Strategic Reforms for Accelerated Agricultural Growth in Pakistan

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Agricultural growth rates in the 1960s, 1970s, 1980s and 1990s show that strong growth during the 1960s was driven by several factors, including greater certainty in the use of irrigation water (as a result of an agreement with India), the introduction of productivity-enhancing fertiliser-seed packages, the introduction of tubewells and the electrification of rural areas, and policy changes that improved the profitability of farming. Growth during the 1970s dropped to 2.3 percent as a result of the uncertainty created by land reforms in 1972 and 1977, severe climatic shocks, a cotton virus that depressed production for most of the decade, and political instability. The recovery in the 1980s and early 1990s can be attributed to the introduction of new cotton varieties and improved management techniques, as well as to a gradual improvement in economic incentives.

Closer inspection of the nature and sources of this growth raises concerns about its sustainability and casts doubt on the ability of the sector to grow by more than 3–4 percent a year in the future. Many of the past sources of agricultural growth in Pakistan appear to have been fully exploited. Strategy for the future must effectively address the followings.

Allowing the market to Operate, policy reforms that support the ongoing structural adjustment should be given top priority. To address the crisis in irrigation management market-determined incentives must be allowed to determine resource allocation within the irrigation system.

Reform in extension should include establishing closer links with research institutions and reducing the number of front-line extension workers and replacing them with fewer, better-trained workers who are more responsive to the needs of farming systems. Full-fledged land reform is difficult to enact and can be considered only after a comprehensive study of costs and benefits. Some important measures can be implemented immediately, however. Foremost is providing security of tenure to many farmers, especially tenants-at-will, thereby improving responsiveness to incentives and creating better incentives for long-term investments.

INTRODUCTION

How has the agricultural sector in Pakistan performed in the past? How is it likely to perform in the future? What are the major issues and constraints facing the sector? What strategic reforms are needed to boost the performance of the sector in the future?

This paper addresses these questions and suggests a strategy for accelerated agricultural growth in Pakistan.

HISTORICAL TRENDS IN AGRICULTURAL PRODUCTION

Agricultural growth rates in the 1960s, 1970s, 1980s, and early 1990s are shown in Table 1. Strong growth during the 1960s was driven by several factors, including

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Author's Note: This paper is based on *Strategic Reforms for Agricultural Growth in Pakistan* edited by Rashid Faruqee (World Bank, 1999).

Table 1

Average Annual Agricultural Growth, 1960–95

(Percent)

Period	Average Annual Growth
1959-60 to 1969-70	4.9
1969-70 to 1979-80	2.3
1979-80 to 1987-88	3.6
1988-89 to 1994-95	3.9

Source: Economic Survey of Pakistan.

Note: Calculations to 1988 are taken from GNP at constant factor cost for 1959-60 under the national accounts methodology; growth is assumed to be continuously compounded. The change in the national income methodology after 1988 prevents us from presenting complete comparable figures since 1979-80. For this reason, figures are presented through to and since 1988.

greater certainty in the use of irrigation water (as a result of an agreement with India), the introduction of productivity-enhancing fertiliser-seed packages, the introduction of tubewells and the electrification of rural areas, and policy changes that improved the profitability of farming. Growth during the 1970s dropped to 2.3 percent as a result of the uncertainty created by land reforms (and their selective implementation) in 1972 and 1977, severe climatic shocks, a cotton virus that depressed production for most of the decade, and political instability. The recovery in the 1980s and early 1990s can be attributed to the introduction of new cotton varieties and improved management techniques, as well as to a gradual improvement in economic incentives.

A breakdown of agricultural growth by subsector is shown in Table 2. Between 1970-71 and 1994-95 agricultural gross domestic product (GDP) more than doubled, increasing from Rs 51 billion in 1970-71 to more than Rs 128 billion in 1994-95—steady growth of about 3 percent a year. Because of even faster growth in

Table 2

Agricultural Performance in Pakistan by Subsector, 1970-71—1994-95

(Billions of 1980 Rupees)

Subsector	1970-71	1975-76	1980-81	1985-86	1990-91	1994-95
Crops	35.9	41.7	49.8	62.9	74.5	79.3
Wheat	12.5	13.8	16.1	20.2	21.7	24.7
Cotton	5.4	7.3	10.2	18.3	24.8	22.4
Sugar	7.2	7.5	8.7	7.9	10.3	13.1
Rice	7.2	7.7	8.5	8.6	9.8	10.5
Noncrops	15.6	18.5	23.6	30.6	40.0	48.9
Livestock	15.3	16.9	20.1	25.9	34.1	42.8
Fisheries	0.2	1.4	2.7	3.6	4.4	5.0
Total	51.4	60.2	76.4	93.5	114.5	128.2
Memorandum Items						
Share of GDP (Percent)						
All Agriculture	40.4	32.9	29.2	25.0	25.1	24.0
Crops	28.2	22.8	19.8	16.8	16.3	14.9
Noncrops	12.2	10.1	9.4	8.2	8.8	9.1

Source: Economic Survey of Pakistan 1994-95.

the non-agricultural sectors the share of agriculture in total GDP declined from about 40 percent to 24 percent over the same period.

