of the wheat subsidy. Therefore, the total increase in the wholesale price of wheat would have been by 14.294% due to trade liberalization. Therefore, the wholesale price of wheat during 1997-98 would have increased from Rs. 7,401/ton to Rs. 8,459/ton.

The impact of the increase in world price of wheat and discontinuation of the subsidy on the issue price on the price received by farmers is estimated from Equation IIIb. It was estimated using the price elasticity of transmission of the wheat price received by farmers with respect to the Lahore wholesale price of wheat, which equals to 0.95. The impact is such that the price of wheat received by farmers would have increased by 13.58% in 1997/98 (from Rs. 6,125/ton to Rs. 6,957/ton).

Impact on the domestic supply of wheat

From Equation I, the elasticity of supply of wheat with respect to the farm level price of wheat is 0.21. The impact of the 7% increase in the world price of wheat and termination of the wheat subsidy on the issue price on the price of wheat received by Pakistani farmers is estimated at 13.58% in 1997/98. Therefore, this would cause an increase in the domestic production of wheat by 2.852%, i.e. from 18.69 million tons to 19.22 million tons during 1997-98. This increase in the production of wheat would generate a gain of producer surplus of Rs. 15,771 million (using the equation for producer surplus in the analytical framework in Chapter 1).

Impact on domestic demand for wheat in Pakistan

The impact on domestic demand for wheat was estimated from Equation II. The demand elasticity with respect to the Lahore wholesale price of wheat was -0.104. This means that a 1% increase in the Lahore wholesale price of wheat is estimated to decrease the domestic demand by 0.104%. Therefore, the impact of the increase in the world price of wheat by 7% and the 7% increase in the wholesale price of wheat due to discontinuation of government subsidy, would have caused the per capita demand for wheat to decline by 1.49% (from per capita consumption of 130.33 kg to 128.39 kg). Considering the total population of 143.28 during 1997/98, the domestic demand of wheat is estimated to decline from 18.67 million tons to 18.40 million tons during 1997/98. The increase in wholesale price of wheat in Pakistan and resulting decrease in quantity demanded would have caused a loss of consumers' surplus of Rs.19,482 million.

It can be concluded from the above analysis that the 7% increase in the international price of wheat due to the UR agreement and discontinuation of the subsidy on the issue price of wheat by 7% will have a positive impact on the production of wheat in Pakistan. On the other

hand, it will have a negative impact on the consumers. However, the overall impact or net loss to Pakistan is negative (Rs. 3,711 million).

3.2 Rice

After wheat, rice is the second most important staple food and it is also one of the major foreign exchange earning sources of Pakistan. In terms of cropped area, rice is the third most important crop after wheat and cotton, occupying around 10% of the total cultivated area and around 19% of the total area under food grains in the country (Table 3.7). Also, it contributes about 19% in total food grain production and around 15% of the total value added by the major crops in Pakistan. Since 1960-61, the area under rice has more than doubled, increasing at an annual growth rate of 1.6%. The area under rice was only 1.5 million ha in 1970-71 increasing to 2.32 million ha during 1997-98. During the same period, rice production increased at an annual growth rate of 2.55%. Rice production was only 2.2 million tons in 1970-71 but increased to 4.34 million tons during 1997-98. During the same time period, however, yields increased at a rate of less than 1% per annum. Most of the increase in total production of rice came through increase in area and less through increasing yields. Area, production and yields of rice are given in Table 3.7.

Table 3.7 Area, production and yield of rice in Pakistan.

F/Year	Area		Production		Yield		Rice Area as % of Total Food Crops Area	Rice Area as % of Total Area Cultivated
	'000 ha	% increase	'000 ton	% increase	kg/ha	% increase		
1970/71	1,503	27.27	2,200	113.59	1,464	67.89	15.71	7.82
1975/76	1,710	13.77	2,618	19.00	1,531	4.58	17.58	8.63
1980/81	1,933	13.04	3,123	19.29	1,616	5.55	17.99	9.52
1985/86	1,863	-3.62	2,919	-6.53	1,567	-3.03	16.65	9.01
1986/87	2,066	10.90	3,486	19.42	1,688	7.72	17.69	9.88
1987/88	1,963	-4.99	3,241	-7.03	1,651	-2.19	18.04	9.50
1988/89	2,042	4.02	3,200	-1.27	1,567	-5.09	17.40	9.71
1989/90	2,107	3.18	3,220	0.63	1,528	-2.49	17.67	10.06
1990/91	2,113	0.28	3,261	1.27	1,543	0.98	17.71	10.08
1991/92	2,097	-0.76	3,243	-0.55	1,546	0.19	17.97	9.96
1992/93	1,973	-5.91	3,116	-3.92	1,579	2.13	16.18	9.22
1993/94	2,187	10.85	3,995	28.21	1,826	15.64	18.35	10.17
1994/95	2,125	-2.83	3,447	-13.72	1,622	-11.17	17.28	9.86
1995/96	2,162	1.73	3,967	15.07	1,835	13.13	17.41	10.03
1996/97	2,251	4.14	4,305	8.53	1,912	4.20	18.62	9.82
1997/98	2,320	3.07	4,338	0.77	1,870	-2.2	19.02	10.12
Growth Rate/year (%)	1.62		2.55		0.91			

Note: Financial year is from July to June.
* Food crops include wheat, rice, bajra, jowar, maize, and barley.
Source: Pakistan Economic Survey (various issues).

The two major rice-growing provinces are Punjab and Sindh, which together accounted for 60% of the total area cultivated during 1996-97. Basmati rice, a fine non-glutinous, long grain and aromatic variety is a high value export crop, which is mainly cultivated in Punjab province. Around 52% of the total area under rice was under Basmati rice and the rest was under non-Basmati (mainly IRRI-type coarse rice varieties) varieties of rice. Province-wise and variety-wise area production and yields of rice are given in Appendix Table 7. Pakistan earns considerable foreign exchange from the export of long grain aromatic Basmati rice. In addition, it also exports non-Basmati rice, which is mainly cultivated in Sindh province.

As the second staple food of Pakistan, rice is mainly utilized for human consumption. Per capita consumption of rice from HIES data is given in Figure 3.2. Per capita consumption increased from 14.88 kg/year in 1979 to 17.34 kg/year during 1998 (per annum growth rate of 0.81%). Total consumption of rice increased from 1.17 million tons in 1978-79 to 2.4 million tons in 1997-98, an annual growth rate of 4.02%. Total human consumption of rice as a percentage of total production was 50-60% during the 1990s. Data on rice consumption and production of rice are given in Table 3.8. Rice consumption data are based on statistical samples, as consumption over one month, and are subject to seasonal as well as recall biases; therefore, these figures may be a little lower than the actual consumption of rice in Pakistan. On the other hand, with the very high growth rate of the poultry sector in Pakistan, the use of broken rice in feed is increasing considerably. Data on the use of rice in feed are not available. The actual quantity of broken rice used in the feed sector is not included in estimating the total consumption of rice in Pakistan. Therefore, the actual consumption of rice might be quite high compared to the human consumption of rice given in Table 3.8. Rice has many milling by-products, such as husk, bran, rice germ, and polishings. These products have several food, feed and pharmaceutical uses.

Figure 3.2 Per capita consumption of rice in Pakistan.
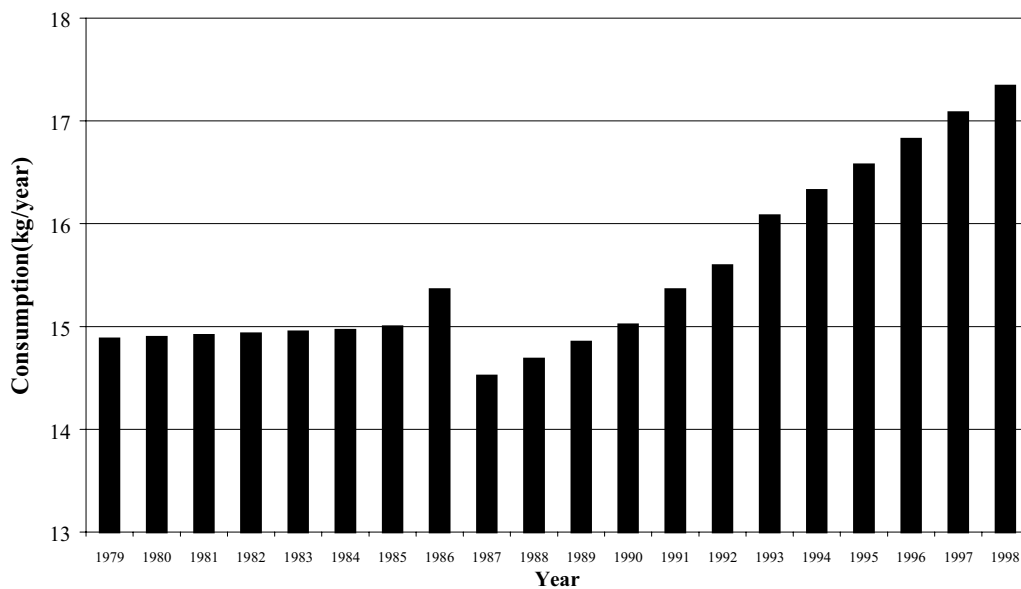
Source: Household Integrated Economic Survey (various issues).

Table 3.8 Production and consumption of rice in Pakistan.

F/Year	Population (millions)	Per Capita Consumption (kg/year)	Total Consumption ('000 tons)	Total Production ('000 tons)	Consumption as % of Production
1978/79	78.94	14.88	1,174.63	3,272	35.90
1979/80	81.36	14.90	1,212.03	3,216	37.69
1980/81	83.84	14.91	1,250.41	3,123	40.04
1981/82	86.44	14.93	1,290.67	3,430	37.63
1982/83	89.12	14.95	1,332.22	3,445	38.67
1983/84	91.88	14.97	1,375.05	3,340	41.17
1984/85	94.73	15.00	1,420.95	3,315	42.86
1985/86	97.67	15.36	1,500.21	2,919	51.39
1986/87	100.70	14.52	1,462.16	3,486	41.94
1987/88	103.82	14.68	1,524.50	3,241	47.04
1988/89	107.04	14.85	1,589.54	3,200	49.67
1989/90	110.36	15.02	1,657.37	3,220	51.47
1990/91	113.78	15.36	1,747.66	3,261	53.59
1991/92	117.31	15.59	1,829.27	3,243	56.41
1992/93	120.83	16.08	1,942.95	3,116	62.35
1993/94	124.48	16.32	2,032.06	3,995	50.87
1994/95	128.01	16.57	2,121.45	3,447	61.54
1995/96	131.63	16.82	2,214.60	3,967	55.83
1996/97	135.30	17.08	2,310.95	4,305	53.68
1997/98	143.26	17.34	2,484.10	4,338	57.26
Growth Rate/year (%)	3.19	0.81	4.02	1.50	

Note: Financial year is from July to June.
Source: Pakistan Economic Survey (various issues).

Rice mills in Pakistan are classified into hullers, shellers and modern types of units in terms of function and scale. The modern units are the latest and provide the best quality rice and the percentage of broken rice in these units is very low compared to traditional shellers. However, these modern rice-milling units process less than 10% of the total quantity available for processing. Around 90% of the rice available in the commercial market is processed by the traditional sheller type mills and the rest is processed by the few modern mills. A few husking units also operate at the local level and supply rice to local markets. Due to the limited capacity of the modern mills, most of the rice available for export is processed by the traditional shellers. The percentage of broken grains is higher in the rice processed by these shellers and it usually does not conform to the standard specifications required for export. There is a need for efficient milling in Pakistan to reduce the percentage of broken rice and to provide export quality rice to compete in the international market.

Before the rice-planting season, the government generally announces its rice policy including the support prices of paddy and rice, and targets for procurement and exports. The minimum support price is usually announced before the start of the rice-growing season and is set on the recommendation of APCom. The following factors are considered in formulating proposals for support prices of various varieties of paddy rice:

- domestic stocks, procurement and exports of rice during the previous year,
- prices of paddy in domestic markets,
- world supply, demand, stocks and trade situation of milled rice,
- export parity prices,
- cost of production of paddy rice,
- real prices of Basmati and IRRI paddy,
- comparative economics of paddy rice and competing crops,
- processing costs and value of rice by-products, including bran, husk, broken rice, etc.

The minimum support prices of rice and paddy, by type, are given in Table 1.6. The prices of all types of paddy rice almost doubled in the 1990s. The government has increased the nominal prices of both paddy and rice at an annual growth rate of more than 10% during the 1990s.

Until 1986-87, the Rice Export Corporation of Pakistan (RECP) had a monopoly on procurement of rice for export purposes and after that, the private sector was also allowed to procure and export rice. RECP terminated rice procurement during 1995-96, and presently rice procurement and export is fully under the private sector. The government had a sort of supervisory role in the export of rice. Presently, RECP is not functional and has been merged with the Trading Corporation of Pakistan (TCP) with effect from December 31st, 1998. The TCP was set up as private limited company in July 1967 under the Companies Act, 1913, under the sole ownership and administrative control of the Federal Ministry of Commerce. TCP plays a key role in food security, as it is responsible for making immediate arrangements for importing any food items whenever any shortage occurs in the country.

Pakistan is one of the major exporters of rice in the world with shares in rice world trade of more than 10% and around 15% in Asian rice trade during the 1990s. Rice exports from Pakistan accounted for more than 40% of total production during the 1990s. The highest share of total exports to total production was during 1997-98 (Table 3.9). Export earnings from rice peaked during 1981 mainly due to high prices of rice in the world market, and decreased to US$220 million in 1984-85 due to a bad rice crop. During 1997-98, foreign exchange earnings from rice exports were US$562.4 million mainly due to a good crop in Pakistan and high international demand for rice. Export earnings from Basmati and non-Basmati were US$253 million and US$309 million during 1997-98, respectively. Export of Basmati, non-Basmati and total rice and their shares in total production are given Table 3.9. The market for Pakistan's export of Basmati rice is concentrated in a few importing countries in the near east, which account for about 95% of the total export of Basmati rice. The major competitor of Pakistan in the international market for Basmati rice is India. The markets of Pakistan's Basmati rice are Dubai, Oman, Saudi Arabia, UK, Bahrain, Iran, Qatar, Kuwait, Yemen, Mauritius, etc. The demand for non-Basmati rice comes from Indonesia, Kenya, African countries, South Africa, Sri Lanka, Tanzania, etc. The major competitors of Pakistan for this type of rice in the international market are Vietnam, Burma, China, and Thailand. Country specific exports of Basmati and non-Basmati rice are given in Tables 3.10 and 3.11.

Table 3.9 Rice exports from Pakistan.

F/Year	Basmati				Non-Basmati				Total			
	Total Production ('000 tons)	Total Exports ('000 tons)	Total Export as % of Total Produced	Value of Exports (US$ million)	Total Production ('000 tons)	Total Exports ('000 tons)	Total Export as % of Total Produced	Value of Exports (US$ million)	Total Production ('000 tons)	Total Exports ('000 tons)	Total Export as % of Total Produced	Value of Exports (US$ million)
1980/81	980.00	409.60	41.80	290.09	2,143.20	834.00	38.91	275.28	3,123.00	1,243.60	39.82	565.37
1981/82	1,054.90	261.80	24.82	197.42	2,374.80	689.20	29.02	219.22	3,430.00	951.00	27.73	416.63
1982/83	1,010.40	237.70	23.53	148.27	2,434.30	667.10	27.40	141.50	3,445.00	904.80	26.26	589.82
1983/84	965.20	406.00	42.06	243.77	2,374.30	859.00	36.18	178.07	3,340.00	1,265.00	37.87	421.86
1984/85	958.30	174.10	18.17	108.79	2,356.90	544.60	23.11	111.63	3,315.00	718.70	21.68	220.42
1985/86	883.10	260.50	29.50	173.60	2,035.80	1,055.50	51.85	168.88	2,919.00	1,316.00	45.08	342.47
1986/87	916.90	187.70	20.47	133.06	2,569.40	1,052.70	40.97	161.05	3,486.00	1,240.40	35.58	294.11
1987/88	943.20	221.80	23.52	160.70	2,297.70	988.40	43.02	203.19	3,241.00	1,210.20	37.34	363.90
1988/89	1,099.00	228.00	20.75	156.95	2,101.20	626.30	29.81	153.56	3,200.00	854.30	26.70	310.51
1989/90	1,217.00	208.00	17.09	141.93	2,003.10	535.90	26.75	97.93	3,220.00	743.90	23.10	239.86
1990/91	1,220.20	466.40	38.22	220.94	2,040.60	738.20	36.18	129.04	3,261.00	1,204.60	36.94	349.93
1991/92	1,092.20	557.90	51.08	230.75	2,150.90	853.90	39.70	185.43	3,243.00	1,411.80	43.53	416.18
1992/93	1,124.10	462.20	41.12	199.28	1,992.00	569.90	28.61	117.13	3,116.00	1,032.10	33.12	316.41
1993/94	1,266.70	305.70	24.13	125.97	2,728.00	678.60	24.88	116.67	3,995.00	984.30	24.64	242.64
1994/95	1,351.60	452.30	33.46	184.03	2,094.90	1,399.97	66.83	270.58	3,447.00	852.30	24.73	454.61
1995/96	1,487.50	716.40	48.16	296.04	2,479.00	884.10	35.66	214.59	3,967.00	1,600.50	40.35	510.63
1996/97	1,563.70	457.20	29.24	204.72	2,741.10	1,310.00	47.79	263.60	4,305.00	1,767.20	41.05	468.30
1997/98	1,539.00	552.38	35.89	253.30	2,799.00	1,540.41	55.03	309.10	4,338.00	2,092.79	48.24	562.40
Growth Rate/year (%)	3.16	1.89		-0.84	1.65	3.91		0.73	2.08	3.31		-0.03

Note: Financial year is from July to June.
Source: Pakistan Economic Survey (various issues).
      Agricultural Statistics of Pakistan 1996-97.

Table 3.10 Country-wise export of Basmati rice from Pakistan (US$ million).

Country	1993-94	1994-95	1995-96	1996-97	1997-98
Dubai	29.7	44.1	68.3	60.2	70.2
Oman	13.9	16.5	22.1	23.5	32.7
Saudi Arabia	33.7	27.7	28.8	44.8	28.4
U.K	-	-	2.6	4.7	13.5
Bahrain	4.4	4.8	5.7	9.2	12.5
Iran	6.1	47.4	88.3	5.4	12
Qatar	4.6	4.9	9	13.5	11.8
Kuwait	9	5.1	7	6	8.9
Yemen	2.7	3.5	4	4.4	7.7
Mauritius	-	-	7.7	4.5	6.2
Others	21.9	29.7	51.8	28.7	49.4
Total	126	183.7	295.3	204.9	253.3

Source: Federal Bureau of Statistics, Islamabad.

