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Government Intervention in Pakistan's Cotton Sector

Gary Ender

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Abstract

Pakistan is a major producer and exporter of cotton--the world's second largest exporter in 1985/86. Since 1984/85 cotton production has increased dramatically because of the rapid spread of a new high-yielding variety and improved plant protection practices. Pakistan can generally export cotton competitively at world prices, although subsidies were necessary to sustain exports when world prices declined sharply during 1986 and 1987. Estimated producer subsidy equivalents (PSE's) indicate that producers have been implicitly taxed by the Government's trade and output price policies, an effect that is only partially offset by input subsidies. Maintenance of low domestic cotton prices favors increased production and exports by the textile industry.

Keywords: Pakistan, cotton, policies, subsidies, PSE, CSE, production, consumption, fertilizer, irrigation, exports

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Summary

Pakistan can generally export cotton competitively at world prices, and production is expanding despite the burden of Government intervention borne by its producers. The country is a major producer of cotton and was the world's second largest exporter in 1985/86. Producers benefit from almost ideal conditions, including rich soils, plentiful sunshine, and extensive canal and tubewell irrigation systems. Since 1984/85, cotton production has increased dramatically, due primarily to the rapid spread of a new high-yielding variety and increased spraying of pesticides. Nevertheless, the average yield has reached only the world average, so there is much scope for improvement.

Producers have been implicitly taxed by the Government's trade and output price policies. Input subsidies, primarily on fertilizer, only partially offset this effect. The average impact of the Government's agricultural policies was a tax of about 21 percent during 1981/82-1986/87. The Government's main intervention in the cotton sector was its monopoly on exports. By restricting exports, the Cotton Export Corporation (CEC) depressed domestic prices to favor the textile industry. Cotton and cotton products comprise more than a third of exports, and the textile industry is a major employer.

In 1988/89, the Government continued to liberalize cotton exports by allowing private exporters to purchase cotton in the open market, instead of from the CEC. Such exports are now subject to a minimum export price and an export duty. In 1985/86 and 1986/87, when a world glut caused a sharp decline in prices, the Government subsidized exports (via CEC trading losses) to maintain its foreign exchange earnings and limit a costly buildup of stocks.

Government intervention was measured using producer and consumer subsidy equivalents (PSE's and CSE's). A subsidy equivalent is a measure of the overall value to a producer or consumer of a set of policy interventions by the Government.

Government Intervention in Pakistan's Cotton Sector

Gary Ender

Introduction

Pakistan has become a major competitor of the United States in the world cotton market, and was the world's second largest exporter of cotton in 1985/86.¹ Beginning in 1984/85, strong production increases helped Pakistan's share of world exports to rise from about 6 percent to over 15 percent. The United States regained the leading position among cotton exporters in 1986/87, but Pakistan remained among the top four exporting countries.

This study examines the cotton sector in Pakistan. Beginning at the farm level, it details the technical and economic factors underlying recent trends in area, yield, and production. It then highlights the importance of the textile industry and cotton exports. Because the Government has played a strong role in the cotton sector, especially in the marketing of lint, the relevant agencies and their policies are delineated. To measure the value of various taxes, subsidies, and other policies to producers and consumers of cotton, producer and consumer subsidy equivalents (PSE's and CSE's) are calculated. This and other information is used to examine Pakistan's competitiveness as a cotton exporter, and the possibilities for trade liberalization and reductions in subsidies.

The Importance of Cotton in Production and Trade

Cotton area in Pakistan has tended to increase since the 1960's, and cotton now occupies more area than any crop besides wheat. During the late 1980's, yields rose dramatically because of improvements in varieties and pest management. As a result, between 1982/83 and 1987/88, production increased by almost 80 percent. Pakistani lint is of inherently high quality and has moved readily into world export markets both as raw cotton and as processed yarns and textiles. Cotton-based enterprises are the largest subsector of manufacturing employment and output,

¹Cotton is also referred to as "raw cotton" and "lint."

and, in 1986/87, exports of raw cotton and cotton products accounted for 37 percent of total merchandise exports.

Cotton's Role in Agriculture

Much of Pakistan is agro-climatically suited to the production of irrigated cotton. In the Indus Valley, where irrigation systems were developed very early, cultivation of cotton can be traced back at least 5,000 years. The species first grown were the Asiatic, short-staple varieties, now termed "Desi."² New World (also called "American" or "Upland") cotton was introduced into Pakistan in the 20th century. The latter has longer fibers and now occupies 92 percent of the cotton area; Desi cotton covers the other 8 percent.

Cotton occupies more crop area in Pakistan than any crop besides wheat (table 1). Of the major crops, wheat is a "rabi," or winter crop; the other crops are grown in the rainy "kharif," or summer season. Most cotton is rotated with wheat or fallow. The relatively long picking periods of most existing varieties of cotton often prevent adequate land preparation or timely planting for the following wheat crop, but it is widely believed that net profitability is higher under the existing pattern.³

Among the kharif crops, there are two important land-use patterns. Where agro-climatic factors result in comparable productivity, cotton, rice, and sugarcane compete for acreage on the basis of changes in relative prices and technology. In addition, there are local areas where agro-climatic factors (often soil) strongly favor one crop, so there are also areas where farmers almost always plant cotton.

Table 1--Area and production of major crops in Pakistan, 1986-87

Crop	Average	Production
	<u>1,000 ha</u>	<u>1,000 tons</u>
Wheat	7,706	12,882
Cotton	2,502	1,309
Rice	2,066	3,486
Sugarcane	762	29,926

Source: (7), see References.

²"Staple" refers to fiber length.

³The wheat-cotton farming system has not been thoroughly studied in Pakistan, partly because research on cotton and wheat are coordinated by different agencies.

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Area Trends

Both total cropped area and area under cotton have tended to increase in Pakistan over the past 20 years. Total cropped area increased by about 3 million hectares, at a rate of about 1.3 percent per year, over the 1967/68-1987/88 period. This increase was primarily due to an increase in multiple cropping, as the net sown area increased less than 0.7 million hectares. Thus, the areas under major crops are likely to have increased at least partly because of intensified cropping.

During 1967/68-1987/88, cotton area increased at about 1.7 percent annually from about 1.8 million hectares to about 2.6 million hectares over the same period (table 2, fig. 1). Since the absolute area increase in cotton is greater than the total addition to net sown area, at least some of the increase in cotton was probably on new land.⁴ Since 1977/78, moreover, cotton area has increased at about 3 percent per year, much faster than total area.

Figure 2 shows the recent trends of rice and cotton area in the Punjab, the most important agricultural province. At this provincial level, annual increases in rice area tend to be accompanied by decreases in cotton area and vice versa. From figure 2 and calculations on similar data, it appears that some of

Table 2--Cotton supply and use in Pakistan

Marketing year (Aug./July)	Area	Yield	Pro- duc- tion	Imports	Exports	Disap- pear- ance	Ending stocks
	<u>1,000 ha</u>	<u>kg/ha</u>	----- <u>1,000 480-pound bales</u> -----				
1979/80	2,023	368	3,417	4	1,177	2,040	583
1980/81	2,108	341	3,297	0	1,488	2,158	234
1981/82	2,215	343	3,495	4	1,097	2,398	238
1982/83	2,263	364	3,779	4	1,272	2,598	151
1983/84	2,221	214	2,186	280	376	2,150	91
1984/85	2,236	451	4,629	27	1,263	2,433	1,051
1985/86	2,366	521	5,667	4	3,146	2,681	895
1986/87	2,505	527	6,058	0	2,870	2,986	1,097
1987/88	2,568	572	6,742	4	2,356	3,820	1,667
1988/89	2,500	584	6,549	4	3,779	4,106	1,335

Source: (25).

⁴Additional cotton area that did not come from intensified cropping could have come from decreases in the area of competing crop(s), but the primary competitor, rice, did not show an absolute decline.

Figure 1
Cotton area in Pakistan
Million hectares

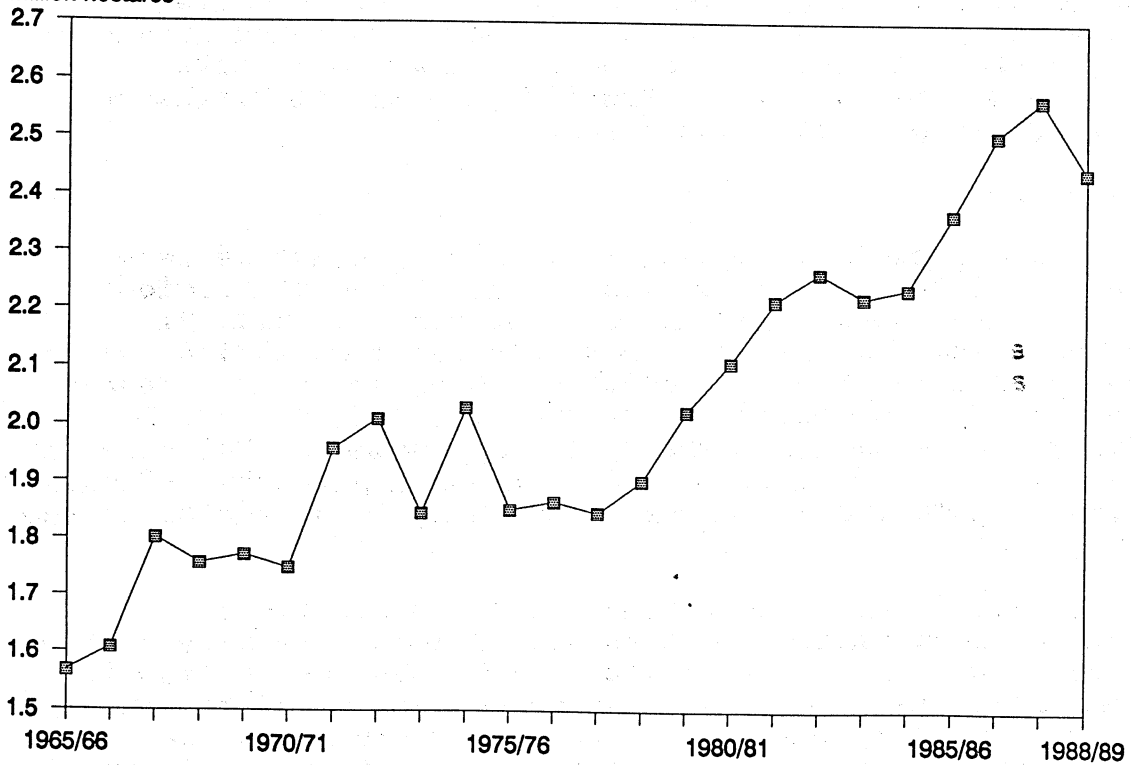
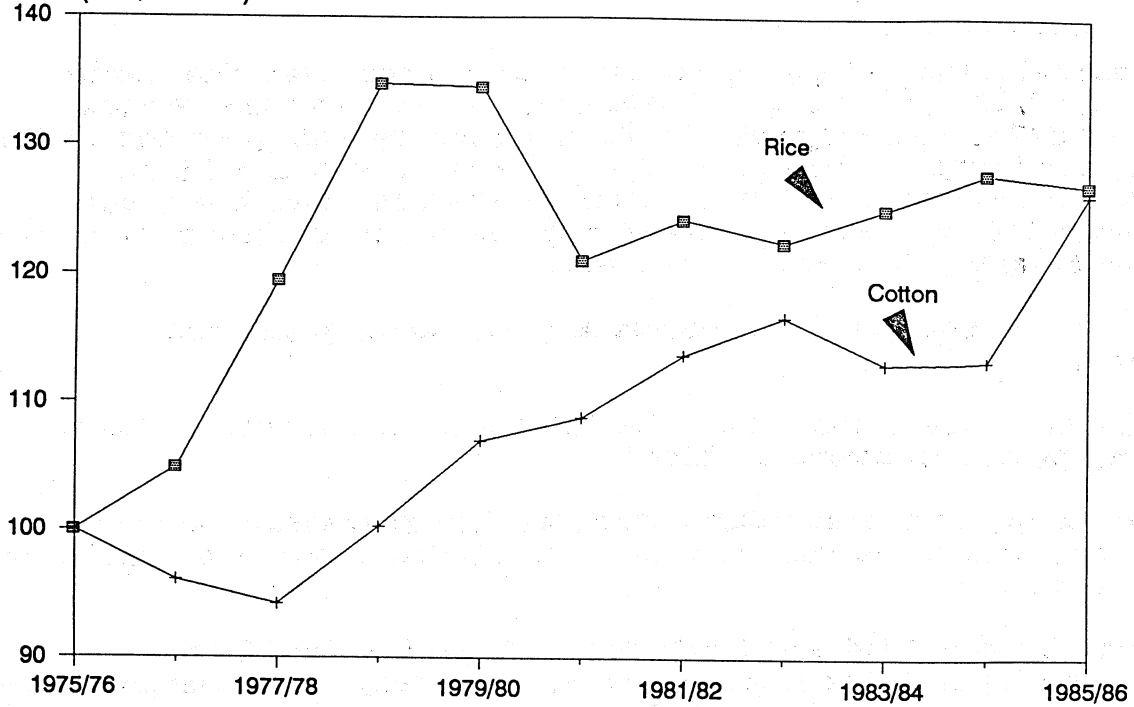


Figure 2
Rice and cotton area in Punjab
Index (1975/76 = 100)



cotton's expansion has come at the expense of potential expansion of rice, in which area has not increased over the past decade.⁵

Cotton now accounts for about three-quarters of the area under cash crops and over 10 percent of the total cropped area.⁶ Virtually all cotton is grown in the Punjab and Sind Provinces. However, a major irrigation project is expected to make cultivation possible on a substantial area in the Northwest Frontier Province in the next 5 years.⁷

Yield Trends

Cotton yields showed no (upward or downward) trend between 1967/68 and 1982/83, although annual variation (coefficient of variation), was substantial at about 14 percent (fig. 3).⁸ Because of excessive rain and pest infestations, 1983/84 was a very bad year for cotton in Pakistan. Over the next 3 years, however, yields rose dramatically from the 1980/81-1982/83 average of 349 kg/ha (lint basis) to an average of 541 kg/ha in 1985/86-1987/88, an increase of more than 50 percent. Virtually all of this yield increase came in the Punjab, as yields in the Sind stagnated.

Why would area continue to increase quite steadily--the coefficient of variation was less than 5 percent--while yields were subject to substantial fluctuation? The answer lies in profitability. The soils and irrigation systems of the Indus Valley favor cotton; despite government intervention that depresses producer prices, cotton was still the best alternative. Indeed, a recent study found that cotton had the highest revenue/cost ratios of any major crop during 1983-86.^{9 10}

⁵The correlation between rice and cotton area over the period 1978/79-1987/88 for all of Pakistan was -0.38; for the Punjab during 1978/79-1985/86 (1985/86 is the most recent year for which data are available), it was -0.51. Rice area was 2 million hectares in 1978/79 and 1.9 million in 1987/88, and the growth rate derived from a semilog trend regression over that period was not significantly different from zero.

⁶Other cash crops include sugarcane, tobacco, jute, and sugarbeet.

⁷Dr. Zahoor Ahmad, Director, Cotton Research Institute, Multan, Pakistan, personal communication.

⁸As measured by the standard error of the regression over the mean of the dependent variable in a linear regression of yield on a trend variable.

⁹A study by the Food and Agriculture Organization/United Nations Development Program, cited incompletely in an unpublished study by the Asian Development Bank.

Cotton yields fluctuated, however, in part because of a lack of an effective pest management scheme. In addition, variations in rainfall sometimes left reservoirs low, limiting the effectiveness of surface irrigation systems. Deferred or inadequate maintenance of these systems also reduced their performance.

