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Trade and agricultural pricing policies, along with public investments in irrigation and agricultural research and extensions, have played a crucial role in agricultural development of Pakistan.¹ From the 1960s through the mid-1980s, major government interventions in domestic agricultural markets, trade policies and controls on foreign exchange created large distortions to agricultural prices. In general, the total effects of these policies, including the indirect effects of trade policy distortions on real exchange rates, was to lower real prices of tradable agricultural products (Hamid, Nabi and Nasim 1990; Dorosh and Valdès 1990). In spite of the price disincentives, however, agricultural output rose rapidly due to adoption of the green revolution package of inputs (improved seed, fertilizer, irrigation), and the resultant increase in productivity (Ali and Byerlee 2002). Major investments in land and, most important in the Pakistan context, in water supply (particularly through tube wells) also allowed increases in net area sown.

Substantial liberalization took place from the mid-1980s to the early 1990s, however, greatly reducing explicit tariffs and taxes, as well as government direct interventions in markets for most agricultural products (Nabi 1997; Salam 2001; Ahmed 2003). Nonetheless, the government continues to intervene heavily in domestic wheat markets, and there remain significant tariffs on vegetable oils and milk products. This chapter describes these interventions and presents internally consistent estimates of nominal rates of assistance, as well as estimates of broader trade policy effects through real exchange rate distortions.

The next section presents a brief overview of Pakistan's agriculture, highlighting growth rates in area, yield and production for various crops. The following section describes key trade and pricing policies for the major crops over time, and presents measures of policy distortions

¹ Throughout the chapter the data and policy analysis refer to the current territory of Pakistan, which prior to 1971 was West Pakistan. (In 1971, East Pakistan became the independent country of Bangladesh.)

(nominal rates of assistance) over time. Then broader trade and exchange rate policies in Pakistan and estimates of indirect effects of those distortions on relative prices faced by agricultural producers are presented. The final section concludes with a discussion of the political economy context of Pakistan's agricultural policies.

Pakistan's agricultural sector

Although agriculture is the primary sector of employment for nearly half of the Pakistan's national workforce, it contributes barely one-fifth of national GDP and only one-eighth of exports, even when processed foods are included. The decline in the relative importance of agriculture has been less rapid for Pakistan than for other South Asian countries except in terms of exports, whose share was more than half prior to the 1970s (Table 1). Agricultural earnings still account for about 70 percent of rural household incomes, however.

Four crops (wheat, cotton, basmati and coarse rice, and sugar cane) account for two-thirds of total cropped area and agricultural crop GDP and more than one-third of total agricultural GDP. Much of the focus of agricultural policy, research and extension has been on these crops, and adoption of green revolution technology of improved seeds, increased fertilizer use and irrigation (especially private tube wells that provided better water control) contributed to substantial increases in yields and production of wheat and rice in the 1970s and 1980s. Livestock, mainly dairy, but also poultry, sheep and goats, accounts for nearly half of agricultural GDP. The shares of gross value of agricultural production attributable to different products, when expressed at undistorted prices, are shown in Figure 1.

Nearly 80 percent of cropped area is irrigated, and agriculture is by far the largest user of available water resources in the country, consuming on average about 95 percent of available water resources. Increases in water resource availability for irrigation and expansion of irrigated area have played a central role in agricultural growth since the 1960s. Total irrigated area increased by 80 percent between 1960 and 2005, from 10 to 19 million hectares, mainly due to

an expansion in tube well irrigation.² In 2004, 37 percent of irrigated land was irrigated solely with canal water; 41 percent with canal and tube well water, and 18 percent solely with tube well water.

Annual agricultural growth in Pakistan averaged 3.7 percent over the period 1959 to 2001, although there were wide year-to-year variations. Apart from a period of slow growth in the first half of the 1970s, average agricultural growth exceeded 3.2 percent per year in each quinquennium from 1960 to 2000, due in large part to high growth in the crop sector in the 1970s and 1980s from Green Revolution technology (improved seeds, increased fertilizer use, and irrigation). However, the performance of the agriculture sector (particularly the crops sub-sector) has suffered in recent years because of severe droughts in the country, as well as environmental factors (increased soil salinity and deteriorating groundwater quality). Pakistan's agricultural sector grew at a modest rate of only 2.6 percent per year from 1999 to 2005, however (0.5 percent per year on a per capita basis). Real value added of the four major crops (wheat, basmati and other rice, cotton and sugarcane) grew by 2.6 percent per year over the period, with substantial fluctuations in recent years, while that of the livestock sector increased somewhat faster at 3.5 percent.

Most of the increase in production of the major crops since the early 1990s has come from increased yields. For example, from 1990 to 2005, average annual growth rates in wheat and basmati rice area were 0.2 and 2.5 percent, respectively, while yields grew by 2.2 and 3.6 percent, respectively (Table 2). Cotton yields, by contrast, stagnated over this period, increasing by only 0.8 percent per year (although 2004 was a bumper crop), and yields of sugar cane increased by only 0.9 percent per year. Maize has enjoyed a large expansion in both yields (4.7 percent per year) and production (5.8 percent per year) over the same period.

Trade and exchange rate policies

² Throughout this chapter, crop or fiscal years are indicated by the second of the two calendar years (e.g., 2005 refers to 2004/05).

Pakistan operated a fixed nominal exchange rate regime, with only the rate relative to the United States dollar changing from independence through to the early 1980s.³ In the 1960s, the government operated various export bonus schemes that substantially raised the rupee price of foreign exchange for exporters. The official nominal exchange rate remained fixed throughout the 1960s until a major devaluation in 1971-72 when it was halved in US dollar terms. Domestic inflation coupled with a fixed nominal exchange rate steadily eroded export incentives (a real exchange rate appreciation) in the late 1970s and early 1980s, however. To restore incentives for export growth, the Zia government undertook a succession of nominal devaluations of the rupee (totaling 73 percent) from Rs/\$ 9.90 to 17.2 between fiscal years 1981 and 1987 that achieved a real exchange rate depreciation of 65 percent.⁴

Thereafter, there was little change in real exchange rates until 1996, when the nominal exchange rate was allowed to depreciate more rapidly. Between fiscal years 1996 and 2001, the nominal exchange rate depreciated by 74 percent from Rs/\$ 33.6 to 58.4, although because of relatively high domestic inflation the real exchange rate depreciated by only 11 percent.

Large inflows of foreign capital (both public and private) that began in late 2001 related to post-September 11 shifts in donor policies and repatriation of private sector capital to Pakistan. They contributed to an 8 percent appreciation of the real exchange rate from September 2001 to October 2002. These capital inflows also helped Pakistan avoid a pending balance of payments crisis and increase public spending. Careful macro-management, including repayment of international debt, combined with a surge in public and private sector imports resulted in a depreciation of the real exchange rate in 2003 and 2004. More-recent trends, however, suggest that expansionary monetary and fiscal policy may have adversely affected incentives for tradable goods relative to nontradables, as the real exchange rate appreciated by 14 percent between December 2004 and November 2005.

Prior to major reforms in 1991 and 1997, Pakistan generally followed an import substitution trade policy aimed at promoting the industrial sector. Trade taxes were also a major source of government revenue. Under the first Nawaz Sharif government (November 1990 to

³ See Hamid, Nabi and Nasim (1990) for a detailed discussion of Pakistan's trade and exchange rate policies from the 1960s through the mid-1980s.

⁴ According to economic theory, nominal devaluations, in themselves, cannot cause real exchange rate changes. However, these nominal devaluations also directly reduced the implicit tariff on imports due to quotas, a policy shift that does affect relative prices.

July 1993), tariff rates were cut sharply in 1991 and, as a result, net tariff revenues as a share of imports fell from 34 percent in 1990 to 27 percent in 1991. Unweighted average tariff rates fell from 77 percent in 1988 to only 45 percent in 1994. The number of items subject to quantitative restrictions also was reduced, from 1361 in 1988 to only 970 in 1993 – although nearly 10 percent of all commodities were still subject to quantitative restrictions in 1993 (Nabi 1997, pp. 144, 148). This trade reform was accompanied by liberalization of foreign exchange markets in 1992, including permitting foreign currency bank deposits (Hasan 1998, p. 276).

Six years later, in March 1997, under the second Nawaz Sharif government (February 1997 to October 1999), the maximum tariff rate was reduced from 65 percent to 45 percent, the number of tariff slabs was reduced from 13 to 5, and there was a sharp reduction in tariff rates of smuggling-prone items to between 10 and 25 percent (Hasan 1998, p. 319).

These changes in trade policy are reflected in net custom duties, which fell from an average of 34 percent in 1985-89 to 22 percent in 1990-96, and to an average of only 12 and 9 percent in 1997-2000 and 2001-03, respectively. The decline in total taxes on imports has been far less dramatic, however, since as custom duties were lowered sales taxes on imports were raised. Thus, total taxes on imports declined by only 10 percent between 1990 and 2000, from 34 percent to 24 percent.⁵ Average statutory tariff rates were similar for agriculture and industrial products: 21.8 and 20.2 percent, respectively in 2001 (World Bank 2004, p. 44).

Along with a reduction in tariff rates, trade liberalization in the 1990s included a gradual reduction in the number of products subject to quantitative restrictions. By 1997 only 2.7 percent of product lines were subject to traditional quantitative restrictions. The subsequent reforms begun in 1997 led to the elimination of essentially all remaining traditional quantitative restrictions and parastatal import monopolies by 2003, with the important exceptions of a ban on import of products not included in a positive list of 677 items, and local-content programs in the automobile industry (World Bank 2004, p. 22).

The combined effect of import tariffs and quotas on domestic prices can be expressed as an implicit tariff rate, defined as the ratio of domestic prices (measured at the border) to import prices. In the absence of detailed data on domestic and import prices, we calculate estimates of

⁵ Note that to the extent that domestic goods also pay sales taxes, these import sales tax do not represent a trade policy distortion if they are in lieu of a sales tax on the imported products.

the implicit tariff, extending an earlier series by Dorosh and Valdès (1990) using the average percentage change in actual average tariff rates. The calculations suggest that trade liberalization in Pakistan reduced implicit tariffs sharply over time, from an average of 53 percent in 1985-89 to an average of only 15 percent in 2001-03. Likewise, the effects of trade policy distortions on the real exchange rate have diminished over time (Figure 2).⁶

Impacts of agricultural price and trade policies on nominal rates of assistance

We consider in this section the distortionary policies in place for milk and several key crop products — wheat, cotton, rice (basmati and IRRI), sugar and maize. Together these products account for around 70 percent of the value of agricultural production (Figure 1). In line with the project's methodology (Anderson et al. 2008), we estimate nominal rates of assistance (NRA) on output for each of those products. Through careful comparisons of domestic prices with prices at the border or international reference prices, adjusted for quality differences, marketing margins and the dual exchange rate system,⁷ these measures capture the proportional extent to which government-imposed distortions create a gap between domestic prices and what they would be under free markets.