Table 3.11 Country-wise export of non-Basmati rice from Pakistan (US$ million).

Country	1993-94	1994-95	1995-96	1996-97	1997-98
Indonesia	-	46.7	19	5.6	84.5
Kenya	8.3	13.6	14	51.8	59.5
African Countries	37.7	77.3	56.6	67.8	49.8
South Africa	-	-	-	16.1	25.1
Sri Lanka	-	-	1.7	21.5	24.6
Tanzania	-	-	2.6	6.5	8.6
Dubai	5.7	14	16.1	18.5	7.3
Afghanistan	6.7	12.3	6.5	8.3	4
Iran	4.1	6.5	10.8	5.1	3.4
Philippines	-	-	16.9	3.5	-
Others	53.7	100.1	64.4	58.9	42.3
Total	116.8	270.5	208.6	263.6	309.1

Source: Federal Bureau of Statistics, Islamabad

Pakistan has a comparative advantage in the production of Basmati rice and is a major producer and exporter of this type of rice (Longmire and Zebond 1993). The government has already liberalized the export of rice from Pakistan. To take full advantage of liberalized policies of the government of Pakistan and especially the GATT, there is a need to put more emphasis on improving the quality of both Basmati and non-Basmati rice to compete in the international market. In addition, good infrastructural facilities such as transport, ports, storage and equipment for quality control need to be developed. Presently, all rice exporters in the private sector are registered with the EPB, and they have their own association called the Rice Exporter's Association of Pakistan (REAP). REAP is playing an important role in improving the quality of the exportable surplus and increasing the rice export from Pakistan. To stabilize rice prices and discourage adulteration (mixing high quality rice with lower quality broken rice) the EPB and REAP jointly fix the minimum export price (MEP) for various qualities of rice on a weekly basis. This may help to improve Pakistan's image in the international market. Also REAP has been authorized to issue quality certificates to rice exporters of Pakistan.

3.2.1 Impact of trade liberalization on rice at the national level

The impact of trade liberalization on rice at the national level was determined by statistical and simple marketing and price analysis. The conceptual frame of the impact of trade liberalization on agricultural commodities is discussed in Chapter 1. The statistical analysis of the impact of trade liberalization is based on regression analysis of demand, supply and price linkage equations for both Basmati and non-Basmati types of rice. From these estimated equations, elasticity of supply, demand and price linkages were estimated to analyze the impact of trade liberalization.

Pakistan is one of the main exporters of rice, especially for Basmati type rice, and exports around 40 to 50% of the total production of rice in the country. Also, rice is the second staple food after wheat in Pakistan. Pakistan has always been self-sufficient in rice, and possessed an exportable surplus each and every year in the past. Therefore, under the minimum access commitment of WTO, there is really no need in the case of Pakistan to import rice. Also, compared to the value of rice exports, the value of the export subsidy in the form of freight subsidy and refund on sales tax custom duties is negligible, which is well below the WTO standard.

Pakistan has comparative advantages in rice production, and would benefit with opening up of other international markets such as Japan's commitment to buy rice from the international market. Also, many WTO member countries have to reduce their domestic subsidies on rice up to 20%, and as a result their domestic production would decline considerably. It is expected that their export of rice would decline considerably and prices of rice in the international market would increase considerably. Pakistan would greatly benefit from rice trade liberalization. The opening up of the rice market following the UR and the stronger growth in import demand relative to export supplies are expected to boost international rice prices. The study conducted by FAO (1995a) on the impact of the Uruguay Round on agriculture has determined that in real terms, the price of rice is likely to increase by around 7% in the international market. Using the results of FAO (1995a), the impacts of trade liberalization on rice supply, demand and prices were analyzed in the case of Pakistan. Under the market access commitment of WTO member countries, it is assumed that the export prices of Pakistani rice may increase by 7%.

It is assumed that the world price for milled Basmati and non-Basmati rice is the export unit value of Pakistan Basmati and non-Basmati rice based on FAQ (fair average quality) clean rice (f.o.b. Karachi port of Pakistan). In estimating the supply, demand and price linkage equations for both Basmati and non-Basmati rice, time series data from 1981 to 1998 were used. Data used for estimating supply, demand and price linkage equations for Basmati and non-Basmati rice are given in Appendix Table 9.

To assess the impact of trade liberalization on rice at the national level in Pakistan, supply, demand and price linkage equations were estimated using standard regression analysis. To get more reliable estimates, all the equations were also corrected for autocorrelation. All the equations were used to assess the impact of a 7% increase in the international price of rice on domestic supply, demand and farm level and wholesale prices, and to estimate the producer and consumer surplus. The estimated equations are given below:

- Estimated supply equation for Pakistani Basmati rice (QSBR):

  Log (QSBR) = 1.034 + 0.259*Log (PFBR(-1))+ 0.555*Log(QSBR(-1))   (Equation I)
       (0.965) (2.161)   (2.072)

  R^2 = 0.92 E_{sbr} = 0.259   DW=1.87

  Where,
  Log (QSBR) = Natural log of total production of Basmati rice in Pakistan ('000 tons)

  Log (PFBR) = Natural log of farm level prices received by Basmati paddy growers (Rs./ton)
  E_{sbr}= Elasticity of supply with respect to farm level price of Basmati paddy

- Estimated domestic demand equation for Basmati rice in Pakistan:

  Log (QDBR) = 9.716 – 0.397*Log (PWBR) + 0.048*TREND   (Equation II)

(2.528) (-1.87)   (1.45)

$R^2 = 0.57$ $E_{dbr} = 0.397$ DW=1.87

Where,
Log (QDBR) = Natural log of total consumption of Basmati rice ('000 tons)

Log (PWBR) = Natural log of the wholesale price of Basmati rice in Lahore, Pakistan (Rs./ton)

E_{dbr}= Elasticity of demand of rice with respect wholesale price of Basmati rice in Rs./ton.

- Price linkage equations: there are two sets of price linkage equations which represent the relationship between price of paddy at farm level and price of milled rice at various market channels.
  Wholesale price of milled Basmati rice at Lahore versus export price of Pakistan Basmati rice in Rs./ton:

Log (PWBR) = -1.369 + 1.109*Log(PEBR)   (Equation IIIa)
             (-0.709)   (5.365)

$R^2 = 0.64$ $E_{wbr} = 1.109$ DW=1.54

Where,
Log (PWBR) = Natural log of wholesale prices of milled Basmati rice at Lahore (Rs./ton)
Log (PEBR) = Natural log of export price of Basmati rice of Pakistan in Rs./ton.
E_{wbr} = Elasticity of wholesale price of Basmati rice at Lahore with respect to export price of Pakistan Basmati rice.

Price of Basmati paddy received by farmers versus wholesale price of Basmati rice at Lahore:

Log (PFBR) = -1.467 + 1.074*Log (PWBR)   (Equation IIIb)
             (-2.370) (15.615)

$R^2 = 0.94$ $E_{fbr} = 1.074$ DW=2.10

PWBR: Natural log of price of Basmati: paddy received by farmers

- Estimated supply equation for non-Basmati rice (QSNBR)

Log (QSNBR) = 4.713+0.428*Log (PFNBR)-0.026*TREND
              (4.527) (2.863)   (-2.158)   (Equation IV)

$R^2 = 0.61$ $E_{sbr} = 0.428$ DW=2.01

Where,

Log (QSNBR) = Natural log of total production of non-Basmati rice in Pakistan ('000 tons)

Log (PFNBR) = Natural log of farm level prices received by non-Basmati paddy growers (Rs./ton)
TREND= 1981=1, 1982=2,..........., 1998=18
E_{snbr}= The elasticity of supply with respect to farm level price of non-Basmati paddy

- Estimated domestic demand equation for non-Basmati rice in Pakistan:

    Log (QDNBR) = 7.403 – 0.121*Log (PWNBR) – 0.11*TREND   (Equation V)
                 (2.05) (-1.04)   (1.26)

    R^2 =0.56 E_{dnbr} = -0.121 DW=2.96

    Where,
    Log (QDNBR) = Natural log of total consumption of non-Basmati rice ('000 tons)

    Log (PWNBR) = Natural log of wholesale price of non-Basmati rice in Lahore, Pakistan (Rs../ton)

    E_{dnbr}= Elasticity of demand of rice with respect wholesale price of non-Basmati rice in Rs./ton.

- Price linkage equations: There are two sets of price linkage equations which represent the relationship between price of paddy at farm level and price of milled rice at various market channels.
    Wholesale price of milled non-Basmati rice at Lahore versus export price of Pakistan non-Basmati rice in Rs./ton:

    Log (PWNBR) = -1.108 + 1.127*Log (PENBR)   (Equation VIa)
                 (-1.41)   (12.33)

    R^2 = 0.91 E_{wnbr} = 1.127 DW=1.76

    Where,
    Log (PWNBR) = Natural log of wholesale prices of milled Non-Basmati rice at Lahore, Pakistan in Rs./ton
    Log (PENBR) = Natural log of export price of non-Basmati rice of Pakistan in Rs./ton.
     E_{nbr} = Elasticity of wholesale price of non-Basmati rice at Lahore with respect to export price of Pakistan non-Basmati rice.

- Price of non-Basmati paddy received by farmers versus wholesale price of non-Basmati rice at Lahore:

    Log (PFNBR) = 0.275 + 0.888* Log (PWNBR)   (Equation VIb)
                 (0.88) (23.62)

    R^2 = 0.97 E_{fnbr} = 0.89   DW=1.98

Chapter 3

Impact on domestic prices of Basmati and non-Basmati rice in Pakistan

From Equation IIIa, the elasticity of price transmission of wholesale price of Basmati rice at the Lahore market with respect to the Pakistani export price of Basmati rice is 1.109. This means that a 1% increase in the Pakistani export price of Basmati rice would increase the Lahore wholesale price of Basmati rice by 1.109%. Therefore, the increase in export price of Basmati rice by 7% causes an increase in the 1997-98 wholesale price of Basmati rice by 7.762% (from Rs. 17,417.75/ton to Rs. 18,769.67/ton).

The impact of the increase in world price of rice on the price received by farmers of Basmati growers is estimated from Equation IIIb. It was estimated using the price elasticity of transmission of the Basmati paddy price received by farmers with respect to the Lahore wholesale price of Basmati rice which equals 1.074. The impact is such that the price of Basmati paddy received by farmers would have increased in 1997-98 by 8.337% (from Rs. 9,375/ton to Rs. 10,156.59/ton).

From Equation VIa, the elasticity of price transmission of the wholesale price of non-Basmati rice at the Lahore market with respect to the Pakistani export price of non-Basmati rice is 1.27. This means that a 1% increase in the Pakistani export price of non-Basmati rice would increase the Lahore wholesale price of non-Basmati rice by 1.127%. Therefore, the increase in the export price of non-Basmati rice by 7% causes an increase in the 1997-98 wholesale price of non-Basmati rice by 7.889% (from Rs. 9,829/ton to Rs. 10,604.41/ton).

The impact of the increase in world price of rice on the price received by non-Basmati growers is estimated from Equation VIb. It was estimated using price elasticity of transmission of the non-Basmati paddy price received by farmers with respect to the Lahore wholesale price of non-Basmati rice which equals 0.89. The impact is such that the price of non-Basmati paddy received by farmers would have increased in 1997-98 by 7.02% (from Rs. 4,375/ton to Rs. 4,682.13/ton).

Impact on the domestic supply of Basmati and non-Basmati rice

From Equation I, the elasticity of supply of Basmati rice with respect to the farm level price of Basmati rice is 0.259. The impact of the 7% increase in the world price of rice on the price of Basmati paddy received by the Pakistani farmers is estimated at 8.337%. Therefore, this would cause an increase in the domestic production of Basmati rice by 2.159%, i.e. from 2,370 thousand tons (1,539 thousand tons of rice * 1.54) to 2,421.17 thousand tons (1,572.23 thousand tons of rice * 1.54). This increase in the production of Basmati paddy rice would generate a gain of producers' surplus of Rs.1,872.37 million (using the equation for producer's surplus in the analytical framework in Chapter 1).

From Equation IV, the elasticity of supply of non-Basmati rice with respect to the farm level price of non-Basmati rice is 0.428. The impact of the 7% increase in the world price of rice on the price of non-Basmati paddy received by Pakistani farmers is estimated at 7.02%. Therefore, this would cause an increase in the domestic production of non-Basmati paddy by 3.005%, i.e. from 4,310.46 thousand tons (2,799 thousand tons of rice * 1.54) to 4,439.99 thousand tons (2,883 thousand tons of rice * 1.54). This increase in the production of non-Basmati paddy rice would generate a gain of producers' surplus of Rs. 3,392.59 million (using the equation for producer's surplus in the analytical framework in Chapter 1).

Therefore, on the whole, the 7% increase in the world prices of rice would have increased the total production of rice (both Basmati and non-Basmati) from 4.338 million tons to 4.455 million tons (2.692% increase) during 1997-98. This increase in the total production of rice would have generated a gain of producers' surplus of Rs. 5,264.96 million in Pakistan during 1997-98.

Impact on domestic demand for rice in Pakistan

The demand elasticity of Basmati rice with respect to Lahore Basmati rice was -0.378. This means that a 1% increase in the wholesale price of Basmati rice is estimated to decrease the domestic demand by 0.397%. Therefore, the impact of the 7% increase in the world price of rice on the wholesale price of rice by 7.763% would have caused the domestic demand for Basmati rice to decline by 3.082% (reduced total Basmati rice consumption from 894.28 tons to 866.74 thousand tons) during 1997-98. The increase in the wholesale price of Basmati rice in Pakistan and resulting decrease in quantity demanded would have caused a loss of consumer surplus of Rs. 1,190.54 million.

The demand elasticity of non-Basmati rice with respect to the wholesale price was 0.121 which means that 1% increase in the wholesale price is estimated to decrease the domestic demand by 0.121% (Equation V). Therefore the impact of the 7% increase in international prices of rice on the wholesale prices of non-Basmati rice in Pakistan by 7.889% would have caused the domestic demand of non-Basmati rice to decline by 0.955% (decreased total consumption of non-Basmati rice from 1,090.65 thousand tons to 1,080.23 thousand tons) during 1997-98. This increase in the wholesale price of non-Basmati rice and resulting decrease in quantity demanded would have caused a loss of consumer surplus of Rs. 841.66 million (using the equation for consumer surplus in the analytical framework of Chapter 1).

It can be concluded from the above analysis that the 7% increase in the international prices of rice due to the UR agreement will have a positive impact on the production of both Basmati and non-Basmati rice in Pakistan. On the other hand, it will have a negative impact on consumers. However, the overall impact or net gain to Pakistan from both Basmati and non-Basmati rice is positive (Rs. 3,232.76 million).

3.3   Maize

After wheat and rice, maize is the third most important cereal crop in Pakistan. Maize occupies around 4% of the total cropped area and 7% of the total area under food crops. It accounts for 3.5% of the value of agricultural output in Pakistan. The area under maize increased at a rate of 1.14% per annum from 1970-71 to 1997-98. Similarly, maize production grew at an annual rate of 2.1% during the same period. However, maize yields are very low, averaging only 1.3 ton/ha from 1970-71 to 1997-98. The national average maize yield increased from 1,122 kg/ha in 1970-71 to 1,440 kg/ha during 1997-98. This increase in yield can be mainly due to the wider adoption of improved maize varieties and hybrid seeds provided by the private sector. Maize yields in Pakistan are considerably lower than the potential that could be achieved using improved production technology packages (Chatha 1982; Chaudhary 1983; CIMMYT 1989; Akhtar 1997a, b, c). Area, production and maize yields in Pakistan are given in Table 3.12.

Table 3.12 Area, production and yield of maize in Pakistan.

F/Year	Area		Production		Yield		Maize Area as % of Total Food Crops Area	Maize Area as % of Total Area Cultivated
	'000 ha	% increase	'000 ton	% increase	kg/ha	% increase		
1970/71	640	33.33	718	63.55	1,122	22.62	6.69	3.33
1975/76	620	-3.13	803	11.84	1,294	15.33	6.37	3.13
1980/81	769	24.03	970	20.80	1,262	-2.47	7.16	3.79
1985/86	804	4.55	1,009	4.02	1,256	-0.48	7.18	3.89
1986/87	816	1.49	1,111	10.11	1,361	8.36	6.99	3.90
1987/88	854	4.66	1,127	1.44	1,320	-3.01	7.85	4.13
1988/89	866	1.41	1,204	6.83	1,391	5.38	7.38	4.12
1989/90	863	-0.35	1,179	-2.08	1,367	-1.73	7.24	4.12
1990/91	845	-2.09	1,185	0.51	1,401	2.49	7.08	4.03
1991/92	848	0.36	1,203	1.52	1,419	1.28	7.27	4.03
1992/93	868	2.36	1,184	-1.58	1,364	-3.88	7.12	4.06
1993/94	879	1.27	1,213	2.45	1,380	1.17	7.37	4.09
1994/95	890	1.25	1,318	8.66	1,481	7.32	7.24	4.13
1995/96	881	-1.01	1,283	-2.66	1,457	-1.62	7.10	4.09
1996/97	871	-1.14	1,259	-1.87	1,445	-0.82	7.20	3.80
1997/98	869	-0.23	1,251	-0.63	1,440	-0.35	7.12	3.79
Growth Rate/year (%)	1.14		2.08		0.93			

Note: Financial year is from July to June.
* Food crops include wheat, rice, bajra, jowar, maize, and barley.
Source: Pakistan Economic Survey (various issues).

Maize is grown all over Pakistan. NWFP, the northern province of Pakistan, produced almost two-thirds of the national production and Punjab accounted for around 35% of the total production in the country. Province-wise area, production and yield of maize are given in Appendix Table 8.

In Pakistan, maize is basically a summer season crop planted in lowland and mid-altitude agro-ecological zones of NWFP and Punjab (CIMMYT 1989). Approximately two-thirds of the maize is planted in irrigated areas and the rest is farmed under strictly rain-fed conditions. The maize crop is mainly grown by small farmers who utilize it as a multi-purpose food and forage crop. Generally these resource poor maize growers use marginal land to plant this crop, use less inputs compared to wheat, rice and cotton, and the major portion of their produce is used for home/farm consumption (CIMMYT 1989; Tetlay et al. 1987; Byerlee et al. 1984; Akhtar et al. 1986).