What happened in the last few years to increase yields so rapidly? The combination of new, higher yielding varieties and much improved pest management has been largely responsible for this performance. Weather has also been good. Since 1980, several new improved varieties have been released for the Punjab, including NIAB-78 in 1983 and CIM-70, MNH-129, and S-12 more recently (table 3). NIAB-78 is an early, vigorous variety with a high yield of lint which has become very popular. Until the release of TH-1101 in 1985, there had been no new variety released for the Sind since 1977.¹¹

Production Trends

With improvements in varieties and pest management, production increased by almost 80 percent between 1982/83 and 1987/88, from 3.78 million bales (of 480 pounds) to 6.76 million bales (fig. 4). The apparent advantage in improved varieties allowed the Punjab to increase its share of production from about two-thirds in the early 1980's to four-fifths by 1986/87.

These enhancements to productivity were possible partly because Pakistan's cotton yields were low historically. The dramatic increases have brought Pakistan's yield only up to the world average. It is still below that of almost all the major cotton-producing countries, however (fig. 5). Among those, Pakistan surpasses only India and Brazil. Given Pakistan's advantage in irrigation, there is considerable scope for improvement in its cotton yields.

Inputs

The bulk of cotton production in Pakistan benefits from canal irrigation. Use of other inputs, particularly fertilizer and pesticides, has increased rapidly. The combination of dry weather, adequate irrigation, and appropriate applications of fertilizer and pesticides creates an excellent environment for cotton productivity.

¹⁰Available evidence indicates that government policies also depressed returns to the cultivation of basmati (aromatic) rice, a major alternative crop.

¹¹A new variety, Shaheen, has also recently been approved for the Sind, but seed quality in the Sind continues to be mentioned as an important issue.

Figure 3
Cotton yield in Pakistan
Kilograms per hectare

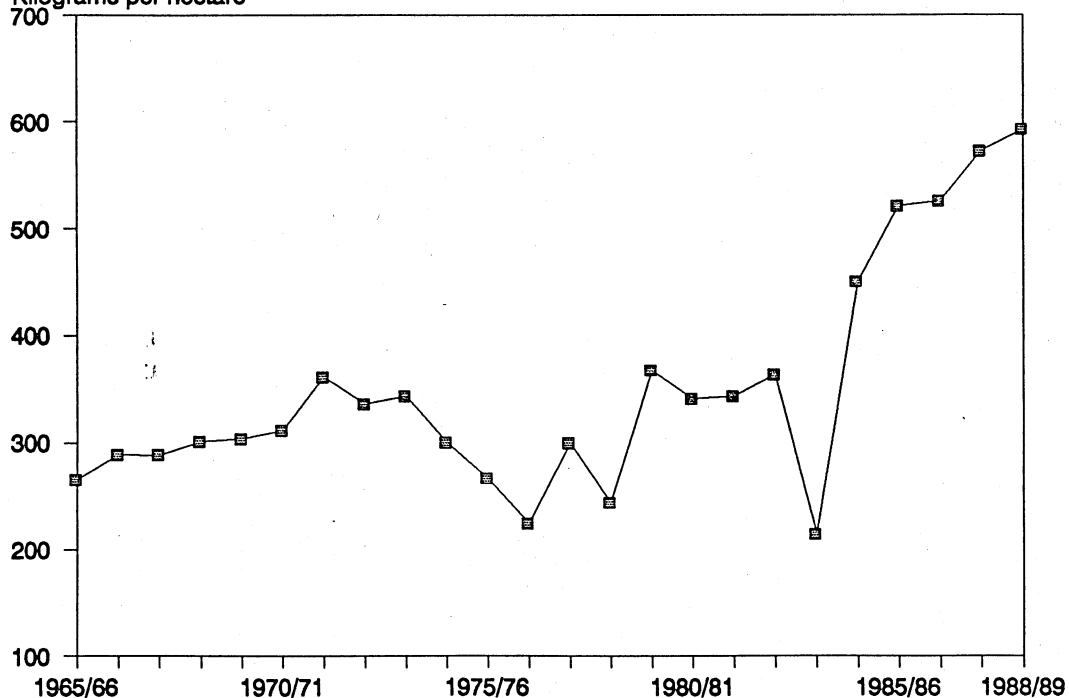


Table 3--Characteristics of cotton varieties in Pakistan

Variety	Year of release	Ginning percentage	Staple length	Micronaire value	Pressley strength
		<u>Percent</u>	<u>Inches</u>		<u>1,000 lbs per sq.inch</u>
Punjab:					
B-557	1975	34.5	1-1/32	4.5	92.9
MNH-93	1980	36.5	1-1/16	4.7	94.0
NIAB-78	1983	36.6	1-1/32-1-1/16	4.6	92.5
MS-84	1983	34.0	1-1/4	3.9	91.3
SLH-41	1984	34.0	1-1/32	4.4	95.8
CIM-70	1986	31.2	1-5/32	4.2	92.5
MNH-129	1986	38.5	1-1/16	4.4	95.4
Sind:					
M-100	1963	34.0	1-1/32-1-1/16	3.5-4.0	85.0
H-59-1	1974	34.0	1-1/8	3.5-3.7	90.0
S-59-1	1975	34.0	1-1/8	3.5-3.7	92.7
K-68/9	1977	33.0	1-3/16	4.3	96.1
TH-1101	1985	35.0	1-1/16	4.0-4.4	89.0-90.0

Source: (20).

Figure 4
Cotton production in Pakistan
1,000 bales (480 lb.)

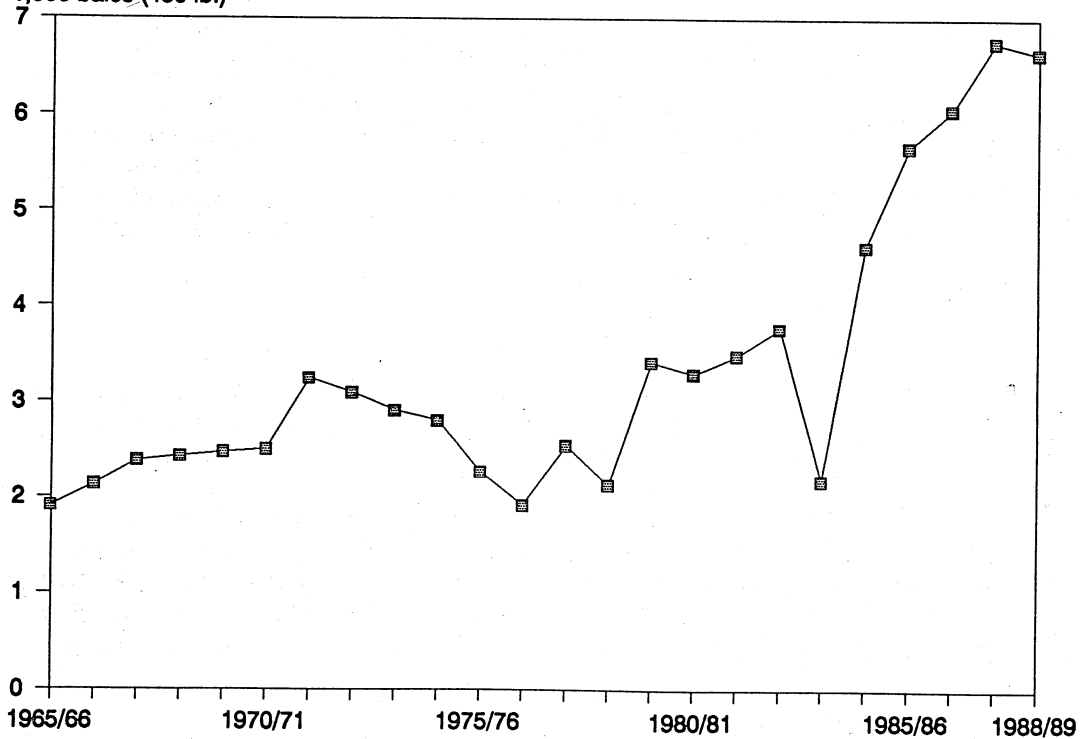
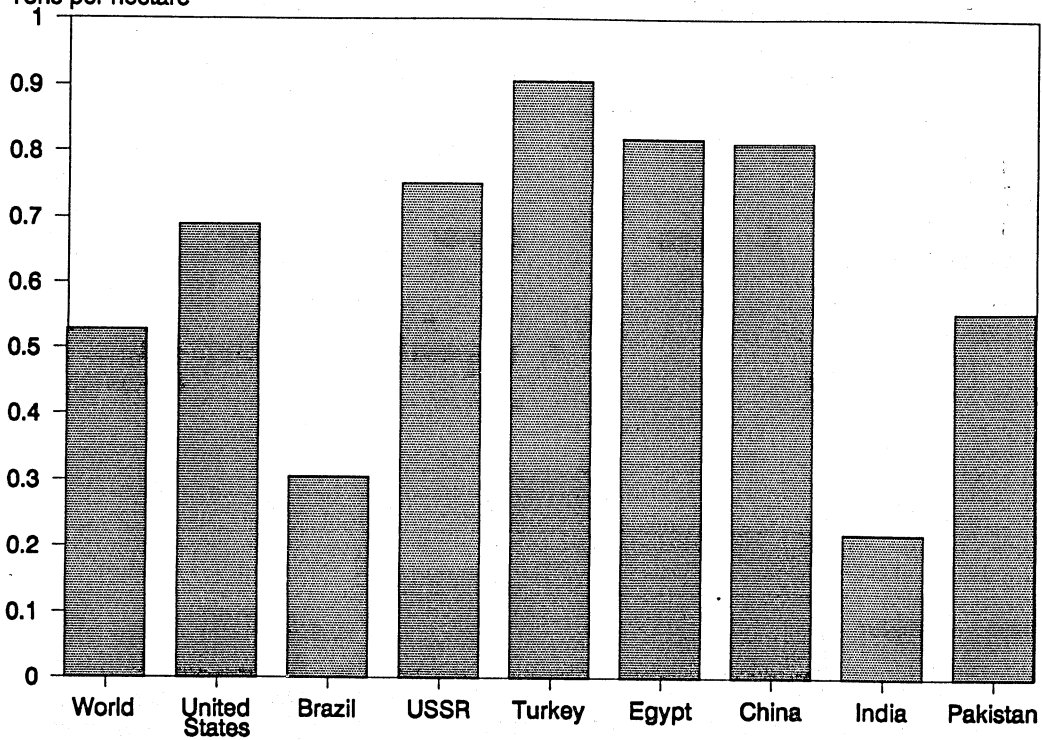


Figure 5
World cotton (lint) yields (1986-88 average)
Tons per hectare



Irrigation

Irrigation is essential to agriculture in Pakistan because of its low rainfall. The cotton-growing area of Multan, for example, rarely receives more than 10 inches of rain per year, although some agricultural areas receive up to 30 inches (16).¹² In Pakistan, between 70 and 80 percent of the total cultivated area is irrigated (table 4). Extensive canal systems are supplemented by over 220,000 tubewells (12). The irrigation system is widely and intensively developed in the Sind and Punjab Provinces. About 90 percent of Pakistan's agricultural production and all Upland cotton comes from irrigated land. Desi cotton is all rainfed.

Fertilizer

The use of chemical fertilizer has grown rapidly over the past 30 years (table 5). Pakistan's cotton farmers now apply an average of more than 100 kg/ha of fertilizer nutrients.¹³ However, various suboptimal cultural practices, many related to field preparation and cultivation, result in low responsiveness to fertilizer applied before planting. The brief period between wheat harvesting and cotton planting, as well as the variability of rainfall at this time, contribute to this problem. Some feel that cotton farmers in Pakistan are using too much total nitro-

Table 4--Area irrigated by crop in Pakistan, 1987/88

Crop	Area irrigated
	<u>Percent</u>
Wheat	80
Rice	100
Cotton	90
Sugarcane	100
Other	45

Source: ERS estimates.

¹²Underlined numbers in parentheses refer to items in the References section.

¹³In 1986/87: cotton, 107 kg/ha; wheat, 116; rice, 86; and sugarcane, 188 (10, 16). In 1983, Pakistan's total fertilizer use per hectare of arable land and permanent crops in nutrient kg/ha compared with other cotton-producing developing countries was as follows: Brazil, 30.7; Egypt, 360.5; India, 39.4; Mexico, 61.2; Pakistan, 58.6; and Turkey, 58.1. Source: Food and Agriculture Organization.

gen, normally the limiting nutrient to plant growth, resulting in overly tall plants, fruit shedding, and delay of maturity.¹⁴

Pesticides

Plant protection is particularly important in cotton production. Cotton is plagued by both sucking pests (like aphids) and boring pests (particularly various bollworms). A large part of the recent increases in yield may be attributed to greater use and effectiveness of chemical plant protection measures (table 6). In 1983/84, when most cotton producers suffered major declines in production due to pest infestation, the gains possible from line sowing (including easier pesticide application) became apparent. Farmers overwhelmingly adopted line sowing the following year and better plant protection along with it.¹⁵ In 1985/86, for the first time, over half the cotton area received at least three sprayings (10).

Virtually all spraying is done with hand sprayers, although some farmers have begun to use tractor-mounted apparatus. Integrated pest management techniques are also being investigated. These techniques could eventually provide comparable protection at lower cost and with greater safety.

Input Interactions

Inputs are often more effective in combination. This is especially true of fertilizer and water, since nutrients must be

Table 5--Fertilizer use in Pakistan

Year	Nitrogen	Phosphorus	Potassium	Total
<u>1,000 metric tons of nutrients</u>				
1955/56	7	--	--	7
1960/61	31	--	--	31
1965/66	70	1	--	71
1970/71	252	30	1	283
1975/76	441	104	3	548
1980/81	843	227	10	1,080
1985/86	1,128	350	34	1,512
1986/87	1,332	410	42	1,784

-- = less than 500 tons.

Source: (23).

¹⁴Dr. Zahoor Ahmad, Director, Cotton Research Institute, Multan, Pakistan, personal communication.

¹⁵Dr. Zahoor Ahmad, Director, Cotton Research Institute, Multan, Pakistan, personal communication.

dissolved to be absorbed. It is also true of plant protection measures and irrigation water. A drier environment with controlled applications of water often reduces the rate of pest multiplication. Pakistan's dry climate and extensive irrigation system are thus major assets that could contribute to continuing increases in cotton productivity.

Fiber Quality

Several characteristics of cotton fiber contribute to its quality. These include length, strength, fineness, color, and cleanliness. In cotton marketing, other characteristics are usually summarized in a grade or a trade name (like "Afzal"), but length is always mentioned specifically. Commonly used world price standards like the "A" and "B" indices are based largely on staple length, "A" being longer, but the tendency is for cottons in the "A" index to be of higher grade also.¹⁶ The average staple length and quality of Pakistan's cotton lint increased in the 1980's with varietal and ginning improvements. While previously Pakistan's lint fell almost entirely in the "B" category, today some of it qualifies as "A," even though the minimum length of the "A" index itself was increased.¹⁷

Pakistani lint is of inherently high quality. The fiber is strong, as well as reasonably fine and bright. Picking practices and varietal mixing, however, have affected the resulting lint quality. As labor for picking has become scarce, in-kind payment for pickers has changed from a volume to a weight basis,

Table 6--Percentage of cropped area sprayed by hand or tractor in Pakistan

Year	Rice	Cotton	Sugarcane
		<u>Percent</u>	
1979/80	5.7	9.6	16.1
1982/83	9.2	16.9	15.3
1985/86	3.7	54.8	12.9

Note: Aerial spraying covers 10-15 percent of sugarcane area and 3-4 percent of rice area.

Source: (10).

¹⁶The "A" index currently includes cottons of at least 1-3/32" and the "B" index, cottons of 1" to 1-1/16". These price indices are compiled by Liverpool Cotton Services Ltd. in its "Cotton Outlook" publication.