Important structural changes have taken place in the agricultural sector since 1970-71. Although crop production remains the largest contributor to agricultural GDP (62 percent in 1994-95), noncrop agriculture has grown significantly since the 1970s, with livestock contributing 33 percent and fisheries and forestry contributing 15 percent of agricultural GDP in 1994-95.

Structural changes have also taken place within the crop sector. By 1994-95 cotton had become almost as important as wheat in terms of value added, accounting for 28 percent of total crop earnings. Expansion of cotton caused a corresponding decline in the relative importance of rice, which fell to 13 percent of total crop earnings, and sugar, which fell to 16 percent of total crop earnings, both down from 20 percent in the early 1970s. The lesson from the early 1990s is that depending on cotton for strong export performance and economic stability may be unwise given its susceptibility to yield and price fluctuations. Productivity growth in other major crops is also levelling off and there have been few increases in productivity in crops other than cotton.

Wheat is the most important food grain in Pakistan and is estimated to contribute more than half of per capita caloric intake and 85 percent of total protein intake. Some wheat is also fed to livestock. The area under wheat increased from 7.4 million hectares in 1982-83 to about 8.2 million hectares in 1994-95. Yields also rose, from just under 1,700 kilograms per hectare in 1982-83 to more than 2,000 kilograms per hectare in 1994-95. The area under maize grew only slightly, from about 790,000 hectares in 1982-83 to 830,000 hectares in 1994-95. Maize yields increased modestly, from 1,250 kilograms per hectare to nearly 1,500 kilograms per hectare over the same period.

Rice production was flat between the early 1980s and 1992-93, with the area under rice fluctuating moderately around 2 million hectares since 1980. Yield growth fell from almost 1,750 kilograms per hectare in 1982-83 to just under 1,550 kilograms per hectare in 1992-93. Basmati yields declined by 15 percent and coarse and irri yields declined by 4 percent. More recently (1993-94 and 1995-96) high yields have led to record rice production levels of close to 4 million tons.

Like many other countries Pakistan has pushed for self-sufficiency in sugar, and production has increased slowly since the mide-1980s. About 0.85 million hectares have been under sugar since the early 1980s and yields have increased moderately, from 35,700 kilograms per hectare in 1982-83 to 46,747 kilograms per hectare in 1994-95.

The livestock subsector is less important than the crop subsector and remains largely uncommercialised. Many questions about performance and potential face the subsector (such as a possible tradeoff between the growth of crops and livestock) and further analysis is needed before sound policy recommendations can be made regarding its commercialisation. Livestock production contributed about 33 percent

of agricultural GDP in 1994-95. Between 1981-82 and 1994-95 the volume of red meat and milk production grew by 5-6 percent a year. The poultry industry was even more dynamic, growing by 12-13 percent a year during the early 1990s. In 1994-95 poultry accounted for almost 15 percent of total meat production, compared with 9 percent in 1984-85 and 6 percent in 1980-81. The most important animal product is milk, 70 percent of which comes from buffalo.

A favourable climate gives Pakistan a strong comparative advantage in horticulture, as indicated by the rapid growth of the subsector in the absence of policy interventions. The country's climatic zones give it an edge in several valuable niches in the horticulture market, notably off-season (relative to the European market) midwinter harvests, year-round tropical fruits, low-chilling temperate fruits (such as berries and some types of stone fruit), and high-chilling temperate fruits (stone fruit). But the perishability of horticultural products requires an efficient processing and marketing infrastructure, which is largely lacking in Pakistan.

ASSESSMENT OF PERFORMANCE

Between 1990 and 1995 the agricultural sector grew at about 3.0 percent annually—a rate that compares favourably with Egypt and India, but unfavourably with China, Thailand, and Indonesia (Table 3). Closer inspection of the nature and sources of this growth raises concerns about its sustainability and casts doubt on the ability of the sector to grow by more than 3-4 percent a year in the future [Faruqee (1995)]. Concern is based on several factors. First, rapid population growth means that per capita growth has been weaker in Pakistan than in other Asian countries, where strong agricultural growth has been maintained with much lower population growth. In China, for example, aggregate agricultural growth has been only about one percentage point higher than in Pakistan, but per capita growth has been much higher (3.6 percent compared with only 0.2 percent) because of lower population growth. In India aggregate agricultural growth was lower than in Pakistan, but per

Table 3

Annual Growth in Agriculture and Population in Selected Asian Countries

(Percent)

Country	Agriculture 1990–95	Population 1970–95
China	4.1	1.4
Egypt	1.8	2.0
India	2.9	2.0
Indonesia	3.2	1.7
Pakistan	3.0	2.8
Thailand	3.2	1.7

Source: World Bank (1995).

capita growth was higher than in Pakistan. Moreover, because Pakistan is comparatively well endowed with natural resources (arable land, water, and sunshine) and other favourable factors (a sizeable domestic market and a favourable location) a faster rate of growth could have been expected.