Wheat

⁶ Utilizing a value of the omega parameter of -0.41, the implicit appreciation of the rupee due to trade policy fell from 15 percent in 1985-89 to an average of only 5 percent in 2001-03. The omega parameter is defined as the percentage change in the real exchange rate divided by the percentage change in trade policy (which is measured as one plus the equivalent tariff adjusted for export taxes). The value of the omega parameter derives from an ordinary least squares estimate using monthly price and trade data from 1972 to 1987 (Dorosh and Valdès 1990). Co-integration techniques were not utilized in that report, but a regression using first differences of variables resulted in a value of omega of -0.54. Note that black market premia are small for Pakistan after 1985, averaging 6.4 percent from 1985 to 1993, and 12.0 percent from 1996 to 1999. The real exchange rate appreciation due to trade policy, however, is conceptually different from a black market premium, which largely reflects controls on foreign exchange rather than explicit trade policies. See Anderson et al. (2008) for a discussion of this issue in the context of the present project.

⁷ The NRAs for tradables include an estimate of the trade tax effect of the overvalued exchange rate. As outlined in the methodology, that estimate uses the black market exchange rate premium (see Easterly 2006) and assumes that only half of exporters' foreign exchange rate earnings are sold to the government at the official rate. See Anderson et al. (2008) for details of this methodology.

Wheat is Pakistan's main staple food, accounting for 1042 calories/person/day in 2001, or 42 percent of total caloric consumption (2001 FAO).⁸ Adoption of green revolution technology enabled Pakistan to more than double its wheat production from the early 1970s to the late 1990s, and it has risen by a further one-quarter since then (Table 3).⁹ Nonetheless, in most years since 1960 Pakistan has been a net wheat importer.

Government wheat policy

Government wheat policy in Pakistan attempts to balance competing interests of producers and consumers. On the production side, policy is aimed at increasing wheat productivity (yields) and output, as well as supporting farmer incomes. Increased wheat production has also been seen as part of an overall national food security strategy of reducing dependence on food imports. On the consumption side, the government has attempted to enhance household food security, particularly through ensuring availability of wheat flour at affordable prices and maintaining price stability. Food policy options are constrained, however, by overall fiscal constraints, as well as a desire to minimize fiscal subsidies on food. Moreover, the wheat procurement price has been seen as a major determinant of overall inflation because of its role as a wage good and an indicator of overall government price policy. Thus, wheat policy is to some degree constrained also by inflation targets and inflation policy.

To achieve these objectives, the federal and provincial governments have employed various instruments. Domestic procurement quantities and prices are the major instruments for spurring domestic production and improving farmers' incomes.¹⁰ The national support price and procurement quantity targets are set at the federal level, in consultation with provincial governments, although the implementation of procurement policy is the responsibility of

⁸ HIES 2001 data show a slightly higher absolute figure (1052 calories/person/day), but a much higher caloric share (58 percent of 1819 calories/person/day). Rural consumption per capita is 42 percent higher than urban consumption per capita, at 10.3 versus 7.2 kg per month.

⁹ Most wheat in Pakistan is harvested in March and April towards the end of the July to June fiscal year. In the discussion that follows, fiscal years are used unless otherwise noted, with production from the previous fiscal year used in calculating net availability for the current fiscal year.

¹⁰ Provincial governments, particularly the government of Punjab (the largest province), intervene heavily in wheat markets. Government procurement averaged 4.0 million tons per year in 2002 and 2003, about 25 percent of production in these years. Punjab alone accounted for almost 90 percent of procurement, equivalent to 27 percent of its production.

provincial governments and PASSCO (Pakistan Agricultural Storage and Supplies Corporation).¹¹ Likewise, sales of government wheat, almost exclusively to flour mills on a quota basis, are largely the responsibility of provincial governments.¹²

Provincial governments have generally set procurement targets aimed at securing enough grain for planned distribution and stock build-up. Restrictions on the transport of wheat were widely used until the mid-1990s to help ensure that district officials of the provincial Departments of Food were able to meet their procurement targets. Marketing of wheat was subsequently liberalized, but in 2004 the Punjab government re-imposed restrictions on transport of wheat in an effort to meet procurement targets – and then removed them once again in 2005. Imports of wheat, undertaken by the federal government, have been used to supplement provincial food stocks and enable sufficient wheat sales to keep domestic price levels from rising too high. The government (and private sector contractors) also exported wheat in the 2000-03 May-April marketing years following record levels of production and procurement in 2000.¹³

Effects of government policy on domestic wheat prices

Despite the objective of boosting wheat production and self sufficiency, Pakistan's trade and pricing policies have consistently taxed wheat producers and subsidized consumers relative to world prices. The mechanisms and levels of taxation have changed over time. In the 1960s wheat procurement prices were on average two-thirds higher than border prices measured using the official exchange rate.¹⁴ Taking into account the distortions in the foreign exchange market brought about by the two-tiered exchange rate system, however, brings the average nominal rate of assistance to wheat producers down to just below zero for 1962-69. Thus, in this period

¹¹ PASSCO supplies wheat to food deficit provinces, Northern Areas, Azad Jammu and Kashmir (AJK) and the defense establishment.

¹² Substantial wheat market liberalization took place in the late 1980s with the abolition of wheat ration shops and liberalization of private wheat imports (which were subsequently disallowed).

¹³ There are major fiscal subsidies and economic rents involved in the sale of wheat to flour mills at below-market rates. Wheat issue prices (the price of wheat sales to flour mills) do not cover the full cost of procurement (domestic or imported), storage and handling. Provincial food subsidies in 2002 reached Rs 6.8 bn. This subsidy was 12 percent greater than total Public Sector Development Program budget for the Health Division in 2004 (Rs 6.05 bn). Subsidies on sales of imported wheat accounted for another Rs 1.2 billion in that year. See Dorosh and Salam (2008).

¹⁴ Nominal rates of protection are calculated assuming that Karachi serves as the central market for wheat, i.e. that in the absence of distortions, wheat imports would not reach northern Pakistan (Punjab). See the Appendix for details of the calculations of border prices.

exchange rate policy fully offset the impact of high nominal domestic procurement policies, although less than fully in the latter 1960s, and less than in the early 1960s (Table 4).

During the 1970s, domestic prices were kept on average almost one-fifth below border prices (measured at equilibrium exchange rates) through large scale government imports, as net injections (releases minus domestic procurement) average 12 percent of total net availability (Table 3).¹⁵ Nonetheless, nominal rates of protection fluctuated widely from year to year during this period. Massive distortions in the foreign exchange rate market (and high NRAs for wheat) continued until a sharp devaluation in late 1972 following the secession of East Pakistan (Bangladesh) the previous year. During the 1972-74 period, when world prices of wheat and other grains rose sharply, Pakistan effectively insulated its domestic wheat market from that shock through government imports and subsidized sales. The implicit tax on wheat farmers peaked at 70 percent in 1973, but during the remainder of the 1970s as world prices fell and Pakistan wheat policy maintained real domestic wheat prices at approximately constant levels, the NRAs became much less negative (Appendix Table A1).

Government net injections in wheat markets were substantially smaller in the 1980s, averaging only 2.7 percent of net availability. During that decade wheat NRAs averaged -22 percent. Then policy reforms during the 1990s reduced exchange rate distortions to low level, but government net market interventions rose again to an average of 12.4 percent of net availability. As a result, domestic prices were depressed slightly more below border prices, with the NRA averaging -24 percent.

Pakistan briefly became a net exporter of wheat following a bumper harvest in early 2000. Because world market prices were lower than domestic prices, these exports required government subsidies. Government domestic procurement was greater than sales by a total of 3000 kt and 660 kt in 2000 and 2001, respectively. Without these interventions, domestic prices would have been about one-tenth lower in 2000 and 2001. From 2002 through 2004, net government injections averaged 929 kt per year, about 5.2 percent of net availability (about half

¹⁵ These calculations assume that private sector imports and exports were zero, except in 2005, which includes an estimated 1.0 million tons of private sector imports. The data on wheat availability in Table 3 indicate an excess of net imports over net injections. This gap, equal to 453 thousand tons per year in 1981-1990, 321 thousand tons per year in 1991-2000, and 204 thousand tons in 2001-06, reflects private sector net imports, storage losses and public stock changes (as well as possible discrepancies across data sources).

of the share of net availability in the 1990s). As in most of the 1990s, prices were again below import parity levels (by 23 percent).

In 2005, the government allowed private wheat imports, which totaled about 1 million tons for the year, keeping wholesale prices in Karachi close to import parity levels. Because release prices of wheat were about the same or higher than market prices in late 2005 and early 2006 in parts of Punjab and Sindh, total government sales to flour mills were less than normal, resulting in a build-up of year-end stocks and net market withdrawals of about 1.8 million tons (10 percent of net availability), similar to the average levels of 2000 and 2001 (Dorosh and Salam 2008).

Thus, government wheat policy has helped to stabilize prices as policy interventions have adjusted to changing market conditions, albeit at well below border prices despite this being an import-competing product. Large-scale subsidized import sales in years of high world prices (particularly the early 1970s and much of the 1990s) reduced prices to the benefit of consumers. In years of very good harvests (a less frequent occurrence -- several years of the 1980s, 2000 and 2001) net market withdrawals kept domestic prices from falling steeply, thereby protecting farmers' incomes.

Cotton

Cotton, the largest cash crop of Pakistan, is second only to wheat in terms of area sown. Area under cotton has averaged around 3 million hectares, accounting for 15 per cent of the total cropped area annually, and for about one-quarter of the value added by major crops. Domestic cotton is also a major input into Pakistan's textile industry. The cotton industry also contributes to export earnings indirectly in that various cotton products (cotton lint, yarn, cloth and garments) account for about two-thirds of the value of Pakistan's merchandise exports.¹⁶

As the textile industry has expanded over time in Pakistan, exports of raw cotton have declined and an increasingly large proportion of cotton is processed domestically into yarn. Pakistan's raw cotton (lint) exports dropped from an annual average of 414 thousand tons (kt) in the 1980s to only 161 kt in the 1990s and 72 kt in 2000-05. At the same time, Pakistan has

¹⁶ However, Pakistan also imports some cotton and synthetic yarn, cloth and garments.

imported substantial volumes of lint cotton, so that net exports in lint cotton has gone from an annual average of 408 kt in the 1980s to -205 kt (net imports) during 2001-05 (Table 5). Imports of cotton lint are mainly high-grade longer staple cottons.