¹⁷The "A" index was based on 1-1/16" cotton until August 1981, when it was changed to 1-3/32".

discouraging the removal of foreign matter.¹⁸ On the other hand, many buyers appreciate Pakistani cotton because it is hand-picked; its macroscopic trash is considered easier to remove than imperfections ("neps") created by modern, higher temperature gins like those in the United States.¹⁹

Until recently, there was no formal grading system and no quality premiums, either for seed cotton or for lint. In the last few years, the Cotton Export Corporation (CEC), in conjunction with Food and Agriculture Organization/United Nations Development Program, and Asian Development Bank projects, has established a cotton standards institute to improve grading. It has also financed investment by ginners in lint cleaners and buys all the cleaned output. In conjunction with this modernization program, the CEC has instituted a system of differential pricing for high-quality lint. Many new grades of cotton have been established, of which two, 1505 and 1544, use the cleaned lint.

Cotton's Role in the Economy

Cotton has always been the most important fiber crop in Pakistan, making the cotton textile industry an important part of the economy. Total manufacturing output now makes up about 17 percent of gross domestic product (GDP) (15). Cotton-based enterprises are the largest subsector of manufacturing, accounting for about 15 percent of manufacturing value-added, followed by food and beverages (6).

In 1983/84, large cotton mills employed about 200,000 workers, or about 40 percent of the workers in all manufacturing industries (7). There were over 160 mills, with an installed capacity of over 4.2 million spindles (7). In 1987/88, the Government estimates that there were almost 200 cotton mills with about 4.3 million spindles installed, of which over 85 percent were operating. Imports of spinning machinery were liberalized in June 1987, and construction of new facilities is apparently proceeding at a rapid pace. By 1988/89, as many as 1.5 million additional spindles were installed.²⁰

Production of cotton yarn has risen consistently since Pakistan's independence (1947). Yarn is made almost entirely in the large-scale, or mill, sector, which was once also an important producer of cloth. The number of looms in the mill sector and the volume of cotton cloth produced peaked in the early 1970's at about 650 million square meters. Today the mill sector operates fewer than 10,000 looms (7). Pakistan's exports of cloth have continued to increase, however, based on expanding production by small powerloom units (table 7).

¹⁸Personal communication with ginners in Multan, Pakistan.

¹⁹Personal communication with cotton traders in Memphis, TN.

²⁰Mr. S.M. Usman, General Secretary, All Pakistan Textile Mills Association, personal communication.

Small powerloom units are firms that do mostly contract weaving of grey (plain) cloth. Their numbers increased rapidly in the mid-1970's after the Bhutto Government exempted the smallest ones--units with four powerlooms or fewer--from excise taxes and other levies. They are typically located in rural areas and small towns. Their looms often operate 24 hours a day, using both full-time and part-time labor. Flexible employment practices mesh well with seasonal employment in agriculture, and farming households with small holdings often take advantage of the opportunity to supplement their income.²¹ Small powerlooms are the largest users of yarn in Pakistan.

There appears to be no official statistics on powerlooms for all of Pakistan. Most powerlooms seem to be located in the Punjab, however, for which the Punjab Directorate of Industries has done surveys. These surveys reveal about 82,000 small powerlooms in the Punjab in 1986 versus 53,000 in 1975 (21). The number of powerlooms in Pakistan has grown from about 20,000 in 1968 (1) to about 100,000 at present. Estimates of labor employed in these units vary; at present between 150,000 and 225,000 workers probably tend powerlooms.

The powerloom sector produces about 90 percent of Pakistan's cloth and 80 percent of the cloth that is exported. In general, however, small powerloom units cannot export their cloth directly because export quotas are allocated entirely to the mills (21). Besides yarn and grey cloth that are the primary products of the mills and the powerloom units, the cotton textiles industry also produces and exports ready-made garments and hosiery, home furnishings like sheets, towels, and tablecloths, and canvas and tents (table 8).

Table 7--Production of cotton yarn and exports of cloth in Pakistan

Year	Yarn production	Cloth exports
	<u>Mil. kgs</u>	<u>Mil. sq. m</u>
1970/71	304	333
1975/76	350	464
1980/81	375	501
1985/86	482	727
1986/87	586	694

Note: Data on total production of cloth are not available, so exports are shown as a proxy.

Source: (7).

²¹Dr. Zahoor Ahmad, Director, Cotton Research Institute, Multan, Pakistan, personal communication.

Cotton Exports

Over the 20 years ending in 1984/85, the volume of Pakistan's raw cotton exports fluctuated greatly but showed no trend; the coefficient of variation was over 55 percent. Much but not all of this variation was correlated with yield variation (fig. 6). In value terms, exports of cotton lint, yarn, and cloth all grew at rates of 15 percent or more per year over the 1969/70-1984/85 period. In 1985/86, both exports and beginning stocks jumped dramatically as increases in yields in two consecutive crops enlarged domestic surpluses.

By 1986/87, the value of Pakistan's total raw cotton and cotton product exports reached over \$1.3 billion, or over 37 percent of total merchandise exports.²² Pakistan's precarious external position further reveals the importance of consistent foreign exchange earners like cotton. While Pakistan's gross official reserves rose during 1975-83, they have tended to fall since then. Moreover, the capacity of reserves to pay for imports has weakened. Reserves were equivalent to 2 months or more of imports only three times in the last 10 years, dropping to 2.6 weeks in 1987/88. The current account deficit has seesawed,

Table 8--Exports of cotton and cotton manufactures by Pakistan

Item	1983/84	1984/85	1985/86	1986/87
	<u>Million dollars</u>			
Cotton	131	288	514	447
Yarn	217	262	280	507
Cloth	360	306	315	345
Tent and canvas	62	50	31	23
Made-ups	123	131	210	259
Ready-made garments	107	101	124	194
Hosiery	57	43	55	97
Total cotton and manufactures	1,057	1,181	1,529	1,872
Total merchandise exports	2,770	2,505	3,075	3,685
	<u>Percent</u>			
Cotton and manufactures' share	38	47	50	51

Source: (14).

²²In the first 11 months of Pakistan fiscal year 1987/88, cotton and cotton product exports exceeded \$1.4 billion. The share of raw cotton in these exports has fluctuated considerably with production and mill demand, averaging about 30 percent, but there has been no overall tendency to increase or decrease (14, 7).

dropping significantly below 3 percent of gross national product (GNP) only twice during Pakistan fiscal years (PFY's) 1981-88 (7). With growing debt and government deficits, the range of the debt service ratio has increased from 20-25 percent during PFY's 1980-83 to 26-33 percent during PFY's 1984-87 (7).

Cotton exports from Pakistan and the United States compete directly in several markets, particularly in Asia (table 9, fig. 7).²³ Most U.S. cotton exports (including those to Asia) are of a medium staple length (between 1" and 1-1/8"). Most of Pakistan's production and exports are of a similar staple length (between 1-1/32" and 1-3/32"). In Asian markets, Pakistan's cotton is reported to compete favorably with Texas Orleans cotton (1" staple) because of its superior strength.

For both countries, Japan is the largest importer, and Hong Kong and China have also been important. Korea and Taiwan are large

Table 9--Pakistan's cotton exports by destination

Destination/year ^{1/}	1983/84	1984/85	1985/86	1986/87	1987/88
	<u>1,000 480-pound bales</u>				
Bangladesh	--	52	73	30	91
China	5	--	--	--	138
Hong Kong	40	179	297	315	421
Indonesia	--	51	152	150	138
Italy	5	45	143	200	209
Japan	159	253	397	500	285
South Korea	15	45	232	145	102
Taiwan	10	157	569	375	150
Thailand	--	70	151	200	193
Other ^{2/}	143	409	1,134	970	883
Total	377	1,261	3,148	2,885	2,611

-- = none or negligible.

^{1/} August/July, except 1987/88, which is September/August.

^{2/}Included in 1986/87: 150,000 bales to West Germany and 75,000 to Portugal. Included in 1987/88: 133,000 bales to Portugal, 84,000 to West Germany, 83,000 to Spain, and 69,000 to Greece.

Sources: (18) and ERS estimates.

²³In the midseventies (1974/75-1976/77), the United States sent 83 percent of its cotton exports (by volume) to Asian countries that were among its top 10 markets; during the same period, Pakistan sent 79 percent of its cotton to Asian countries among its top 10 markets. In the early eighties (1982/83-1984/85), the United States still sent 62 percent to such Asian markets and Pakistan sent 59 percent.

Figure 6
Cotton yields and exports in Pakistan
Indices (1965/66 = 100)

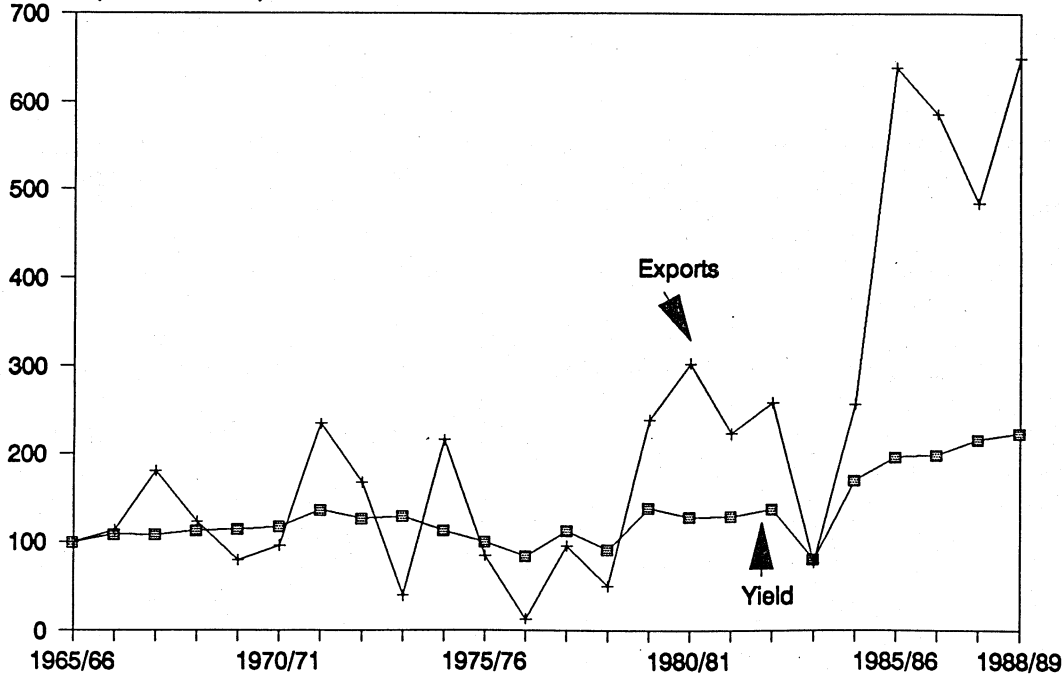
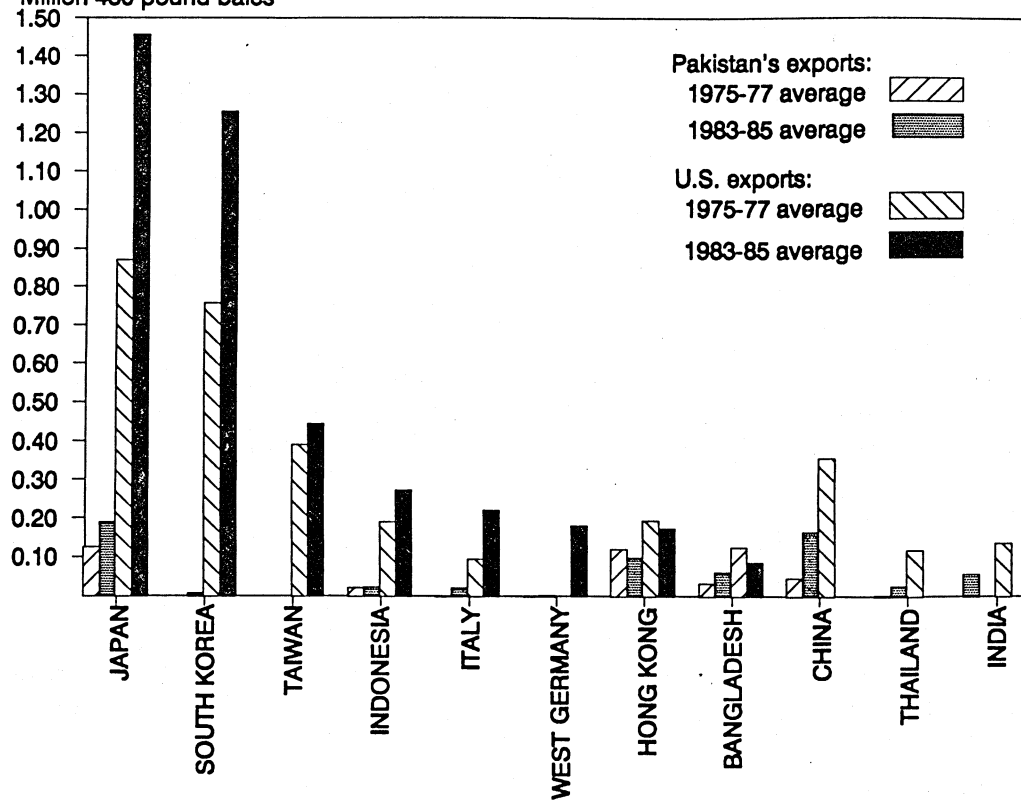


Figure 7
Pakistan and U.S. cotton exports by major destinations
Million 480 pound bales



markets for the United States, and Pakistan has recently begun to compete in them. Both countries shipped smaller amounts of cotton to Bangladesh and Thailand fairly regularly in the past. Recently, Thailand expanded its textile industry, importing from both suppliers.

Government Institutions and Policies

The Government of Pakistan has implemented a variety of policies which affect the production, consumption, and trade of cotton. These include macroeconomic policies, which may affect specific commodities through their effect on the general economy; agricultural input policies, which may affect agricultural commodities by altering the costs of production; as well as policies specific to cotton. In general, macroeconomic and cotton-specific policies have tended to tax cotton producers, while input-based policies have tended to subsidize them, the overall effect being taxing. Consumers of cotton lint, namely manufacturers, have been subsidized. Overall, one sees a mix of policies in which some, like exchange rate overvaluation, were used to achieve general objectives, whereas others, like the fertilizer subsidy, compensated certain groups for the negative effects of the economywide policies.

Macroeconomic Policies

From 1973 to 1982, the Pakistani rupee was pegged to the U.S. dollar, and was often overvalued. This overvaluation amounted to a tax on domestic producers of commodities like cotton, since their potential exports were less competitive than they could have been and competing imports were cheaper. In 1982, the rupee was delinked from the U.S. dollar and a managed float was instituted. Since then, the rupee has been gradually devalued but may still be overvalued by as much as 20 percent.²⁴

Cotton Policies and Institutions

The Cotton Export Corporation (CEC) was established in 1973 to repair the poor reputation of the private trade regarding reliability, timeliness, and quality of cotton exports. As a corporation run by the Government, it has been the sole exporter of cotton from Pakistan. (Recent changes in the export regime are described below, under "Moves Toward Liberalization.") It is generally believed that the CEC has accomplished its main purpose. Private traders report that, if necessary, the CEC often ships a better quality fiber than that contracted for, in order to meet its obligations.

The CEC has nominally paid a 10-percent export duty on lint. Since the CEC is a government corporation, however, the duty has had little meaning as a policy tool. Moreover, the CEC is also charged with carrying out various development programs in the

²⁴ (11) and unpublished sources.

cotton sector, so the Government has had other reasons to transfer funds to and from the corporation.