Another characteristic of past growth it that is has come largely through more extensive rather than more intensive agriculture. The continued reliance on area expansion for growth indicates that technological progress in agriculture has been slow in recent years. Area expansion has encountered increasing constraints in Pakistan, as indicated by the country's low cropping intensity of 130 percent. Egypt, a country with strikingly similar resource endowments, has a cropping intensity of 180 percent. This partly explain why Pakistan, with an agricultural land base six times that of Egypt, has agricultural production that is less than twice as high.

The past performance of the agricultural sector should not be judged on production trends alone. Output growth relative to inputs—that is, productivity and productivity growth—also must be considered. Productivity growth in Pakistan has been measured by several different methods, all of which lead to the conclusion that production has been poor relative to input use for several years. One straightforward productivity measure is output per hectare (Figure 1). For cotton and wheat output per hectare has risen in recent years; for maize and rice it has remained stagnant. Partial productivity measures (output per unit of a single factor) also suggest that productivity is much lower than in comparable countries, such as India and Egypt.

Source: Economic Survey, (1995).

Fig. 1. Yield Trends for Four Major Crops in Pakistan, 1980-81–1993-94.

Another indicator of average productivity is yield gaps (the difference between average and best farmers' yields). Recent studies indicate that yield gaps in Pakistan are excessive. The yield gap for wheat is as high as 30 percent; for rice the figure is 50 percent [Byerlee and Akmal (1994) and Saleemi (1994)]. Such gaps are generally caused by the lack of timely inputs, insufficient water, and seed impurities.

The most reliable measure of productivity is total factor productivity, which compares an index of all outputs with an index of all inputs. Two recent studies [cited in Byerlee and Akmal (1994)] found that total factor productivity has either stagnated or declined in Pakistan since the mid-1970s. These studies suggest that the true contribution of agriculture to economic growth may have been considerably smaller than is suggested by the 4.4 percent increase in agricultural output that Pakistan experienced between 1980 and 1993. Ali and Velasco (1993) calculated total factor productivity by region and cropping system and found poor results for all major systems (Table 4).

Table 4

Annual Growth Rates in Total Factor Productivity in Various Cropping Systems in Pakistan, 1970–79 and 1980–89

System/Region	1970–79	1980–89
Wheat-cotton, Punjab	–0.62	0.01
Wheat-maize, Punjab	0.42	–8.79
Wheat-mixed, Punjab	–1.92	–1.53
Wheat-rice, Punjab	–2.00	–2.90
All Punjab	–1.30	–0.80
All Sindh	–0.5	–1.70

Source: Ali and Velasco (1993).

What factors lie behind the low levels of growth in agricultural productivity? Although no comprehensive studies analysing the causes of low productivity and slow productivity growth have been undertaken, a few studies have examined the subject. Several studies [including Byerlee, Harrington and Sharif (1990); Hussain *et al.* (1994) and Heissy (1990)] identified seed supply and distribution systems as major obstacles to yield increases for some crops, including wheat. Mahmood *et al.* (1992) examined sources of productivity growth during different periods on a crop-by-crop basis and found that input and output price signals (which have been influenced by government policies) and levels of human capital affected productivity (Table 5). They concluded that wheat yields stagnated in the pre-green revolution period of the early 1960s and increased during the green revolution (1960s to mid-1970s), even though the area under irrigation remained unchanged. During the 1980s yield growth dropped considerably, as a result of inefficient irrigation, distorted prices, and misguided macroeconomic policy, according to the study.

Table 5

Decomposition of Crop Growth in Area and Yield Effects, 1961–1989

Crop	Period	Area	Yield	Multiple
Wheat	1961–67	111.4	–9.9	–1.5
	1967–76	13.7	75.7	10.6
	1976–89	40.0	47.3	12.7
Rice	1961–67	44.5	46.2	9.3
	1967–76	18.6	73.6	7.8
	1976–89	78.5	16.5	5.0
Cotton	1961–67	45.8	39.9	14.3
	1967–76	1.7	91.2	7.1
	1976–89	19.1	56.4	22.5

Source: Mahmood *et al.* (1992).

Note: The decomposition is $Q=AY$, where Q is output, A is area, and Y is yield. The change in output between any two years t and $u,t>u,$ is $DQ\ Qt - Qu$ and can be broken down as $DQ = YuDA + AuDY + DYDA$. The effects sum to 100 for each crop in each period. For methodology on total factor productivity (TFP) calculation see Byerlee (1994).

Other variables found to have had an impact on the level and growth of productivity were deregulation of input markets (especially agrochemical) and technological change (and the research that generates it).