To help ensure adequate incomes for cotton farmers, the government began announcing support prices for cotton lint and seed cotton (*phutti*) in 1975. The mechanism by which the government attempted to actually influence market prices changed substantially over this period, however, and support prices for cotton lint were discontinued after 1995.

From 1974 through 1986, the Cotton Export Corporation (CEC), established in the early 1970s, had a monopoly on cotton (lint) exports. By restricting the volume of exports, the CEC suppressed domestic prices of cotton below world price levels. At official exchange rates, the nominal rates of assistance on cotton lint averaged -12 and -9 percent in the 1970s and 1980s, respectively. Cotton producers benefited, however, from trade protection for vegetable oils that boosted domestic prices of cotton seed, which averaged approximately one-quarter of the value of seed cotton (*phuti*) during 2000-04. Including the protection on cotton seed, the total nominal rates of assistance for cotton farmers was less negative. But when the dual exchange rate system is taken into account, the average NRA for cotton becomes -18 percent in the 1960s, -6 percent in the 1970s and -2 percent in the 1980s (Table 4).

Beginning in 1986 and continuing through 1993, export taxes on cotton were calculated as a fixed percentage of the margin between the benchmark price (the target ex gin price of lint plus export incidentals) and the minimum export price (fixed daily by the Inter Agency Committee and announced by the State Bank of Pakistan, and based on the international prices of lint, domestic prices of yarn and lint, domestic requirements of the industry and the global and local supply situation).¹⁷ The tax rate on this margin, as well as the benchmark price, were adjusted frequently, however, as the government attempted to maximize export tax receipts as well as to ensure low prices for the domestic yarn and textile industries.¹⁸ This system of variable export taxes effectively insulated the domestic market from movements in international prices. Nonetheless, under-invoicing of cotton exports continued through shipments of grades higher than the declared grades.

¹⁷ This system was designed to correct a problem of under-invoicing that had lowered export tax receipts.

¹⁸ Private sector exports were allowed again beginning in 1987, but initially the cotton lint had to be purchased from the CEC. In 1988 exporters were allowed to buy cotton from the ginners directly.

Poor domestic harvests of cotton in 1993 and 1994 made Pakistan a net importer of cotton, with imports of about 100 kt each year. The increasing imports and dwindling availability of cotton for exports brought into focus the demerits of the bench mark system which had heavily taxed the cotton farmers but provided cheap raw material to the textile industry and encouraged inefficiency in the textile sector. There was great resentment among the farmers against the system who demanded its abolition. As a result, the export duty on cotton was abolished in 1994 and domestic prices since the 1994 cotton season have been in line with the international prices and even higher in some years.

Since 1994, demand for lint in the textile sector has continued to outpace supply, and Pakistan has been a net importer of cotton lint in most recent years, with gross imports averaging 259 kt per year during 2000-04. Moreover, in spite of the end of the Multi-Fibre Agreement (MFA) at the end of 2004, Pakistan's textile sector has continued to flourish, with imports of lint for 2005 approximating the levels in each of the previous two years (about 400 kt).

Duties on both exports and imports of cotton have been very low since the mid-1990s, and direct market interventions have likewise been minimal, except in 2004 when the Trading Corporation of Pakistan bought 270 kt of cotton (11 percent of production) in an effort to boost domestic prices.¹⁹ Annual price movements, however, suggest that domestic prices of seed cotton are essentially determined by world prices of cotton lint and the domestic price of cotton seed (Orden et al. 2005). In this case, attempts to stabilize prices through procurement are unlikely to have a major effect on prices unless external trade is restricted.

Thus, trade policy distortions in domestic markets for cotton lint are minimal, though seed cotton enjoys some protection because of import tariffs on vegetable oils that boost the price of cotton seed oil. Using domestic prices of cotton seed in the calculations, the estimated average nominal rate of protection for 2000-05 for seed cotton is only 4 percent at export parity.²⁰ The protection provided to cotton seed oil, however, raises the nominal rate of protection for seed cotton by about 3 percentage points to a total of 7 percent at export parity for lint in the same period (Table 4).

¹⁹ The Trading Corporation of Pakistan (TCP) also procured 35 kt (2 percent of production) in 2001 to support prices.

²⁰ The import parity price is calculated on the basis of the Liverpool Cotton Price Index B; the export parity price uses Pakistan's actual average export prices of lint.

Basmati and IRRI rice

Rice is the third largest crop of Pakistan after wheat and cotton, accounting for 19 percent of area planted to food grains, with an average production of around 5 million tons. Two major varieties of rice are produced in Pakistan: long grain, aromatic “basmati” rice and ordinary coarse rice (often and in this chapter termed “IRRI” rice). Both varieties are exported, with basmati rice exports accounting for about 35 percent (780 thousand tons per year) of total rice exports of 2.2 million tons per year in recent years.

Pakistan has exported substantial quantities of basmati rice following the large increase in world oil prices in the early 1970s which led to a surge in Middle East demand for rice imports. The Bhutto government, which also nationalized many domestic industries (including rice milling in 1976), set up the Rice Export Corporation as a state monopoly.²¹ Under the assumption that elasticities of domestic supply and international demand were low, the government set a low procurement price. To keep domestic consumption low (and export volumes high), the government also instituted a monopoly procurement scheme with only limited domestic sales. Nominal rates of assistance estimates for basmati paddy suggest that, during both the 1960s and 1970s, farmers received barely half what they would have under free markets (Table 4).²²

Following the coup by General Zia in July 1977, rice mills were returned to the private sector and basmati rice marketing was gradually liberalized. From 1977 to 1987, provincial food departments still retained considerable influence in domestic markets through the annual “Monopoly Procurement Scheme” for basmati rice. That scheme set licensing rules, restrictions on movement of rice across district boundaries and quotas to dealers for sales in domestic markets. Traders were allowed to sell 20 percent of the amount delivered to procurement center in domestic markets; the remainder was exported. As a result of these restrictions on domestic supply, consumer prices were substantially above procurement prices. Compulsory procurement

²¹ This history of the rice sector through 1987 is based on Hamid, Nabi and Nasim (1990).

²² Calculations of border prices by the Agricultural Prices Commission use a very large transport and processing cost for basmati rice from Punjab to Karachi (the export port) of Rs 4650/ton, about twice the total of import incidentals and transport of wheat from Karachi to the procurement center in Punjab, (Rs 2542/ton), or the costs for export of IRRI rice (2300 Rs/ton). Because of these high marketing margins, APCOM’s calculated border prices of basmati rice at farm-gate are market prices.

was abandoned in the 1986 harvest season, limited private sector exports were allowed, and procurement prices were raised. The system of voluntary procurement at the announced support price of paddy continued through to 2001.

Over 60 percent of the IRRI rice produced in Pakistan is produced in Sindh, where it is also a staple food. Government policies for IRRI rice also included announced support prices and domestic procurement, although in the 1970s and 1980s, the Rice Export Corporation did not procure IRRI rice in Punjab because the higher transport costs (relative to Sindh, the center of procurement) made exports of Punjab rice unprofitable. Nominal rates of assistance for IRRI rice, calculated on the basis of world rice prices,²³ show producer taxation in the 1980s of just over one-fifth but its gradual disappearance since then. Beginning in 2003, the government has been announcing indicative prices for paddy, but procurement has been minimal. Currently, no export tax is levied on rice, and imports are subject to a 10 percent customs duty. This is reflected in the NRA for IRRI rice of 12.5 percent for 2000-05 (Table 4).

Sugarcane

Sugarcane, cultivated exclusively on irrigated land in Pakistan, accounts for 4-5 percent of the 22 million cropped hectares per year in the country. About half of the area under sugarcane comes from farms operating less than 5 hectares. The geographical distribution of its production follows a similar pattern as for other irrigated crops, with two-thirds of the crop cultivated in Punjab and about one-fourth in Sindh. The area planted to sugarcane cultivation increased by 61 percent between 1979 and 1999 and, along with it, the number of sugar mills, from 32 in 1980 to 79 in 2005, all of which are now in the private sector. Crop production is highly variable due to both fluctuations in water availability that influence area and yield, and to changing price incentives. Sugarcane production in Punjab has ranged from 19 to 34 million tons, and in Sindh from 9 to 17 million tons during the period 1979-2005. To stabilize prices in the wake of these fluctuations in production, the government frequently adjusts import tariffs (set at 15 percent in 2005) and related taxes on sugar, and has even placed export bans.

²³ Using fob Bangkok, White Milled 5 percent broken rice (IFS 57876n7M81) and a 0.71 quality adjustment factor (equal to the average ratio of the average price of Pakistan Non-basmati rice exports to the fob Bangkok price for the 1974-79 period).

In addition to restrictions and taxes on trade, domestic marketing and processing of sugar cane were highly regulated until the mid-1980s. Zoning of sugar mills, which required farmers to sell 80 percent of their sugarcane to the mill located in their zones, was abolished in 1987, freeing farmers to sell their sugarcane to whichever mill they preferred. Until 2000, the federal government annually announced the support price of sugarcane, but since then support prices have been decided by provincial governments. However, there is no institutional arrangement for public sector procurement of sugarcane when sugar mills do not pay farmers the full support price.²⁴

Given the wide variation in domestic production as well as world prices, Pakistan's domestic sugar prices and measured NRAs have fluctuated greatly. In general, though, sugarcane and refined sugar production have been highly protected in Pakistan. Nominal rates of assistance averaged over 100 percent in the 1960s and early 1970, and again in the latter 1980s when international prices fell again. Even since then they have continued to be above 50 percent (Table 4).

Maize

Maize is counted as a major crop in Pakistan, although it is sown on an area of only about just under one million hectares (one-eighth that of wheat). Production averaged 2.1 million tons per year in 2002-04, or 8 percent of total grain production. Maize is cultivated on both irrigated and non-irrigated land, mainly in NWFP (57 percent of maize area) and Punjab (41 percent of maize area). The area cultivated expanded by an average of 1.0 percent per year from 1989 to 2005 when adoption of hybrid maize planted in the spring on irrigated land contributed to a 4.7 percent per year growth in yields. Most maize in Pakistan is used as livestock and poultry feed, which has expanded rapidly along with domestic demand for poultry products.