The CEC purchases cotton from ginneries and other agents. Traditionally, it has allowed domestic spinners to buy from the new cotton crop first. This makes it easier for the CEC to estimate the quantity that can be exported which will maintain low and stable domestic prices. Occasionally, the CEC will sell cotton to the spinners; in 1986-87, it sold about 210,000 bales in this way. With the weakening of the external position, foreign exchange earnings from cotton may now receive even more weight than historically. As the primary implementing body of the Government's cotton policy, the CEC has to balance various objectives; these include the need for foreign exchange and the desirability of keeping domestic cotton prices low.

To maintain the flow of foreign exchange and market share, the CEC has sometimes incurred trading losses. Since 1981/82, the CEC made a gross profit in 4 out of 6 years; it lost money on cotton exports in 1985/86 and 1986/87 (table 10). The CEC's (overall) operating profit, excluding the export duty it paid, was positive in the same 4 years. However, the sum of these net profits during 1981/82-1984/85 was less than the annual loss in both 1985/86 and 1986/87, each of which exceeded \$100 million.

Producer Policies

Minimum support prices for both seed cotton and lint are set annually on the recommendation of the Agricultural Prices Commission (table 11). The Commission takes world prices and costs of production into consideration in making its recommendations. Support prices are the same at all locations and throughout the year, although adjustments are made for quality. Support prices for lint are effective at the gin.

Farmers normally sell seed cotton to ginneries (or their agents), from whom the CEC buys lint.^{25 26} The CEC allows domestic spinners to buy most of their requirements at market prices at harvest time before it enters the market. It then begins purchasing cotton at market prices. Only if the domestic market price for cotton drops below the minimum support price does the CEC buy at the support price. This has rarely happened, although it did as the harvest began for the 1986 crop (fig. 8). At that time, a U.S. marketing loan program caused very large stocks to enter the world market, depressing world prices. The CEC attempts to maintain low and stable wholesale prices for lint,

²⁵Seed cotton is the cottonseed together with the lint around it, as it is picked from the boll (seed pod) at harvest. Cottonseed is the seed that remains after the lint has been removed by ginning.

²⁶Although comparable support prices are announced for both seed cotton and lint, an enforcement mechanism (CEC purchasing) seems to exist only for the lint price.

which help to maintain the competitiveness of the domestic textile industry.

Because of the CEC's deference to the domestic textile industry, one might interpret the support price to be both the floor price and a "target market price" in years of normal supply. On the one hand, the CEC was obligated to buy at the support price when the market price fell sharply in 1986. Moreover, in years like 1984/85 and 1985/86, when there were substantial increases in production, market prices did not fall even to the support price.

On the other hand, in earlier normal years like 1981/82 and 1982/83, market prices hardly rose above the support price. This may be because spinners knew they need not buy at a much higher price: the CEC was the only other possible buyer, and it stood ready to limit exports in order to keep prices down. Such an

Table 10--Balance sheet items of the Cotton Export Corporation of Pakistan

Item	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
	<u>Million rupees</u>					
Duty paid	266	326	153	330	834	84
Gross operating profit ^{1/}	85	402	159	376	-1,630	0
Operating profit after paying duty ^{2/}	-125	184	-7	-117	-2,511	-2,483
Operating profit before paying duty	141	510	146	213	-1,676	-2,399
	<u>Rupees/dollar</u>					
Exchange rate	10.55	12.75	13.48	15.16	16.13	17.18
	<u>Million dollars</u>					
Operating profit before paying duty	13	40	11	14	-104	-140

^{1/} "Gross operating profit" is sales revenue less cost of sales. Sales revenue includes payment of export duty. Cost of sales includes material (cotton), some salaries and depreciation, inventory adjustment, and other items. Thus, gross operating profit is an indication of whether the CEC is making a profit on its trading.

^{2/} "Operating profit" includes additional salaries and depreciation and finance charges.

Source: (8).

Figure 8
Cotton (lint) prices in Pakistan, marketing year
U.S. cents/pound

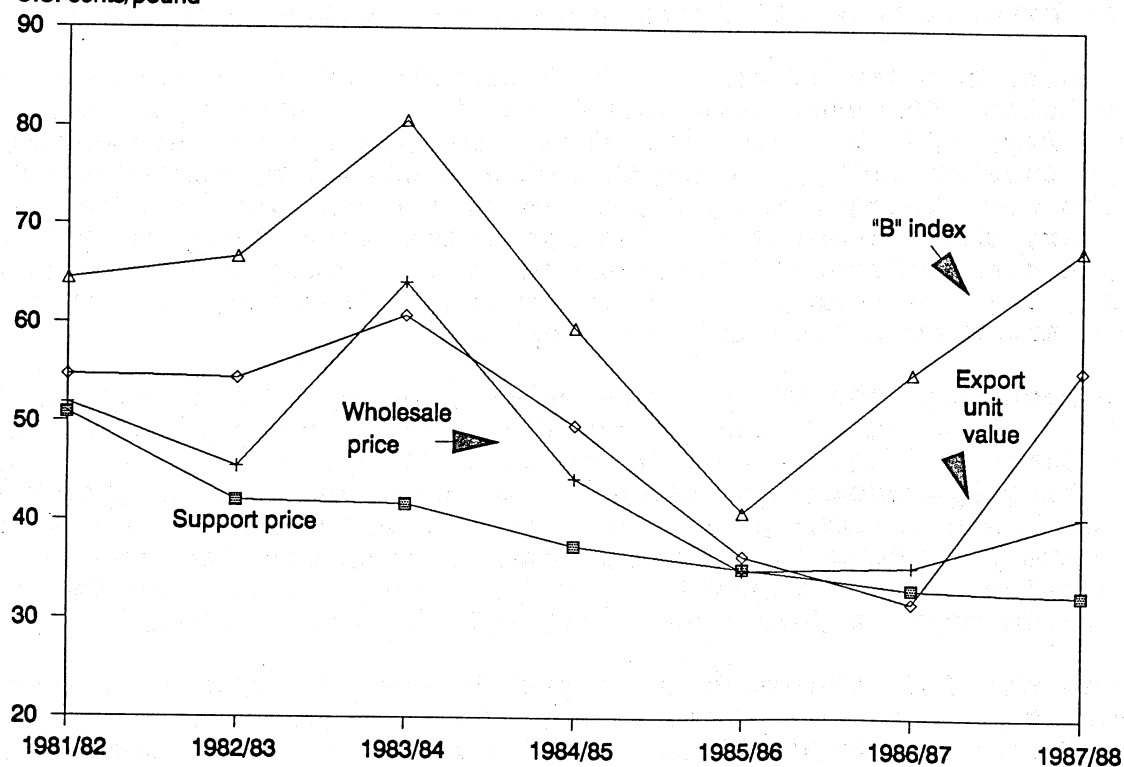


Table 11--Support and market prices for cotton in Pakistan

Year	Support price, seed cotton	Market price, seed cotton (Multan)	Support price, lint cotton	
	-----Rupees/40kgs-----			U.S. cents/lb.
1981-82	178.0	191.7	473.0	51
1982-83	183.0	190.9	473.0	42
1983-84	186.0	304.3	496.0	42
1984-85	189.0	204.7	500.4	37
1985-86	193.0	201.9	500.4	35
1986-87	193.0	213.4	500.4	33
1987-88	193.0	239.5	504.0	32

Note: Data are for variety B-557 (1-1/32"). In 1987-88, market prices were also applicable to NIAB-78.

Source: (7).

analysis cannot apply to abnormal years like 1983/84, when there was a major shortfall in production. In 1987/88, the private sector began to provide the ginner and the farmer with an alternative to sales only to the CEC or the spinners, and the margin between support and market prices widened (fig. 9).

Note that, because of reasonably good international market information, the wholesale price was influenced by the "B" index price (fig. 8). On the other hand, the gap between these prices varied substantially, so one cannot say that international price signals were being passed unaltered to the domestic market. Moreover, the transmission of price changes was also not perfect between the wholesale lint level and seed cotton prices. As a result, there was only a weak relationship between "B" index prices and seed cotton prices (fig. 10).

Until recently, the CEC was the only exporter of cotton, and the quantity it purchased for export was usually the residual supply after domestic requirements were met. The CEC has generally sold its cotton aggressively. Pakistan's export unit value (average free on board Karachi price) for a given year, even adjusted by 3-5 cents per pound for international transportation, has tended to be below the corresponding annual average of the "B" index, into which most of Pakistan's cotton falls (table 12).²⁷

Because the CEC insulated the domestic economy from world cotton prices, these prices did not have a significant, direct impact on the quantity exported. However, changes in world cotton and yarn prices had an impact on the domestic demand for cotton through the demand for yarn and other exported cotton products. Interventions affecting the price of yarn have generally been limited to duties, imposed primarily for revenue purposes, and occasional export quotas.

Research Policy

Because of cotton's importance, research has always been managed, not by the Pakistan Agricultural Research Council, but by a separate agency, the Pakistan Central Cotton Committee (PCCC). Cotton breeding is conducted by various government agencies and universities, and the PCCC organizes coordinated national trials.

New varieties are tested and released for a specific province, in order to reduce admixture of fibers of different quality during ginning. NIAB-78, possibly the most important new variety, was developed at the Nuclear Institute for Agriculture and Biology and released in 1983. Its early maturation, vigor, and high yield led to its rapid adoption in the Punjab and some unauthorized spread to the Sind. It was recently approved for the Sind also, but its yields there are considerably lower than in the Punjab.

²⁷See description above, under "Fiber Quality."

Figure 9
Seed cotton prices in Pakistan, marketing year

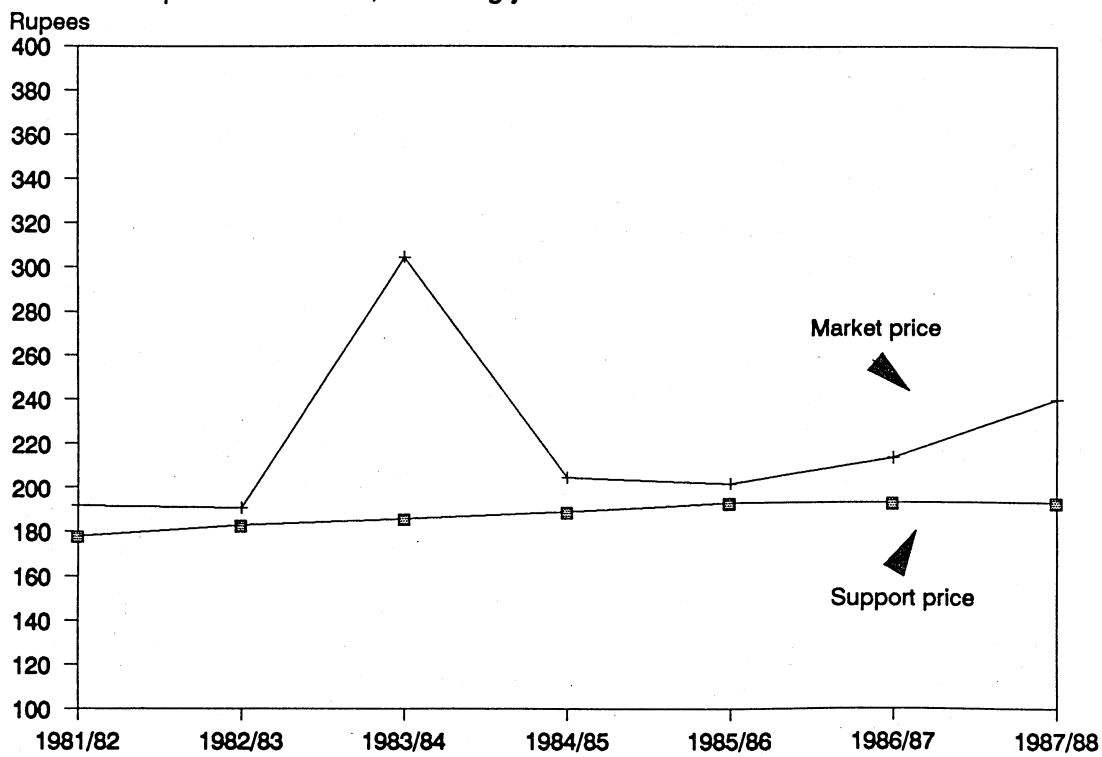
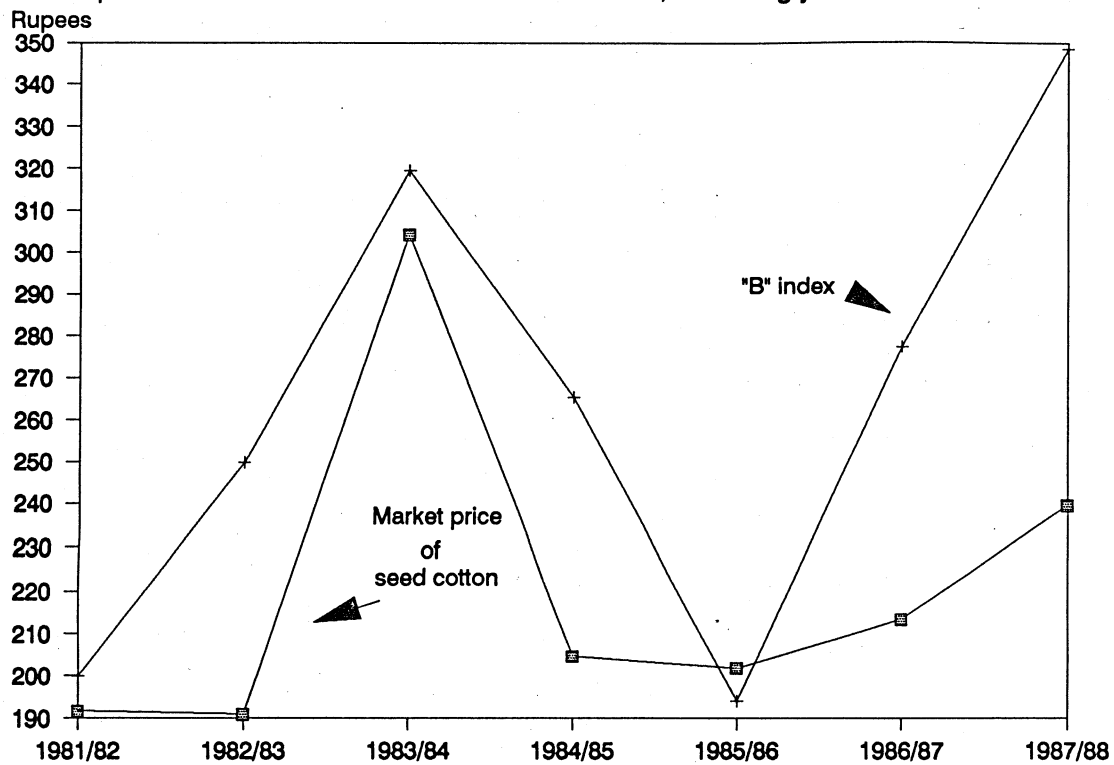


Figure 10
Cotton prices in Pakistan: Seed cotton versus "B" index, marketing year



Input Policies and Institutions

Until 1987, fertilizer was imported only by the Federal Directorate of Fertilizer Imports (FDFI), but fertilizer has been freely available in the provinces through both private dealers and government outlets. The FDFI has used international tenders to buy primarily phosphatic fertilizers. In some years, urea was imported. The Government has covered virtually all domestic marketing costs for both imported and domestically produced fertilizers (3).