Ali and Velasco (1993) attributed declining total factor productivity to resource degradation and found a clear correlation between intensification of input use across districts and resource quality. Intensification leads to resource degradation in several ways. Double-cropping affects the timing of crops in the rotation (such as the delayed planting of wheat in wheat-cotton systems) and may encourage the development of insect and pest diseases specific to each system. Such problems have been found with rice-wheat and cotton-wheat systems throughout South Asia. The use of modern inputs—such as tubewell water, which is unsuitable for crops because of its high salinity—may also contribute to degradation of the land, and increased machinery use may have increased soil compaction.

Byerlee and Siddiq (1994) studied wheat yields between 1966 and 1986 and found that growth was less than expected from the application of green revolution inputs. They attributed the worse than expected performance to a decline in the quality of the resource base. Indicative of resource degradation is the fact that yields of high-yielding wheat varieties have not risen since 1970 despite the intensification of fertiliser use. Yields of high-yielding rice varieties rose only 0.2 percent a year between 1969 and 1981 and were stagnant between 1981 and 1990 [Mahmood *et al.* (1992)].

Many of the past sources of agricultural growth in Pakistan appear to have been fully exploited. There is no possibility of a significant increase in total

cultivable land or irrigation. At best a 10 percent expansion in water resources can be expected, and only at a prohibitive cost. With past sources of growth weakening, future growth will have to come predominantly from productivity growth, which will be achieved by allocating resources to crops in which Pakistan has a comparative advantage, improving the technical efficiency of inputs of each major crop, and increasing cropping intensity.

Prospects and Challenges for the Future Supply Potential

A country's comparative advantage in a commodity or product can be measured using the domestic resource cost (DRC), the ratio of domestic (nontraded) inputs to the value of foreign exchange per unit of the crop, all evaluated at opportunity cost. The DRCs for Pakistan's principal crops are shown in Table 6.

Table 6

Trend Values of Domestic Resource Costs for Major Crops, 1991-92

Crop, Location	DRC	Crop, Location	DRC
Cotton, Multan	0.28	Wheat, Multan	0.68
Cotton, Nawabshah	0.26	Wheat, Gujranwala	0.29
Sunflowers, Multan	1.10	Wheat, Nawabshah	0.58
Yellow Maize, Faisalabad	1.29	Basmati Rice, Gujranwala	0.49
Coarse Rice, Larkana	1.09	Sugarcane, Faisalabad	2.09
Broilers, Sindh	0.23	Sugarcane, Larkana	1.91
Broilers, Lahore	0.77	Sugarcane, Mardan	1.57

Source: Longmire and Debord (1993), Table 16.

Cotton, wheat, basmati rice, and livestock production all have DRCs of less than 1, indicating that Pakistan has a comparative advantage in their production. Coarse rice and sunflowers are marginally inefficient (DRCs near 1): sugarcane and yellow maize are highly inefficient (at least for the indicated regions).

Although Pakistan has a strong comparative advantage in wheat, wheat imports are large and growing. Pakistani sugarcane appears to be extremely uncompetitive and the gain in productivity from switching water use to more efficient crops would be considerable. Overall, the supply potential depends on moving production toward competitive crops and closing the large yield gaps described earlier.

Demand Prospects

Pakistan's strong comparative advantage in wheat, basmati rice, and cotton suggests that these commodities will likely have the greatest production growth potential once market controls are removed. Prospects are also good for expansion of livestock and horticultural products. But production growth will be profitable for farmers only if there is strong market demand for these commodities; weak demand

(domestically or internationally) could constrain production expansion. Once production increases and prices become competitive, exports will rise. How large are the markets for these products and how strong is the future demand likely to be?

Food consumption patterns change as incomes rise and move away from traditional staples, such as wheat and rice, toward higher-valued products, especially milk, meat, fruits, and vegetables. This is already being observed. In 1969-70 cereals accounted for 18 percent of average consumer expenditure in Pakistan and milk accounted for 4 percent. Based on the most recent household expenditure survey (1990-91), cereals represent 19 percent and milk accounts for 18 percent of average consumer spending.

Population growth will also increase the demand for food commodities. Projections of future meat and animal product consumption for the 1993-94 to 2004-05 period show rapid growth in consumption of poultry and eggs (more than 5 percent a year in both cases), mutton (nearly 4.5 percent), fresh milk (4 percent), and beef (3 percent) [Akmal (1993)].

The estimated growth rates for selected crops indicate that markets will exist in the future for those crops that Pakistan can produce efficiently (Table 7). Demand for meat is projected to grow by 10–15 percent a year, demand for fruits and vegetables by about 10 percent a year, and demand for basmati rice by 8–12 percent a year. Crops with low projected rates of demand growth (less than 5 percent growth) include other rice and maize, which cannot be produced efficiently.