In NWFP, maize is basically cultivated for human consumption, while only a little maize is consumed as food in Punjab. However, even in NWFP province, maize demand is declining as wheat is substituting for maize (Amir 1986). Around 20% of the total national maize production is utilized by industry in Pakistan (Amir 1986; Akhtar 1998). More than half of industry's share is used in the wet-milling industry to produce starch, sweeteners, corn oil, glucose, custard powder, and gluten. It is expected that the demand for maize products will improve with rapid urbanization and rising real national income in Pakistan. The other almost half share of industry is consumed by the poultry industry for manufacturing feed. Maize is the most suitable cereal for poultry feed in Pakistan and there is a considerable demand for maize in this sector. However, the price of maize in all major markets of Pakistan remained higher than the prices of other cereals, such as wheat (Akhtar 1997a). Due to higher prices of maize, feed producers prefer to use damaged wheat, broken rice, barley and sorghum, which are cheap substitutes for maize. The demand for maize in the industrial sector for value added products is

expected to improve significantly in the near future because of high demand for poultry feed, starch and other products.

It is estimated that industrial and feed demand for maize is growing at an annual rate of 6.8% (CIMMYT 1989). Table 3.13 shows that actual total production of maize in the country increased at an annual rate of 1.81% from 1985-86 to 1997-98. The demand for industry and poultry feed increased from 25% of the total maize production in 1985-86 to 36% in 1997-98. On the other hand, demand for human consumption decreased from 75% of the maize production in 1985-86 to 70% in 1997-98. During this period, maize demand for human consumption increased at an annual rate of less than 1%, and demand for industry and feed increased at an annual rate of 6.8%. Maize demand for waste and seed increased at an annual rate of 2.25% (using the average maize seed rate and 1% increase in area under maize during the same period).

The role of the private sector is increasing in maize research and seed production in Pakistan. In this sector, Rafhan Maize Products Limited, Faisalabad, is the most organized and well-established private organization in Pakistan. This wet-milling private company runs its own very effective hybrid maize breeding and seed production program. The company provides its contract growers with hybrid maize seed, fertilizer and other inputs on credit and purchases the produce after the maize harvest at the farm at predetermined prices. In addition to inputs, the company also provides technical advice through its field staff who supervise the crop of the contract growers. The main products of Rafhan are maize oil, glucose, custard powder, glutin and maize starch. The demand of all these products has increased considerably over time.

Pakistan is not a big trade partner in maize. During the 1980s, Pakistan exported a small quantity of maize and the pattern of maize exports was very irregular. The maximum export was in 1984-85 when 10.6 thousand tons of unmilled maize was exported; otherwise, maize exports were marginal in the 1980s. During the 1990s, Pakistan imported maize for the processing industry and seed purposes only. Maize imports from 1989 to 1997 are given in Table 3.14. Maximum maize imports were during 1995-96, worth US$2.06 million. The pattern of maize import has also been very irregular. For example, only 1.8 thousand tons of maize was imported during 1997-98. Country specific import of maize is given in Table 3.15. USA and Thailand have been the major providers of maize to Pakistan.

Table 3.13 Maize production and utilization in Pakistan.

F/Year	Production ('000 tons)	Per Capita Consumption (kg/year)	Human Consumption ('000 tons)	Industry & Feed ('000 tons)	Total Consumption ('000 tons)	Seed & Waste ('000 tons)
1985/86	1,009	7.75	757	202	959	49
1986/87	1,111	8.35	841	216	1,057	54
1987/88	1,127	8.1	841	231	1,072	55
1988/89	1,204	8.39	898	247	1,145	59
1989/90	1,179	7.77	857	264	1,121	58
1990/91	1,185	7.43	845	282	1,127	58
1991/92	1,203	7.19	843	301	1,144	59
1992/93	1,184	6.67	805	321	1,126	58
1993/94	1,213	6.52	811	343	1,154	59
1994/95	1,318	6.38	817	366	1,183	60
1995/96	1,283	6.36	837	391	1,228	61
1996/97	1,259	6.33	857	418	1,275	63
1997/98	1,251	6.31	877	446	1,323	64
Growth Rate (%/year)	1.81	-1.70	1.23	6.82	2.72	2.25

Note: Financial year is from July to June.
Source: Agriculture Statistics of Pakistan, 1996-97.

Table 3.14 Maize imports of Pakistan.

F/Year	Quantity ('000 ton)	Value (US$ million)	Imports as % of Production
1989/90	0.4	0.42	0.03
1990/91	0.1	0.11	0.01
1991/92	25.73	1.64	2.14
1992/93	0.94	0.36	0.08
1993/94	15.42	0.61	1.27
1994/95	18.26	0.33	1.39
1995/96	84.02	2.06	6.55
1996/97	22.65	1.77	1.80
1997/98	1.8	2.74	0.14

Note: Financial year is from July to June.
Source: Federal Bureau of Statistics, Islamabad
　　　Agricultural Statistics of Pakistan, 1996-97.

Table 3. 15 Country-wise maize imports of Pakistan (US$ million).

Country	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98
USA	0.19	0.11	0.00	0.28	0.47	0.14	1.37	1.21	1.98
Thailand	0.00	0.00	0.04	0.07	0.13	0.16	0.34	0.45	0.53
Turkey	0.06	0.00	0.02	0.00	0.00	0.04	0.00	0.00	0.09
France	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05
Egypt	0.17	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.04
Zimbabwe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Iran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Viet Nam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Philippines	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.01	0.00
Australia	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Afghanistan	0.00	0.00	0.04	0.01	0.01	0.00	0.06	0.06	0.01
Hong Kong	0.00	0.00	1.54	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.42	0.11	1.64	0.36	0.61	0.33	2.06	1.77	2.74

Source: Federal Bureau of Statistics.

3.3.1 Impact of trade liberalization on maize at the national level

The impact of trade liberalization on maize at the national level was determined by statistical and simple marketing and price analysis. The conceptual frame of impacts of trade liberalization on agricultural commodities is discussed in Chapter 1. The statistical analysis of impacts of trade liberalization is based on regression analysis of demand, supply and price linkage equations for maize. From these estimated equations, elasticity of supply, demand and price linkages were estimated to analyze the impact of trade liberalization.

The study conducted by FAO (1995a) on the impact of the Uruguay Round on agriculture determined that in real terms prices of maize are likely to increase by 4% in the international market. The impacts of trade liberalization on maize supply, demand and prices were analyzed in the case of Pakistan, assuming the price of maize will increase by 4% in the international market.

Wholesale prices of maize and prices received by maize farmers were used to estimate price linkage equations. International prices of maize used in the analysis were f.o.b. US No. 2 yellow maize Gulf Ports prices and converted into rupees using the average official exchange rate for a particular time period. In estimating the supply, demand and price linkage equations for maize, time series data from 1981 to 1998 were used.

To assess the impact of trade liberalization on maize at the national level in Pakistan, supply, demand and price linkage equations were estimated using standard regression analysis. To get more reliable estimates, all the equations were also corrected for autocorrelation. All the equations were used to assess the impact of a 4% increase in the international prices of maize on domestic supply, demand and farm level and wholesale prices, and estimating the producer and consumer surplus. The estimated equations are given below:

- Estimated supply equation for Pakistan maize (QSM):

$$\text{Log (QSM)} = 1.918 + 0.065*\text{Log (PFM(-1))} + 0.654*\text{Log(QSM(-1))} \quad \text{(Equation I)}$$
$$\quad\quad\quad (1.69)\ (1.178) \quad\quad\quad\quad (3.025)$$

$R^2 = 0.86 \quad\quad E_{sm} = 0.065 \quad DW = 1.85$

Where,
Log (QSM) = Natural log of total production of maize in Pakistan ('000 tons)

Log (PFM) = Natural log of farm level prices received by maize growers (Rs./ton)

E_{sm} = Elasticity of supply with respect to farm level price of maize.

- Estimated domestic demand equation for maize in Pakistan:

$$\text{Log (PCCM)} = 3.311 - 0.150*\text{Log (PWM)} - 0.009*\text{TREND} \quad\quad \text{(Equation II)}$$
$$\quad\quad\quad (4.307)\ (-1.47) \quad\quad\quad\quad (-1.024)$$

$R^2 = 0.87 \quad E_{dm} = -0.15 \quad DW = 1.72$

Where,
Log (PCCM) = Natural log of per capita consumption of maize (kg)
QDM = Total consumption of maize in '000 tons (PCCM * Population)
Log (PWM) = Natural log of wholesale price of maize in Lahore, Pakistan (Rs./ton)

E_{dm} = Elasticity of demand of maize with respect wholesale price of maize.

- Price linkage equations: There are two sets of price linkage equations which represent the relationship between the price of maize at the farm level and the price of maize at various market channels.
  Wholesale price of maize at Lahore versus the world price of maize in Rs./ton.

$$\text{Log (PWM)} = 0.418 + 1.004*\text{Log (PIM)} \quad\quad\quad\quad\quad \text{(Equation IIIa)}$$
$$\quad\quad\quad (0.637)\ (11.928)$$

$R^2 = 0.90 \quad E_{wm} = 1.0054 \quad DW = 2.05$

Where,
Log (PWM) = Natural log of wholesale prices of maize at Lahore, Pakistan in Rs./ton.
Log (PIM) = Natural log of world price of maize in Rs./ton.
E_{wm} = Elasticity of wholesale price of maize at Lahore with respect to international price of maize or Elasticity of price transmission.

- Price of maize received by farmers versus wholesale price of maize at Lahore:

$$\text{Log (PFM)} = -0.105 + 1.002*\text{Log(PWM)} \quad\quad\quad\quad\quad \text{(Equation IIIb)}$$
$$\quad\quad\quad (-1.50)\ (4.24)$$
$R^2 = 0.99 \quad E_{fm} = 1.002 \quad DW = 1.91$

E_{fm} = Elasticity of farm price with respect to farm price in Lahore or Elasticity of price transmission.

Impact on domestic prices of maize in Pakistan

From Equation IIIa, the elasticity of price transmission of the wholesale price of maize at Lahore market with respect to the international price of maize is 1.004. This means that 1% increase in the international price of maize would increase the Lahore wholesale price of maize by 1.004%. Therefore, the increase in world prices of maize by 4% would have caused an increase in the 1997-98 wholesale price of maize in Pakistan by 4.02%. Therefore, the wholesale price of maize during 1997/98 would have increased from Rs. 8,538.25/ton to Rs. 8,881.49/ton during 1997/98.

The impact of the increase in the world price of maize on the price received by farmers is estimated from Equation IIIb. It was estimated using the price elasticity of transmission of the maize price received by farmers with respect to the Lahore wholesale price of maize, which equals 1.002. The impact is such that the price of maize received by farmers would have increased in 1997-98 by 4.03% (from Rs. 7,684.43/ton to Rs. 7,994.11/ton).

Impact on the domestic supply of maize

From Equation I, the elasticity of supply of maize with respect to the farm level price of maize is 0.065. The impact of the 4% increase in the world price of maize on the price of maize received by Pakistani farmers is estimated at 4.03%. Therefore, this would cause an increase in the domestic production of maize by 0.262%, i.e. from 1.251 million tons to 1.254 million tons, during 1997-98. This increase in the production of maize would generate a gain of producers' surplus of Rs. 387.87 million (using the equation for producer's surplus in the analytical framework in Chapter 1). Domestic prices of maize are already high in Pakistan compared to international prices. Therefore, the maize producers would not gain much from trade liberalization.

Impact on domestic demand for maize in Pakistan

The impact on domestic demand for maize was estimated from Equation II. The demand elasticity with respect to the Lahore wholesale price of maize was -0.15. This means that a 1% increase in the Lahore wholesale price of maize is estimated to decrease the domestic demand by 0.15%. Therefore, the increase in the world price of maize by 4% would have caused the domestic demand for maize to decline by 0.603%. The domestic demand is estimated to decline from 1.323 million tons to 1.315 million tons during 1997-98. The increase in the wholesale price of maize in Pakistan and resulting decrease in quantity demanded would have caused a loss of consumers' surplus of Rs. 452.73 million.

It can be concluded from the above analysis that the 4% increase in the international prices of maize due to the UR agreement will have a positive impact on the production of maize in Pakistan. On the other hand, it will cause a negative impact on consumers. However, the overall impact or net loss to Pakistan is negative (Rs. 64.86 million) during 1997/98.

4. Effects of Trade Liberalization at the Farm Level: A Case Study

4.1 Major cropping systems in Pakistan

Pakistan is blessed with diverse agro-climatic conditions, and the irrigated plains of Pakistan constitute the largest irrigated system in the world. This system extends from the Peshawar valley in the north through the Indus valley of Punjab (central part) and Sindh (southern part) provinces, and covers around 16 million ha which is 80% of the total cultivated area of Pakistan. Also, it provides the bulk of the national food supply and export earnings from the agricultural sector (Byerlee and Hussain 1992). The remaining 20% of the total cultivated area is rain-fed where crop production is based solely on rainfall. The rain-fed plains cover an area stretching across northern Punjab into southern NWFP. Average rainfall in these areas varies from about 300 mm to over 1000 mm.

The annual variations in temperature provide two distinct crop seasons, viz., 'Kharif' (summer) and 'Rabi' (winter). Kharif crops are generally planted during April to June and harvested between October to December. Rabi crops are grown October to December and harvested April to May. Wheat is the major Rabi crop often constituting around 80% of the total cropped area in this season. The major Kharif crop varies depending on climate, soils and access to market. Generally, wheat is the main subsistence crop and the Kharif crop is the main cash crop in this system. Cropping systems vary widely in Pakistan mainly due to variation in agro-climatic factors and soil types. Based upon climatic factors, soil conditions, source of irrigation, extent of farm mechanization, access to market, etc., farmers grow various crops. Wheat, gram and rapeseed/mustard are the major Rabi crops, while rice, maize, cotton, sugarcane, millet and sorghum are the main Kharif crops. Also, a variety of both Rabi and Kharif vegetables and fruits are cultivated in the country. Out of Pakistan's total cropped area of 22.93 million ha in 1997-98, food grains (wheat, rice, maize, millet, sorghum, barley) accounted for 50%, cash crops (sugarcane, tobacco, sugar-beet and jute) 18%, pulses (gram, mung, mash, masoor, mattri, others) 7%, oilseed (rapeseed/mustard, sesamum, groundnut, linseed, castorseed, others) 3% and the rest was occupied by fruits, vegetables, condiments and others.

Farm size plays an important role in crop planning. Small farmers (≤5ha) generally devote a greater share of their cropped area to food grain crops followed by cash and fodder crops mainly to fulfil their food and capital requirements and to feed their livestock. In contrast large farmers devote more area to cash crops compared to food grain crops. The share of important Kharif/Rabi crops in total Kharif/Rabi crop area by farm size is given in Table 4.1.

Cotton is mainly cultivated in Northern and Central Sindh, and Southern and Central Punjab provinces. Basmati rice is cultivated in Northern Punjab and non-Basmati (IRRI type coarse rice) in central Sindh. Similarly, maize is mainly cultivated in NWFP and in Central Punjab. Rain-fed areas are mainly suited for growing sorghum and millet for fodder and wheat, rapeseed/mustard and pulses as food grain crops to meet food requirements. In Pakistan, there are three major cropping systems in the irrigated plains, and these are mainly defined by the Kharif crop grown in rotation with wheat in the Rabi season. The most extensive cropping system is cotton-wheat, which extends from Southern Punjab through Sindh province on the right bank of the Indus river. Approximately 40% of the total area under wheat in Pakistan is cultivated in areas where cotton is the major Kharif crop (Akhtar et al. 1986; Byerlee et al. 1984). The second major system is rice-wheat, which covers on more than 2.2 million ha, and is

the main focus of the present study. This can be further divided into the rice-wheat system of Punjab, where the fine-grained Basmati rice predominates, and the rice-wheat system of Sindh, in which high-yielding coarse grain rice (IRRI type) is cultivated. The third system of irrigated lowlands is the most diversified system and found in Central Punjab and the Peshawar valley of NFWP, where sugarcane and maize are the most important Kharif crops and are rotated with wheat, potatoes, rice, cotton and vegetables.

Table 4.1 Share of important Kharif/Rabi crops in total Kharif/Rabi crop area by size of farm in Pakistan.

Farm Size (ha)	Crop Area as % of Total Kharif/Rabi Crops Area							
	Kharif Crops					Rabi Crops		
	Rice	Cotton	S. Cane	Maize	Others	Wheat	Pulses	Others
≤0.5	16	16	3	38	27	80	*	20
0.6 to 1.0	20	20	4	29	27	81	1	18
1.1 to 2.0	27	23	6	19	25	78	2	20
2.1 to 3.0	30	25	7	11	27	76	4	20
3.1 to 5.0	29	26	8	7	30	74	5	21
5.1 to 10	23	28	8	5	36	72	8	20
10.1 to 20	22	30	7	4	37	69	13	18
20.1 to 60	22	33	7	3	35	67	15	18
>60	19	36	9	3	33	68	11	21
All Farms	25	28	7	8	32	73	7	20
Govt. Farms	14	10	4	7	65	42	21	37

Source: Census of Agriculture, 1990. Agriculure Statistics Pakistan, 1996-97.
* = less than 0.5 ha.

In rain-fed areas, wheat is the main Rabi crop and the other crops in this system are grams, pulses, and rapeseed/mustard. The rain-fed plains (or the Barani tract) are considered as those areas lying below 1,000 m where crop production is based solely on rainfall, (Byerlee et al. 1984). Kharif crops are secondary to the main Rabi crop, wheat, and become unimportant in drier areas. Livestock are an integral part of the rain-fed system and their importance increases relative to crop production in the drier areas. Farmers in these areas have a relatively poor resource base; farms are small and often fragmented. Average farm size in these areas is less than the average in the main irrigated areas in Punjab province (Byerlee et al. 1984).

The rice-wheat system of Punjab, which is the main system of growing food grain crops, is the focus of this study. Rice (both Basmati and non-Basmati rice), wheat and maize, the main food grain crops, were selected for a case study to determine the commodity-specific and location-specific impacts of trade liberalization in Pakistan.

4.2 Research methods

4.2.1 Selection of commodities and areas

Wheat (the main winter crop) and rice and maize (main summer crops) are the main food grain crops of Pakistan, so they were selected to study the commodity-specific impact of trade liberalization at the farm level. To determine the location-specific impact, the rice-wheat cropping system of Punjab was selected, as it is one of the major systems in Pakistan occupying more than 2.2 million ha. The rice-wheat system of Punjab is one of the major irrigated cropping systems of Punjab occupying around 1.1 million ha and it is centered in the districts of Lahore, Shiekhupura, Gujranwala and Sialkot. Most of the fields in this system are planted in an annual rice-wheat cropping pattern and approximately 72% of the wheat in the area is now sown after rice (Amir and Aslam 1992). Sunflower, potatoes, peas, watermelon, maize, sugarcane and fodders are the other minor crops grown in the area. The present study will be mainly focused on wheat, rice (Basmati and non-Basmati) and maize.