In addition to the marketing-cost subsidy, fertilizer users have been assisted via a system of cost-based subsidies to (and taxes on) fertilizer producers and marketers. High-cost domestic producers have been subsidized, and low-cost producers taxed (via a "development surcharge"). The Government has also subsidized the use of natural gas by fertilizer producers (3). As a result, domestic fertilizer prices have been lower than adjusted world prices and have been the same everywhere in the country. Indeed, the subsidy on fertilizer prices was traditionally a large part of the Government's agricultural budget. Since 1980, however, it has been the policy of the Government to phase out fertilizer subsidies. While this has not yet been fully accomplished, the farm price of nitrogen was nearly doubled between 1979/80 and 1986/87, while the price of phosphoric acid was more than doubled (table 13). In 1987, the ban on private importation of fertilizer was removed. Since most imports are phosphatic fertilizer and domestic prices for these remain subsidized, however, the FDFI remains the primary importer.

Inputs other than fertilizer have also been subsidized. Until 1988, interest-free loans were provided to small farmers (those with less than 5 hectares). Because this program was shown not

Table 12--Cotton (lint) prices in Pakistan

Marketing year (Aug./July)	Support price (at the gin)	Whole-sale price (Karachi)	Export unit value (f.o.b. Karachi)	"B" index (cif N. Europe)	Exchange rate
	-----U.S. cents per pound-----				Rs./\$
1981/82	51	52	55	64	10.55
1982/83	42	45	54	67	12.75
1983/84	42	64	61	81	13.48
1984/85	37	44	50	60	15.16
1985/86	35	35	36	41	16.13
1986/87	33	35	32	55	17.17
1987/88	33	41	55	68	17.56

Sources: (7, 18, 27).

to be reaching its intended beneficiaries (22), it has been discontinued. The Agricultural Development Bank of Pakistan has also provided loans for agricultural production and investment at below-market rates.

The agricultural sector has ordinarily consumed about 20 percent of all electricity, for which it has paid a rate equivalent to about 60 percent of the national average rate. In many (rural) districts, as much as 75 percent of the total electricity demand comes from tubewells.²⁸ Most pumps for tubewells use petroleum-based fuel, but electric pumps tend to be found on larger farms, and cotton also tends to be a large-farm crop. In supplying water to farmers, the Government recovers only part of its operating and maintenance expenditures on canal irrigation; the unrecovered part constitutes a subsidy to cotton and other producers who use surface irrigation water. The Government also directly subsidizes the sinking of tubewells.

The Government once subsidized the use of pesticides. This practice was discontinued in 1980 when the pesticide trade was privatized. Currently, the provincial governments provide small subsidies for the purchase of sprayers. In addition, the Government will provide a plane and pilot for aerial spraying if

Table 13--Official prices of fertilizers in Pakistan

Date/year	Urea	Diammonium phosphate	Sulphate of potash
<u>Rupees/50 kgs</u>			
11-08-73	55	57	32
20-04-74	75	75	32
16-04-76	68	72	32
20-04-78	68	72	29
17-10-78	63	67	27
25-02-80	93	100	30
16-03-82	103	105	30
06-10-82	118	121	35
10-06-83	128	133	40
1983/84	128	133	40
1984/85	128	133	40
1985/86	128	146	50
1986/87	128	146	50
1987/88	NA	161	60

NA = Not applicable because of deregulation.

Source: (7).

²⁸Dr. Larry C. Morgan, Chemonics International Consulting Division, formerly Chief of Party, Economic Analysis Network Project, Islamabad.

requested, although farmers must purchase the pesticides. However, there has been very little aerial spraying of cotton.²⁹

Evaluating Government Intervention in Cotton

To measure the value of various taxes, subsidies, and other policies to producers and consumers of cotton, producer and consumer subsidy equivalents (PSE's and CSE's) are calculated. A subsidy equivalent is a measure of the overall value to a producer or consumer of a set of policy interventions by the Government. Ideally, such an amount would exactly compensate an individual for the removal of all policies.³⁰

Methods and Assumptions

In general, it is convenient (although not always the most appropriate method) to use government budgetary data to calculate PSE's and CSE's. However, such data are not always relevant or available. Even when they are, the figures are rarely accompanied by explanations of their method of calculation, which often makes their use hazardous.

In the absence of budget data that reveal the cost of many policies, and because the impact of some policies is on market prices rather than budget costs, some policy effects must be estimated by calculating a "price wedge." The price wedge deduces the degree of economic subsidization or taxation by comparing a domestic price under conditions altered by policy with an import (or export) parity price derived from a world, free-market price. A parity price is a representative world price for a comparable commodity (for example, "B" index cotton), adjusted by the official exchange rate and for the transformations of marketing, namely transportation, storage, and processing.

Because the PSE/CSE estimation process keeps the effects of different policies separate, one can estimate the effects of government policies not only on producers and consumers, but also on taxpayers.³¹ The PSE's for cotton in Pakistan measure the

²⁹Mr. Mohammad Zafar, Joint Secretary, MINFA (Inputs), personal communication.

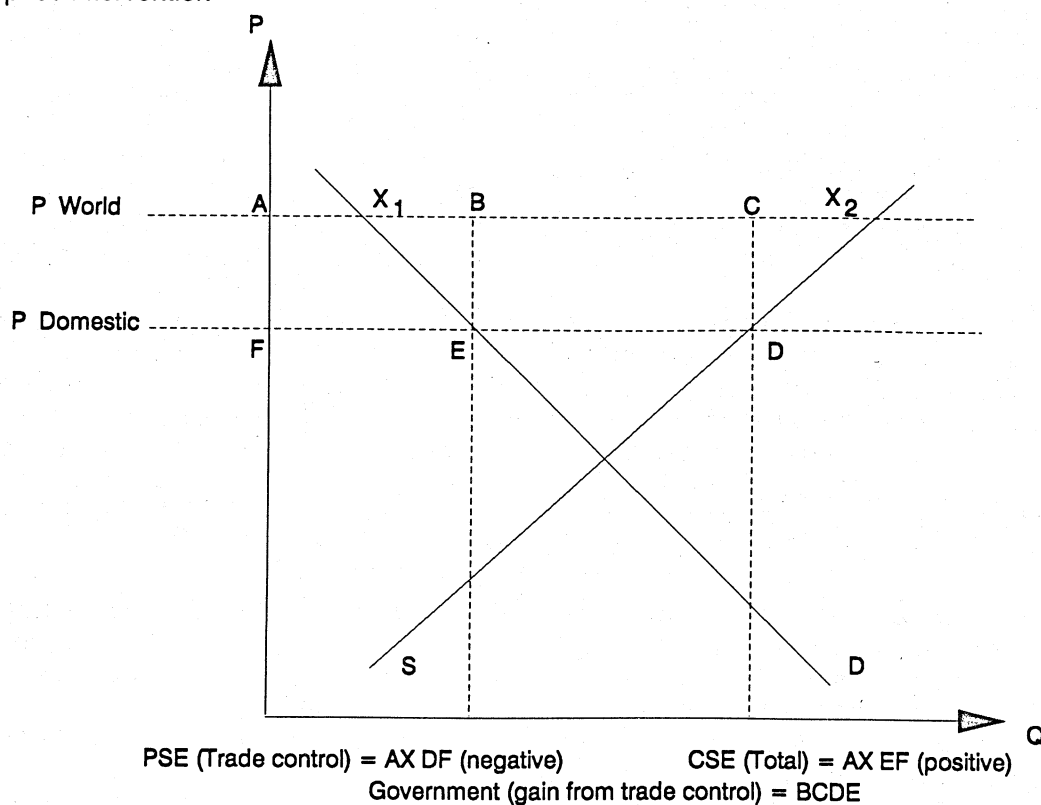
³⁰For a thorough discussion of PSE methodology, see U.S. Department of Agriculture, Economic Research Service, Agriculture and Trade Analysis Division, Agriculture in the Uruguay Round: Analyses of Government Support. Staff Report No. AGES880802, December 1988.

³¹In this regard one should remember that PSE's and CSE's are slightly different from producer and consumer surplus. Because the former use actual observations and not estimated supply and demand curves, certain deadweight losses to society are not estimated.

value to producers of those policies which affect the market price of output (that is, control of trade and price supports) and those which do not (for example, input subsidies). Policies included in the estimation of CSE's all affect the market price of output. The arithmetic sum of the CSE and the price component of the PSE is the economic loss to the Government from its market price intervention. The total economic cost to taxpayers is this amount plus the cost of input subsidies.³²

This can be seen in figure 11. S and D denote the supply and demand curves. Without intervention, Pakistan would export an amount, X_1X_2 , of cotton at the price, P_{WORLD} , which is exogenously determined. The effect of the CEC's restriction of trade is to reduce the domestic price to P_{DOMESTIC} and the amount exported to ED. The PSE for trade control is thus equal to the price wedge,

Figure 11
Pakistan cotton PSE's: Effects on producers, consumers, and taxpayers of market price intervention



³²This calculation of economic loss (gain) is conceptually correct but slightly inaccurate because the PSE and the CSE are not measured relative to the same market price. The PSE is calculated relative to an estimated world price for seed cotton at the farmgate, while the CSE is calculated relative to the world price for lint at the wholesale level.

AF, times the amount actually produced, FD, or the area ACDF. The CSE is equal to the price wedge--here we ignore the difference between producer and consumer prices--times the amount actually consumed, FE, or the area, ABEF.³³ Because the CEC buys at the domestic price and sells all of the exports at the world price, the Government's gain from trade control is the price wedge times the amount of exports, or BCDE.

Output Price Policies

Export and import parity prices are used here to estimate the impact of cotton price control on both producers and consumers, and the impact of fertilizer price control on producers (tables 14, 15, and 16). (Additional details of PSE/CSE calculations can be found in the appendix.) The Government controls exports of cotton and the purchase price of the CEC functions partly as a support price. To jointly estimate the value of these actions to producers, domestic producer prices of seed cotton are compared with export parity prices.

Parity prices are based on a world reference price, the "B" index, rather than Pakistan's export unit value, because it is felt that the index better represents the minimum value of Pakistan's cotton. The resulting PSE (CSE) is therefore felt to be a more accurate representation of the value to cotton producers (consumers) of the export regime. As a result of recent improvements in quality and staple length, moreover, some cotton from Pakistan has been included in the "A" index, so the estimates of value herein are probably still conservative.

For the PSE, prices are compared for seed cotton because this is the form in which the producer sells the product, and the intention of the analysis is to measure the value of government policies to the producer. In making the comparison, one assumes that the effects of Government policies on the price of lint are passed through to the producer via the price of seed cotton. Since there are over 1,000 gins in Pakistan, this is probably a reasonable assumption for most farmers.

To calculate a parity price for seed cotton, it is necessary to include the value of the cottonseed produced jointly with the lint. In doing so, it is assumed for convenience that the domestic price of cottonseed is not distorted. In reality, the Government has tended to depress the price of vegetable fats and oils, and one can expect a similar effect on the prices of oilseeds. Using domestic prices for cottonseed, the parity price of seed cotton is reconstructed conceptually from the prices of lint and cottonseed, with ginning ratios as weights. The value of the cottonseed then comprises from 16 to 23 percent of the

³³Theoretically, the PSE should include the triangle CX₂D in figure 11 and the CSE should exclude the triangle X₁BE. It is standard practice to ignore these triangles in PSE and CSE calculations to avoid the use of estimated supply and demand elasticities.

Table 14--Pakistan cotton PSE's: Price supports and state trading

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
A. World reference price	Cts/lb \$/ton	64 1,422	67 1,470	81 1,777	60 1,313	41 902	55 1,212	"B" index, c.i.f. N. Eur. (Aug./Jul.). Source: (18).
B. Freight & insurance adjustment	\$/ton	-75	-75	-75	-75	-75	-75	Estimated freight differential. Source: ERS based on trade sources in Karachi.
C. Exchange rate	Rs/\$	10.55	12.75	13.48	15.15	16.14	17.18	Source: (7).
D. F.o.b price	Rs/ton	14,209	17,782	22,946	18,757	13,352	19,528	(A+B)*C.
E. Loading, clearing wharfage	Rs/ton	140	150	160	170	180	180	Source: ERS estimates. See appendix table 3.
F. Transport, gin to port	Rs/ton	220	240	220	270	310	320	Source: ERS estimates. See appendix table 3.
G. Lint value inland	Rs/ton	13,849	17,392	22,566	18,317	12,862	19,028	D-E-F-G.
H. Cottonseed price	Rs/40kg Rs/ton	89 2,217	86 2,139	109 2,716	90 2,257	92 2,305	98 2,451	Weighted average wholesale prices, July/June. Source: See appendix table 2.
I. Crushing percentage	Rs/ton	0.85	0.80	0.85	0.85	0.85	0.85	Source: (25).
J. Cottonseed value inland	Rs/ton	1,884	1,711	2,306	1,919	1,959	2,084	Cottonseed value adjusted for percentage of production crushed. (HXI)
K. Lint ginning percentage	Pct.	34	34	34	34	34	34	Percentage reported for typical varieties.
L. Value of seed cotton as components	Rs/ton	5,952	7,042	9,195	7,494	5,666	7,845	(G*K)+(1-K)*J.
M. Ginning and pressing costs	Rs/ton	680	680	544	680	680	680	Source: ERS estimates. See appendix table 3.
N. Value of seed cotton at gin	Rs/ton	5,272	6,362	8,651	6,814	4,986	7,165	L-M.
O. Transport, farm to gin	Rs/ton	110	120	130	130	140	150	Source: ERS estimates. See appendix table 3.
P. Export parity price at farmgate	Rs/ton	5,162	6,242	8,521	6,684	4,846	7,015	N-O.
Q. Producer price	Rs/ton	4,678	4,758	7,401	5,099	5,028	5,313	(Seed cotton) Source: See appendix table 2.
R. Price difference	Rs/ton	-484	-1,484	-1,120	-1,585	182	-1,701	P-O. (Negative value indicates tax.)
S. PSE: Support prices and state trading	Mil. Rs.	-1,085	-3,668	-1,662	-4,795	664	-6,736	Price difference times production.

Table 15--Pakistan cotton CSE's: Price supports and state trading

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
A. Supplier's export price	Cts/lb \$/ton	64 1,422	67 1,470	81 1,777	60 1,313	41 902	55 1,212	"B" index, actual and estimated, c.i.f. N. Eur. (Aug./Jul.). Source: (18).
B. Freight and insurance adjustment	\$/ton	-75	-75	-75	-75	-75	-75	Estimated freight differential. Source: ERS estimate, based on trade sources in Karachi.
C. Exchange rate	Rs/\$	10.55	12.75	13.48	15.15	16.14	17.18	Fiscal year (July/June) basis. Source: (7).
D. Border price	Rs/ton	14,209	17,782	22,946	18,757	13,352	19,528	(A+B)*C.
E. Unloading, clearing, & wharfage	Rs/ton	140	150	160	170	180	180	Source: ERS estimates. See appendix table 3.
F. Transport, port to mill	Rs/ton	220	240	220	270	310	320	Assumed equal to gin-to-port transportation. Source: ERS estimates. See appendix table 3.
G. Import parity price	Rs/ton	14,569	18,172	23,326	19,197	13,842	20,028	D+E+F.
H. Domestic wholesale price	Rs/40kg Rs/ton	478 11,953	507 12,677	756 18,898	584 14,595	494 12,359	533 13,324	Weighted annual average wholesale prices at Karachi. Source: See appendix table 4.
I. Price difference due to state control	Rs/ton	2,616	5,494	4,428	4,602	1,483	6,704	G-H.