Table 7

Projected Average Annual Growth Rates for Demand of Selected Commodities, 1993-94 to 2000-01

(Percent)

Commodity	Moderate Growth Projection	High Growth Projection
Wheat	3.6	5.4
Basmati Rice	8.0	11.8
Other Rice	2.2	3.8
Maize	3.0	5.4
Cotton	7.0	9.4
Sugar	10.0	13.1
Meat	10.2	14.6
Horticulture	8.6	11.9

Source: Pakistan (1988).

Note: Moderate growth projections assume 2.5 percent annual population growth and 5.5 percent annual GDP growth. High growth projections assume 3.5 percent annual population growth and 6.5 percent annual GDP growth.

The demand for wheat is projected to grow by less than production, suggesting that wheat imports will decline and production will be determined by how much producers are willing to supply at the import parity price level. In contrast, demand for sugar, which cannot be produced efficiently, is expected to grow by more than 10 percent, suggesting that sugar imports will likely increase in the future.

The World Bank (1995) projects that Pakistan's export market will grow by 6-7 percent a year between 1995 and 2005, a rate slightly less than the 1980-90 average and lower than that of some of Pakistan's competitors. The Bank also projects world cotton consumption to grow by 1.9 percent a year through 2005. Domestic consumption in Pakistan should increase by 0.7 percent a year between 1991 and 2005, compared with 0.4 percent annual growth between 1970 and 1990.

The demand prospects for cotton-based manufactures depend on international trade agreements. The recent Uruguay Round Agreements under the General Agreement on Tariffs and Trade (GATT) call for a ten-year phase-out of the Multi-Fibre Arrangement, which should provide greater access for Pakistani products, especially to the U.S. and European markets. Because most of the phase-out is concentrated toward the end of the ten-year period, no immediate improvement can be expected, however.

Challenges for the Future

The future prospects for the agricultural sector depend on its ability to increase the output and income of the producers. Two direct means of achieving higher output and income are technological change and commercialisation. What are the positive effects of technological change and commercialisation? If demand for agricultural goods is elastic, technological innovation that increases land productivity can set off a chain of beneficial effects [Binswanger and von Braun (1991)]. Higher profits will initially accrue to farmers who adopt new technology, and a supply response to higher profits will lead to increased production. Demand for agricultural labour and other inputs will rise, as will demand for marketing and transport services, leading to more employment. Higher levels of consumer spending (as a result of higher profits) will increase the demand for domestic goods and labour, and the rural wages will rise. Commercialisation can also open up new domestic and international markets to small farmers.

The two forces may work in tandem. Developing countries that shifted their crop mix toward marketed and traded crops have shown higher growth in yields per acre in staple food crops. For Pakistan specialising in labour-intensive crops can create employment and reduce food prices by stimulating the adoption of new technology in staple foods.

But the poor could also lose from technological change and commercialisation as farmers are caught on the agricultural treadmill. Because demand for agricultural products is often inelastic consumers capture most of the gains from technology—

that is, as output increases, prices fall because demand does not increase correspondingly. In the extreme, farmers reap none of the gains from technology. Farmers can, however, cushion the impact of technological change by diversifying into other crops. And although they may not gain from innovation as producers, they benefit as consumers through lower food prices. The benefit of falling food prices often outweighs the cost of falling profits and the government can limit price declines by eliminating or reducing export restrictions.

Government can do little to avoid the constraint of world demand, however. Countries can avoid losses imposed by technological change elsewhere by accelerating their own rate of technological change. If they fail to do so, loss of competitiveness can lead to balance of payments difficulties and depreciation of the exchange rate, which in turn will have negative consequences for the agricultural sector. The loss of income associated with a loss of competitiveness will fall on both consumers and producers.

Constraints on Future Agricultural Growth and the Need for Reforms

The relative productivity of most crops is low and the productivity growth has been slow. Past growth relied mainly on expansion of cultivable land, expansion that is no longer possible. Fertiliser use is levelling off, suggesting that returns to further intensification are falling. Productivity growth through technological progress appears to have petered out once the green revolution technology was diffused widely throughout the country. What can be done to revitalise the sector so that it can achieve growth rates that are both satisfactory and sustainable? The answer lies in increased productivity compared to the present level, which will require major changes in systems, policies, and institutions for agriculture over the next 3 to 5 years.

Broadly speaking, agriculture faces two sets of constraints in Pakistan—resource constraints and policy distortions. Resource constraints fall into four categories: (a) the inappropriate use of land, causing soil erosion and land degradation; caused partly by inappropriate incentive policy (b) a pattern of land concentration that does not promote efficiency (many farms are either too large or too small) and the absence of secure tenure, which creates disincentives for investment in land; (c) a problem-plagued irrigation system; and (d) inadequate human resources and infrastructure.