4.2.2 Data collection

The data used in this study are mainly based upon previous studies conducted in the rice-wheat areas of Punjab (Byerlee and Hussain 1992; Amir and Aslam 1992; Ahmad 1997; Azeem et al. 1994; Byerlee et al. 1984; Aslam and Akhtar 1987; Akhtar et al. 1986). The second source of data is an informal survey conducted in this area during November-December, 1998. The major objective of this survey was to collect information regarding the socio-economic conditions of farmers, socio-economic constraints, resource base of small farmers, production practices, input use, crop yields, marketing of the produce, prices of input and output, etc. The third source of data for the case study was the Agriculture Prices Commission (APCom) where data on cost of production for wheat, Basmati rice and non-Basmati rice was collected. APCom conducts farm surveys on a regular basis for major crops to collect data on cost of production for major crops, which is one of the criteria for recommending minimum support prices of these crops. As the support price is designed to provide a minimum but guaranteed return to farmers for their investment, it is the financial cost of raising a given crop. Therefore, all those cultural practices and inputs which are used in raising the crops starting from land preparation until harvesting of the principal produce have been taken into account while estimating the cost of production. While estimating the cost of production from the data collected through the field surveys, the expenses on the use of those inputs supplied by the farmers from their own resources were imputed using the prevailing market prices of such inputs. A similar method has been followed in imputing the expenses incurred in those cultivation operations performed by the farmers through their own resources, such as ploughing by their bullocks, use of family labor etc. The existing land rent for the use of land has been also included in estimating the cost of production. Mark-up (interest) on working capital at the rate of 12% per annum was charged on all expenses that are incurred before the crop is harvested. In addition, management charges have also been used in estimating cost of production of specific crops. APCom used the cost of production of the average farmers as a reference point in formulating its support price proposals due to following factors (APCom 1998):

- The unit cost of production of progressive farmers is generally quite low and thus its use in price setting should squeeze the farm sector;
- The unit cost of production of 'traditional' farmers is generally very high, especially compared to the cost of production of the other two categories of farmers and, therefore, its use as a reference point for price determination should lead to excessive resource transfer to farming and would encourage inefficiency in farm production; and
- Generally speaking the cost of production of 'average' farmers is higher than that of the 'traditional' farmers, thus prices based on the cost of production of 'average' farmers would also cover the cost of production of the 'progressive' farmers.

Based upon the above analysis by APCom, in the present study the cost of the production of an 'average' farmer was used, which generally represent all the farmers.

APCom conducts field surveys in collaboration with provincial departments of agriculture, and uses a three stage stratified sample design for selecting the representative sample for the survey. In the first stage, randomly various 'Tehsils' (sub-districts) are selected for a specific crop growing area. In the second stage, sample villages are randomly selected from the sample Tehsils. In the third stage, sample growers of various crops are randomly selected to collect data regarding cost of production and net returns of various crops in the rice-wheat areas of Punjab. Data on the cost of production and net returns of rice, wheat and maize for an average farmer pertain to the cropping year 1997-98.

Historical data on farm level prices, wholesale prices, international prices, freight rates, and other related data were collected from Pakistan Economic Survey, 1997-98, Agricultural Statistics of Pakistan, 1996-97, APCom, Ministry of Commerce, and Ministry of Food, Agriculture and Livestock.

4.2.3 Sample area, farm characteristics and issues

The sample area of this case study is the north-eastern part of Punjab province called the 'Rice Bowl' (Figure 4.1). This Rice Bowl, lies at the foothills of the Himalayas and is irrigated by the snowmelt water of the Himalayas carried through five rivers. For centuries, this area has been popular for producing the unique fragrant Basmati rice. In addition to Basmati rice, this area is also good for growing many other crops such as wheat, gram, pulses, sunflower, maize, peas, potato, Rabi and Kharif fodders, etc.

The soils of this area are made up of an alluvial clayey fraction, which has the capacity and capability of retaining moisture in the root zone longer than other soil types. This keeps the plant root zone cool. Coupled with it the foothills creates a special weather that keeps days hot and nights cool, which is vital for good plant growth and grain quality. This pleasant and sweet fragrance of Basmati rice produced in this particular geographical belt plus the excellent quality of rice in terms of more than double elongation of the cooked grain and fluffiness makes it a unique rice. As it is from a unique rice belt, no other country could replicate it, although many countries claim to cultivate fragrant rice (Guard 1998).

Soil types, climate, and market access are the main factors that influence the farmer's decision to grow a specific combination of crops in a certain sequence. Rice and wheat crops are mainly cultivated on clay soils, and potatoes, sunflower, peas and watermelon are cultivated on loamy soils in these areas. In the rice-wheat zone, three soil categories are commonly found. Under the major group of normal soils, three soil types exist, which include loam soils, clay soils, and silty clay soils. The second major group of soils is saline sodic soils found in these areas, which are unsuitable for cultivation (Byerlee et al. 1984; Government of Pakistan 1979; Ahmad 1997).

A network of both canals and tube-wells irrigates the rice-wheat area of Punjab. Since rice requires a lot of water and irrigation water is a scarce input in the area, private and public tube-wells are supplemented with scheduled water available from seasonal canals. Due to the seasonal nature of these canals, around two-thirds of the farmers own tube-wells and the rest rent tube-wells. In some areas, like Sialkot Tehsil, farmers exclusively rely on tube-wells. Electric tube-wells are preferred to diesel tube-wells due to their lower operating cost. Many farmers also depend on public tube-wells installed as part of the Salinity Control and Reclamation Project called SCARP (Amir and Aslam 1992; Ahmad 1997). The canals in this area generally remain closed during the Rabi season. In addition to canals and tube-wells, rainfall is another important supplement to irrigation water. Annual rainfall varies from 425 mm to 800 mm in this area. Around two-thirds of the total rainfall is received during the Kharif season with the arrival of monsoons and the rest in the Rabi season.

The rice-wheat area is characterized by small (≤5 ha) to medium size (6-10 ha) farms. Average farm size reported by Byerlee et al. (1984) was about 8 ha with over 75% of farms operating between 1.5-20 ha. On the other hand, Azeem et al. (1994) has reported the average farm size in this area of about 7 ha. It can be concluded from these studies that average farm size in the area is between 7-8 ha and the number of very small farmers (less than 1.5 ha) and very large farmers (more than 20 ha) is relatively low compared to other zones such as the cotton zone of Punjab.

Figure 4.1 Map of Pakistan showing the rice-wheat sample area.
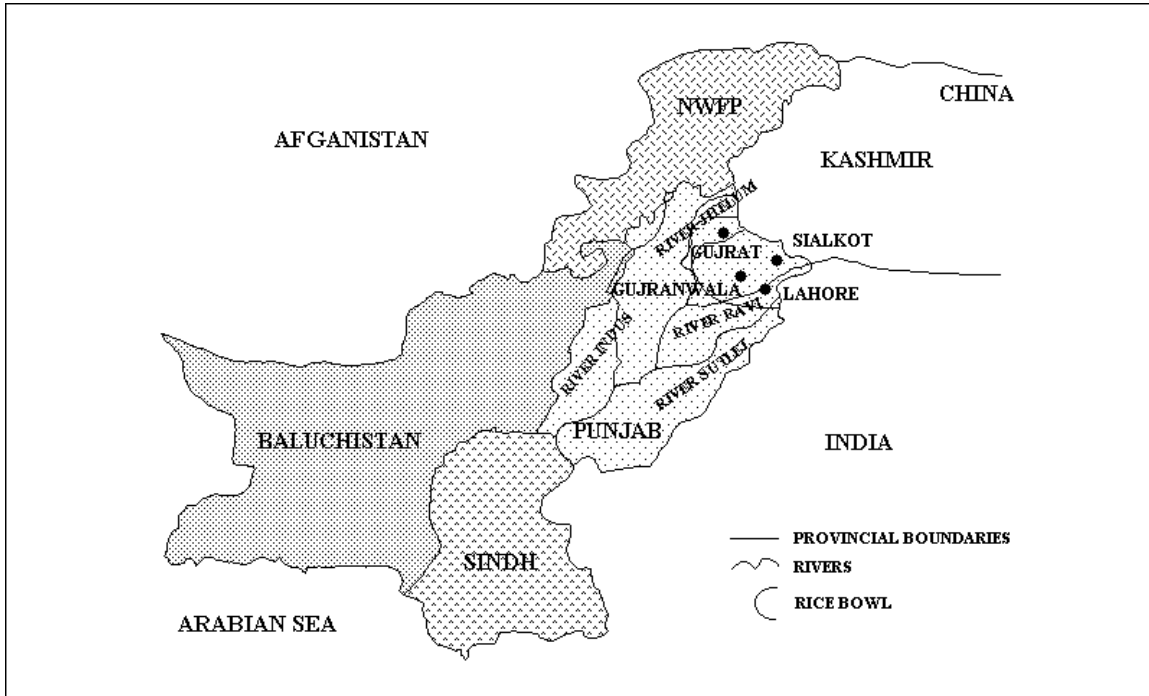
Around two-thirds of the farms are owner-operated, around 25% are owner-cum-tenant and the rest are operated by tenants on share or lease basis (Amir and Aslam 1992). The terms for share tenancy differ from one area to the other. In most areas, owners and tenants share equally in the output and fertilizer and other costs, except the cost of seed which is born by the tenants. In some cases, the farmer receives only a one-third share, but in this case the landowner generally supplies some of the inputs including water and fertilizer. Cash renting is more common compared to share tenancy. Depending on the soil type, annual land rent ranges from Rs. 3,000 to Rs. 5,000 per hectare in the area. Almost all the farmers in the area use tractors for land preparation. Around 40% of the farmers own tractors and the rest hire tractors for seedbed preparation for all crops. Only around 2% of the farmers still use bullocks for land preparation (Ahmad 1997).

The farmers' existing cropping pattern for Rabi and Kharif seasons and the index of cropping intensity is given in Table 4.2. Wheat was the dominant crop in the Rabi season and occupied more than 80% of the total area. Around 20% of the wheat area was planted on time (before November 30) because this area was mainly planted after non-Basmati varieties, which are early maturing rice varieties. The other 80% of the area under wheat was planted late (after November 30) since this area was mainly planted after Basmati rice, which matures late. The other Rabi crops reported by the farmers were gram, sugarcane, vegetables, and orchards. Only 4% of the total area was reported as fallow. The index of Rabi cropping intensity was high (92%) mainly due to enough tube-well water and less fallow area. In the Kharif season, around 70% of the area was planted under Basmati rice, 13% non-Basmati, and the rest was planted under sugarcane, maize and other crops. The index of Kharif cropping intensity was 95%. The overall cropping intensity reported by the farmers was 187%, which is similar to reports in other studies (Akhtar et al. 1992; Amir and Aslam 1992; Azeem et al. 1994).

Table 4.2 Cropping pattern in the rice zone of Punjab.

Crop	Area ('000 ha)
Rabi Season	
Normal wheat	18.8
Late planted wheat	62.2
Berseem	12.3
Gram	0.2
Sugarcane	1.1
Vegetables	1
Orchard	0.4
Fallow	4
Rabi Cropping Intensity (%)	92
Kharif Season	
Basmati- 385	62.6
Super Basmati	7.5
IRRI rice	7.9
KS-282 rice	1.5
Kashmira rice	3.9
Sesamum	0.6
Kharif fodder	10
Maize	2.2
Sugarcane	1
Fallow	2.8
Kharif Cropping Intensity (%)	95
Total Cropping Intensity (%)	187

Source: Ahmad 1997.

As a result of the continuous rice-wheat sequence for more than two decades in north-eastern Punjab, a number of crop management related problems have emerged. Rice requires puddled compact soil making a hard pan to hold standing water for rice growing. On the other hand, wheat needs a well-drained soil for deep penetration of the root system (Hobbs et al. 1987). Due to the different soil requirements for wheat and rice cultivation, a number of problems have emerged in this area. One of the important issues is the conflict between rice and wheat management due to dominance of the late maturing Basmati rice, which leaves little time for seedbed preparation and leads to late planting of wheat in the area. As a result wheat yields are considerably lower than the other irrigated neighboring areas of the Punjab (Byerlee et al. 1984; Amir and Aslam 1992; Ahmad 1997). During the last ten years, various crop techniques were introduced to increase production of the system, including the introduction of early maturing Basmati variety (B-385) for primary planting of wheat, zero tillage technique for timely preparation of seedbeds for wheat planting, and the introduction of other substitute crops for wheat, such as sunflower for late planted wheat after Basmati. However, the lack of zero drills for wheat planting and an early maturing Basmati variety did not provide the required results and the low wheat yield after Basmati rice is still a major problem in the area (Ahmad 1997).

4.3   Rice cultivation

Basmati is the main type of rice planted in this area. The word Basmati, from "Bas" meaning smell and "Matti" meaning soil, means the smell of soil. This leads one to believe that the quality of Basmati has a lot to do with the soil type (Guard 1998). In the rice-wheat area of north-eastern Punjab, almost 80% of the rice area is under Basmati and the rest under non-Basmati rice. On average the Basmati rice crop matures in 120 days and IRR-type rice crop matures around 100 days. Transplanting time of both types of rice is the same. Generally, Basmati rice is transplanted at the beginning of July and harvesting continues from early November to December. On the other hand, IRRI type rice is planted in June and harvested by

October. A number of factors are involved in the farmer's decision with respect to Basmati versus IRRI rice:

- Prices of Basmati are almost double compared to IRRI type rice;
- Basmati requires less inputs (less responsive to fertilizer) compared to IRRI type;
- Traditionally Basmati is preferred for eating;
- Basmati can be planted just after the beginning of the monsoon when more water is available;
- Basmati provides more straw for feeding livestock;
- Basmati rice nursery can be planted just after wheat harvesting, which minimizes labor conflicts with wheat harvesting and thrashing.

On the other hand, IRRI type rice is preferred by farmers for several reasons:

- Early maturity (almost one month before Basmati) and provides more time for seed preparation for wheat;
- More responsive to fertilizer;
- Reduced stubble for incorporation;
- Fewer marketing problems (for example discounts for quality for Basmati);
- More resistance to insect attack;
- Yields are almost double compared to Basmati;
- Requires less irrigation water compared to Basmati.

Most rice growers use hired labor to transplant the rice nursery in the fields. A severe shortage of labor during transplanting and harvesting seasons is reported. Rice transplanting is mainly done in June-July when the schools are closed for summer vacations, and many school children transplant the rice nursery in the fields (which is cheap labor). Rice transplanting technology is still at the demonstration stage and is not widely used the farmers. Similarly, around 80% of the farmers in the area harvest and thresh rice manually and the rest use combines. The farmers prefer to thresh manually to get good quality straw and a premium price for Basmati rice. Small farmers mainly use family labor and exchange labor, while big farmers use hired labor for harvesting and threshing operations.

4.3.1 Rice marketing

Generally rice growers sell their paddy to local traders ("Arthies") or in the nearby grain markets through commission agents ("Buparis"). Rice mills or their dealers also directly purchase from farmers (only large farmers) or from the local grain markets. Usually small farmers sell their produce in the villages to shopkeepers or local consumers. Formal specifications and quality testing equipment are recommended but are rarely used for the purchase of paddy. Visual inspection is the only common practice for determining the quality and price. There is an open market for paddy and rice in Pakistan, however the government still announces minimum support prices of various varieties of rice in Pakistan. These prices are used as a base price in the market during the post-harvest period. Generally post-harvest prices at the farm level were higher than the support prices. The paddy and rice marketing channels from producer to consumer are shown in Figure 4.2.

4.3.2 Partial budgets for Basmati and non-Basmati rice production

Costs of production and net returns for Basmati and non-Basmati types of rice were estimated to determine the impact of trade liberalization on these crops at the farm level (Tables 4.3 and 4.4). Assuming the 1993-94 crop estimates as a base year for the scenario without trade liberalization, the estimates for the 1997-98 crop were used for the scenario with trade liberalization. The difference between the with and without trade liberalization scenarios is assumed to be the impact of trade liberalization at the farm level on rice in the rice growing areas of the Punjab. It is also assumed that the input levels, and yields of both types of rice

during 1993-94 (without trade liberalization) are the same as in 1997-98 (with trade liberalization). It is assumed that due to trade liberalization, however, the prices of inputs and outputs have changed over time from 1993-94 to 1997-98 crop years.

The main variable costs for both types of rice crops are land preparation, irrigation, fertilizer and hired labor. Land preparation costs include dry ploughing, wet ploughing and planking (puddling). Hired labor costs include uprooting, transporting and transplanting of nursery seedlings, weeding, fertilizer application, irrigation, watercourse cleaning, harvesting and threshing. Gross costs include land rent for six months and management charges per hectare for the whole rice season. Using an average yield of Basmati paddy rice of 2.21 tons/ha during 1997-98, and an average yield of non-Basmati rice of 3.31 tons/ha in 1997-98, the cost of production, gross returns, and net returns/ha were estimated to calculate the impact of trade liberalization on rice at the farm level.

Non-Basmati paddy rice, at average levels of yields, was not a profitable crop, and returns were only high enough to cover variable costs. Also net returns were insufficient to give a reasonable return on capital to farmers. These results demonstrate the importance of cost reducing technologies (for example rice transplanting), improving the yield levels and increasing the support prices of non-Basmati paddy rice. Net returns in the case of Basmati rice were higher compared to non-Basmati rice. There is a need to considerably improve the productivity of both Basmati and IRRI type rice to get higher returns. Per hectare yields of both types of rice are considerably lower than the potential yield levels in the area.