Apart from import duties that ranged from 10 to 25 percent since the mid-1990s, the government has not intervened in maize production and marketing. Often maize has been a nontradable good since the 1980s, with domestic prices below import parity levels (even without the import tariffs) but above export parity levels. Thus, the protection from import competition

²⁴ In some years, sugarcane commissioners of provincial governments put pressure on mills to try to force them to pay farmers the support price.

provided by tariffs has had little effect on domestic prices, and the maize NRA has been close to zero (Table 4).

Milk

In order to protect the domestic dairy industry, Pakistan has consistently levied import tariffs on imported milk powder. Nominal rates of assistance arising from these tariffs averaged above 70 percent in the 1960s and 1970s.²⁵ Tariff rates for milk powder were lowered in the early 1990s and have ranged from 20 to 45 percent since the mid-1990s, resulting in a nominal rate of assistance averaging 40 percent in the 1990s and 20 percent from 2000 through 2005. The contrast between this high level of assistance to dairying, along with that for sugar, and the much lower and usually negative NRAs for the other covered products, can be seen in Figure 3.

Edible oils and oilseeds

Pakistan meets over two-thirds of its edible oil requirements from imports, which have risen sharply in recent years, from 1.1 million tons in 2000 to 1.6 million tons in 2004. In value terms, imports of edible oils in this period have more than doubled, from \$326 million to \$758 million. Traditional sources of domestic edible oil production have been cotton seed, a by-product of cotton farming, and rapeseed and mustard.²⁶ The area under rapeseed and mustard, sown in winter, has averaged at 273 thousand hectares in recent years. Sunflower and soybean were introduced in Pakistan in the 1980s and promoted through various development schemes and policy measures, including fixation of attractive support prices to encourage production and procurement by the public sector agencies to facilitate marketing of the produce. The area planted to sunflower has increased rapidly in recent years, especially in southern Punjab and lower Sindh, from a total of 108 thousand hectares in 2002 to 264 thousand hectares in 2004.²⁷

²⁵ These rates were estimated using the unit import value of dry skim milk, adjusted by a conversion ration of 1:8 and a quality factor of 90 percent, following Dorosh and Valdès (1990).

²⁶ Other minor oilseed crops grown in Pakistan include groundnut, safflower sesamum, canola (an improved cultivar of rapeseed and mustard) and linseed.

²⁷ Soybean remains a very minor crop: its area has been steady at around only 220 hectares.

There was little direct taxation of imported vegetable oils in the 1970s and 1980s, and exchange rate distortions led to an implicit subsidy on imports (and taxation of domestic producers) of just 3 percent in the 1970s and nothing in the 1980s. Since the early 1990s, however, vegetable oils have been consistently taxed in Pakistan. For example, from 2000 through 2005, import tariffs on soybean oil were Rs 9050/ton, which was equivalent to an average of 32 percent of the import value (using the average price of Pakistan imports for each year). Import tariffs on palm oil were equivalent to about 40 percent of the import value. Likewise, except for three years in which world prices were relatively high (1994, 1995 and 1997), domestic prices of sunflower have been substantially higher than estimated border prices. NRAs are not calculated for these products though because edible oils as a group constitutes a tiny fraction of the value of Pakistan's agricultural production.

Distortions to input prices

The major distortion to non-factor input prices in agriculture in Pakistan has been the subsidy on nitrogenous fertilizer.²⁸ Domestic producer prices of mainly urea have been kept consistently below import parity border prices. This has been achieved by using domestic natural gas inputs in domestic fertilizer production and passing some of the savings to farmers through a discounted price. Since the early 1990s, there has been little or no subsidy on di-ammonium phosphate (DAP) and other major fertilizers, which are mainly imported, but not produced domestically.

Domestic prices of both urea and DAP averaged between 30 to 45 percent below import parity in the later 1970s and the 1980s. From 1990 to 2005, however, domestic prices of DAP were on average only 4 percent below import parity prices, while prices of urea were 38 percent below border prices.

Costs of urea and DAP were 8 and 10 percent, respectively, of the value of wheat production according to APCOM estimates for 2002. This implicit subsidy on fertilizer was equivalent to about 3 percent ($0.08 * 0.38$) of the value of wheat production from 1990 to 2005.

²⁸ Surface irrigation water is also implicitly subsidized as water charges (abiana) are insufficient to cover the cost of maintenance of dam, canals and other water channels. Measurement of the economic value of these subsidies involves assessment of overall investment and maintenance costs, as well as problems attributing these costs to various crops, and so is not attempted in this study.

Thus, the NRA for wheat should be inflated by about 3 percentage points in this period. For the late 1970s and the 1980s when DAP was subsidized as well, the NRAs for wheat should be about 7 percentage points ($0.18 * 0.40$) higher. NRAs for paddy, cotton and sugarcane are also understated by similar amounts in the two periods. These calculations are rather imprecise, and do not include water subsidies, but are nonetheless added to the NRA time series for the various crops for completeness and because they are non-trivial.

Assistance to producers of agricultural relative to non-agricultural tradables

A weighted average of the above NRA estimates has been obtained using the values of production at undistorted prices as weights. This is provided in Table 4, along with separate averages for import-competing and exportable subsectors. Those averages show that, prior to the devaluation in 1972, the nominal assistance provided to import-competing farmers more than outweighed the implicit taxation of exporters. In the following 20 plus years, however, import subsidies for wheat and less import protection for sugar meant the NRA for the import-competing sub-sector fell to near zero so, with exportables still being implicitly taxed by between 20 and 30 percent, the NRA for all covered products averaged slightly below zero. And over the past dozen years it has averaged very close to zero (Figure 4 and Table 4).

Another consequence of the above set of NRA changes has been a considerable decline in the dispersion of product NRAs around their mean value each year. One measure of that, shown near the bottom of Table 4, is the standard deviation of those NRAs: it has fallen from more than 100 percent in the latter 1960s to less than 60 percent in the 1970s and 1980s and to closer to 30 percent in the past 15 years. This convergence in NRAs, which can be seen in Figure 3, suggests there would now be a more efficient allocation of land and other farm resources among those covered industries than in earlier decades.

The covered products account for as much as 70 percent of the value of Pakistan's agricultural output at undistorted prices. Most of the country's other farm products are nontradable or are not subject to interventions that significantly affect price incentives, so their average NRA is assumed to be zero. That brings down the weighted average NRA for the sector

as a whole relative to that for just the covered products, to rates a little closer to zero. This is shown in row 5 of Table 6, assuming the average rate of non-product-specific assistance to farmers is zero.

One final indicator worth mentioning in that table is the trade bias index. This captures the extent to which the NRA averages differ as between agriculture's import-competing and exporting sub-sectors. That indicator (row 6 of Table 6) makes clear that the very considerable degree of anti-trade bias in the industry pattern of assistance in the past – notwithstanding the implicit import subsidies for wheat – has been greatly diminished over the past 15 years. Given that trade openness tends to enhance productivity growth, this trend too adds to the prospect for the sector to contribute more to the country's prosperity.

What is also important to agriculture's competitiveness within the economy and ability to contribute to it is the extent to which non-agricultural tradable sectors are assisted by government policies. As mentioned earlier, the combined effect of import tariffs and quotas on domestic prices of non-farm goods can be expressed as an implicit tariff rate, defined as the ratio of domestic prices (measured at the border) to import prices. In the absence of detailed data on domestic and import prices, we calculate estimates of that implicit tariff, extending backward and forward an earlier series by Dorosh and Valdès (1990) using the average percentage change in actual average tariff-equivalent rates.²⁹ The calculations can provide a NRA for import-competing parts of the non-farm sector. When combined with an assumed NRA of zero for the exportable part of that sector, a production-weighted average NRA for non-agricultural tradables is generated. Crude though this is, it provides a reasonable measure that can be compared with the NRA for tradable agriculture using the relative rate of assistance (RRA) concept. As defined in the footnote to Table 6, the RRA shows the extent to which prices received by farmers are depressed relative to prices faced by producers of other tradables in the country.

The middle rows of Table 6 summarize the RRA findings, with annual estimates reported in Appendix Table A2. The NRAs for non-farm sectors is clearly very large in the pre-1972 period of a highly overvalued currency, with the dual exchange rate system generating very high

²⁹ Dorosh and Valdès (1990) estimate an equivalent tariff of 47 percent in 1986 based on changes in relative price indices and a base estimate of the equivalent tariff in 1980 of 55.0 percent, from Naqvi and Kemal (1983). The calculations use the change in tariff rates as an index of the overall implicit tariff change (instead of price indices), to extend the $(1+t_m)/(1-t_x)$ series reported in Dorosh and Valdès (1990, Table 9), since t_x was zero for that year (see Dorosh and Valdès 1990, Table 28).

level of protection for the import-competing manufacturing sector. That NRA came down sharply following the devaluation in 1972, remained reasonably steady for more than a decade, and then from the late 1980s fell steadily and in recent years has averaged less than 10 percent. Thus even though agriculture enjoyed a high positive NRA pre-1972, it was far smaller than the average NRA for non-farm activities and so resources were being attracted away from farming: the price of farm goods relative to those for non-farm goods averaged almost 60 percent below what it would have been under free markets. Following the 1972 devaluation the degree of anti-agricultural bias diminished somewhat, but the RRA still averaged about -35 percent through to the early 1990s. Only after that did it begin to fall, significantly, and since the late 1990s it has averaged less than -10 percent (Figure 5). So an anti-agricultural bias remains, but it is very small relative to what prevailed in the previous two decades and especially in the two decades before that prior to the secession of East Pakistan (Bangladesh).

Finally in Table 6, we report how the estimated NRA, RRA and trade bias index for agriculture would differ if we had not taken into account the fact that a dual exchange rate added to the anti-trade bias. A comparison of them with the numbers above suggests that we would have overstated the degree of both direct and indirect taxation of agriculture, especially in the latter 1960s and early 1972s before the devaluation.

Political economy and conclusions

Pakistan has a long history of intervening in agricultural product markets to influence prices, production and total supply. For major food commodities, particularly wheat, consumer interests have tended to outweigh producer interests in policy determination, and domestic prices have generally been kept below free trade levels. For cotton, industrialists in the spinning, weaving and clothing industries benefited from policies to keep domestic prices of the raw material low. Producers of rice, a major export, were also taxed until the mid-1990s, either through restrictions on sales or explicit export taxes and controls. Among major commodities, only for milk (and vegetable oils) have producers consistently gained from government trade and pricing policies

(mainly import tariffs). Offsetting the negative effects on output prices to some extent, however, have been implicit subsidies on canal water (irrigation fees less than the maintenance costs of canals), on electricity and fuel for pumps, on fertilizer, and on credit for purchase of tractors.