As for policy constraints, although there has been some improvement, they are still serious. Direct intervention by the government in agricultural markets has diminished in recent years but remains excessive. Subsidisation of wheat imports, duty and period restrictions on cotton exports, and protection of sugarcane continue to distort incentives. Nominal protection coefficients reveal a persistent policy bias against cotton and wheat and in favour of sugarcane. Indirect intervention, through

protection of industry, penalises agriculture through its impact on relative sectoral prices. Government policy also affects vital inputs (fertilisers and seeds) and the credit market.

The composition of public expenditure in agriculture is also distorted. Spending is dominated by subsidies that do not help farmers, either because of rent seeking and inefficiencies or because the subsidy is designed to help consumers at the expense of producers.

Growth rates achieved in the past can be sustained and even surpassed if major changes are made in systems and policies. The most important change will be a redefinition of the role of government in which the government is limited to ensuring the smooth functioning of markets and promoting private sector activities. Investment and public expenditure in agriculture will have to be reshaped, with government spending focusing on public goods and market failures.

The next sections of this paper deal with major resource and policy constraints currently facing Pakistani agriculture: policy distortions, public enterprises, the land market, irrigation, and rural credit. Other key constraints are also examined briefly.

Policy Distortions

Massive government involvement in agriculture has done little to benefit farmers in Pakistan. Government policy has severely distorted agricultural incentives—directly through agricultural pricing policy and indirectly, until recently, through exchange rate policy.

The effect of price reforms in Pakistan will be determined by producer response. Reforming all policies that impose indirect taxes on agriculture should result in a broader, more substantial response than reform of direct interventions alone. Producers will respond to price reforms that are credible; credibility can be affected by macroeconomic uncertainty, which dampens the response to price reforms because it creates instability in relative incentives. When inflation is high and the real exchange rate overvalued, indirect taxation is high and highly variable. Removing direct price interventions may not lead to a large supply response because of uncertainty and because the impact of nominal price changes on relative prices is difficult to discern.

Although the negative effects of the government's exchange rate policy have been eliminated, the indirect effects from providing heavier trade protection to certain industries linger and input markets remain distorted by subsidies. Those distortions dissipate most of the benefits directed at farmers.

Public institutions have proliferated in almost every area of agriculture, with little benefit to the sector. Public enterprises dominate the marketing and distribution of agricultural products, crowding out private sector involvement. The research and extension institutions are particularly weak and the underpricing of electricity and

water has entailed hidden expenditures that make the continued provision of those essential inputs financially unsustainable.

For agricultural growth to be sustainable basic reforms are needed. The proper role of the government should be to encourage the development of a smoothly functioning market through institutional and regulatory reform that facilitates market efficiency and private sector activities. Where market failure is not an issue and government inefficiency is evident, the role of government should be drastically reduced. Government spending should focus on public goods and market failures, not on activities better suited to the private sector. The government should continue to play an active role in reducing poverty and protecting the environment.

Public Enterprises

The problems of market distortions caused by public enterprises in agriculture are significant. Public enterprises have not yielded tangible benefits, have inhibited the development of an efficient market in agricultural services, and have been a drain on the budget. They show that the long-run cost of price intervention on agricultural producers has been substantial.

Pakistan's agricultural public enterprises suffer from economic, financial, and managerial deficiencies. From an economic perspective, pursuit of noncommercial goals, noncommercial pricing, and a drive for import protection have led to operating inefficiency, a high cost structure, and inadequate capitalisation to meet potential demand. From a financial perspective, low profitability, heavy debt, overreliance on government bailouts, and preferred credit have contributed to a poor return on investment. On the management side, overstaffing and loose control of human resources and inadequate accounting and cost control procedures have led to administrative inefficiency.

Given the poor performance of public enterprises and the distortions created by their intervention in production and marketing activities, what kind of reforms are needed? Faruqee, Ali and Choudhry (1999) suggest specific institutional and policy reforms. They argue that institutional reforms should focus on divestiture of all commercial activities to the private sector and that only those institutions and functions that support the creation of public goods should remain in government hands. The privatisation of viable but large enterprises could take place in stages to allow the private sector to absorb the entities' assets gradually, increase competition, and prevent the growth of private monopolies. To supplement the institutional reform and privatisation process, policy reforms should focus on four main issues: macroeconomic policy reform (such as eliminating trade barriers and exchange rate controls), price reform, regulatory reform (including strengthening the legal environment for business), and financial reform (especially easing government credit restrictions of financial institutions).

Land Markets

The main resource inputs—and constraints—to any country's agriculture are land and water. Farmers require access to these basic natural resources if crops are to be sustainable. Whatever a country's natural endowment these resources require proper management and protection.

Both equity and productivity can be improved by land reform. Land reform in Taiwan (China), instituted between 1949 and 1953, greatly improved the distribution of income and raised agricultural output. From the outset the government pursued several broad goals [see Fei, Ranis and Kuo (1979)]. It sought to strengthen farmers associations and other components of the organisational and financial infrastructure and to repair physical infrastructure. Farmers associations, once dominated by landlords and nonfarmers, were reorganised to serve farmers' interests. These associations also began to provide credit and facilities for purchasing, marketing, warehousing, and processing agricultural products.