Figure 4.2 Paddy rice marketing channels of Pakistan, 1997/98.
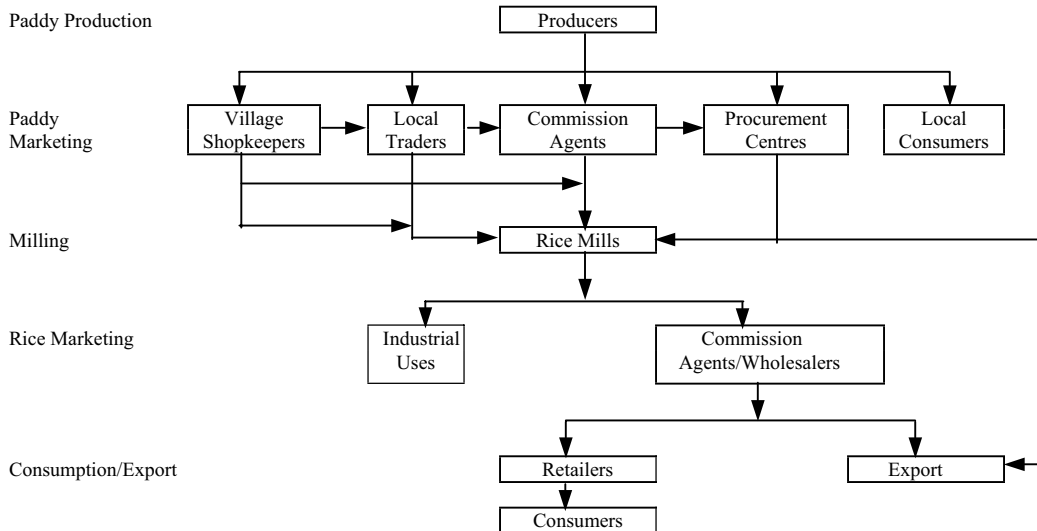
4.3.3   Impact of trade liberalization on Basmati and non-Basmati rice at the farm level

The impact of trade liberalization on Basmati and non-Basmati rice producers was analyzed using partial budgets of Basmati and non-Basmati rice without trade liberalization (during 1993-94) and with trade liberalization (during 1997-98) at the farm level in rice areas of Punjab. In Pakistan there is no fertilizer or pesticide/insecticide subsidy. The impact of trade liberalization was studying by looking at changes in input and output prices that considerably increased from 1993-94 to 1997-98. During this period, the minimum support prices of both Basmati and non-Basmati rice significantly increased, and now are close to international prices. Presently, trade of rice in Pakistan, which used to be under the public sector, is completely under the private sector.

Expenditures on fertilizer, irrigation, and land preparation almost doubled between 1993-94 and 1997-98 after trade liberalization. In the case of Basmati rice, expenditure on fertilizer increased by Rs. 1,102.81/ha, and the same expenditure on non-Basmati increased by Rs. 1,781/ha. The total gross cost of production of Basmati rice increased from Rs. 9,439/ha to Rs. 17, 383/ha, and in the case of non-Basmati rice, gross cost of production/ha increased from Rs. 8,196 to Rs. 15,523 after trade liberalization. Gross costs/ton in the case of Basmati rice increased from Rs. 4,281/ha to Rs. 7,884/ha, and gross costs/ton of non-Basmati rice increased from Rs. 2,475 to Rs. 4,687 per hectare. Net returns per hectare increased from Rs. 4,198 to Rs. 4,828 for Basmati rice. However, in the case of non-Basmati rice, net returns per hectare decreased from Rs. 720 to only Rs. 12 which is mainly due to low prices of non-Basmati rice. These results show the positive impact of trade liberalization on rice production in Punjab, and are similar to the findings on the impact of trade liberalization on rice production at the national level given in the previous chapter.

Table 4.3 Average farmer's cost of production and returns of Basmati paddy rice crop in Punjab, Pakistan.

Operation/Input/Output	Without Trade Lib.* (Rs./ha)	With Trade Lib ** (Rs./ha)	Difference (Rs./ha)
1 Land preparation	1,330.29	2,099.50	769.21
2 Nursery	944.31	1,552.15	607.84
3 Weedicides/Plant protection	364.70	1,026.70	662.01
4 Farmyard manure	89.83	123.5	33.67
5 Fertilizer	1,019.47	2,122.27	1,102.81
6 Irrigation	1,766.17	3,823.91	2,057.73
7 Labour	631.31	1,283.58	652.28
8 Interest on investment @14%	430.23	842.21	411.99
per year for 6 months on items 1-7	20		
9 Harvesting, threshing & winnowing	880.78	1,528.21	647.44
10 Management charges for 6 months	252.68	387.79	135.11
11 Land rent for 6 months	1,729.00	2,593.50	864.50
12 Gross cost (add items 1-11)	9,438.76	17,383.33	7,944.57
13 Yield per ha (tons)	221	221	
14 Farmgate price per ton	6,000.00	9,625.00	3,625.00
15 Returns (multiply items 13 &14)	13,230.00	21,223.13	7,993.13
16 Value of straw	406.66	988.00	581.34
17 Gross returns (add items 15 &16)	13,636.66	22,211.13	8,574.46
18 Net return per ha (subtract item 12 from 17)	4,197.90	4,827.79	629.89
19 Gross cost per ton (divide item 17 by 13)	4,280.62	7,883.60	3,602.98
20 Net return per ton (divide item 18 by 13)	1,903.81	4,827.79	2,923.98

* Cost of production and net returns of 1993-94 Basmati paddy rice crop per hectare, without the impact of trade liberalization at the farm level.

** Cost of production and net returns of 1997-98 Basmati paddy rice crop per hectare, with the impact of trade liberalization at the farm level.

Source: Agriculture Prices Commission, Islamabad, Pakistan.

Table 4.4 Average farmer's cost of production and returns of non-Basmati paddy crop in Punjab, Pakistan.

Operation/Input/Output	Without Trade Lib.* (Rs./ha)	With Trade Lib ** (Rs./ha)	Difference (Rs./ha)
1. Land preparation	1,142.50	1,914.25	771.75
2. Nursery	755.41	1,533.03	757.62
3. Weedicides/Plant protection	404.78	1,269.85	865.07
4. Farmyard manure	101.76	121.03	19.27
5. Fertilizer	1,053.85	2,834.74	1,780.89
6. Irrigation	1,404.59	2,018.91	614.21
7. Labour	633.09	1,312.56	679.47
8. Interest on investment @14% per year for 6 months on items 1-7	372.33	770.30	397.97
9. Harvesting, threshing & winnowing	819.87	1,384.53	564.67
10. Management charges for 6 months	252.68	387.79	135.11
11. Land rent for 6 months	1,235.00	1,976.00	741.00
12. Gross cost (add items 1-11)	8,195.86	15,522.89	7,327.04
13. Yield per ha (tons)	3.31	3.31	0.00
14. Farmgate price per ton	3,125.00	4,550.00	1,425.00
15. Returns (multiply items 13 &14)	10,350.00	15,069.60	4,719.60
16. Value of straw	231.86	494.00	262.14
17. Gross returns (add items 15 &16)	10,581.86	15,563.60	4,981.74
18. Net return per ha (subtract item 12 from 17)	2,386.00	40.71	-2,345.30
19. Gross cost per ton (divide item 17 by 13)	2,474.59	4,686.86	2,212.27
20. Net return per ton (divide item 18 by 13)	720.41	12.29	-708.12

* Cost of production and net returns of 1993-94 Basmati paddy rice crop per hectare, without the impact of trade liberalization at the farm level.
** Cost of production and net returns of 1997-98 Basmati paddy rice crop per hectare, with the impact of trade liberalization at the farm level.
Source: Agriculture Prices Commission, Islamabad, Pakistan.

4.4   Wheat cultivation

Wheat is the main Rabi (winter) crop in the area and is planted on around three-fourths of the total cropped area in this season. Wheat planting in the north-eastern rice zone of Punjab starts after rice harvesting during October and usually ends at the end of December (some fields are also planted in the first two weeks of January). Generally, December planted wheat is considered late planted wheat. Around 60% of the area under wheat in the rice zone is late planted, because it is mainly grown after Basmati rice. The productivity of late-planted wheat is much lower than that of early planted wheat after non-Basmati rice. Late planting of wheat is the major conflict in this area. There is a trade-off between good land preparation for wheat planting and timely planting of wheat after IRRI type rice and vise versa after Basmati type rice (Byerlee et al. 1984; Amir and Aslam 1992). Wheat harvesting starts at the end of May. Almost all farmers use threshers, but still some farmers prefer manual harvesting to get good wheat straw.

4.4.1 Wheat marketing
Generally, small farmers grow wheat for home consumption and medium and large farmers sell a considerable amount of their wheat production. Most of the wheat surplus is generated in Punjab province followed by Sindh province. Figure 4.3 shows the marketing channels of wheat from producers to consumers. Generally farmers sell their surplus wheat to local grain traders ("Arties") or commission agents in nearby grain markets or local procurement centers established by the provincial food departments and PASSCO. Flour mills purchase directly from farmers through their agents or from commission agents at local grain markets. Also, provincial food departments supply wheat to flour mills at the fixed issue price (subsidized) and these flour mills supply wheat flour at a fixed rate to consumers in the cities.

The procurement centers purchase wheat from farmers at the minimum support price fixed by the government.

Figure 4.3 Wheat marketing channels in Pakistan, 1998.
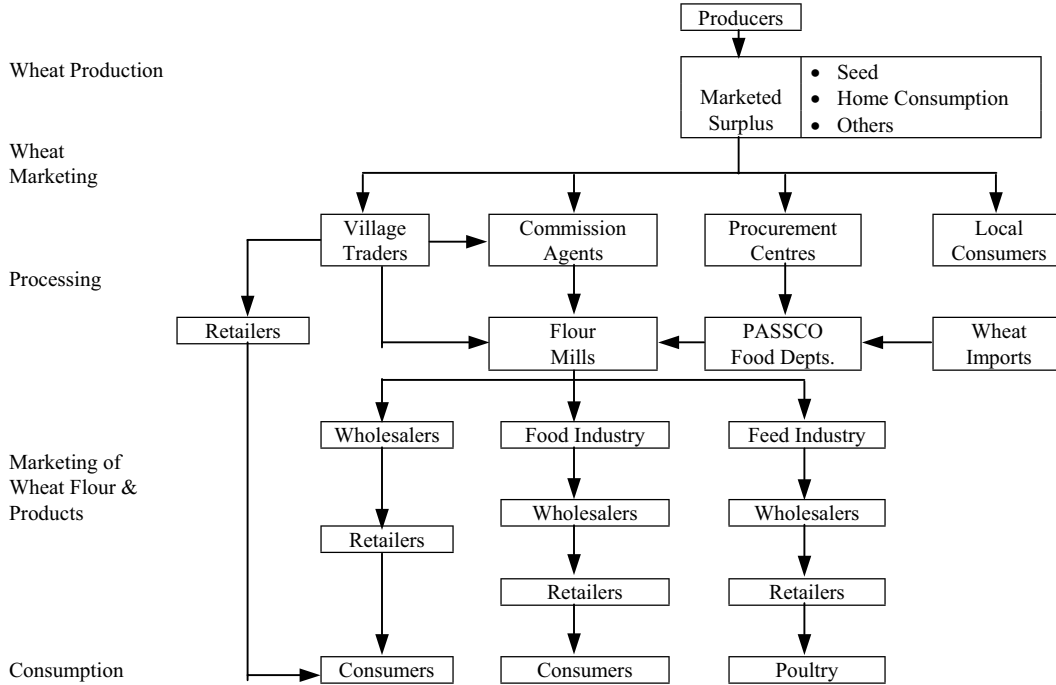
4.4.2 Partial budget for wheat production

The farm level partial budget for an average wheat farmer was prepared to determine the impact of trade liberalization at the farm level for wheat (Table 4.5). Assuming the 1993-94 wheat crop estimates as a base year for the scenario without trade liberalization, the estimates for 1997-98 were used for the scenario with trade liberalization. The difference between the with and without trade liberalization scenarios is assumed to be the impact at the farm level on wheat production in the wheat growing areas of Punjab. It is also assumed that the input levels, and yields of wheat during 1993-94 (without trade liberalization) are the same as during 1997-98 (with trade liberalization). It is also assumed that due to trade liberalization, the prices of inputs and outputs have changed over time from 1993-94 to 1997-98 crop years. However, it is expected that due to the considerable increase in the price of wheat at the farm level, the productivity of wheat will also increase in the future.

The main variable costs for the wheat crop are land preparation, irrigation, and fertilization. Gross costs include land rent, harvesting and threshing charges and management charges including land rent for six months and management charges. Using an average wheat yield of 2.156 tons/ha during 1997-98, the cost of production, gross returns, and net returns/ha were estimated to determine the impact of trade liberalization on wheat production in the wheat growing areas of Punjab.

At average levels of wheat production, net returns/ha were negative during 1997-98 (with trade liberalization) and this shows that it is unprofitable to cultivate wheat at the present minimum support prices of wheat. Returns from wheat cultivation were only sufficient to cover variable costs and farmer's labor but insufficient to cover cost of land rent and to give a reasonable return on capital to farmers. These results demonstrate the importance of cost

reducing technologies (such as zero-tillage, early maturing Basmati varieties, etc.), if wheat is to compete with alternative crops such as sunflower in the rice-wheat areas. Similar results were achieved in other studies conducted in this area (Byerlee and Hussain 1992; Aslam and Akhtar 1986; Amir and Aslam 1992; Ahmad 1997). Also these results show the importance of improving the present wheat yield levels which are considerably lower than the potential yield levels in the area.

Table 4.5 Average farmer's cost of production and returns of wheat crop in Punjab, Pakistan.

Operation/Input/Output	Without Trade Lib* (Rs./ha)	With Trade Lib** (Rs. ha)	Difference (Rs./ha)
1. Land preparation	862.05	1,416.99	554.93
2. Seeds & planting	919.43	1,418.32	498.89
3. Interculture/weeding/weedicides	48.44	101.81	53.38
4. Irrigation	749.55	1,299.94	550.39
5. Farmyard manure	57.90	74.10	16.20
6. Fertilizer	1,359.69	2,026.17	666.48
7. Labour	299.64	413.28	113.64
8. Interest on investment @14% per year for 6 months on items 1-7	300.77	472.54	171.77
9. Harvesting & threshing	2,232.56	3,572.71	1,340.15
11. Land rent for 6 months	2,223.00	3,705.00	1,482.00
10. Management charges for 6 months	321.59	387.79	66.20
12. Gross cost (add items 1-11)	9,374.61	14,888.65	5,514.04
13. Yield per ha (tons)	2.16	2.16	
14. Farmgate price per ton (minimum support price)	4,000.00	6,000.00	
15. Returns (multiply items 13 &14)	8,624.00	12,936.00	4,312.00
16. Value of wheat straw	1,510.00	1,729.00	219.00
17. Gross returns (add items 15 &16)	10,134.00	14,665.00	4,531.00
18. Net return per ha (subtract item 12 from 17)	759.39	-223.65	-983.04
19. Gross cost per ton (divide item 17 by 13)	4,348.15	6,905.68	2,557.53
20. Net return per ton (divide item 18 by 13)	352.22	-103.73	-455.95

* Cost of production and net returns of wheat during 1993-94, without trade liberation.
** Cost of production and net returns of wheat during 1997-98 with trade lberalization.
Source: Agricultural Prices Commission, Islamabad, Pakistan.

4.4.3 Impact of trade liberalization on wheat at the farm level

In Pakistan there is no subsidy on fertilizer and other inputs including insecticide/pesticide. The impact of trade liberalization was determined by looking at the changes in input and wheat output prices which increased considerably from 1993-94 to 1997-98. During this period, the minimum support prices of wheat considerably increased, and were close to international prices during 1997-98 (which used to be significantly lower than world prices). Presently, the private sector is also allowed to import wheat, which used to be completely under government control. Expenditures on fertilizer, irrigation, and land preparation have significantly increased from 1993-94 (before trade liberalization) to 1997-98 (after trade liberalization). For example, expenditure on fertilizer increased from Rs. 1,360/ha to Rs. 2,026/ha during this time. Total gross cost of production of wheat increased from Rs. 9,375/ha before libralization to Rs. 14,889/ha after liberalization. Gross cost per ton for wheat increased from Rs. 4,348 to Rs. 6,906 for with and without trade liberalization, respectively. However, net returns from wheat cultivation were negative during 1997-98 (with trade liberalization), although they were positive during 1993-94 (without trade liberalization). These results show that prices of wheat output did not increase in proportion with the increase in input prices during this period. In the present price structure, wheat cultivation is not a profitable enterprise compared to other competing crops such as sunflower, canola, etc.

4.5   Maize cultivation

Most small farmers plant maize for human consumption, as a feed grain, and as a fodder crop. Maize consumers generally grind the maize grains into flour to bake 'chapaties'. Maize is also commonly consumed as roasted green ear corn. It is a very common practice among the farmers to thin green plants before flowering to feed livestock and the remaining maize plants are harvested for the grain and the stalks are used as feed for farm animals.

Maize is primarily a summer season crop grown in lowland and mid-altitude agro-ecological zones in Punjab and NWFP. It is planted in July-August and harvested during October-November. In the rice zone, it competes with the rice crop and little area is under maize in the north-eastern Punjab. Maize is mainly grown in silty loam type of soil, which is less suitable for paddy cultivation (CIMMYT 1989).

4.5.1 Maize marketing

In the past, maize was a subsistence crop and the farmers held most of the produce for their regular diet, seed, livestock, etc. With increasing real national income, urbanization, shift in consumption patterns in favor of wheat, rice, meat, dairy, fruits and vegetables, and introduction of new maize products, maize producers created a surplus for the industry. Presently, 20 to 30% of the national production of maize is market surplus to be used in the food industry, feed industry and directly consumed (flour, cobs, grains) in different parts of the country. Most of the market surplus is generated in Punjab province, whereas in the NWFP much of the maize is used for home consumption at the farm and very little is available for sale in the market. Figure 4.4 shows the marketing channels of maize. Generally, small maize growers sell their surplus maize to local grain traders (beoparies) or to wholesalers (commission agents) in the nearby grain markets. Big farmers or contract growers either directly sell maize to the food or feed industry or to the commission agents. Usually food and feed industries have permanent contacts with commission agents in various big grain markets. These agents purchase maize from the producers for their respective industrial units and charge a commission. Very little is sold in these markets for direct human consumption and seed. All the industrial units sell their products and by-products through their wholesalers all over the country. The government of Pakistan does not announce a minimum support price for maize, so maize prices are generally higher than those of other grains, such as wheat. However, the contract growers of Rafhan Maize Products Limited sell their produce to the company at predetermined prices at the time of planting. Presently, the company purchases around 40% of the required quantity from its contract growers in Punjab (Akhtar 1997; CIMMYT 1989).

4.5.2 Partial budget for maize production

The costs of production and net returns for an average farmer of maize are estimated to analyze the impact of trade liberalization on maize at the farm level during 1993-94 (without trade liberalization) and 1997-98 (with trade liberalization). The partial budget for maize cultivation estimates without and with trade liberalization are given in Table 4.6. The major components of cost of production of maize are land preparation for cultivation, fertilization, irrigation water supply and inter-culture. Compared to rice and wheat, these results indicate that maize cultivation is a profitable enterprise in the area.

Figure 4.4 Maize marketing channels in Pakistan, 1998.