Competing interests and relative strengths of various groups of stakeholders help explain these diverse policies. In the case of wheat, for example, farmers, particularly those with net sales, benefit from increases in procurement prices and quantities.³⁰ Flour millers gain from low issue (sales) prices of wheat that are typically below open market prices. Low market prices for wheat and wheat flour benefit net buyers of this staple, who account for about 80 percent of Pakistan's population. Provincial food departments make great efforts to achieve domestic procurement targets which provide most of the grain for subsequent distribution. Large-scale procurement creates, and subsidized sales also create, the possibility of substantial economic rents. Sales of grain (at the issue price) from the surplus provinces (typically Punjab) to other provincial food departments involve an implicit cross-subsidization to the receiving provinces since issue prices do not cover the full costs of procurement, storage and distribution. The provincial and federal governments are also concerned with minimizing fiscal subsidies and overall inflation. Finally, donors have generally pushed for reductions in food subsidies and an increased role of the private sector in wheat marketing.

For cotton and sugarcane, agricultural processors have an even stronger influence on policies. Industrialists in the spinning, weaving and clothing industries have a dominant voice in cotton policy debates because of the importance of these sectors in terms of value added, employment and foreign exchange earnings. Sugar millers are in a stronger position than are processors of most other crops because the perishability of the input (the yield of sugar (rendement) produced from harvested sugar cane drops sharply within days of harvest), and the high transport cost limit competition across sugar mills. Consequently, relations between the farmers and sugar mills have been tenuous at best, which has adversely impacted the development of sugarcane and related sub-sectors. In spite of the opposing interests of processors

³⁰ Pakistan Integrated Household Survey (PIHS) 2001-02 data also indicate that wheat sales are highly concentrated. The top 10 percent of wheat farmers in terms of sales account for 47 percent of total wheat sales; the top 20 percent of wheat farmers in terms of sales (only 5 percent of Pakistan's households) account for 67 percent of total wheat sales. Overall, only 20 percent of Pakistan's households have a surplus of wheat production over home consumption, and 23 percent of wheat farmers are net wheat purchasers. (Net purchases are calculated on the basis of household production and an assumed per capita consumption of 140 kgs/person/year.)

and consumers noted above, however, Pakistan's farmers have more political power to defend their interests than farmers in many developing countries with more equal distributions of land. This is because the presence of many large farmers gives the agricultural sector a stronger voice in the political debate.

Nonetheless, in spite of the competing interests and producers and consumers, macro-economic considerations, the demonstration effect of broad trade liberalization in other countries, and pressure from donors have resulted in a general reduction in the level of government interventions and the extent of policy-induced agricultural price distortions since the 1970s. During the 1970s, the Bhutto government nationalized major industries and set up agricultural marketing institutions that played a major role in agricultural markets for wheat, cotton, rice and sugarcane. Broad trade and macro-policy reforms in the mid-1980s reduced overall import protection in Pakistan, both directly and via exchange rate distortions. Price distortions were substantially reduced, but the agricultural marketing institutions of the 1970s were left in place. Reforms in the 1990s were deeper in the sense that government direct interventions in markets (buying and selling of commodities) was dramatically reduced for cotton and rice, the Rice Export Corporation of Pakistan and the Cotton Export Corporation were abolished, and private sector involvement in external trade was generally encouraged. Trade distortions were reduced overall, as well as for agricultural products. Since 2000, price distortions in Pakistan's agricultural markets have remained relatively small. However, the government continues to intervene heavily in wheat markets in ways that incur significant costs but that in general have had little effect on market prices, although the purchasing following the bumper wheat harvest of 2000 is an exception. The government also re-entered the cotton market following the bumper cotton crop in 2004.

Pakistan's agricultural and trade policies are far more liberalized now than thirty years ago, and price distortions across sectors are generally small. Even so, pressure from various stakeholders continues to influence government policy decisions to intervene directly in markets for the main farm products, particularly in years of bumper harvests that threaten to dramatically reduce producer prices or situations of supply shortfalls of key consumer goods (e.g. wheat and sugar). Maintaining consistent and transparent policies is thus crucial for further improvements in market efficiency. Overall, price distortions are no longer a major constraint to agricultural

growth and real incomes of farmers in Pakistan, but the sector could contribute more to economic prosperity if the dispersion in NRAS among farm products were to be reduced further.

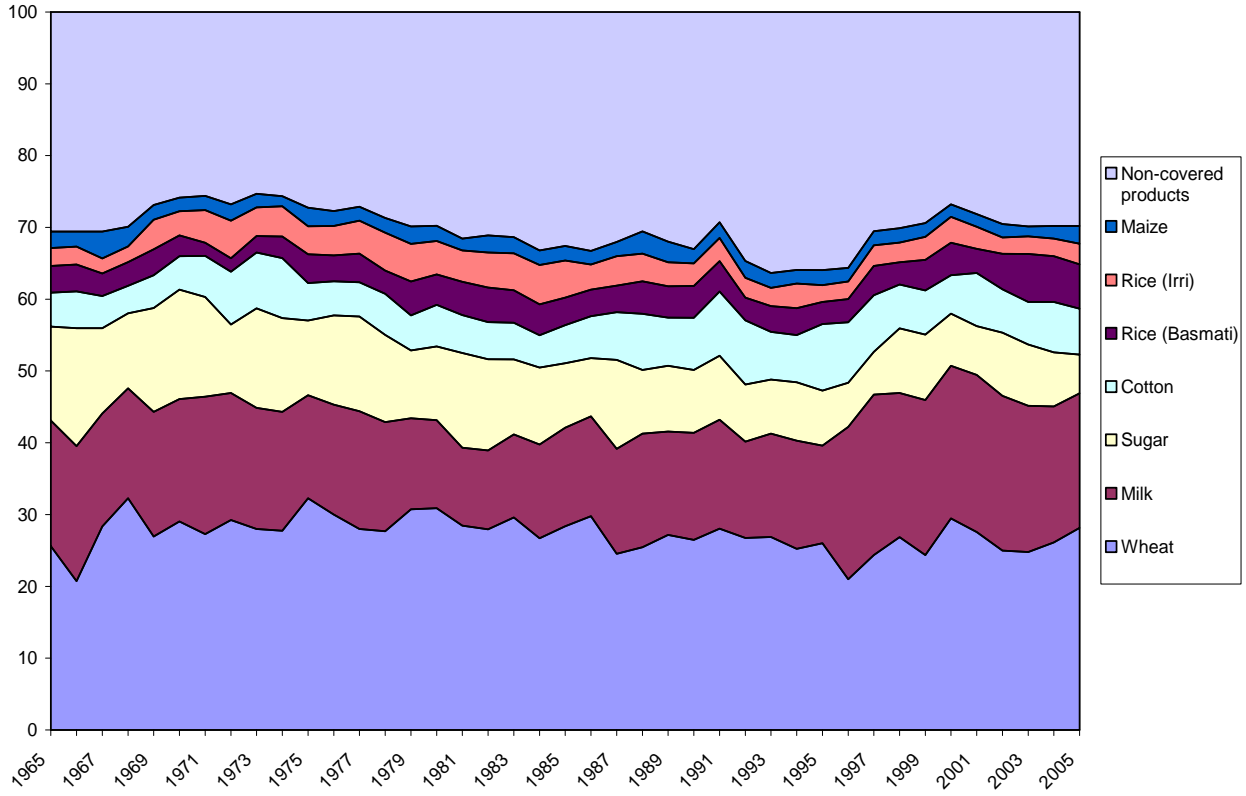
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Figure 1: Shares of covered products in value of agricultural production at undistorted prices, Pakistan, 1965 to 2005

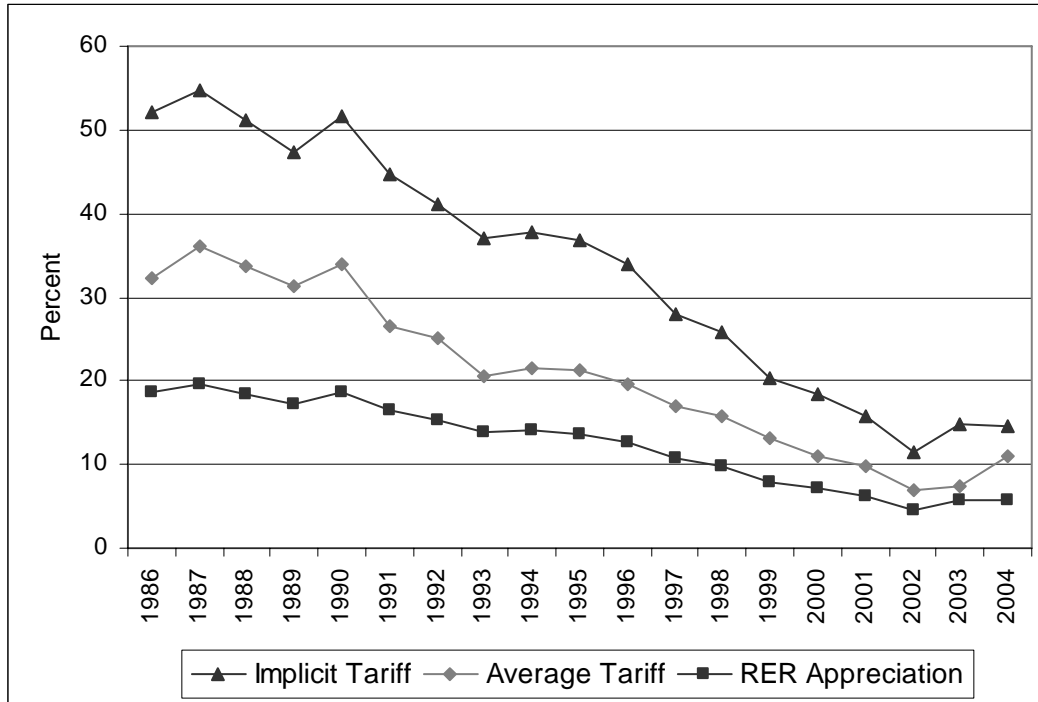
(percent)