At the same time, the Taiwan government sought to restructure the agricultural economy by reducing farm rents, selling public lands, and introducing a land-to-the-tiller programme. Land rents were reduced by fixing a limit for farm rents and enabling tenants to appeal for a lower rent if crops failed, allowing tenants to pay rents at the end of the period, mandating the registration of written contracts and fixed leases, and giving tenants the option of purchasing land from owners. As a result of these policy prices of farmland dropped. Tenants, who would now benefit by working harder, raised crop yields and increased their incomes. These farmers were then able to purchase the land. With this success the government accelerated land reform by selling public land, giving priority to land less tenants and cultivators of public land. The stage was then set for the most dramatic reform, the compulsory selling of land. The government stipulated that privately owned land in excess of a specified area had to be sold to the government, which then resold that land to the tenants. This measure gave the farmers new incentives to increase production.

As a result of the reforms the distribution of landholdings changed dramatically between 1952 and 1960. Wealth was substantially redistributed from landlords to new owner-cultivators. The distribution of income also became more equitable. Between 1941 and 1956 the share of property in total agriculture dropped from 63.7 percent to 44.3 percent. The share of farm income going to cultivators rose and that to landowners and moneylenders fell [Fei, Ranis and Kuo (1979)]. Important features of the Taiwanese experience relevant for Pakistan include imposition of higher taxes for farmers not fully utilising cultivable land and selling public lands to the landless.

Land resource management in Pakistan leaves much to be desired. Much of the poor quality of the land can be attributed to soil erosion and irrigation-related problems, such as salinity and water logging. Imperfections in the agrarian land market and the need for reform are discussed by Mahmood (1999). Despite attempts

at land reform, the agrarian land market in Pakistan remains imperfect and represents one of the important obstacles to increased agricultural output. Mahmood addresses three key questions: what market failures characterise land in Pakistan, how can these market failures be explained, and what kinds of reforms are needed to address these problems? He argues that an efficient land market has failed to develop because property rights to land do not exist in many areas and because the system of land records and registration is obsolete and inefficient. The result is limited access to land and a highly concentrated pattern of landholdings. The inequitable distribution of land resulting from market failures adversely affects agricultural output because the resulting size distribution of farms inhibits agricultural growth.

Given the distribution of landholding size and the rigidities of the land market, would land reform help? Ill-conceived land and tenancy reforms have created a bias against a fixed-rental land market: poor implementation of earlier reforms resulted in little benefit to sitting tenants. Uncompensated land redistribution would be politically unfeasible; compensated land reform would be very expensive and would likely be met with widespread evasion.

While the costs and benefits of future land reform should be studied more carefully before further reform is considered certain actions could be implemented in the short-term. These include removing distortions in the machinery and credit markets that have facilitated self-cultivation at the expense of tenants, giving tenants-at-will greater security of tenure, improving the operation of land markets by streamlining the land titling and registration process, and using a land tax to increase the efficiency of land use.

Irrigation

About 90 percent of agricultural output in Pakistan is entirely dependent on irrigation. Yet Pakistan's irrigation and drainage system is in dire straits. Despite substantial budgetary input the system suffers from severe and worsening operational problems, including water logging and salinity, overexploitation of fresh ground water, low efficiency in delivery and use, inequitable distribution, unreliable delivery, and insufficient cost recovery.

These problems have many sources. The government treats water as a public good, not a private tradable good for which markets can operate. Lack of well-defined property rights and the illegality of sales of surface water severely constrain informal irrigation water markets. The government has failed to make budgetary provision for operation of the system and maintains separate public bodies for irrigation maintenance and revenue collection. Administrative discipline, which was adequate in the past, has now broken down and the cost of irrigation maintenance has vastly increased.

Unlike on-farm drainage, off-farm drainage is a public good (since it is generally not possible to exclude individuals from the area wide drainage benefit of

lowering the water table). Off-farm drainage will have to continue to be supplied by the government. The underlying problem of inappropriate institutional framework will nevertheless require reforms that will ensure autonomy, transparency, and accountability.

What can be done to improve the irrigation and drainage system and what should be the strategy for institutional changes? Ahmad and Faruqee (1999) suggest that sustained improvement in performance is possible only with market-determined incentives for irrigation and on-farm drainage. A first step is to draw up enforceable property rights to water, without which any attempt to legalise and commercialise water markets would be futile.

Ahmad and Faruqee argue that establishing individual property rights will not be enough and that the move toward commercial water markets will require major institutional changes in the delivery of irrigation and drainage. The best option for the government is to develop user-directed, autonomous, commercially orientated public utilities to ensure operational transparency and cost recovery of all operations and maintenance and future investment expenditures. As the major users of water, farmer organisations will also be vital to any new market-based irrigation system. These groups could be organised immediately to carry out some maintenance, ensure that water is distributed in accordance with property rights, monitor groundwater use, organise on-farm drainage development, and collect delivery and drainage changes. Off-farm drainage, a public good, must continue to be the responsibility of the government. The public sector institutions in drainage need to be reconstituted to provide them with the autonomy needed to pursue broad-based investment and cost recovery.