Production	**Maize Producers**
Marketing	**Marketed Surplus** — • Fodder • Cobs • Seeds (Home Consumption) • Others
	Village Traders (Beoparies) — **Wholesalers**
Processing	**Retailers** — **Food Industry** — **Feed Industry**
Marketing of By-Products	**Wholesalers** — **Wholesalers** — **By-Products (Starch) Industrial Use**
	Retailers — **Retailers**
Consumption	**Consumers** — **Poultry**
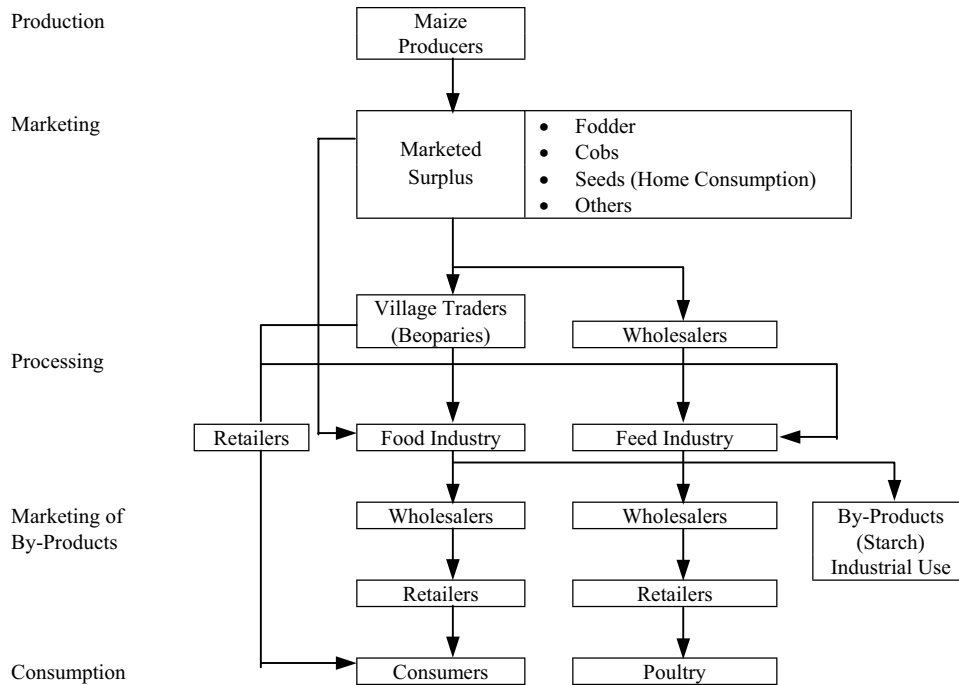
4.5.3 Impact of trade liberalization on maize at the farm level

Using an average maize yield of 2.57 tons/ha during 1997-98, the cost of production, gross returns, and net returns/ha were estimated for 1993-94 and 1997-98 maize crops, and the impact of trade liberalization on maize cultivation was analyzed. During this time period, the farm level prices of maize increased considerably, and now the private sector is also allowed to import maize for commercial purposes. The total gross cost of production of maize increased from Rs. 10,595/ha to Rs. 15,883/ha during this period. Gross cost per ton of maize increased from Rs. 4,122 to Rs. 6,180 during this time period. Also net returns from maize cultivation increased from Rs. 2,668/ha to Rs. 4,821/ha for the with and without trade liberalization period. These results show the positive impact of trade liberalization on the income of maize growers and match with the welfare analysis results at the national level (positive producers surplus) in the last chapter.

Table 4.6 Average farmer's cost of production and returns of maize crop in Punjab, Pakistan.

Operation/Input/Output	Without Trade Lib.* (Rs./ha)	With Trade Lib.** (Rs./ha)	Difference (Rs./ha)
1. Land preparation	890.00	1,012.70	122.70
2. Seeds & planting	309.00	753.35	444.35
3. Interculture/weeding/weedicides	524.00	1,432.60	908.60
4. Irrigation	950.00	1,506.70	556.70
5. Farmyard manure	450.00	666.90	216.90
6. Fertilizer	1,240.00	2,148.90	908.90
7. Labour	640.00	889.20	249.20
8. Interest on investment @14% per year for 6 months on items 1-7	337.70	588.72	251.02
9. Harvesting, dehusking & shelling	1,950.00	2,791.10	841.10
11. Land rent for 6 months	2,964.00	3,705.00	741.00
10. Management charges for 6 months	340.00	387.79	47.79
12. Gross cost (add items 1-11)	10,594.70	15,882.96	5,288.26
13. Yield per ha (tons)	2.57	2.57	0.00
14. Farmgate price per ton	4,875.00	7,675.00	2,800.00
15. Returns (multiply items 13 &14)	12,522.90	19,715.54	7,192.64
16. Value of maize stalks	740.00	988.00	248.00
17. Gross returns (add items 15 &16)	13,262.90	20,703.54	7,440.64
18. Net return per ha (subtract item 12 from 15)	2,668.20	4,820.58	2,152.38
19. Gross cost per ton (divide item 12 by 13)	4,122.45	6,180.14	2,057.69
20. Net return per ton (divide item 18 by 13)	1,038.69	1,876.59	837.89

* Cost of production and returns for 1993-94 maize crop per hectare without the impact of trade liberalization.

** Cost of production and returns for 1997-98 maize crop per hectare with he impact of trade liberalization at the farm level.

Source: Agricultural Prices Commission, Islamabad, Pakistan.

5. Conclusions and Policy Implications

5.1 Summary

- With the fast economic growth in many countries, particularly in Asian developing countries, trade of agricultural products is expanding and it is expected that trade growth will further accelerate. The movement towards trade liberalization is active in Asia and the Pacific region, and most of the countries have signed the Uruguay Round trade agreement under WTO. However, widespread concern about the effects of trade liberalization on regional agricultural production has been growing. The extent and direction of the impacts of trade liberalization of agricultural products differ by country and product. In order to proceed smoothly with the adjustment process towards a more liberalized economic environment, the effects of trade liberalization, especially those on small farmers, need to be analyzed and identified. The project "Effects of trade liberalization on agriculture in selected Asian countries with special focus on upland crops" aims at identifying the changing international trade of agricultural products and characterizing the economic situation in rural communities in selected Asian countries in the process of trade liberalization. The present study is part of this project and focuses on Pakistan. This is the second part of the study named the "Impacts of Trade Liberalization on Selected Agricultural Commodities in Pakistan". It attempts to quantify the impact of trade liberalization on food commodities (wheat, rice and maize) at the national level, and also includes a case study to determine the area-specific impact on these commodities.
- Being a signatory of WTO, Pakistan has accepted all the Uruguay Round trade agreements under WTO. It is currently in the process of implementing the agreements and modifying legal and administrative rules to ensure their consistency with rules and practices under the WTO. For example, the maximum tariff rate has been reduced from 225% in 1986 to 35% in March 1999. Also many NTBs have been removed, including import and export by government institutions, and the list of negative import items has been significantly reduced.
- Pakistan has experienced steady economic growth with a real GDP growth rate of about 6% and agricultural GDP has increased on average 3.8% per year during the last few decades. The share of agricultural GDP in the country's GDP is around one-fourth. Although the share of agriculture has been slowly decreasing from around 60% in 1960 to only 24 % in 1998, the agricultural sector is still one of the most important parts of the economy of the country employing more than 50% of the total labour force, directly and indirectly making around two-thirds of the total export earnings.
- Since 1950, Pakistan has continued to face serious balance of payment problems, not only because of international economic conditions, but also due to its adoption of restrictive trade policies to provide protection to infant industries. Due to over protection of domestic industries, domestic production of commodities became less competitive in the world market. Exports from Pakistan consist of only a few products and the lack of diversification has resulted in decreasing export performance. Cotton and cotton based products account for more than 60% of merchandise exports. The cotton crop is highly prone to natural hazards like cotton leaf-curl-virus and climatic factors. After cotton-based products, the other main export commodities are rice, fish and its preparations, fruits and vegetables, and leather. Wheat, edible oil, tea, and milk and its products are the major agricultural import commodities in Pakistan. The drain

of foreign exchange on imports of wheat increased from only US$ 64 million to more than US$ 700 million during 1997-98. Similarly, imports of edible oil increased from $265 million to $768 million and import of tea from US$ 119 million to US$ 227 million from 1981 to 1998.

- Wheat is the most important food crop as it is the staple food and the largest cereal crop in terms of area in Pakistan. However, its demand has often exceeded domestic production, and the country imports around 2 million tons of wheat (10-20% of total production). The impact of trade liberalization on wheat was estimated using standard regression analysis based on demand, supply and price linkage equations and time series data from 1981 to 1998. Using the results of the FAO (1995a) study on the "Impacts of the UR on Agriculture", it is assumed that international prices of wheat will increase by 7%. In addition, it is assumed that the wholesale price of wheat would also increase by another 7% due to termination of the wheat subsidy on the issue price in the country. This 14% increase in wholesale and farm level prices of wheat was estimated using elasticity coefficients. Due to this 14% increase, it is estimated that wholesale and farm level prices of wheat in Pakistan would increase by 14.295% and 13.58%, respectively, during 1997-98. The increase in farm level prices would have increased the total production of wheat from 18.69 million tons to 19.22 million tons (increased by 2.852%) during 1997-98. This increase in the production of wheat would have generated a gain of producers' surplus of Rs. 15,771 million. On the other hand, due to the increase in wholesale price of wheat, the domestic demand of wheat would have declined from 18.67 million tons to 18.40 million tons (1.49%) in 1997-98, and so caused a loss of consumers' surplus of Rs. 19,482 million. Overall the impact of the increase in the international price of wheat would have resulted in a net loss to Pakistan of Rs. 3,711 million during 1997-98.

- After wheat, rice is the second most important staple food and it is also one of the major foreign exchange sources of Pakistan. In terms of area, rice is the third most important crop after wheat and cotton, occupying around 10% of the total cultivated area and around 19% of the total food grain production in the country. The impact of trade liberalization on rice (both Basmati and non-Basmati rice) was estimated using standard regression analysis based on demand, supply and price linkage equations and time series data from 1981 to 1998. Using the results of the FAO (1995a) study on the "Impacts of the UR on Agriculture", it is assumed that international prices of rice will increase by 7%, and its impact on wholesale and farm level prices of rice was estimated using elasticity coefficients. Due to the increase in the international price of rice, it is estimated that wholesale and farm level prices of Basmati rice in Pakistan would have increased by 7.763% and 8.377%, respectively. On the other hand, wholesale and farm level prices of non-Basmati rice would have increased by 7.889% and 7.02%, respectively. The increase in the farm level price would have increased the total production of Basmati rice from 1.539 million tons to 1.572 million tons (increase by 2.123%), and total production of non-Basmati rice from 2.799 million tons to 2.883 million tons during 1997-98. This increase in the production of Basmati and non-Basmati rice would have generated a gain of producers' surplus of Rs. 1,872 million and Rs. 3,393 million, respectively. Due to the increase in the international price of rice, total production of rice would have increased from 4.338 million tons to 4.455 million tons and generated a total gain in producers' surplus of Rs. 5,264.96 million. On the other hand, due to the increase in the wholesale price of Basmati rice in Pakistan (by 7.763%), its domestic demand would have declined from 894.28 thousand tons to 866.74 thousand tons during 1997-98 and caused a loss of consumers' surplus of Rs. 1,190.54 million. Due to the increase in the wholesale price of non-Basmati rice (by 7.889%), its domestic demand would have declined from 1,090.65 thousand tons

to 1,080.23 thousand tons during 1997-98 and caused a loss of consumers' surplus of Rs. 841.66 million. Overall the impact of the increase in the international prices of rice would have resulted in a gain to Pakistan of Rs. 3,233.76 million during 1997-98.

- Maize is the third most important food crop in Pakistan, and it occupies around 4% of the total cropped area and 7% of the total area under food crops. Pakistan is not a big trade partner in maize, and its import used to be restricted in the past. Prices of maize in Pakistan were considerably higher than the international prices. The impact of trade liberalization on maize was estimated using standard regression analysis based on demand, supply and price linkage equations and time series data from 1981 to 1998. Using the results of the FAO (1995a) study on the "Impacts of the UR on Agriculture", it is assumed that international prices of maize will increase by 4%, and its impact on wholesale and farm level prices of maize was estimated using elasticity coefficients. Due to the increase in the international price of maize, it is estimated that wholesale and farm level prices of maize in Pakistan would have increased by only 4.02% and 4.03%, respectively. The increase in the farm level price would have increased the total production of maize from 1.251 million tons to 1.254 million tons during 1997-98. This increase in the production of maize would have generated a gain of producers' surplus of only Rs. 387.87 million. On the other hand, due to the increase in the wholesale price of maize, domestic demand of maize would have declined from 1.323 million tons to 1.315 million tons in 1997-98, and as a result caused a loss of consumers' surplus of Rs. 452.73 million. Overall the impact of the increase in the international price of maize would have resulted in a net loss to Pakistan of Rs. 64.86 million.

- To study the impact of trade liberalization on location-commodity-specific agriculture, the rice area of Punjab province was selected to analyze the effects on rice (Basmati and non-Basmati), wheat and maize. Partial budgets of these three commodities were estimated, and the impact of trade liberalization at the farm level analyzed. The cost of production and net return data for these commodities were estimated for the scenario without trade liberalization (using base year 1993-94) and the scenario with trade liberalization (during 1997-98) at the 1997-98 yield and input levels. For the without trade liberalization scenario, 1993-94 prices of inputs and outputs were used. On the other hand with trade liberalization, 1997-98 farm level prices of inputs and outputs were used. The difference in cost of production and net returns between these two categories was assumed to be the effect of trade liberalization at the farm level.

- Using the partial budgets before and after trade liberalization, the impact at the farm level is such that the cost of production of Basmati, and non-Basmati (IRRI type) rice, wheat and maize was increased by Rs. 7,945/ha, Rs. 7,327/ha, Rs. 5,514/ha and Rs. 5,288/ha, respectively, during 1997-98. On the other hand, net returns in the case of Basmati rice and maize increased by Rs. 630/ha and Rs. 2,152/ha respectively during 1997-98. In the case of non-Basmati rice and wheat, net returns decreased by Rs. 2,345/ha and Rs. 983/ha, respectively during 1997-98.

5.2 Policy implications

- Presently, Pakistan is in the process of implementing the UR agreements on agriculture, which is a very complex and comprehensive undertaking and its impacts cannot be easily quantified mainly due to uncertainty in the agricultural sector. Therefore, extra precautions may be taken in the interpretation and adoption of its impacts on the agricultural sector. With the existing economic and political structure in Pakistan, it is expected that the country will face considerable policy challenges in the

course of implementation of the UR agreement, including tariff reduction. Various other policy adjustments would be required to fulfil obligations under the WTO, for example, eliminating of the wheat import subsidy, fixing support prices below the world prices, opening up the market for food commodities, etc.

- In the agricultural sector, most of the producers, exporters, and policy makers are presently not well aware about the Uruguay Round trade agreement on agriculture. There is an urgent need to pursue public awareness programs on the impact of trade liberalization on agriculture, including trade policy developments, priorities, and strategies of the major trading partners of Pakistan.

- To further expand the export of agricultural commodities, Pakistan may have to adopt measures and programs that would ensure that its export products compete successfully with those exported by other LDCs, particularly producers of the same commodities in Asia.

- From global trade liberalization in agriculture, Pakistan is interested in expanding its world market share mainly for its exportable agricultural commodities such as rice. Also, Pakistan has to liberalize its agricultural imports, which means domestic producers have to face competition from international agriculture, which enjoys access to inexpensive capital, well-developed infrastructure and the latest technology. In this situation, there is a need to considerably increase the productivity and efficiency of all agricultural traded commodities. The productivity of almost all traded goods is very low compared to their potential. Therefore, efforts must be made through extension to promote improved cultural and intensive management practices to increase the existing productivity levels. Also, present price policies may be revised and commodity prices may be market-oriented, and government may slowly phase out all forms of price support policies and control on output markets in the country.

- It is expected that domestic prices of wheat, the main staple food in Pakistan, will increase considerably and the country will have to spend a huge amount of foreign exchange on its imports. In the case of wheat, the best strategy would be to achieve self-sufficiency by considerably increasing the productivity of the local wheat crop, which is far below the potential yield levels.

- Internal liberalization is the key to fully benefiting from external trade liberalization in agriculture. There is a need to remove distortions in the agricultural sector in Pakistan, such as excessive unnecessary government control, restrictions on produce movement and private sector participation in agriculture, fixing minimum support prices, etc.

- Due to lower (or negative) net returns from planting food grains, including wheat, the cropping pattern is getting diversified with a shifting away from food grains towards high value crops or export oriented crops. This is a very serious issue, since with the existing population growth of around 3%, demand for food commodities is increasing at a faster rate. In such a situation there is a need to carefully design policies on key issues, such as whether or not to shift the food grain area towards high value crops, although earnings from the high value crops or crops with export potential may be used to import food grains to meet domestic requirements.

- Trade-related physical infrastructure in the country needs considerable improvement to fulfil the growing needs of international trade in Pakistan. Facilities such as the transport network, equipment for quality control, bulk storage and handling facilities, railway sheds, etc., should be improved through increased private investment to develop the physical infrastructure in the country.

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Appendix Tables

Appendix Table 1 An overview of the UR agreements.

Category	Agreements
1. Trade Barriers	
Tariffs	Average tariffs on industrial products cut by 39%;
	Elimination of duties in 11 sectors;
	Increase in proportion of bound duties.
Non-tariff measures	Prohibition of grey area measures;
	Tariffication of NTMs in agriculture.
2. Sectors	
Natural resource-based products	Tariff reduction; increase in proportion of bound duties;
	Some progress on escalation.
Tropical products	Reduction in tariff peaks, increase in proportion of bound duties, some progress on escalation.
Textiles and clothing	Four-stage phase-out of MFA;
	Transitional safeguards;
	Constraints on circumvention.
Agriculture	Tariffication of NTMs and gradual reduction thereof;
	Constraints on de-coupled domestic support;
	Reduction in value and quantity of products subject to export subsidies;
	Affirmation of rights and objections in sanitary and phytosanitary measures;
3. GATT System	
Safeguards	Prohibition of grey area measures;
	Explicit sunset arrangements;
	Tighter criteria for applications
	Limited provision for discrimination.
Subsidies and CVDs	Traffic light system introduced (pre-heated, 'actionable' & unprohibited subsidies)
	Discipline in use of CVDs
GATT articles	Requirements that interventions under XII and XVIII be price-based;
	Clarification and re-enforcement of XXIV criteria.
	Strengthening of procedures for calculating dumping margin under VI, as well as strengthening injury test and dispute settlement.
	Strengthening of provisions on rules on origin and free shipment inspection;
MTMs	New procedures for negotiation of compensation when bindings are modified to assist.
TRIMs	Prohibition of TRIMs inconsistent with Articles III and XI
	Phase out of existing TRIMs.
	Concessions for developing countries.
4. New Issues	
TRIPPs	General commitment to MFN where possible;
	Specific provisions on copyrights, trademarks, geographical indication, idustrial designs, patents, layout designs of ICs, trade sectors;
	Phased transition for developing countries.
Services	General commitment to MFN where possible;
	Arrangement for progressive liberalization;
	Specific institution provisions for air transport, financial services, & telecommunications
WTO	Creation of WTO 'umbrella' organization;
	Commitment to sustain TPRM;
	Integrated dispute settlement system;

Source: GATT 1994.