Source: Authors' spreadsheet

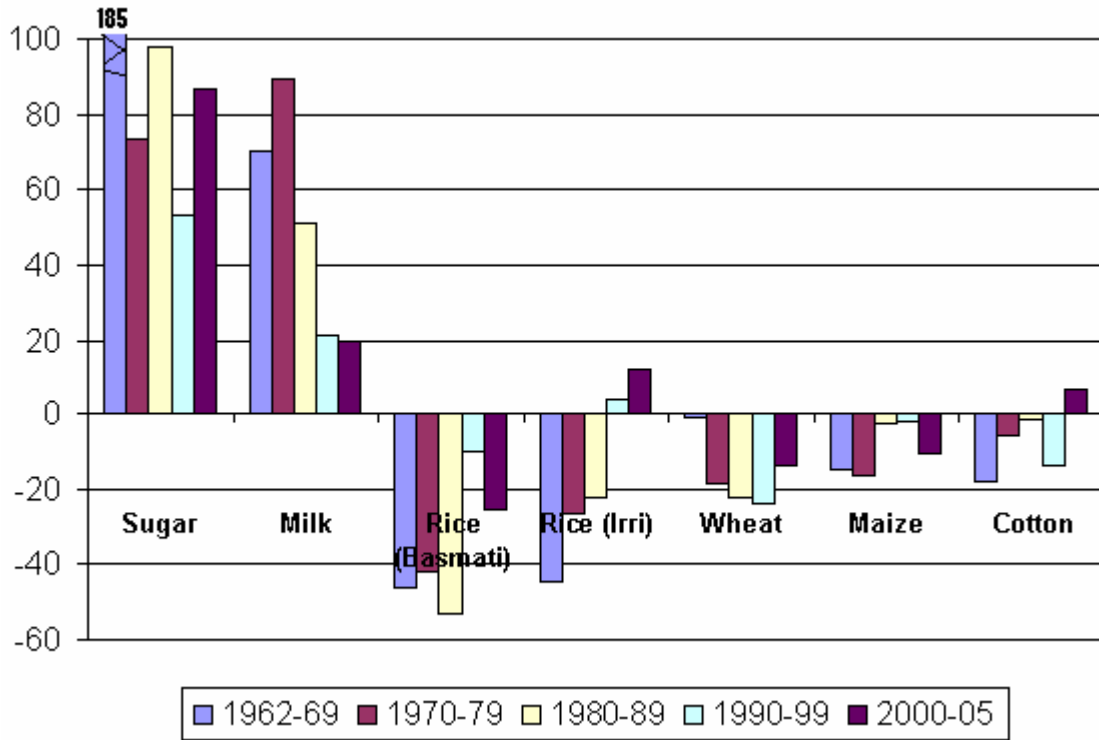
Figure 2: Import tariffs and real exchange rate changes, Pakistan, 1985 to 2003

(percent)



Source: Authors' calculations.

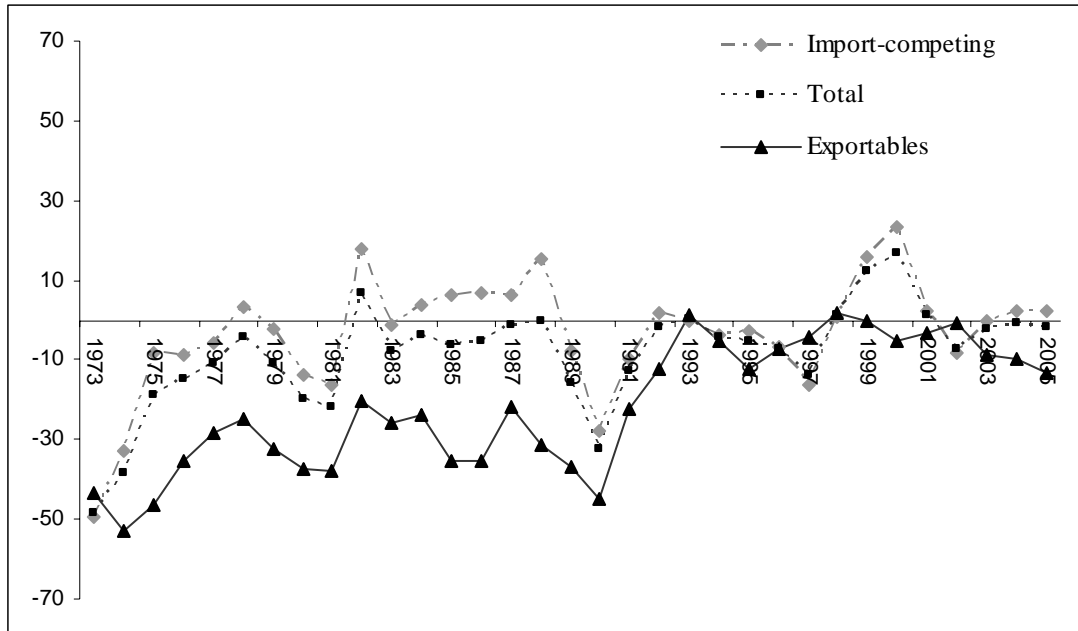
Figure 3: Nominal rates of assistance for major covered products, Pakistan, 1962 to 2004
(percent)



Source: Authors' spreadsheet.

Figure 4: Nominal rates of assistance to exportable, import-competing and all agricultural products, Pakistan, 1973 to 2004

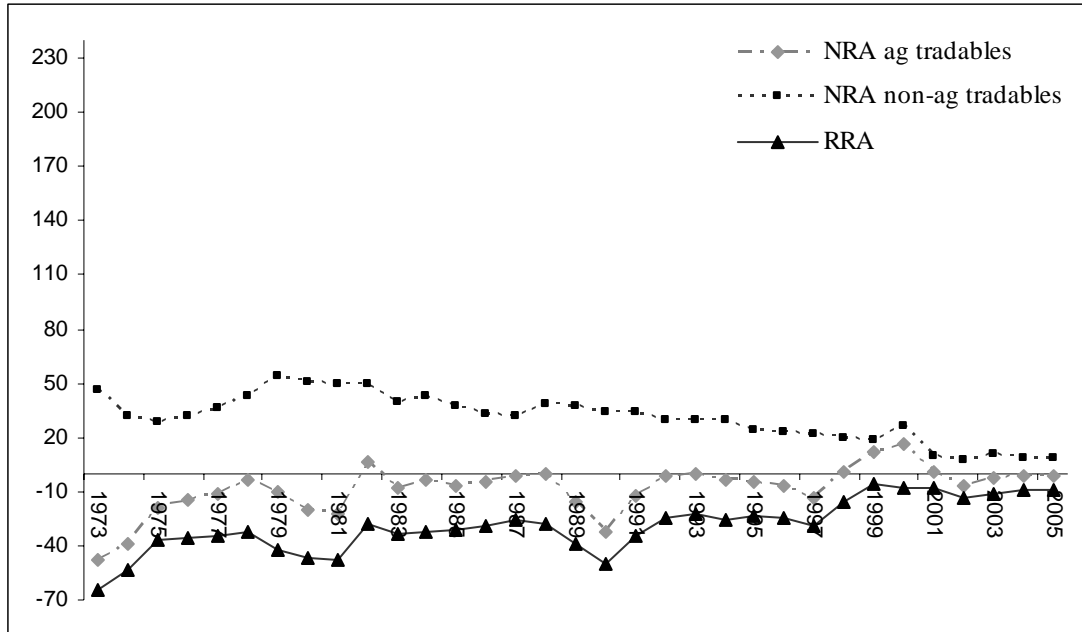
(percent)



Source: Authors' spreadsheet

Figure 5: Nominal rates of assistance to all non-agricultural tradables, all agricultural tradable industries, and relative rates of assistance,^a Pakistan, 1973 to 2004

(percent)



^a The RRA is defined as $100 * [(100 + NRA_{ag}^t) / (100 + NRA_{non-ag}^t) - 1]$, where NRA_{ag}^t and NRA_{non-ag}^t are the percentage NRAs for the tradable parts of the agricultural and non-agricultural sectors, respectively.

Source: Authors' spreadsheet

Table 1: Agriculture's shares of national employment, GDP and merchandise exports, Pakistan, 1965 to 2004

	(percent)			
	1965-69	1975-79	1985-89	2000-04
Share of employment				
Pakistan	55	53	49	45
All South Asia	74	70	65	57
Share of GDP				
Pakistan	35	29	24	22
All South Asia	43	36	29	21
Share of exports				
Pakistan	53	38	30	12
All South Asia	46	40	26	13

Source: Sandri, Valenzuela and Anderson (2007), compiled from World Bank's *World Development Indicators*.

Table 2: Area, Yield and Production of Major Crops, Pakistan, average for 2004-06

(average)

	Area (m. ha)	Area (% growth) ^a	Yield (tons/ha)	Yield (% growth)	Production (m. tons)	Production (% growth)
Wheat	8,292	0.19	2.52	2.19	20,937	2.39
Rice ^d	2,534	1.33	2.03	1.92	5,140	3.28
Basmati	1,539	2.51	1.65	3.60	2,538	6.20
Other Rice	951	-0.52	2.52	1.45	2,398	0.93
Maize	984	1.01	2.80	4.74	2,751	5.80
Other foodgrains ^b	850	-1.37	0.60	0.55	514	-0.68
Gram	1,047	-0.38	0.64	2.08	669	1.70
Sugarcane	982	0.71	49.19	0.92	48,325	1.64
Oilseeds	315	-0.84	0.74	0.80	234	0.22
Cotton	3,093	0.77	0.67	0.79	2,086	1.56
Tobacco	51	-0.09	2.01	1.05	102	0.96
Other crops ^c	4,506	-0.66	n.ap.	n.ap.	n.ap.	n.ap.
Total	22,653	0.15	n.ap.	n.ap.	n.ap.	n.ap.

^a Growth rates are average annual growth rates, 1990-91 to 2005-06.

^b Other foodgrains consist of bajra, jowar and barley. Oilseeds include rapeseed, mustard and sesamum.

^c Other crops include fruits, vegetables and all other crops.
2005/06 data are preliminary.

^d Basmati and other rice figures are for data in 2004-05.

Source: Calculated from *Pakistan Economic Survey*, 2005-06 (Tables 2.1 and 2.4).