Table 16--Pakistan cotton PSE's: Fertilizer subsidies

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
A. Nitrogen (N)								
1. Supplier's price of urea	\$/ton	236	174	161	180	163	111	Export unit values. Source: (24). See appendix table 5.
2. Exchange rate	Rs/\$	10.55	12.75	13.48	15.15	16.14	17.18	Source: (7).
3. Import price of urea	Rs/ton	2,495	2,216	2,171	2,730	2,630	1,902	1x2.
4. Unloading, clearing & wharfage	Rs/ton	140	150	160	170	180	180	Source: ERS estimates. See appendix table 3.
5. Landed cost of urea	Rs/ton	2,635	2,366	2,331	2,900	2,810	2,082	3+4.
6. Inland transportation	Rs/ton	210	220	210	250	290	300	Source: See appendix table 5.
7. Farm cost of imported N	Rs/ton	6,184	5,623	5,523	6,848	6,739	5,179	(5+6)/.46; based on N content of Urea.
8. Dom. sale price of N	Rs/ton	4,150	5,000	5,570	5,570	5,570	5,570	Based on price of Urea. Sources: (3, 7)
9. Price difference	Rs/ton	2,034	623	(47)	1,278	1,169	-391	7-8.
10. Consumption of N	1000 tons	833	953	914	935	1,128	1,332	Source: (7).
11. Subsidy on N	Mil. Rs.	1,694	593	(43)	1,195	1,319	-521	9x10/1000.
B. Phosphate (P)								
1. Supplier's price (c.i.f)	\$/ton	266	271	230	257	236	210	Import unit values for diammonium phosphate (DAP). Source: (24, 7).
2. Exchange rate	Rs/\$	10.55	12.75	13.48	15.15	16.14	17.18	Source: (7).
3. Import price of DAP	Rs/ton	2,810	3,459	3,100	3,887	3,812	3,609	1x2.
4. Unloading, clearing & wharfage	Rs/ton	140	150	160	170	180	180	Source: ERS estimates. See appendix table 3.
5. Landed cost of DAP	Rs/ton	2,950	3,609	3,260	4,057	3,992	3,789	3+4.
6. Inland transportation	Rs/ton	210	220	210	250	290	300	Source: See appendix table 5.
7. Farm cost of imported P	Rs/ton	4,450	6,124	5,382	6,684	6,671	6,863	(8.5.+8.6.-.18 x (A.7.))/ .46, based on phosphoric acid content of DAP, discounted for the value of N.
8. Domestic sale price of P	Rs/ton	2,780	3,170	3,600	3,600	4,170	4,170	Based on price of DAP, discounted for the value of N contained. Sources: (3, 7).
9. Price difference	Rs/ton	1,670	2,954	1,782	3,084	2,501	2,693	7-8.
10. Consumption of P	1000 tons	226	265	260	294	350	409	Source: (7).
11. Subsidy on N	Mil. Rs.	377	784	463	907	875	1,102	9x10/1000.
C. Total producer subsidy on fertilizer	Mil. Rs.	2,070	1,377	420	2,101	2,194	580	A+B.
D. Share of total fertilizer used on cotton	Pct.	15	15	15	15	15	15	Source: ERS estimate.
E. Total fertilizer subsidy/tax to cotton producers	Mil. Rs.	311	207	63	315	329	7	CxD.

parity price of seed cotton at the gin. Thus, the value of the cottonseed should not be ignored.

There are significant problems attendant to estimation of a parity price for cottonseed, however. The world markets for both cottonseed and cottonseed oil are very thin; standard reference prices for cottonseed are not available. One could also make use of Pakistan's import unit values for palm and soybean oils, but this would require rather heroic assumptions about technical and economic substitutability. By using observed domestic prices, adjusted for cottonseed not crushed, one obtains an underestimate of the parity price of seed cotton and thus a conservative estimate of the taxing effect of government policy on cotton producers.

Among the transformations of marketing, the costs of transportation at various stages, handling, and ginning are estimated. Among these the cost of ginning is the largest. Because farmers sell their seed cotton to ginners or their agents rather than pay a fee to have it ginned, data on ginning charges are not readily available. For this reason, some sensitivity analysis on these estimates is provided below (see table 22) with the discussion of the results.

For the CSE, the adjusted world price for lint is compared with the wholesale price of lint in Pakistan. While the costs of transportation and handling are more difficult to estimate than production and prices, there are no major complications in calculating the CSE for cotton.

Fertilizer Subsidies

Because Pakistan's fertilizer subsidies are implemented through a system of subsidies on the domestic producers of fertilizer, budgetary figures do not necessarily measure the impact on farmers correctly. Reported fertilizer subsidy figures apparently include only the gross subsidy, the development surcharge levied on low-cost producers having gone into general revenue.³⁴ However, since the subsidy formulas are based on cost of production and imply an arbitrary (and usually guaranteed) level of profit, and since the most important input into urea production--natural gas--was also subsidized, the subsidy to fertilizer producers may be quite different from the subsidy that farmers receive.

For these reasons, the fertilizer subsidy is estimated by comparing import parity prices (for nitrogen and phosphoric acid) with administered prices.³⁵ Parity prices are based on Pakistan's export unit value rather than the import unit value,

³⁴Mr. Shafi Niaz, Chairman, Agricultural Prices Commission, personal communication and (3).

³⁵Complete data for potash are not available, and since it is by far the least important of the three nutrients, it is ignored.

the latter are probably inflated by the terms of certain trade arrangements. The share of fertilizer nutrients used on cotton and other crops is available in official statistics.

Credit Subsidies

Other components of the PSE and CSE are estimated by straightforward methods when data are available (tables 17, 18, and 19). To estimate the value of interest-free loans (which went only to small farmers), loan volumes and market interest rates are used, together with the share of small farms planting cotton out of total small farms. For subsidized interest-rate loans, rate differentials, loan volumes, and estimated shares to cotton farmers are employed.

Electricity Subsidy

Similarly, in electricity the calculations use the rate differential to agriculture, the amount of electricity used by agriculture, and the estimated share to cotton. This share is estimated as the share of irrigation water used by cotton, since pumps are the primary use for agricultural electricity.

Irrigation Subsidies

For the canal water subsidy, official statistics are available on receipts and on operating and maintenance expenditures. They are also available for the total tubewell subsidy. The share of total irrigation water going to cotton is estimated directly from various data and estimates of total and irrigated area. Separate figures for the two types of irrigation (on cotton land) are not available.

Unmeasured Policies

Most subsidies on pesticides were discontinued as of 1980/81. Farmers must now pay when provincial governments spray their fields, although these governments still subsidize the purchase of sprayers. Data on these subsidies are not available, but they are presumed small and are ignored.

The export duty paid by the CEC is not specifically included in the PSE or CSE because it is an intragovernmental transfer. The Government also collects a cess (tax) on domestic and export sales of raw cotton that is apparently used to fund cotton research. While the cess collection data are available, insufficient information is available on the method of collection to properly allocate it to the PSE and/or CSE, so it is also not specifically included in the PSE/CSE calculations. Note, however, that any effect of the cess on the price paid by consumers or received by producers is already measured, as part of the price wedge calculation; what is omitted is a specific, subtotal entry.

The Government of Pakistan has traditionally made substantial investments in irrigation, including dams, canals, public

Table 17--Pakistan cotton PSE's: Credit subsidies

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
A. Agricultural credit extended								
1. Ag. Development Bank of Pakistan	Mil. Rs.	1,551	2,298	3,098	4,101	5,217	5,940	Sources: (10, 2) and ERS estimates.
a. Dairy	Mil. Rs.	30	101	124	335	575	659	
b. Poultry	Mil. Rs.	55	43	65	146	222	266	
2. Federal Bank for Cooperatives	Mil. Rs.	1,253	1,312	1,213	1,660	1,681	2,418	
3. Total interest bearing	Mil. Rs.	2,804	3,610	4,311	5,761	6,898	8,358	
a. Crops	Mil. Rs.	2,719	3,466	4,122	5,280	6,101	7,433	3-1.a.- 1.b.
4. Interest-free	Mil. Rs.	1,274	1,581	2,644	3,244	4,538	6,551	
B. Interest rates								
1. Market	Pct.	15	15	15	15	15	15	Market rate is Agricultural Development Bank of Pakistan's (ADBP) lending rate to agribusiness; other rates are ADBP's rates for agricultural loans. Sources: (2, 22).
2. Lending	Pct.	11	11	11	11	12	12	
C. Interest rate subsidies								
1. Lending	Pct.	4	4	4	4	3	3	Difference between lending rate and market rate.
2. Interest-free	Pct.	15	15	15	15	15	15	
D. Credit subsidy for crops								
1. Interest-bearing	Mil. Rs.	109	139	165	211	183	223	Value of 1 year of subsidized interest A.3.a.* C.1. A.4.* C.2.
2. Interest-free	Mil. Rs.	191	237	397	487	681	983	
E. Share of credit subsidies going to cotton producers								
1. Interest-bearing	Pct.	15	15	15	15	15	15	Estimated as share of fertilizer used on cotton. See table 3. Estimated as share of small farms growing cotton. Source: See appendix table 7.
2. Interest-free	Pct.	16	16	16	16	16	16	
F. Credit subsidies going to cotton producers								
1. Interest-bearing	Mil. Rs.	16	21	25	32	28	34	D.1* E.1.
2. Interest-free	Mil. Rs.	30	37	62	76	106	154	D.2* E.2.
3. Total	Mil. Rs.	46	58	87	108	134	187	1.+2.
G. Credit subsidies going to livestock producers								
1. Dairy	Mil. Rs.	1	4	5	13	17	20	A.1.a.*C.1.
2. Poultry	Mil. Rs.	2	2	3	6	7	8	A.1.B.*C.1.

Table 18--Pakistan cotton PSE's: Electricity subsidies

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
A. Electricity usage by sector								
1. Household	Mil. kwh	3,223	3,752	4,535	5,076	5,845	6,806	Source: (Z).
2. Commercial	Mil. kwh	1,047	1,049	1,287	1,413	1,526	1,713	
3. Industrial	Mil. kwh	5,002	5,572	5,884	6,249	7,288	8,012	
4. Agricultural	Mil. kwh	2,369	2,559	2,673	2,798	2,900	3,471	
B. Electricity rates by sector								
1. Household	Rs./kwh	0.40	0.40	0.40	0.40	0.45	0.45	Sources: (Z, 2).
2. Commercial	Rs./kwh	1.30	1.30	1.30	1.30	1.45	1.45	
3. Industrial	Rs./kwh	.84	.84	.84	.84	.94	.94	
4. Agricultural	Rs./kwh	.23	.23	.23	.23	.25	.25	
C. Weighted average rate	Rs./kwh	.64	.63	.63	.63	.70	.69	Rates weighted by usage.
D. Rate subsidy to agriculture	Rs./kwh	.41	.40	.40	.40	.45	.44	C-B4.
E. Electricity subsidy to agriculture	Mil. Rs.	960	1021	1067	1114	1317	1542	DxA4.
F. Cotton's share of agricultural electricity	Pct.	13	13	13	13	14	14	Estimated as share of agricultural irrigation going to cotton, since agricultural irrigation pumps are main agricultural users of electricity. Source: ERS estimates.
G. Electricity subsidy to cotton producers	Mil. Rs.	127	137	141	150	181	219	ExF.

Table 19--Pakistan cotton PSE's: Irrigation subsidies

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
A. Expenditures on operation and maintenance (O&M)								
	Mil. Rs.	1,472	1,550	1,822	2,490	2,457	2,842	Sources: (Z, 1Z).
B. Receipts								
	Mil. Rs.	881	979	1,027	1,034	1,096	1,222	Sources: (Z, 1Z).
C. O&M subsidy								
	Mil. Rs.	591	571	795	1,456	1,361	1,621	A-B
D. Tubewell sinking subsidy								
	Mil. Rs.	24	24	0	0	16	18	Source: (Z).
E. Total irrigation subsidy								
	Mil. Rs.	615	95	795	1,456	1,377	1,639	C.+D.
F. Share of irrigation water used on cotton								
	Pct.	13	13	13	13	14	14	Source: ERS estimates.
G. Irrigation subsidy to cotton producers								
	Mil. Rs.	81	80	105	197	190	232	ExF.

tubewells, and drainage and reclamation. Estimates of the extent of these expenditures are not included here, partly for lack of data and partly due to methodological problems. The primary conceptual problem is how to allocate lumpy investments over time to beneficiaries in a given set of years.

Overvaluation of the exchange rate is generally not an issue in the calculation of PSE's for developed countries, because the effects would not be specific to the agricultural sector and because exchange rates tend to float freely. In countries like Pakistan, however, where agriculture-based exports are well over half of all exports, it can be argued that exchange rate distortions affect mostly agricultural producers (and consumers). Nevertheless, estimates of overvaluation are not included in the PSE's here, partly for the lack of a clearly preferred method of estimation.

While overvaluation has not been included in these PSE estimates, the official exchange rate must be used to convert reference prices into local currency. Although the rupee was unpegged from the dollar in 1982, it does not float freely. Thus, it seems reasonable to include exchange rate policy in the discussion of factors affecting the level of the PSE. That is, while the rupee is being managed against a basket of currencies, the Government retains control over the rate of exchange and has periodically intervened to accelerate or decelerate its rate of change.³⁶ Therefore, changes in the official exchange rate can be considered partly exogenous and partly policy-induced.

Results

Because of the nature of PSE/CSE calculations, the results presented in this report should be considered best-effort, broad indicators of the main taxes and subsidies affecting cotton producers and consumers in Pakistan. These figures are estimates, and should not be interpreted to be exact measurements of the impacts of the policies discussed.

Effects of Output Price Policies

The PSE calculations show that in most recent years, the control of exports and support prices together resulted in an implicit tax of about 15 to 40 percent on cotton producers (table 20). Year-to-year changes in the PSE reflect primarily changes in the world reference price and the official exchange rate. The domestic price of cotton was generally stabilized by Government policies.

In 1982/83, "taxation" was at the high end of the range, due to the recent unpegging of the rupee from the U.S. dollar and the devaluation of the rupee that ensued. This further raised the

³⁶For example, from February 1985 to March 1986 the Government held the rupee almost constant in terms of U.S. dollars, allowing it to depreciate with the dollar against other major currencies.

value of imported cotton relative to domestic cotton. The following year, a sharp drop in production raised the price of domestic cotton, reducing the implicit taxation. In 1984/85, the rupee depreciated again significantly, while in 1985/86, a glut forced world prices down and Pakistan chose to accept gross trading losses on some of its cotton exports. This is revealed in the PSE as a reduction of taxation to almost zero. The results for 1986/87 reflect a return of world prices to normal levels, continuing devaluation of the rupee with respect to the dollar, and an increase in domestic cottonseed prices. The percentage tax in this year was the largest for the years covered, 40 percent.

The cotton price wedge calculation, like other parts of the PSE, is imperfect. One should compare prices for the same variety/quality in the same form at the same place over the same, relevant time period. To do so, one takes data for different forms or places and adjusts them by marketing or processing costs. One must also choose the appropriate time period over which to observe both the "producer" price and the parity price. For cotton in Pakistan, the time periods and the quality factor hold the most potential for introducing inaccuracy.

While representative varieties could be chosen at the producer level, the "B" index price may increasingly underestimate the value of Pakistan's cotton in the world market. Further research might be able to eliminate some of this inaccuracy by combining the "A" and "B" indices, using as weights the amounts of different cottons produced in Pakistan.

The harvest season is a relevant time period for comparison of producer prices.³⁷ Fortunately, monthly "producer" prices for seed cotton are available for this period, although these are probably not farmgate prices.³⁸ The relevant period for a world reference price is not as clear, however, since the product has been transformed (into lint) and is traded throughout the year. In the price wedge calculation, annual averages of "B" index prices were used; these averages are fairly close to the corresponding averages for only the harvest period.³⁹

The items in the price wedge for which obtaining accurate data is most difficult are marketing costs--ginning, transportation, handling, etc. For some commodities these might be a significant part of the total cost. Since cotton is compressed for transpor-

³⁷For cotton in Pakistan, the peak harvest season normally spans the September to February period.