Appendix Table 2 Data used in declaring Pakistan as a net food importing country for 1992-93 to 1994-95.

Food/ Food Group	Period	Food Imports Quantity ('000 tons)	Value (Rs. million)	Food Exports Quantity ('000 tons)	Value (Rs. million)	Net Food Imports Quantity ('000 tons)	Value (Rs. Million)
Total Food	1992-93		36,921		14,741		22,180
	1993-94		31,455		15,471		15,984
	1994-95		55,145		24,885		30,260
Major Food Items							
Wheat	1992-93	2,890	12,167	0	0	2,890	12,167
	1993-94	1,901	7,234	5	26	1,896	7,208
	1994-95	2,617	12,752	0	0	2,617	12,752
Rice	1992-93	0	0	1,032	8,214	-1,032	-8,214
	1993-94	14	123	984	7,319	-971	-7,196
	1994-95	0	0	1,852	14,026	-1,852	-14,026
Pulses (all)	1992-93	239	1,736	0	0	239	1,736
	1993-94	154	1,319	0	0	154	1,319
	1994-95	191	1,916	0	0	191	1,916
Sugar	1992-93	75	553	0	0	75	553
	1993-94	48	449	122	1,205	-74	-757
	1994-95	5	72	316	3,771	-311	-3,699
Milk, dry/ condensed	1992-93	7	267	0	0	7	267
	1993-94	10	496	0.077	7	10	489
	1994-95	10	515	0.378	21	10	494
Butter	1992-93	0.275	9	0	0	0	9
	1993-94	0.248	8	0	0	0	8
	1994-95	0.153	9	0	0	0	9
Butter oil (Ghee)	1992-93	24.487	528	0	0	24	528
	1993-94	1.83	121	0	0	2	121
	1994-95	0.075	4	0	0	0	4
Vegetables oils/fats	1992-93	1,340	15,312	0	0	1,340	15,312
	1993-94	1,137	14,819	0.015	0.615	1,137	14,818
	1994-95	1,424	31,455	0.384	14.37	1,424	31,440
Tea (black & green)	1992-93	126	5,386	0.085	4	126	5,381
	1993-94	116	5,619	1.489	85	115	5,534
	1994-95	117	5,794	4.137	231	112	5,562
Vegetables (all)	1992-93	33	206	9	190	25	16
	1993-94	43	318	35	366	8	-48
	1994-95	83	593	36	301	47	292
Fruits (all)	1992-93	41	283	121	1,179	-80	-896
	1993-94	68	440	128	1,330	-59	-890
	1994-95	69	491	139	1,256	-70	-766
Meat (beef & mutton)	1992-93	0.001	0.037	0.442	13.85	0	-14
	1993-94	0.003	0.154	0.156	11.24	0	-11
	1994-95	0.156	6.349	0	12.23	0	-6
Other food items[1]	1992-93		474		5,140		-4,666
	1993-94		509		5,121		-4,611
	1994-95		1538		5,252		-3,714

[1]Fish, cereal products, spices, fruit products, coffee and other food preparations.
Note: A minus (-) sign indicates net exports.
Source: Ministry of Food, Agriculture and Livestock, Islamabad.

Appendix Table 3 Tariff and non-tariff barriers on agricultural commodities (2-digit level) in Pakistan.

Heading No.	Description of Goods	Tariff Rate (%)				Bound Rate of Duty (%)	Quantitative Restrictions					
							1989		1995		1997	
		1989	1995	1996	1997		Imports	Exports	Imports	Exports	Imports	Exports
1	Live animals	0-40	15-65	15-65	15-65	100	SC/NL	BAN	HS/NL	SD	HS/NL	SD
2	Meat and edible meat offal	80	35-70	35-65	15-65	100	SC/NL	BAN	NL	SD	NL	SD
3	Fish & crustaceans, molluscs and other aquatic invertebrates	0-60	25-70	35-65	15-65	100						
4	Diary produce; bird's eggs; natural honey; edible products of animal origin, not elsewhere	60-100 Rs.10/kg	25-70	25-65	25-65	100	SC/NL	BAN	NL	NL		
5	Products of animal origin, not elsewhere	40-80	35-70	35-65	35-65	100	SC/NL		NL	NL		
6	Live trees and other plants; bulbs, roots and the like; cut flowers & ornamental foliage	100	35	35	35	100						
7	Edible vegetables & certain roots & tubers	0-100	10-35	Oct-35	0-35	100		BAN				
8	Edible fruit and nuts; peel of citrus fruit or melons	0-100 Rs.12/kg	30-70	35-65	55-65	100						
9	Coffee, tea, mate and spices	40-100 Rs.60/kg	15-70	15-65	0-65	100		BAN				
10	Cereals	0-40	0-65	0-65	0-25	100-150	NL	BAN/Quota/RECP		SD/Quota/RECP		SD/Quota/RECP

Notes:
HS denotes restrictions for health and safety conditions.
NL denotes negative list, i.e. items in this list cannot be imported.
TCP denotes Trading Corporation of Pakistan. It is a parastatal body involved in imports of different commodities.
BAN indicates banned items and hence items in this list cannot be imported or exported.
RECP denotes Rice Export Corporation of Pakistan.
CECP denotes Cotton Export Corporation of Pakistan.
SD denotes special dispensation.
SC denotes specific condition, which includes taking permission from different ministries as well as meeting specification standards prescribed by the government.
Blank entries mean no restriction.
Source: Qureshi 1996.

Pakistan Custom Tariff (various). Central Board of Revenue, Ministry of Finance, Government of Pakistan.
Uruguay Round (1994) "Schedule XV-Pakistan", GATT Secretariat, February.
Pakistan Gazettes (various issues).
Ministry of Commerce (various issues) Trade Policy, Government of Pakistan.

Continued . . . .

Appendix Table 3 Tariff and non-tariff barriers on agricultural commodities (2-digit level) in Pakistan (continued).

Heading No.	Description of Goods	Tariff Rate (%)				Bound Rate of Duty (%)	Quantitative Restrictions					
							1989		1995		1997	
		1989	1995	1996	1997		Imports	Exports	Imports	Exports	Imports	Exports
11	Oil seeds and oleaginous fruit; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straws & fodder	0-100	10-70	10-65	0-65	100	NL		HS/NL		HS/NL	SD
12	Lac; gums, resins and other vegetable saps and extracts	0-80 Rs.150/kg	25-70	65	45-65	100	NL		NL		NL	
13	Vegetable Plaiting materials; vegetable products, nes	20-100 Rs.100/kg	45-70 Rs.100/kg	45-65 Rs.110/kg	45-65 Rs.150/kg	100						
14	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	40-100 Rs.3000-3500 /m.ton	40-100 9550 /m.ton	25-65 Rs.8590-9550 /m.ton	25-65 Rs.7600-10,000 /m.ton	100	SC/NL/ T.C.P.	BAN	NL		HS/NL	SD
20	Preparations of vegetable, fruit, nuts or other parts of plants.	100	35-70	35-65	45-65	100			SC			
21	Miscellaneous edible preparations	40-125	35-70	35-65	45-65	100			NL			
23	Residues and waste from the food industries; prepared animal fodder	20	15-45	15-45	15-45	100			NL		NL	SD
24	Tobacco	50	70	65	65				NL			
52	Cotton	0	0	10	10					CEC		CEC

Notes:

HS denotes restrictions for health and safety conditions.

NL denotes negative list, i.e. items in this list cannot be imported.

TCP denotes Trading Corporation of Pakistan. It is a parastatal body involved in imports of different commodities.

BAN indicates banned items and hence items in this list cannot be imported and/or exported.

RECP denotes Rice Export Corporation of Pakistan.

CECP denotes Cotton Export Corporation of Pakistan.

SD denotes special dispensation

SC denotes specific condition, which includes taking permission from different ministries as well as meeting specification standards prescribed by the government.

Blank entries mean no restriction

Source: Qureshi 1996.

Pakistan Custom Tariff (various). Central Board of Revenue, Ministry of Finance, Government of Pakistan.

Uruguay Round (1994) "Schedule XV-Pakistan", GATT Secretariat, February.

Pakistan Gazettes (various issues).

Ministry of Commerce (various issues) Trade Policy, Government of Pakistan.

Appendix Table 4 Compliance of Pakistan's agricultural policies with the provisions of the Uruguay Round Agreement on agriculture and structural adjustment programs.

Category of Policy	Pakistan's Policy	Compliance		Efficiency and Equity Considerations
		Agreement on Agriculture	Structural Adjustment Program	
A. Domestic Agricultural Policies				
1. Output Prices				
Commodity specific mechanisms using some form of administered price to support producer prices.	Minimum guaranteed prices for wheat, rice, non-traditional oilseeds, sugar, cotton, and a range of minor crops.	Will influence the AMS[2] to the value of PD-Pb(qm). Support is negative in aggregate and for most individual commodities except sugar and coarse rice. Current policies therefore comply unless removal of implicit taxation leads to a positive MAS. Even then *de minimis* ruling may exempt commodities with positive protection[3].	SAPs[4] emphasize elimination of producer subsides or taxes. Current negative levels of support for most agricultural commodities do not therefore comply. Implementation of SAP provisions should lead to removal of the gap between domestic and adjusted border prices and increasing returns to producers.	While minimum price guarantees can provide a degree of price stabilization which may increase efficiency though reducing market risk, in general output price intervention may result in an inefficient allocation of resources. It is generally regressive in its impact, favoring those who market most, or those able to produce commodities for which support is most positive.
2. Traded Input Prices				
Actions influencing the prices of seeds, fertilizers, pesticides, machinery, etc.	These input subsidies have been largely phased out. Subsidy on fertilizer and subsidies on certified wheat seed and on renting of certain machinery.	Input subsides *generally* available to *poor* farmers are exempt from inclusion in the AMS. This should apply at least to fertilizer and seed subsides[5].	Elimination of input subsides are an important SAP condition. Current policies which are in the process of eliminating subsides on traded inputs therefore comply.	Such support is potentially more cost-effective to administer than output price support, and can be used to promote technical innovation, but it frequently by-passes the poorest farmers who may not use these inputs.
3. Non-Traded Input Prices				
Primarily credit subsides; also implicit subsides/taxes on water, electricity, etc.	Subsides for such imports are important type of input subsidy in Pakistan. The largest government expenditure is on implicit subsides for irrigation water, followed by those for credit and electricity.	Providing these are *generally* available to *poor* farmers, they should be exempt from inclusion in the AMS measurement.	Implicit subsides on water and electricity as well as general interest rate subsides are not compatible with the spirit of SAPs and there may be pressure to reduce or eliminate them[6].	Credit subsides, being input neutral compared with trade inputs, provide a relatively efficient form of support with substantial scope for targeting towards the poorest. However, water and electricity subsides may lead to excessive and inefficient use.

Continued ....

Appendix Table 4. Compliance of Pakistan's agricultural policies with the provisions of the Uruguay Round Agreement on agriculture and structural adjustment programs, (continued).

Category of Policy	Pakistan's Policy	Compliance		Efficiency and Equity Considerations
		Agreement on Agriculture	Structural Adjustment Program	
4. Marketing Interventions				
Activities which influence the functions of marketing intermediaries and the financing of marketing costs.	Most agricultural commodities are marketed, at least partly, by public sector agencies, both imports & exports and for non-trade commodities; e.g. Provincial Food Departments and PASSCO. For exports: the RMC (rice) and the CEC (cotton)[7].	Only those subsidies which 'distort' prices of inputs or outputs are the concern of the Agreement, which is, therefore, neutral with regard to any subsidies which merely facilitate public sector marketing. Marketing subsidies affecting input or output prices are includes in the MAS. Subsidies which reduce export marketing costs are exempt.	De-regulation and privatization of public sector enterprise are a significant feature of SAPs which are likely to reinforce current moves in this direction.	Public sector marketing is often regarded as insufficient, although frequently this is due to a failure to account separately for commercial and social functions. The latter can be important to areas disadvantaged by poorly developed physical and market infrastructures[8].
5. Non-Price Measures				
Direct (de-coupled) income payments, income insurance; restructuring grants.	Not applicable in Pakistan at present.	Although most 'green box' policies are not currently applicable, there may be scope in the future particularly with regard to payments under environmental programs[9].	SAP conditionally seldom makes reference to this type of policy, excepted so far as high levels of government expenditure are discouraged. At the same time, interventions which reflect environmental concerns are increasingly considered favorably.	In so far as 'de-coupled' non-price support does not directly affect resource allocation, it can be an efficient mechanism of intervention. Direct income transfers may also be potentially easy to target. At the same time, administrative costs may render such interventions prohibitively expensive in developing countries.
B. Trade Policy Instruments				
1. Export Policies				
Taxes, subsidies, and export prohibitions, etc.	Export duties on basmati rice and cotton; an export subsidy on cut flowers; export prohibitions on oilseeds, pulses, certain livestock, timber and (periodically) cotton.	Export taxes do not run counter to the Agreement. Prohibitions do, however, except for health or social reasons, so some of these will be hard to justify. The cut flower subsidy is a 25% freight subsidy, and therefore compatible with an agreement which exempts from restriction national and international subsidies on exports by developing countries. [10]		Export taxes11 and subsidies, in so far as they distort domestic resource allocation, are frowned upon, although the promotion of export earning activity is encouraged.	Export taxes are a relatively inefficient way of raising government revenue since they act as distinctive to export production, although 'windfall' taxes following world price escalations may be justifiable on equity grounds. Export subsidies may be efficient in the short term (but only in the short-term) to foster market access or, in the 'small country' case, to dispose of atypical

surpluses.

Appendix Table 4. Compliance of Pakistan's agricultural policies with the provisions of the Uruguay Round Agreement on agriculture and structural adjustment programs (continued).

Category of Policy	Pakistan's Policy	Compliance		Efficiency and Equity Considerations
		Agreement on Agriculture	Structural Adjustment Program	
2. Import Policies Tariffs, quotas, other non-tariff barriers, import prohibitions.	Import subsidy on wheat; import tariffs on coarse rice, maize, non-traditional oilseeds and minor cereals; import prohibition on pigs and pig products.	Most current tariffs fall well within the negotiated tariff boundaries, and import subsidies are not considered, so compliance is not an issue. The decision to simply and increase the transparency of the tariff system will reinforce this state of affairs.	SAP conditionally encourages reductions of tariff barriers, although limited use of tariffs is acceptable at a common rate. Import subsidies, in providing disincentives to domestic producers are discouraged.	Tariffs are less inefficient than other forms of import restrictions, although any intervention which increases the import prices of food is likely to disadvantage the poorest, particularly the urban poor. Import subsidies are highly inefficient, since the subsidy benefits foreign suppliers directly, although the distributional effect, in the case of wheat, is ambiguous: it benefits consumers, many of whom are poor, at the expense of producers, many of whom are also poor.
C Public Investments Investments in research and extension; provision of physical or marketing infrastructures.	Expenditure on research and extension is below the optimal level. For 1992, expenditure on these items is 35% of agricultural subsidies.	Expenditure on research and extension is exempt from AMS considerations, i.e. falls into the 'green box' category, as does investment in physical or marketing infrastructures.	Investment in economic and physical infrastructures, especially where it assists in overcoming market imperfections while leaving resource allocation to market influence, is encouraged providing expenditures within the spending constraints.	Since this type of investment typically facilitates private sector activity and does not directly affect prices, it is regarded as efficient. At the same time, public investments are typically long-term, and the poor tend to have relatively short time horizons. Such investments are also difficult to target.
D. Food Security Measures Consumers price subsidies; food stock maintenance; food and provision.	There are substantial consumer subsidies affecting wheat, edible oils and sugar.	The agreement is neutral with regard to consumer subsidies, so these do not affect compliance. Neither do the maintenance of food reserves (which are not used to support producer prices) or the provision of foodstuffs at subsidized prices.	SAPs generally require curtailment of public spending, particularly on consumer subsidies. Current subsidies are non-compliant and conditionally likely to involve their reductions or elimination.	General food subsidies, such as that on wheat, are highly inefficient since the poor and non-poor may benefit equally. Such leakage is reduced through targeting, but the associated administrative costs can be high[12].

Notes:
1. The table considers compliance with the Agreement on Agriculture, and does not cover the Sanitary and Phytosanitary Agreement.
2. AMS = Aggregate Measure of Support, where Pd = domestic price, Pb = adjusted border price and Qm = the market quantity.
3. Note that the *de minis* provision of the Agreement is based on the total value of production: 10% of total production may be a much larger proportion of marketed production. Increasing the possibility of exemption of positive support to key commodities such as rice, oilseeds and sugar, in the event that negative protection is ended for other commodities.
4. SAP = Structural Adjustment Program.
5. These input subsidies are largely phased out, but any re-introduction could be compatible with the Agreement providing subsidies were *generally* available to the *poor*.
6. As with subsidies on traded inputs the opportunity for targeting assistance, particularly for targeting assistance, particularly regarding credit, may be constrained by the Agreement, although encouraged under SAPs.
7. PASSCO = The Pakistan Agricultural Storage and Services Corporation; REC = The Rice Export Corporation; and CEC = The Cotton Export Corporation.
8. Separation of the commercial and social functions of these agencies is essential from the SAP perspective, although the ownership issue is not a concern of the Uruguay Round.

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Appendix

9. The Search for forms of intervention which are both appropriate to developing country needs and which fall into the 'green box' category is likely to be an important focus in the future.
10. Providing they are not seen as circumventing reduction commitments on export subsidies.
11. Removal of export taxes may present problems when the government is already under pressure to reduce its spending. Revenue loss can exacerbate the problem.
12. SAP pressures to increase producer incentives coupled with conditionally associated with lower government spending (cutting consumer subsidies) makes it imperative to find efficient and cost effective mechanisms for targeting lower levels of consumer subsidy to most food insecure.

Source: Qureshi, 1996. Ministry of Commerce, Government of Pakistan, Islamabad.

Appendix Table 5 Product specific and non-product specific aggregate measures of support (AMS) for Pakistan (rupees million and as percentage of value added of agriculture crops and livestock products).