Table 3: Wheat production and trade, Pakistan, 1972 to 2005^a

Consumption Year	Production (‘000 tons)	Imports ^b (‘000 tons)	Exports (‘000 tons)	Domestic procurement (‘000 tons)	Releases (‘000 tons)	Net injections ^c (‘000 tons)	Net availability (‘000 tons)	Net inject./ avail. (percent)	Closing stocks (‘000 tons)
1972-79	8,223	1,188	0	1,452	2,456	1,004	8,405	12	225
1980-89	12,167	944	0	3,534	3,925	391	11,341	3	1,290
1990-99	16,305	2,418	0	3,655	5,752	2,097	16,771	12	787
2000-05	19,771	326	578	4,580	4,124	-456	17,504	-3	1,337
2001-02	20,051	174	606	6,308	4,457	-1,851	16,195	-12	2,193
2003-04	18,970	537	752	3,645	4,574	929	18,002	52	509
2005	21,612	0	0	3,930	2,107	-1,823	18,627	-10	2,110

^a Years shown are fiscal years with production data from previous fiscal year.

^b Imports shown are government imports.

^c Net injections Includes estimated 1.0 million tons of private imports in 2005.

Source: *Pakistan Economic Survey* (various years) and authors’ calculations.

Table 4: Nominal rates of assistance to covered products, Pakistan, 1962 to 2005
(percent)

	1962-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-05
Exportables^a	-33.3	-35.3	-20.1	-33.5	-29.1	-32.1	-16.7	-4.4	-6.9
Rice (Basmati)	-51.0	-41.1	-37.3	-46.6	-49.5	-56.2	-17.9	-1.7	-25.3
Rice (IRRI)	-42.8	-46.0	-18.8	-33.8	-24.6	-20.2	-0.5	8.1	12.5
Cotton	-18.8	-17.5	-6.3	-5.1	3.1	-6.1	-19.9	-7.9	7.0
Import-competing products^a	9.2	45.0	19.2	-4.3	-1.9	5.4	-7.9	-1.9	3.4
Wheat ^b	-13.2	11.4	-16.2	-21.2	-22.3	-21.7	-27.1	-20.2	-13.9
Maize ^c	-19.9	-9.8	-19.4	-13.0	-5.9	1.2	-2.2	-1.9	-10.6
Sugar ^c	137.0	234.2	113.4	33.6	72.4	123.7	52.1	54.3	86.5
Milk ^c	n.a.	70.4	123.8	54.6	47.5	54.5	25.4	16.9	19.7
Total of covered products^a	-1.0	21.7	9.3	-11.8	-9.3	-5.9	-10.2	-2.6	1.0
Dispersion of covered products ^d	62.1	105.6	74.5	43.2	49.6	65.2	32.2	27.7	39.5
% coverage (at undistorted prices)	69	70	74	72	69	68	66	68	71

^a Weighted averages, with weights based on the unassisted value of production.

^b Wheat import parity price calculations assume that Karachi is the central market for imported wheat.

^c Rice, sugar, milk and maize nominal rates of protection calculated at the wholesale market level. All other rates are calculated at farm gate.

^d Dispersion is a simple 5-year average of the annual standard deviation around the weighted mean of NRAs of covered products.

Source: Authors' spreadsheet

Table 5: Cotton production and trade, Pakistan, 1960 to 2005^a

('000 tons and percent)

	Production	Exports net of imports	Domestic use	Net exports as % of prod'n
1960-69	427	114	307	27
1970-79	584	132	447	21
1980-89	1068	408	616	36
1990-99	1627	96	1487	5
2000-05	1925	-205	2108	-11

^a Data shown are for the next cotton marketing year, e.g. cotton harvest of October-December 2004 is shown as 2005.

Source: USDA data from www.fas.usda.gov/psd/complete_files/default.asp.

Table 6: Nominal rates of assistance to agricultural relative to non-agricultural industries, Pakistan, 1962 to 2005

	(percent)								
	1962-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-05
Covered agric products ^a	-1.0	21.7	9.3	-11.8	-9.3	-5.9	-10.2	-2.6	1.0
Non-covered agric products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All agricultural products ^a	-0.7	15.3	6.8	-8.5	-6.4	-4.0	-6.9	-1.6	0.8
Non-product specific (NPS) assistance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total agricultural NRA (incl. NPS)^b	-0.7	15.3	6.8	-8.5	-6.4	-4.0	-6.9	-1.6	0.8
Trade bias index ^c	-0.38	-0.55	-0.27	-0.31	-0.28	-0.35	-0.10	-0.02	-0.09
<i>Assistance to just tradables:</i>									
All agricultural tradables	-1.0	21.7	9.3	-11.8	-9.3	-5.9	-10.2	-2.6	1.0
All non-agricultural tradables	174.9	224.5	146.7	44.0	48.3	45.1	39.3	27.0	14.5
Relative rate of assistance, RRA^d	-63.8	-62.4	-55.9	-38.6	-38.6	-35.1	-35.2	-23.0	-11.9
MEMO, ignoring exchange rate distortions:^d									
NRA, all agric. products	-3.6	1.4	-15.7	-15.7	-15.4	-6.6	-9.0	-3.7	-1.6
Agricultural trade bias index	-0.51	-0.55	-0.26	-0.31	-0.28	-0.35	-0.10	-0.02	-0.08
RRA	-69.6	-68.5	-67.2	-45.7	-47.4	-37.8	-37.5	-25.3	-14.7

^a NRAs including product-specific input subsidies.

^b NRAs including product-specific input subsidies and non-product-specific (NPS) assistance. Total of assistance to primary factors and intermediate inputs divided by the total value of primary agricultural production at undistorted prices (%).

^c Trade bias index is $TBI = (1 + NRA_{ag_x}/100)/(1 + NRA_{ag_m}/100) - 1$, where NRA_{ag_m} and NRA_{ag_x} are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

^d The RRA is defined as $100 * [(100 + NRA_{ag}^t)/(100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Source: Authors' spreadsheet

Appendix: Key quantity and price data, assumptions and sources

Production volume data are from FAOSTAT for 1960 to 2003 and from Pakistan Economic Survey for 2003 to 2005. For “Rice IRRI”, “Rice Basmati” and “Seed Cotton” production volume data are from Hamid (1990) for 1968 to 1980 and from *Agricultural Statistics of Pakistan* for the remaining years.

Export and import volume data are from FAOSTAT for 1960 to 2003 and from *Pakistan Economic Survey* for 2003 to 2005. For “Rice IRRI”, “Rice Basmati” and “Seed Cotton” export and import data are from Hamid (1990) for 1968 to 1980 and from *Agricultural Statistics of Pakistan* for the remaining years.

Consumption data are from FAOSTAT for 1960 to 2003 and from *Pakistan Economic Survey* (2005/06) for 2003 to 2005. For “Rice IRRI”, “Rice Basmati” and “Seed Cotton” export and import data are from Hamid (1990) for 1968 to 1980. For “Rice Basmati” and Rice IRRI” with unavailable consumption data, consumption was calculated as:

$$\text{Consumption} = \text{Production} - \text{Exports} - 6\% \text{ of Production for Seeds and Wastage}$$

Wholesale product prices are from FAOSTAT, *Pakistan Economic Survey*, Malik (1994), Hamid (1990), APCom database and *Agricultural Statistics of Pakistan*.

Farm-gate product prices are from *Pakistan Economic Survey* or calculated from wholesale product prices adjusted for marketing costs. Marketing costs are calculated using base-year marketing costs (Rs/kg) adjusted for inflation using the consumer price index. See Dorosh and Valdes (1990).

Input prices for fertilizers are from the *Pakistan Economic Survey*.

Border prices

Fob prices are extracted from the IMF *International Financial Statistics*. Cif prices are calculated from Fob prices by adjusting for international shipping costs.

Exchange rates

Official exchange rates are from Dorosh and Valdes (1990), IMF *International Financial Statistics* and *Pakistan Economic Survey*.

Example: methodology for estimating wheat NRA

Numerous studies have estimated rates of protection for agricultural commodities in Pakistan. Results have varied depending on methodologies used, particularly relating to four key issues: reference world prices and quality adjustments; marketing margins; central wholesale market at which free trade imports or exports would compete with the domestically produced good; and the choice of the reference price (import parity, export parity or autarky price).

The calculations for wheat essentially follow Dorosh and Valdès (1990) with regard to world prices and marketing margins, with marketing margins from the mid-1980s to 2005

assumed to be constant in real rupees per ton. (These assumptions are similar to those of Nabi et al. (1990) for the 1960s through the mid-1980s. The marketing margin series also aligns relatively closely to APCOM estimates for 1990s through 2005.)

The present study uses Karachi as the base market for import parity calculations. That is, it assumes that in the absence of government interventions, private sector imports would supply the Karachi wholesale market (in at least part of the year) and that Punjab would supplement local Sindh production in the Karachi market in other parts of the year. Thus import parity in wholesale markets in Punjab is calculated as the import parity price in Karachi less transport costs to Punjab. An alternative assumption (resulting in a higher border price and therefore more negative nominal rates of protection) is Lahore or another large city in Punjab as the base market for import parity calculations, assuming that private sector imports would reach the Lahore market in the absence of government interventions. In this case, the import parity price in the Punjab reference market is equal to the import parity price in Karachi plus transport costs.³¹

Calculations of the relevant reference price are further complicated because in many years domestic prices in Pakistan would likely lie between import and export parity in the absence of government interventions. Thus, in these years, calculations based on import parity would tend to understate the nominal rate of assistance and calculations based on export parity would tend to overstate the NRA (Byerlee and Morris 1993). To correct for this problem, we use an estimated autarky (no trade) price as the reference price in years when the autarky price is below import parity. Autarky prices are estimated using two alternative sets of own-price elasticities of supply and demand.

List of data sources

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³¹ Earlier studies by Hamid, Nabi and Nasim (1990) and Dorosh and Valdès (1990) assume a central market (in terms of price formation) in Punjab rather than Karachi.