³⁸"Market" prices of seed cotton are published by the PCCC, which provides no further description. These are probably prices received at gins.

³⁹September-February "B" index prices were 6 percent higher than annual averages in 1984/85 and 1985/86 and 12 percent lower in 1986/87.

tation, however, at most points along the marketing chain it has a high value relative to its weight. Thus, most marketing costs are small relative to the value of the material itself, and inaccuracies in these costs have little effect on the PSE. The exception is ginning costs; better data for these might make perceptible changes in the PSE.

Effects of Input Policies

The implicit taxation from export controls has typically been partly offset by input subsidies. The value of these was 3 to 5 percent of the value of production (table 20). Fertilizer subsidies (as calculated here) were usually the largest component of input subsidies, over 40 percent in 4 of the 6 years.

Despite the Government's repeated postponements of their elimination, fertilizer subsidies, as measured by PSE's, did show some tendency to decrease as a percentage of all input subsidies.

While their nominal value fluctuated, moreover, the real value of fertilizer subsidies probably declined. The rupee value of the fertilizer subsidy did not increase significantly from its value in 1981/82, while the value of cotton production doubled. Increases in domestic fertilizer prices, particularly for phosphatic fertilizer, prevented the value of the subsidy from increasing when fertilizer consumption rose.

The fertilizer PSE estimates the economic cost of the fertilizer subsidy to the Pakistani economy, while the budgetary subsidy is its actual financial cost. The former estimates the loss from

Table 20--Pakistan cotton PSE's: Summary

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
A. Production	1,000 tons	2,244	2,472	1,484	3,026	3,651	3,959
B. Producer price	Rs/40 kg	187	190	296	204	201	213
	Rs/ton	4,678	4,758	7,401	5,099	5,028	5,313
C. Producer value	Mil. Rs.	10,498	11,762	10,982	15,431	18,359	21,036
D. Policy transfers to producers:							
1. Output price interventions--							
a. Support prices & state trading	Mil. Rs.	-1,085	-3,668	-1,662	-4,795	664	-6,736
b. Percent of producer value	Pct.	-10	-31	-15	-31	4	-32
2. Assistance on inputs--							
a. Fertilizer	Mil. Rs.	311	207	63	315	329	87
b. Credit	Mil. Rs.	46	58	87	108	134	187
c. Electricity	Mil. Rs.	127	137	141	150	181	219
d. Irrigation	Mil. Rs.	81	80	105	197	190	232
e. Total	Mil. Rs.	566	482	396	770	835	725
f. Percent of producer value	Pct.	5	4	4	5	5	3
3. Total policy transfers to producers--							
a. Total	Mil. Rs.	-520	-3,186	-1,266	-4,025	1,499	-6,011
b. Percent of producer value	Pct.	-5	-27	-12	-26	8	-29
c. Per ton	Rs/ton	-232	-1,289	-853	-1,330	411	-1,518

forgoing an opportunity presumed optimal--to import fertilizer at the world price--whereas the latter is the cost of the course of action actually pursued. The relevant figures are shown in table 21. Note that the PSE fluctuates, taking into account the variations in world price that occur due to changes in world supply and demand (see table 16). Pakistan's budgetary subsidy fluctuates much less, reflecting the commitment of the Government to provide subsidies to the fertilizer producers according to an agreed-upon formula.

Net Effects on Producers

In 1982/83, 1984/85, and 1986/87, the net effect on cotton producers of input, output, and trade policies was a significant tax--more than 30 percent (table 20, fig. 12). Given the possible errors in the calculation of PSE's, the net effect on producers appears to have been negligible in 1981/82 and 1985/86.

Among the marketing costs estimated in calculating these PSE's, the cost of ginning is the largest. Because data on ginning charges are not readily available, there is somewhat more uncertainty associated with the estimates. However, the sensitivity analysis in table 22 shows that a change of 10 percent in the estimate of the ginning charges results in only a 3-percent change in the PSE. Thus, even a 50-percent increase in the ginning cost leaves the absolute value of the PSE over 30 percent.

Effects on Consumers

The effect of government policies on cotton consumers (that is, manufacturers of yarn and cloth) has generally been the opposite of the effect on producers. The CSE remained a significant subsidy throughout the entire period of the calculations, partly reflecting low and stable wholesale lint prices (table 23, figs. 8 and 13). Only in 1983/84, when there was a serious shortfall in production, did domestic prices rise significantly.

Low and stable domestic prices are an important policy objective of the CEC, which ensures adequate supplies to the domestic textile industry before exporting. The CSE varied substantially from its average value of 36 percent because of devaluation in 1982/83, the drop in world prices in 1985/86, and a combination of factors in 1986/87.

Overall Effects on Producers and Consumers

The most consistent gainers from the Government's policies were consumers of raw cotton (table 24). This includes primarily domestic manufacturers of yarn and textiles, but others like their employees and customers may also have benefited. Foreign manufacturers gained to the extent that the CEC could have received a higher price for the cotton it sold, but the CSE measures only the gain by domestic consumers.

Figure 12
Pakistan cotton PSE's
Percent of producer value

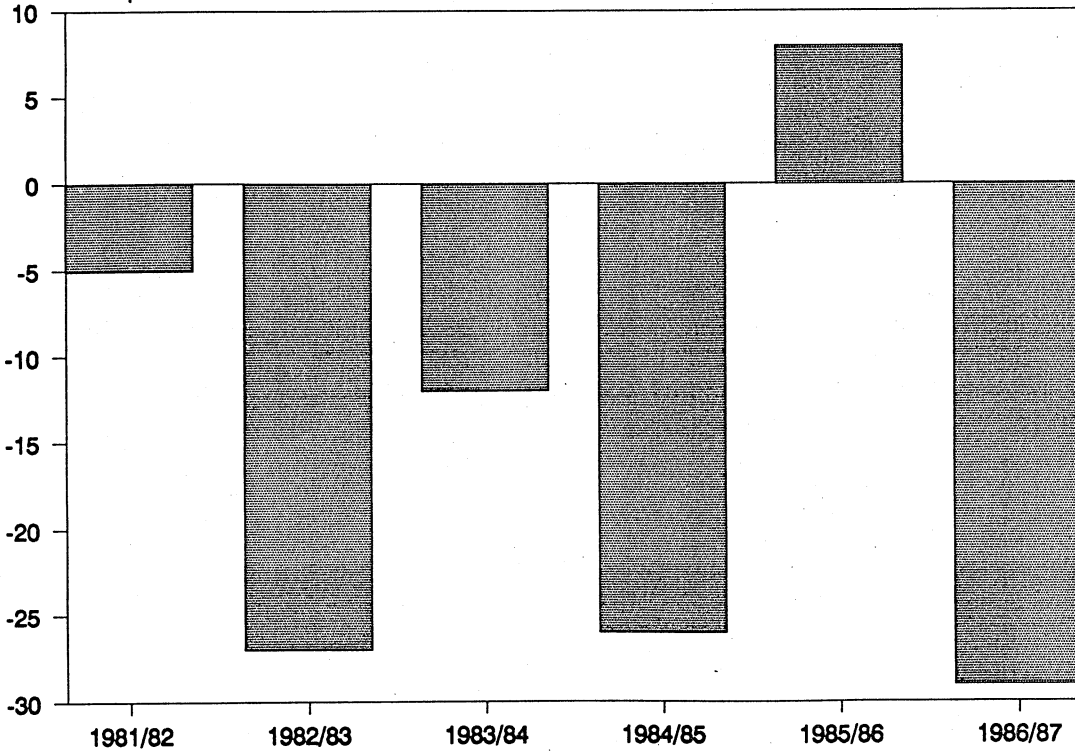
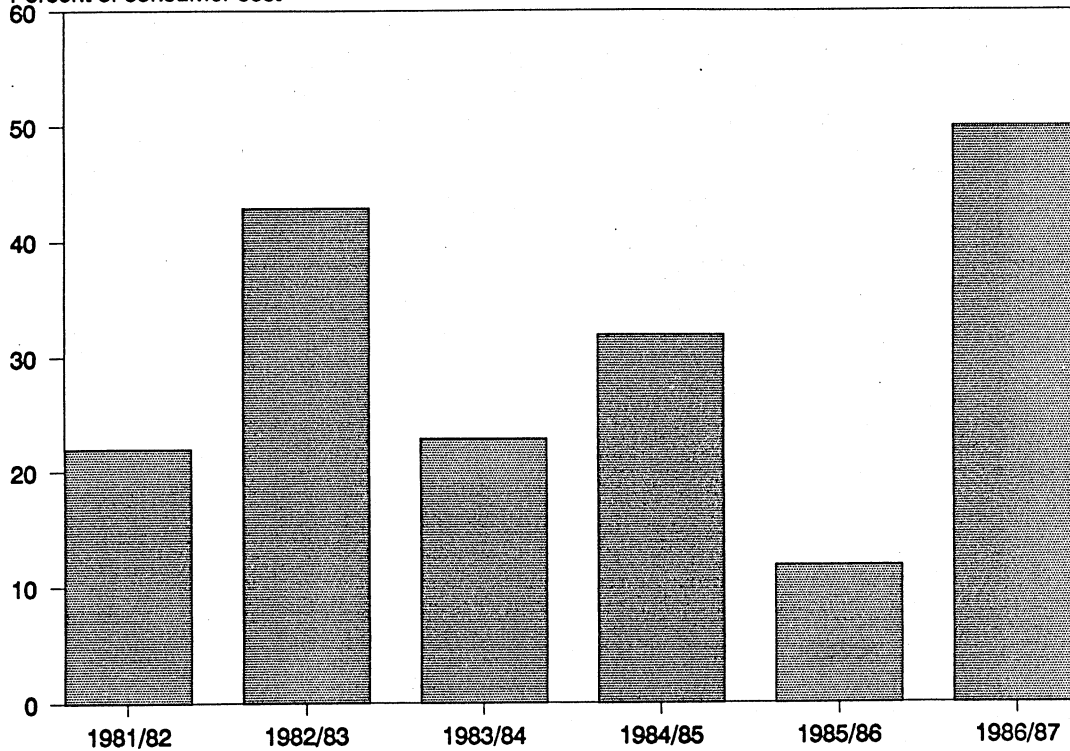


Figure 13
Pakistan cotton CSE's
Percent of consumer cost



The losers were producers. They received less than the export parity price, and this effect was only partially offset by input subsidies. Taxpayers gained in some years, but lost in others, depending on the net value of the PSE and CSE price wedges and input subsidies. Over 80 percent of the average benefit went to "consumers," yet on average, taxpayers were relieved of the need to pay over half a billion rupees per year.⁴⁰

Estimated Effects of Unmeasured Policies

Among the unmeasured policies, investments in irrigation and the overvaluation of the exchange rate may have significant effects on the PSE (and the CSE in the case of the exchange rate). Rough estimates of this effect show that the Government's expenditures on irrigation facilities may add another 3-5 percent to the subsidies category of the PSE's, not enough to significantly alter the overall results.

Overvaluation is also not estimated in this study. Data and estimates that have recently become available, however, reveal that the rupee has been overvalued by about 20 percent in the 1980's. This overvaluation represents an additional tax on producers and an additional subsidy to consumers of cotton.

Competitiveness

Competitiveness can be thought of as the ability of a country or other entity to supply a commodity at a price lower than its

Table 21--Estimated PSE and budgetary fertilizer subsidies in Pakistan

Year	PSE fertilizer subsidy	Budgetary fertilizer subsidy
<u>Million rupees</u>		
1981-82	2,070	1,794
1982-83	1,377	1,948
1983-84	420	1,466
1984-85	2,101	1,501
1985-86	2,194	2,408
1986-87	580	2,026

Sources: (7) and ERS estimates.

⁴⁰The use of the "B" index as a world reference price results in an accurate estimate of the value lost by producers due to government policies. However, the gain to the Government (taxpayers) is overstated, since the CEC often sells at a lower price.

competitors' in a free market, although Government intervention blurs this definition.⁴¹ In the absence of intervention, however, a commodity's price is determined by its cost of production and its marketing costs. On both of these accounts, the evidence suggests that Pakistan would be competitive in the world cotton market.

In 1985, the cost of production in the Punjab, including land rent and other fixed costs, was estimated by the Agricultural

Table 22--Pakistan cotton PSE's: Sensitivity to ginning cost estimates

Item	Base	+10%	-10%	+50%	-50%
		<u>Rs./ton</u>			
Ginning cost	680	748	612	1,020	340
		<u>Percent</u>			
PSE	-36.8	-35.5	-38.1	-30.4	-43.2
Change in PSE	NA	-3	+3	-17	+17

NA = Not applicable.

Source: ERS estimates.

Table 23--Pakistan cotton CSE's: Summary

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
A. Consumption	Thou.						
	bales	2,238	2,450	2,030	2,264	2,520	2,990
	Thou. tons	487	533	442	493	549	651
B. Consumer price	Rs/ton	11,953	12,677	18,898	14,595	12,359	13,324
C. Consumer cost	Mil. Rs.	5,823	6,761	8,351	7,193	6,780	8,672
D. Policy transfers to consumers							
1. State trading	Mil. Rs.	2,616	5,494	4,428	4,602	1,483	6,704
E. Total policy transfers to consumers							
a. Total	Mil. Rs.	1,274	2,928	1,957	2,269	814	4,364
b. Percent of consumer cost	Pct.	22	43	23	32	12	50
c. Per ton	Rs/ton	2,616	5,494	4,428	4,602	1,483	6,704

⁴¹Government intervention generally gives social objectives higher priority than private profitability.

Prices Commission to be about Rs. 2,700 per acre.⁴² The yield of lint was 564 kg/ha that year, and the rupee was about 16 to the U.S. dollar. These figures yield a total production cost of about 34 cents/pound. Yields and costs of production are lower in the Sind, resulting in a cost per pound the same or a little lower. When land and other longrun costs are excluded, the national average cost of production in the following year (1986) was about Rs. 2,000 per acre, equivalent to a variable cost of production of about 25 cents/pound.

Domestic marketing costs (transportation to the ginnery, ginning and pressing, transport to the port, and port handling and clearing) were about 8 cents/pound in 1985/86 (table 14), and overseas freight charges to Europe would add another 5 cents/pound.⁴³ Comparable world cotton prices in the eighties have often been about 60 cents/pound ("B" index, c.i.f. Northern Europe). They dropped below 40 cents/pound (Pakistan's approximate break-even export cost) only from May through September 1986, going below 30 cents/pound in July and August. These data show that Pakistan would normally be able to produce and market cotton at a profit for the world market.

From the PSE results and the discussion above, it is also clear that Pakistani cotton farmers are competitive not because of

Table 24--Pakistan: Calculation of effect of cotton policy on Government/taxpayers

Item	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Average
<u>Million rupees</u>							
Price wedge:							
PSE	-1,085	-3,668	-1,662	-4,795	664	-6,736	-2,881
CSE	-1,274	2,928	1,957	2,269	814	4,364	2,268
To Government	-189	740	-295	2,526	-1,478	2,372	613
Input subsidies:							
PSE	566	482	396	770	835	725	629
CSE	0	0	0	0	0	0	0
To Government	-566	-482	-396	-770	-835	-725	-629
Total effect:							
PSE	-520	-3,186	-1,266	-4,025	1,499	-6,011	-2,252
CSE	1,274	2,928	1,957	2,269	814	4,364	2,268
To Government	-755	258	-691	1,756	-2,313	1,647	-16

⁴²It is difficult to evaluate these estimates. Downward bias could be introduced by the Government's preference to keep support costs and domestic prices down. On the other hand, upward bias may be present, as in most surveys of cost of production in developing countries, because farmers fear taxation.