Year	1986-87	1987-88	1988-89	1990-91	1991-92	1992-93	1993-94	Average (1986-87 to 1988-89)	(1990-91 to 1993-94)
Support Type									
A. Product-Specific AMS									
Wheat	-5,699.62	-4,038.60	-3,857.38	-1,801	-3,481	-3,126	803	-4,531.87	-1,901
Seed Cotton	4,020.14	-7,442.38	-6,681.85	-21,150	-23,293	-9,776	-1,297	-3,368.03	-13,879
Rice Basmati	-1,518.29	-1,432.39	-3,388.32	-507	-323	-1,346	-787	-2,113	-741
Rice Coarse	-489.36	-855.63	-1,280.75	-114	-307	-493	-450	-875.24	-341
Sugarcane	598.48	782.56	-73.21	-1,017	-918	-2,482	n/a	435.94	-1,104
Onion	0	-0.04	-0.08	-1,525	-469	-483	-2,030	-0.04	-1,125
Potato	-5.66	0	-2.3	-6.91	-131	-216	-446	-2.66	-371
Gram	-4.37	-1,566.9	-1,550.4	0.5	27	-2	n/a	-1,040.53	6.4
Soybean	-28.64	-11.51	n/a	2	3	n/a	n/a	-20.08	1.25
Sunflower	29.4	38.58	-89.1	57	210	n/a	n/a	-7.04	67
Safflower	n/a	n/a	n/a	2	n/a	n/a	n/a	-1.68	0.5
Total: All Crop Product-Specific Support	-12,335.16	-14,580.45	-16,923.39	-26,743.5	-28,682	-17,924	-4,200	-11,524.23	-19,387
	(-9.50)	(-9.70)	(-9.57)	(-11.92)	(-10.52)	(-6.28)	(-1.23)	(-7.57)	(-6.90)
B. Non-product Specific AMS									
Agric. Credit Subsidy	735	607	80	688	805	863	550	697	726
Electric Subsidy	784	1,143	1,210	732	829	746	92	1,046	600
Fertilizer Subsidy	1,284	1,819	2,415	625	564	351	223	1,839	441
Total: Non-Product Specific Support	2,803	3,568	3,705	2,045	2,198	1,960	865	3,582	1,767
	(2.16)	(2.37)	(2.10)	(0.91)	(0.81)	(0.69)	(0.25)	(2.35)	(0.63)
C. Aggregate Measure of Support (AMS)	-9,532.16	-11,012.5	-13,218.4	-24,698.5	-26,484	-15,964	-3,335	-7,942.23	-17,620
	(-7.34)	(-7.33)	(-7.48)	(-11.02)	(-9.71)	(-5.59)	(-0.98)	(-5.22)	(-6.27)

Source: 1) Data for the years 1986-87 to 1988-89 have been obtained from Supporting Tables Relating to Commitments on Agricultural Products in Part IV of the Schedule, World Trade Organization, March 1995.

Appendix

2) Data for the remaining years has been obtained from the Ministry of Food and Agriculture, Government of Pakistan, Islamabad.
3) Qureshi 1996.

Note: 1. Figures in parenthesis represent AMS as percentage of value-added of the agriculture sector minus fishing and forestry.

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Appendix Table 6 Province-wise area, production and yield of wheat in Pakistan.

Year	Province	Area ('000ha)			Production ('000tons)			Yield (kg/ha)	
		HYVs*	Others	Total	HYVs	Others	Total	HYVs	Others
1980-81									
	Punjab	4,138	840	4,978	7,510.5	839.5	8,350	1,815	999
	Sindh	988.4	41.6	1,030	1,902.3	43.5	1,945.8	1,925	1,046
	NWFP	529.2	261.2	790.4	745.9	194.9	940.8	1,409	746
	Baluchistan	76.9	108.4	185.3	149.1	88.9	238	1,939	820
	Pakistan	5,732.5	1,251.2	6,983.7	10,307.8	1,166.8	11,474.6	1,798	993
1990-91									
	Punjab	5,528.4	183.3	5,711.7	10,333	180.8	10,513.8	1,869	986
	Sindh	1,015	38.5	1,053.5	2,245.6	28.9	2,274.5	2,212	751
	NWFP	616	244.1	840.1	940.2	208.2	1,148.4	1,526	929
	Baluchistan	218.3	.87.8	306.1	514.8	113.5	628.3	2,358	1,293
	Pakistan	7,377.7	553.7	7,911.4	114,033.6	531.4	14,565	1,902	996
1991-92									
	Punjab	5,494.4	174.8	5,669.2	11,314.2	178.1	11,492.3	2,059	1,019
	Sindh	1,019.7	38.7	1,058.4	2,335.3	30.1	2,365.4	2,290	778
	NWFP	637	205.2	842.2	971.7	191.7	1,163.4	1,525	934
	Baluchistan	218.4	89.4	307.8	542.9	120.2	663.1	2,486	1,345
	Pakistan	7,369.5	508.1	7,877.6	15,164.1	520.1	15,684.2	2,058	1,024
1992-93									
	Punjab	5,750.2	210	5,960.5	11,552	190	11,742	2,009	905
	Sindh	1,015.6	88.1	1,103.7	2,307.5	110.5	2,418	2,272	1,254
	NWFP	651.2	198.4	849.6	993.4	189.6	1,183	1,525	956
	Baluchistan	264.1	121.8	385.9	648.2	165.3	813.5	2,454	1,357
	Pakistan	7,681.1	618.3	8,299.7	15,501.1	655.4	16,156.5	2,018	1,060
1993-94									
	Punjab	5,614.5	156.2	5,770.7	11,101.8	116.2	11,218	1,977	744
	Sindh	1,060.3	45.3	1,105.6	2,076.7	39.9	2,116.6	1,958	881
	NWFP	638	191.6	829.6	960.4	173.9	1,134.3	1,505	908
	Baluchistan	245.3	83	328.3	628.7	115.4	744.1	2,563	1,390
	Pakistan	7,558.1	476.1	8,034.2	14,767.6	445.4	15,213	1,954	936
1994-95									
	Punjab	5,729.5	172.8	5,902.3	12,554.5	158.5	12,713	2,191	917
	Sindh	1,008.4	54.6	1,063	2,266	53.1	2,319.1	2,247	971
	NWFP	665	199.1	864	998.8	181.4	1,180.2	1,502	911
	Baluchistan	258	83	340.5	670.9	119.2	790.1	2,605	1,436
	Pakistan	7,660.3	509.5	8,169.8	16,490.2	512.2	17,002.4	2,153	1,005
1995-96									
	Punjab	5,784.1	189.4	5,973.5	12,251.4	178.6	12,713	2,118	943
	Sindh	1,049.6	56.8	1,106.4	2,291.1	53.7	2,344.8	2,183	945
	NWFP	670.3	198.8	866.1	1,018.5	184	1,202.5	1,519	940
	Baluchistan	299	131.5	430.5	749.7	180.4	930.1	2,507	1,372
	Pakistan	7,803	573.5	8,376.5	16,310.7	596.7	16,907.4	2,090	1,040
1996-97									
	Punjab	5,675.6	164.3	5,839.9	12,227.8	143.2	12,371	2,154	872
	Sindh	1,036.5	70.3	1,106.8	2,354.2	89.7	2,443.9	2,271	1,276
	NWFP	648.1	194.7	842.8	903.6	160.8	1,064.4	1,394	826
	Baluchistan	254.3	65.3	319.6	668.9	102.3	771.2	2,630	1,567
	Pakistan	7,614.5	494.6	8,109.1	16,154.5	496	16,650.5	2,122	1,003

*HYVs: high yielding varieties.
Source: Agricultural Statistics of Pakistan, 1996-97.

Appendix

Appendix Table 7 Province and variety-wise area production and yield of rice in Pakistan.

Year	Province	Area ('000 ha)				Production ('000 tons)				Yield ('000 ha)			
		Basmati	IRRI	Others	Total	Basmati	IRRI	Others	Total	Basmati	IRRI	Others	Total
1975-76	Punjab	528.1	116.1	233.1	877.3	632.3	221.3	353.6	1,207.2	1,999	1,909	1,513	1,376
	Sindh	0	522.1	209	731.1	0	1,027.6	258.5	1,286.1	0	1,965	1,236	1,759
	NWFP	7.7	12.3	43	63	10	18.5	56.1	84.6	1,291	1,503	1,300	1,343
	Baluchistan	0	15.1	23.2	38.3	0	22.7	16.9	39.6	0	1,503	729	1,034
	Pakistan	535.8	665.6	508.3	1,709.7	642.3	1,290.1	685.1	2,617.5	1,199	1,937	1,347	1,531
1980-81	Punjab	813.4	198.7	49.8	1,061.9	965.3	332	64.4	1,361.7	1,187	1,671	1,293	1,282
	Sindh	0	599.9	163.9	763.8	0	1,343.9	206	1,549.9	0	2,240	1,257	2,029
	NWFP	1.3	11.9	44	66.2	14.7	23.9	66.5	105.1	1,427	2,008	1,511	1,588
	Baluchistan	0	30.6	10.6	41.2	0	96.8	9.7	106.5	0	3,163	915	2,558
	Pakistan	823.7	841.1	268.3	1,933.1	980	1,796.6	346.6	3,123.2	1,190	2,136	1,292	1,616
1990-91	Punjab	1,087.4	164.3	10.1	1,261.8	1,158.6	253.7	10	1,422.3	1,065	1,544	990	1,127
	Sindh	-	567.6	112.3	679.9	-	1,310.1	123.3	1,433.4	-	2,308	1,098	2,108
	NWFP	13	16.1	33.2	62.3	26.3	33.9	57.8	118	2,023	2,106	1,741	1,894
	Baluchistan	19.5	81.7	7.5	108.7	35.3	234.3	17.5	287.1	1,810	2,868	2,333	2,641
	Pakistan	1,119.9	829.7	163.1	2,112.7	1,220.2	1,832	208.6	3,260.8	1,090	2,208	1,279	1,543
1991-92	Punjab	1,032.7	189	9.7	1,231.4	1,033.9	298.7	9.6	1,342.2	1,001	1,580	989	1,089
	Sindh	-	591.7	100.7	692.4	-	1,376.7	110.8	1,487.5	-	2,326	1,100	2,148
	NWFP	13.4	16.3	33.4	63.1	25.5	35.5	62	123	1,902	2,177	1,856	1,949
	Baluchistan	19.5	82.2	8.3	110	32.8	238.6	19	290.4	1,682	2,902	2,289	2,640
	Pakistan	1,065.6	879.2	152.1	2,096.9	1,092.2	1,949.5	201.4	3,243.1	1,024	2,217	1,324	1,546
1992-93	Punjab	1,006.8	205.6	9.3	1,221.7	1,075.9	318.7	9.3	1,403.9	1,069	1,550	1,000	1,149
	Sindh	-	487.3	81.5	568.8	-	1,170.4	102.4	1,272.8	-	2,402	1,256	2,237
	NWFP	13.5	15.1	33.5	62.1	24	29.5	58.4	111.9	1,785	1,954	1,740	1,801
	Baluchistan	16.1	95.1	11	120.8	24.2	279.2	24.1	327.5	1,646	2,936	2,191	2,711
	Pakistan	1,035	803.1	135.3	1,973.4	1,124.1	1,797.8	194.2	3,116.1	1,086	2,239	1,435	1,579

Appendix Table 7 Province and variety-wise area production and yield of rice in Pakistan (continued).

Year	Province	Area ('000 ha)				Production ('000 tons)				Yield ('000 ha)			
		Basmati	IRRI	Others	Total	Basmati	IRRI	Others	Total	Basmati	IRRI	Others	Total
1993-94													
	Punjab	1,074	218.5	8.1	1,300.6	1,215.9	361.5	10.8	1,588.2	1,132	1,654	1,333	1,221
	Sindh	-	630.1	72.8	702.9	-	1,840.6	114.3	1,954.9	-	2,921	1,570	2,781
	NWFP	13.4	16.6	32.7	62.7	24.2	37.1	57.1	118.4	1,806	2,235	1,746	1,888
	Baluchistan	16.1	95.8	9	120.9	26.6	285.1	21.5	333.2	1,652	2,976	2,389	2,756
	Pakistan	1,103.5	961	122.6	2,187.1	1,266.7	2,524.3	203.7	3,997.7	1,148	2,627	1,662	1,826
1994-95													
	Punjab	1,107.6	222.6	8.5	1,338.7	1,295.9	376.3	11.8	1,684	1,170	1,690	1,388	1,257
	Sindh	-	535.6	62.7	598.3	-	1,324.7	82	1,406.7	-	2,473	1,307	2,351
	NWFP	13.5	16.8	33	63.3	24.8	33.1	60.3	118.2	1,837	1,970	1,827	1,867
	Baluchistan	24.3	90.3	9.7	124.3	30.9	192.5	14.2	237.6	1,271	2,131	1,463	1,911
	Pakistan	1,145.5	865.3	113.9	2,124.6	1,351.6	1,926.6	168.3	3,446.5	1,180	2,226	1,477	1,622
1995-96													
	Punjab	1,109.2	214.5	4	1,327.7	1,415.1	381.9	6	1,803	1,276	1,780	1,500	1,358
	Sindh	-	570.9	71.4	642.3	-	1,592.9	104.3	1,697.2	-	2,790	1,461	2,642
	NWFP	13.7	17.1	32.9	63.7	24.9	33.2	60.1	118.2	1,818	1,942	1,827	1,856
	Baluchistan	24.9	92.4	10.7	128	47.5	273.9	26.7	348.1	1,908	2,964	2,495	2,720
	Pakistan	1,147.8	894.9	119	2,161.7	1,487.5	2,281.9	197.1	3,966.5	1,296	2,550	1,656	1,835
1996-97													
	Punjab	1,133.1	216.5	4.9	1,354.5	1,486.6	369.8	7.6	1,864	1,312	1,708	1,551	1,376
	Sindh	-	625.5	76.3	701.8	-	1,846.8	114.7	1,961.5	-	2,953	1,503	2,794
	NWFP	13.9	17.4	33.4	64.7	26	34.7	62.8	123.5	1,871	1,994	1,880	1,908
	Baluchistan	26.9	92.4	10.8	130.1	51.1	276.6	28.1	355.8	1,900	2,994	2,602	2,734
	Pakistan	1,173.9	951.8	125.4	2,251.1	1,563.7	2,527.9	213.2	4,304.8	1,372	2,656	1,700	1,912

Appendix Table 8 Area, production and yield of maize in all provinces of Pakistan.

Year	Province	Area ('000 ha)	Production ('000 tons)	Yield (kg/ha)
1975-76				
	Punjab	288.5	386.3	1,339
	Sindh	21.9	12.8	584
	NWFP	306.1	401.5	1,312
	Baluchistan	3.5	1.9	543
	Pakistan	620	802.5	1,294
1980-81				
	Punjab	347.1	444.7	226
	Sindh	22.4	12.3	518
	NWFP	396.3	510.9	1,317
	Baluchistan	3.2	2.5	755
	Pakistan	769	970.4	1,256
1985-86				
	Punjab	338.6	415	226
	Sindh	19.5	10.1	518
	NWFP	440.9	580.6	1,317
	Baluchistan	4.9	3.7	755
	Pakistan	803.9	1,009.4	1,256
1990-91				
	Punjab	319.7	425	1,329
	Sindh	19.6	9.6	490
	NWFP	501.1	745.7	1,487
	Baluchistan	4.5	4.2	933
	Pakistan	845.2	1,184.5	1,401
1991-92				
	Punjab	311.3	415.3	1,334
	Sindh	17.6	8.7	494
	NWFP	514.1	774.9	1,507
	Baluchistan	4.5	4.2	933
	Pakistan	847.5	1,203.1	1,419
1992-93				
	Punjab	323.4	401.9	1,243
	Sindh	12.1	6	495
	NWFP	527.8	771.4	1,461
	Baluchistan	4.2	4.3	1,023
	Pakistan	867.5	1,183.6	1,364
1993-94				
	Punjab	337.3	437.4	1,296
	Sindh	10.7	5.6	523
	NWFP	527.7	767.1	1,453
	Baluchistan	2.8	2.9	1,035
	Pakistan	878.5	1,213	1,380
1994-95				
	Punjab	345.1	460.5	1,334
	Sindh	12.2	6.4	524
	NWFP	528	846.7	4,603
	Baluchistan	4.2	4.5	1,071
	Pakistan	889.5	1,318.1	1,481
1995-96				
	Punjab	334.1	450.8	1,349
	Sindh	11.6	5.9	509
	NWFP	530.9	822.2	1,549
	Baluchistan	4.2	4.5	1,071
	Pakistan	880.8	1,283.4	1,457
1996-97				
	Punjab	325.4	450.2	1,383
	Sindh	10.5	5.6	533
	NWFP	531.6	799.7	1,504
	Baluchistan	3.6	3.9	1,083
	Pakistan	871.1	1,259.4	1,445

Source: Government of Pakistan, Agricultural Statistics of Pakistan, 1996-97.

Appendix Table 9 Data for supply, demand and price linkage equations for Basmati and non-Basmati rice.

Year	Population (million)	Basmati Supply ('000 tons)	Basmati Consumption ('000 tons)*	Per Capita Cons. of Basmati (kg)**	Non-Basmati Supply ('000 tons)	Non-Basmati Cons.*	Per Capita Cons. of Non-Basmati (kg)**
1981	83.84	980	511.6	6.10	2,133.2	1180.6	14.08
1982	86.44	1,054.9	729.81	8.44	2,374.8	1543.1	14.85
1983	89.12	1,010.4	712.08	7.99	2,434.3	1621.1	13.19
1984	91.88	965.2	501.29	5.46	2,374.3	1372.8	14.94
1985	94.73	958.3	726.7	7.67	2,356.9	1670.9	17.64
1986	97.67	883.1	569.61	5.83	2,035.8	858.15	8.79
1987	100.7	916.9	674.19	6.70	2,569.4	1,362.54	13.53
1988	103.82	943.2	664.81	6.40	2,297.7	1,171.44	11.28
1989	107.04	1,099	805.06	7.52	2,101.2	1,348.83	10.60
1990	110.36	1,217	935.98	8.48	2,003.1	1,347.01	10.21
1991	113.78	1,220	680.59	5.99	2,040.6	1,179.96	10.37
1992	117.31	1,092.2	468.77	4.00	2,150.9	1,167.95	9.96
1993	120.83	1,124.1	594.45	4.92	1,992	1,302.58	10.78
1994	124.48	1,266.7	885	7.11	2,728	1,885.72	11.15
1995	128.01	1,351.6	818.2	6.39	2,094.9	569.24	4.47
1996	131.63	1,487.5	681.85	5.18	2,479	1,446.16	10.99
1997	135.3	1,563.7	1,012.68	7.48	2,741.1	1,266.63	9.36
1998	143.26	1,539	894.28	6.24	2,799	1,090.65	7.61

* Total consumption = total supply - export - (6% of deduction of total supply for seed, feed and wastage).

** Per capita consumption = total consumption/total population.