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Appendix Table A1: Nominal rates of assistance to covered products, Pakistan, 1962 to 2005
(percent)

	Cotton	Maize	Milk	Rice	Sugar	Wheat	All covered
1962	-22	-17	na	-52	193	-7	7
1963	-17	-16	na	-42	191	-16	6
1964	-18	-27	na	-45	27	-17	-16
1965	-3	-14	63	-42	84	6	15
1966	-19	-26	63	-42	266	-11	17
1967	-24	-4	60	-53	228	31	24
1968	-19	6	81	-53	296	18	22
1969	-23	-11	85	-31	296	12	29
1970	-11	-11	140	-14	199	19	45
1971	9	-21	143	2	140	19	47
1972	1	19	241	6	192	7	42
1973	-8	-41	26	-62	11	-69	-48
1974	-22	-44	70	-68	25	-57	-38
1975	-2	-11	67	-59	-35	-14	-19
1976	-8	-24	18	-46	-18	-13	-15
1977	-40	-32	38	-20	26	-26	-11
1978	2	-8	43	-36	92	-23	-4
1979	22	9	108	-44	102	-29	-11
1980	-8	-14	59	-48	63	-36	-20
1981	-17	-19	68	-46	-14	-30	-22
1982	32	18	47	-34	61	-2	7
1983	-5	5	14	-34	123	-21	-8
1984	14	-20	49	-34	129	-23	-4
1985	-20	-20	46	-42	178	-18	-6
1986	4	-22	43	-51	155	-15	-5
1987	24	-10	45	-40	115	-24	-1
1988	-18	43	78	-40	124	-18	0
1989	-20	14	59	-47	45	-33	-16
1990	-43	-23	15	-46	21	-46	-32
1991	-31	-9	22	-9	21	-26	-13
1992	-17	15	22	-5	78	-17	-2
1993	-1	11	44	3	85	-23	0
1994	-8	-6	24	-3	56	-23	-4
1995	-18	3	25	1	33	-19	-5
1996	-13	2	24	2	43	-32	-7
1997	-6	-21	1	-2	75	-35	-14
1998	-4	0	9	9	51	-13	1
1999	1	7	25	-1	70	-2	12
2000	17	8	26	-15	145	9	17
2001	5	-15	14	-11	107	-15	1
2002	18	-17	4	-13	62	-27	-7
2003	-2	-12	44	-13	82	-29	-2
2004	3	-15	18	-18	51	-13	-1
2005	0	-13	13	-21	73	-9	-2

Source: Authors' spreadsheet.

Appendix Table A2: Nominal rates of assistance to all tradable agricultural industries and non-agricultural industries, and relative rate of assistance,^a Pakistan, 1962 to 2005 (percent)

	Total ag NRA				Ag tradables NRA			Non-ag tradables	
	Covered products		Non-covered products	All products (incl NPS)	Export-ables	Import-competing	All	NRA	RRA
	Inputs	Outputs							
1962	-4	11	0	5	-36	20	7	164	-59
1963	-5	11	0	4	-27	15	6	175	-61
1964	-4	-13	0	-11	-36	-8	-16	185	-71
1965	-1	17	0	11	-30	31	15	227	-65
1966	-1	18	0	12	-33	38	17	199	-61
1967	-2	26	0	17	-43	53	24	214	-61
1968	-5	28	0	16	-43	48	22	232	-63
1969	-1	31	0	22	-28	55	29	250	-63
1970	-2	47	0	33	-13	64	45	236	-57
1971	-6	53	0	35	5	59	47	261	-59
1972	-13	54	0	30	3	56	42	153	-44
1973	5	-54	0	-36	-43	-49	-48	46	-65
1974	7	-45	0	-29	-53	-33	-38	32	-53
1975	7	-26	0	-14	-46	-8	-19	29	-37
1976	5	-20	0	-11	-35	-9	-15	32	-35
1977	2	-13	0	-8	-29	-6	-11	37	-35
1978	3	-7	0	-3	-25	3	-4	43	-33
1979	5	-16	0	-7	-32	-2	-11	54	-42
1980	4	-24	0	-14	-37	-14	-20	51	-47
1981	5	-27	0	-15	-38	-16	-22	50	-48
1982	4	3	0	5	-20	18	7	49	-28
1983	2	-10	0	-5	-26	-1	-8	39	-34
1984	2	-5	0	-2	-24	4	-4	43	-33
1985	4	-10	0	-4	-35	6	-6	37	-32
1986	3	-8	0	-3	-35	7	-5	33	-29
1987	2	-4	0	-1	-22	6	-1	32	-26
1988	3	-3	0	0	-31	16	0	38	-28
1989	3	-19	0	-11	-37	-8	-16	37	-39
1990	2	-34	0	-22	-45	-28	-32	35	-50
1991	2	-15	0	-9	-22	-10	-13	34	-35
1992	3	-5	0	-1	-12	2	-2	30	-24
1993	2	-2	0	0	1	0	0	30	-23
1994	2	-6	0	-3	-5	-4	-4	30	-26
1995	2	-7	0	-3	-12	-3	-5	25	-24
1996	3	-10	0	-5	-7	-7	-7	23	-24
1997	2	-16	0	-10	-4	-16	-14	21	-29
1998	2	-1	0	1	2	1	1	20	-16
1999	1	12	0	9	0	16	12	19	-5
2000	1	16	0	12	-5	23	17	26	-8
2001	2	-1	0	1	-3	2	1	10	-8
2002	1	-9	0	-5	-1	-9	-7	7	-13
2003	1	-3	0	-2	-9	0	-2	11	-12
2004	1	-2	0	-1	-10	2	-1	9	-9
2005	2	-4	0	-1	-14	2	-2	8	-9

^a The Relative Rate of Assistance (RRA) is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Source: Authors' spreadsheet.

Appendix Table A3: Value shares of primary production of covered^a and non-covered products, Pakistan, 1962 to 2005 (percent)

	Cotton	Maize	Milk	Rice	Sugar	Wheat	Non-covered
1962	9	4	na	8	7	42	31
1963	8	4	na	6	8	43	31
1964	7	4	na	14	11	34	31
1965	6	3	12	12	8	28	31
1966	7	3	14	12	5	27	31
1967	7	5	12	14	4	27	30
1968	6	3	10	14	3	33	30
1969	8	3	12	15	5	31	27
1970	8	3	10	11	7	35	26
1971	8	4	12	9	9	34	26
1972	10	3	7	9	5	39	27
1973	4	2	7	8	6	47	25
1974	7	2	6	14	6	40	26
1975	4	2	7	16	13	30	27
1976	4	2	11	12	13	30	28
1977	7	3	11	10	9	34	27
1978	5	2	10	13	6	35	29
1979	4	2	5	16	4	39	30
1980	5	2	6	14	5	38	30
1981	5	2	5	13	12	32	31
1982	4	2	8	16	8	30	31
1983	5	2	9	13	4	34	31
1984	4	2	8	14	5	33	33
1985	6	2	9	14	3	33	33
1986	5	2	9	14	3	33	33
1987	5	2	10	13	6	32	32
1988	10	2	9	14	4	31	30
1989	7	2	8	12	5	34	32
1990	9	2	9	10	5	33	33
1991	11	2	11	7	6	33	29
1992	11	2	11	6	4	31	35
1993	7	2	10	6	4	35	36
1994	7	2	12	7	5	31	36
1995	11	2	10	5	5	30	36
1996	9	2	16	5	4	29	36
1997	7	2	19	6	3	32	30
1998	6	2	19	5	6	31	30
1999	7	2	20	9	6	28	29
2000	5	2	20	11	3	31	27
2001	7	2	19	7	3	33	28
2002	5	2	19	8	5	32	29
2003	6	2	14	10	5	34	30
2004	7	2	16	11	5	30	30
2005	6	3	16	11	3	31	30

^a At farmgate undistorted prices. Source: Authors' spreadsheet.

Appendix Table A4: Exchange rates, Pakistan, 1962 to 2005

Year	(Rs/US dollar)				Estimated equilibrium exchange rate	
	Official Rate	Secondary market rate	Assumed retention rate ^a	Discount to secondary market rate (%)	using this project's methodology ^b	using the Dorosh and Valdes (1990) methodology ^c
1962	4.8	8.2	0.5	n.a.	7.3	9.5
1963	4.8	7.6	0.5	n.a.	6.9	9.9
1964	4.8	8.6	0.5	n.a.	7.6	11.0
1965	4.8	8.0	0.5	n.a.	7.2	10.3
1966	4.8	7.8	0.5	n.a.	7.1	10.5
1967	4.8	8.7	0.5	n.a.	7.7	11.0
1968	4.8	9.0	0.5	n.a.	7.9	11.6
1969	4.8	10.3	0.5	n.a.	9.0	11.2
1970	4.8	10.6	0.5	n.a.	9.1	12.4
1971	5.6	17.5	0.5	n.a.	14.5	12.3
1972	10.6	13.7	0.5	n.a.	12.9	13.8
1973	9.9	11.3	0.5	n.a.	10.9	11.0
1974	9.9	12.1	0.5	n.a.	11.5	11.0
1975	9.9	11.6	0.5	n.a.	11.1	13.1
1976	9.9	11.2	0.5	n.a.	10.9	13.4
1977	9.9	13.2	0.5	n.a.	12.4	13.0
1978	9.9	13.7	0.5	n.a.	12.7	12.4
1979	9.9	12.3	0.5	n.a.	11.7	12.3
1980	9.9	12.6	0.5	n.a.	11.9	12.7
1981	10.6	14.9	0.5	n.a.	13.8	13.1
1982	12.7	15.8	0.5	n.a.	15.0	15.4
1983	13.5	17.5	0.5	n.a.	16.5	17.0
1984	15.2	16.9	0.5	n.a.	16.4	18.2
1985	16.1	15.9	0.5	n.a.	16.0	20.2
1986	17.2	17.3	0.5	n.a.	17.3	20.7
1987	17.6	20.9	0.5	n.a.	20.0	20.8
1988	19.2	21.1	0.5	n.a.	20.6	22.5
1989	21.4	21.3	0.5	n.a.	21.3	25.4
1990	22.4	24.1	0.5	n.a.	23.6	26.0
1991	24.8	26.2	0.5	n.a.	25.8	28.7
1992	26.0	28.3	0.5	n.a.	27.7	29.3
1993	30.2	32.7	0.5	n.a.	32.1	34.3
1994	30.9	33.4	0.5	n.a.	30.9	35.0
1995	33.6	36.0	0.5	n.a.	33.6	37.7
1996	39.0	41.3	0.5	n.a.	40.7	43.3
1997	43.2	45.7	0.5	n.a.	45.1	47.6
1998	46.8	52.0	0.5	n.a.	50.7	50.8
1999	51.8	64.7	0.5	n.a.	61.5	55.5
2000	58.4	n.a.	n.a.	n.a.	58.4	62.2
2001	61.4	n.a.	n.a.	n.a.	61.4	64.3
2002	58.5	n.a.	n.a.	n.a.	58.5	61.4
2003	57.6	n.a.	n.a.	n.a.	57.6	61.7
2004	59.4	n.a.	n.a.	n.a.	59.4	63.6
2005	59.8	n.a.	n.a.	n.a.	59.8	64.1

^a The proportion of foreign currency actually sold by all exporters at the parallel market rate.

^b See Anderson et al. (2007) on the exchange rate methodology used in this study

^c Equilibrium exchange rates using Dorosh and Valdes' (1990) elasticities approach, not used in the present study.

Source: Authors' compilation using official data plus the methodologies cited in the above notes