⁴³This calculation does not allow for any income from the sale of the cottonseed. It is an estimate of private sector marketing costs, so it also does not include any allowance for bureaucratic or other overhead which the CEC might have.

subsidies but because of a relatively ideal agro-climatic environment and recent technological improvements in cotton cultivation. Despite yields lower than most of their competitors and taxation by Government policies, these farmers still make a profit growing cotton. In the marketing area, the port of Karachi has been modernized and now provides efficient service to exporters, and Pakistan's location gives it some cost advantage over most other shippers to east Asia. Moreover, the CEC apparently gained the required expertise and reputation to successfully carry out international trade.

During the period studied, the Government's involvement in cotton marketing complicates the analysis of competitiveness. This is because the Government has more than one objective in pursuing its cotton policies. While the CEC's objectives have included making a profit, balance of payments considerations have often been more important. In 1985/86 and 1986/87, the CEC incurred substantial trading losses. With a trade deficit that was troublesome and cotton a major export, it is perhaps not surprising that the Government spent rupees to buy cotton at prices higher than it could sell it abroad for dollars. Moreover, the desire to support the domestic textile industry clearly limits the amount of raw cotton exported by the CEC, which could raise its profits by exporting more cotton at (the same) world prices.

Moves Toward Liberalization

In June 1987, the Commerce and Planning Minister announced a new economic package for the next 3 years. It was intended to "promote healthy competition between state and private sectors...and ultimately to increase the country's foreign exchange earnings (18)." The Government removed the ban on exports of cotton by the private sector and, in September, implemented an export duty on cotton. Beginning that month, the private sector was allowed to buy cotton from ginneries and sell it abroad, subject to a minimum export price. Almost half a million bales were exported by the private sector under these provisions during the 1987/88 marketing year before the policy was modified.

More restrictive provisions were in effect during the remainder of 1987/88. Traders could export on their own account, but the source (CEC stocks), minimum price, grade, and availability of cotton were determined by the CEC. The trader was guaranteed a fee above his costs; any profits above this fee were lifted by the Government as a variable export duty. Thus, the CEC regained control of the quantity and price of cotton exports. Traders could locate new customers or increase total volume, but they could make their profit only on volume, as profits above the Government-set fee reverted to the Treasury.

For 1988/89, the Government further modified the export regime so that the private sector could participate more freely. It can buy from the domestic market and export cotton as it likes, subject to a minimum export price, which is generally the price

at which the CEC has sold on that day.⁴⁴ The export duty remains, although the Government has added quality differentials to remove the implicit penalty on the export of higher-quality cottons.

The CEC is generally reported to have done a better job of marketing cotton than the private trade had been doing in the years up to 1973. However, when the CEC incurred losses, these were covered by the Treasury. In the current situation, the CEC and the private sector may be able to coexist as traders as long as cotton exports are profitable. The private sector's continued viability will depend therefore on Pakistan's comparative advantage in cotton production; only the CEC would be able to export in years when the world price is below the cost of cotton in Pakistan. Since cotton is such an important export, the Government's permission for the private sector to continue to handle cotton exports depends primarily on its reliability in bringing in foreign exchange.

It was seen above that the Government policies with the strongest effects on cotton producers and consumers are control of trade and (on producers only) the fertilizer subsidy. The Government has striven to eliminate the latter, with some success. Pesticide subsidies have already been removed. The current policy climate, moreover, does not favor increases in other such subsidies.

The Government might be in a position to eliminate state trading of cotton. If this were done in the context of a global liberalization, the Government could probably expect higher world prices for cotton. In the absence of state trading, the volume of cotton exported would probably rise, and the price would be higher if the private sector did a competent job of exporting. Thus, raw cotton would probably earn more foreign exchange, and it might be possible to levy a substantial duty on cotton exports. If internal prices were permitted to rise toward the world price, cotton area, yield, and production would likely increase due to the increase in prices. With cotton cultivation more profitable, the Government might be in a better position to eliminate the fertilizer subsidy, although this would also depend on the situation in other crops.

For equity reasons, the Government will likely continue to tax exports of yarn, while reducing export taxation of cloth and other cotton manufactures that tend to be produced by small entrepreneurs. However, the elimination of domestic price subsidization of cotton would reduce the profitability of producing both yarn and cloth. This potential loss of revenue and, even more importantly, of employment and value-added in the textile industry, will continue to be key factors in the Government's decisions on cotton export policy.

⁴⁴Mr. Mohammad Sami Qureshi, Chairman, Cotton Export Corporation, personal communication.

In the Uruguay Round of negotiations under the General Agreement on Tariffs and Trade (GATT), Pakistan has made specific proposals for the elimination of the Multi-Fiber Agreement (MFA) and the incorporation of textiles into the GATT. If access to developed-country textile markets were improved, domestic textile manufacturers might benefit from larger and more reliable export sales that would compensate them for the higher domestic cotton prices associated with freer cotton export policies. Without the MFA system of quotas, however, they would have to compete in a wider world market. This would likely pressure the less efficient among them to modernize or shift into other enterprises.

Future Issues of Production and Trade

Several technical factors and policy issues will determine whether Pakistan's production and exports of cotton will continue to grow. By world standards, there is still room for yield increases in Pakistan. This is the major reason to expect future gains in production of cotton in Pakistan. However, the recent improvements in yield have occurred almost entirely in the Punjab. It remains to be seen whether farmers in the Sind will get access to the same number and quality of improved varieties and seed as those in the Punjab.

Too much varietal concentration is always a possibility when one variety, like NIAB-78, has outstanding characteristics. An overwhelming majority of farmers, making individual decisions, may plant such a variety, leaving the nation's production vulnerable to pests or diseases that were not serious problems when several varieties were in use. So far no such problem has been detected. Moreover, the cotton research system seems to be generating enough new varieties that the problem may never occur.

Pesticide use has been trending upward on cotton and has been credited with much of the yield increase. Cotton now has the highest pesticide use per hectare of the three major kharif crops, and expenditures on pesticides are substantial. The use of plant protection measures is not likely to continue its rapid expansion, but this may not prevent further increases in yield, as a significant degree of protection has already been achieved.

Policy issues also present some uncertainties. The Government has had a hard time deciding the appropriate role for the private sector in cotton exports. It will always be difficult for the Government to give up control of such an important export commodity at a time when trade deficits are quite visible. Slow but steady progress in both rice and cotton export liberalization, however, is evidence of the Government's commitment.

The other major policy issue is the fertilizer subsidy. The Government has consistently tried to eliminate it and has made some progress. Amid the recent price increases, total nutrient use and use per hectare have increased from plateau to plateau.

The Government would like to reduce its budgetary cost and encourage the efficient use of fertilizer, but without causing an undue shock to production or exports. With little firm information on farmer behavior, it may be difficult for the policymaker to know when to stop increasing the price.

Pakistan is likely to remain a strong competitor in the world cotton market, largely because it is a low-cost producer. Most of the production-related uncertainties concern the potential for expanding incentives and production, rather than reducing them. Moreover, the demand for raw cotton by domestic processing industries has shown little tendency to overtake supply, so Pakistan's exportable surplus should continue to be substantial.

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Appendix table 1--Calculation of average producer price of seed cotton by state

State/month	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
	<u>Rs/40 kg</u>					
Punjab (variety B-557 at Multan): ^{1/}						
Oct.	180.00	183.83	240.91	208.28	201.98	205.61
Nov.	189.69	187.75	331.55	205.56	197.58	205.72
Dec.	195.82	193.39	345.82	196.53	200.76	224.29
Jan.	199.26	197.76	334.69	202.66	203.19	222.97
Feb.	193.84	191.89	268.38	210.34	206.13	208.33
Peak season average ^{2/}	191.72	190.92	304.27	204.67	201.93	213.38
Sind (variety HT at Hyderabad): ^{3/}						
Sep.	191.67	212.85	235.33	250.29	207.81	210.28
Oct.	174.38	181.92	225.06	209.17	193.46	202.85
Nov.	180.38	180.45	293.42	187.50	192.20	207.03
Dec.	172.17	183.66	334.29	181.42	198.25	209.08
Jan.	174.99	186.67	334.29	181.00	198.33	212.50
Peak season average ^{2/}	178.72	189.11	284.48	201.88	198.01	208.35

^{1/} B-557 has a ginning outturn of 34.5 percent and a staple length of 1-1/32".

^{2/} Oct.-Feb. in Punjab, Sept.-Jan. in Sind.

^{3/} NT 1963 has a ginning outturn of 34.0 percent and a staple length of 1-1/16" to 1-1/32".

Sources: (19,20).

Appendix table 2--Calculation of average producer prices and crush percentage

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
Seed cotton:								
Price-- ^{1/}								Source: (14).
Punjab	Rs/40kg	191.72	190.92	304.27	204.67	201.93	213.38	
Sind	Rs/40kg	178.72	189.11	284.48	201.88	198.01	208.35	
Production-- ^{2/}								
Punjab	1,000 375-lb bales	2,844	3,255	1,694	4,451	5,701	6,450	Sources: (10, 26).
Sind	1,000 375-lb bales	1,550	1,585	1,210	1,476	1,449	1,310	
Weighted average price	Rs/40kg	187.13	190.33	296.02	203.98	201.13	212.53	
Cottonseed:								
Price-- ^{1/}								Sources: (16, 14).
Punjab	Rs/40kg	89.32	86.29	109.60	94.94	95.27	102.47	
Sind	Rs/40kg	87.53	84.07	107.31	76.28	80.12	95.96	
Production--								
Punjab	1,000 tons	969	1,108	596	1,512	1,968	2,193	Source: (10).
Sind	1,000 tons	528	540	425	502	500	445	
Weighted average price	Rs/40kg	88.69	85.56	108.65	90.29	92.20	101.37	
Cottonseed crush percentage:								
Production	1,000 tons	1,497	1,648	1,021	2,014	2,468	2,638	Source: (25).
Crush	1,000 tons	1,272	1,318	867	1,712	2,098	2,243	
Crush	Percent	.85	.80	.85	.85	.85	.85	Source: (25).

^{1/} Wholesale prices at Multan (Punjab) and Hyderabad (Sind); July/June years.
^{2/} Lint basis.

Appendix table 3--Estimation of marketing costs for cotton

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
GDP deflator	1980/81 =100	1.092	1.154	1.264	1.340	1.406	1.456	Source: (27).
Local transport (farm to ginnery)	Rs/ton	110	120	130	130	140	150	1980/81 estimate (Rs 100/ton) times GDP deflator, rounded.
Transport (farm to port, rail)	Rs/T-km Rs/T-mi	.212 .34	.222 .36	.226 .36	.230 .37	.250 .40	.270 .43	Average railway freight rate. Source: (16), ERS estimates.
Transport (farm to port, truck)	Rs/T-mi	.51	.54	.55	.56	.60	.64	Truck cost is estimated as 50 percent more than that of rail. Sources: (2, 23).
Distances to port:								
From Punjab	Miles	575	575	575	575	575	575	Distances to Multan and Nawabshah from Karachi.
From Sind	Miles	185	185	185	185	185	185	Source: ERS estimates.
Weighted average distance	Miles	437	447	413	478	496	509	See appendix table 2 for production weights.
Transport (gin to port, truck)	Rs/ton	220	240	230	270	300	330	Distance times cost/ton-mile, rounded.
Clearing, loading, & handling	Rs/ton	140	150	160	170	180	180	1987/88 estimate (Rs. 197/ton) times GDP deflator, rounded.
Ginning and pressing cost	Rs/ton	680	680	544	680	680	680	Source: ERS estimates.

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Appendix table 4--Calculation of average wholesale cotton prices

Item	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
Price:			<u>Rs/40/kg at Karachi</u>				July/June years. Source: (16).
Punjab ^{1/}	482	512	763	592	497	536	
Sind ^{2/}	471	497	746	558	482	520	
Production:			<u>1,000 375-lb bales</u>				Source: See appendix table 2.
Punjab	2,844	3,255	1,694	4,451	5,701	6,450	
Sind	1,550	1,585	1,210	1,476	1,449	1,310	
Weighted average price	478	507	<u>Rs/40 kg</u>		494	533	
			756	584			

^{1/} Variety B-557.
^{2/} Variety NT, RG.

Appendix table 5--Fertilizer: Calculation of weighted average transportation costs and import unit values

Item	Unit	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	Definition and sources
Fertilizer transport cost estimates:								
Rail	Rs/T/mi ¹	0.34	0.36	0.36	0.37	0.40	0.43	Sources: See appendix table 3.
Truck	Rs/T/mi	.51	.54	.55	.56	.60	.64	
Shares transported:								
Rail	Pct.	21.0	21.0	21.0	20.0	20.0	20.0	Source: (3) and ERS estimates
Truck	Pct.	79.0	79.0	79.0	80.0	80.0	80.0	
Weighted average distance	Miles	437	447	413	478	496	509	Source: See appendix table 3 for distance weights.
Weighted average costs	Rs/ton	208	223	209	248	277	305	
Import unit value estimates for phosphates:								
Import value	Mil. \$	NA	73.46	97.19	105.20	101.13	137.60	Data for diammonium phosphate. Sources: (27, 24) and ERS estimates.
Quantity	1,000 tons	NA	270.8	422.6	410.0	428.2	655.0	
Unit value	\$/ton	266	271	230	257	236	210	
Import unit value estimates for nitrogen:								
F.o.b. N. Europe	\$/ton	216	159	135	171	136	107	Data for urea. Sources: (27, 24) and ERS estimates.
Pakistan urea exports:								
Quantity	1,000 tons			96	237	507	173	Sources: (27, 24) and ERS estimates.
Value	Mil. \$			15.4	42.7	82.7	19.2	
Unit value	\$/ton	236	174	161	180	163	111	

¹ Rupees per ton per mile.

Appendix table 6--Calculation of percentage of irrigation going to major crops

Item	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
Area:						
	<u>1,000 hectares</u>					
Wheat	7,223	7,398	7,343	7,259	7,403	7,706
Rice	1,976	1,978	1,999	1,999	1,863	2,066
Cotton	2,214	2,263	2,221	2,242	2,364	2,502
Sugarcane	947	912	897	904	780	762
Other	7,420	7,579	7,531	7,516	7,400	6,964
Total	19,780	20,130	19,990	19,920	19,810	20,000
Percent irrigated:						
	<u>Percent</u>					
Wheat	79	78	79	80	80	77
Rice	100	100	100	100	100	100
Cotton	92	92	92	92	92	92
Sugarcane	100	100	100	100	100	100
Other	45	46	49	51	55	57
Total	70.8	70.5	72.0	73.3	74.7	75.0
Irrigated area:						
	<u>1,000 hectares</u>					
Wheat	5,699	5,760	5,795	5,807	5,922	5,900
Rice	1,976	1,978	1,999	1,999	1,863	2,066
Cotton	2,037	2,082	2,043	2,063	2,175	2,302
Sugarcane	947	912	897	904	780	762
Other	3,342	3,468	3,667	3,827	4,060	3,970
Total	14,000	14,200	14,400	14,600	14,800	15,000
Share of irrigation to cotton						
	<u>Percent</u>					
	15	15	14	14	15	15

Sources: (10,7,27,2).

Appendix table 7--Calculation of farms less than 5 hectares

Area	Cotton	Wheat	Paddy	Total cultivated
<u>Number of farms</u>				
<0.5 ha	7,904	53,173	10,531	86,108
0.5 - 1.0	28,210	153,654	36,221	249,199
1.0 - 2.0	125,185	514,382	163,616	887,869
2.0 - 3.0	234,476	816,933	293,920	1,501,094
3.0 - 5.0	540,655	1,621,739	581,100	3,263,712
Total	936,430	3,159,881	1,085,388	5,987,982
<u>Percent</u>				
Share	15.6	52.8	18.1	100.0

Source: (13).

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