Rural Credit

Pakistan's credit institutions are not helping to accelerate agricultural growth and reduce poverty. Although the rural sector accounts for more than 70 percent of employment in Pakistan and roughly two-thirds of rural employment is in agriculture, less than a third of rural households receive loans, only 10 percent of which are from institutional sources. Qureshi, Nabi and Faruqee (1999) argue that rural credit markets must be liberalised to improve performance in the rural economy and efficiency in financial institutions.

They suggest reforms in several areas, including policies to stabilise the economy and the replacement of produce and price controls with prudent regulation and supervision. Commercial banks must also operate in a competitive environment and must be free to set interest rates for rural lending that cover their transaction costs. Credit must be made available to support productivity growth for agricultural small holders and small producers of the rural nonfarm sector, where Pakistan's growth potential lies. The authors highlight the importance of providing credit to

women and the rural poor for consumption smoothing and sustainable income-generating activities.

Credit policy should be directed at developing a market-based financial system for rural finance. Because of the market's failure to support disadvantaged groups, however, a special priority programme may be needed to direct credit to women, small holders, and the rural nonfarm sector (including small-scale nonfarm activities, such as livestock, fisheries, forestry and range lands, and industrial micro enterprises).

Subsidising interest rates is not the way to help marginal borrowers, who can be better, served by fixed-cost subsidies and self-selected targeting. NGOs should be encouraged to help. Commercial banks should be encouraged to lend on bases other than the mortgage and passbook system; to experiment with wholesale credit through input suppliers, marketing agents, and NGOs; and to consider lending for such downstream agricultural activities as agro processing.

The biggest challenge facing rural finance is the restructuring of cooperatives. The Agricultural Development Bank of Pakistan should undertake a portfolio audit, the result of which will determine whether a major restructuring of its portfolio or a change in ownership is required. To improve rural financing the system of property rights, title, and default enforcement must also be strengthened.

Other Constraints to Productivity Growth in Agriculture

Human resource constraints, poor rural infrastructure (in particular, transport and energy), and the weakness of the research and extension system are other areas that need to be addressed. A brief discussion of these issues follows. However, because of paucity of relevant data, these constraints are not addressed as separate chapters.

Human Resources

Pakistan's overall education levels compare unfavourably with those of other developing countries (Table 8). Educational spending is low and primary school enrolment is well below expected levels based on per capita income. Large gender differences exist, with women's literacy at just 21 percent (compared with 45 percent for men). Low female literacy is costly because in many East Asian economies educated women who do not enter the labour force are able to educate their children at home. Low literacy and numeracy inhibit agricultural productivity and complicate the task of agricultural support services. Indeed, the lack of education could well be the binding constraint on agricultural productivity over the next ten to fifteen years. Human capital improvements are particularly important to the poor, whose major asset is their labour. Human capital deficiencies lower the return to labour and make it difficult for unskilled labourers to move out of poverty.

Table 8

Education Levels in Selected Developing Countries, 1994

Country	GNP Per Capita (1994 Dollars)	Net Primary Education (Percent)	Adult Literacy (Percent)	Children Reaching Fourth Year of School (Percent)
Mexico	4,180	81	92	95
Egypt	720	48	91	99
Indonesia	880	77	97	89
Pakistan	430	35	29	59
China	530	73	82	86
India	350	52	66	61

Source: UNESCO and UNICEF.

Declining investment in education explains a significant part of the stagnation of agricultural productivity since 1975. A study of total factor productivity in Pakistan covering the 1955–85 period revealed the importance of education. Using data from 35 districts [Rosegrant and Evenson (1993)] found that a 10 percent increase in rural male adult literacy increased total factor productivity by 2.7 percent. In comparison, a 10 percent increase in the area under irrigation was found to increase total factor productivity by 2.4 percent and a 10 percent increase in the share of land under high-yielding varieties increased total factor productivity by just 1.3 percent.

Quality of education is also a major concern. Butt (1985) found that the productivity of farmers with secondary schooling (used as a proxy for quality education) was significantly higher than the productivity of farmers with only primary education. Primary education increased productivity by 7 percent; secondary education was associated with an 11 percent rise in productivity. Education was also positively correlated with fertiliser use.

Rural Infrastructure

Rural investment is an important source of public capital and raises the quality of human capital by facilitating health improvements; rural infrastructure deficiencies represent obstacles to broadly based agricultural growth. Improved infrastructure also facilitates the development of nonfarm income generating opportunities, which are key to poverty alleviation. The poor benefit to the extent that infrastructure lowers the cost of either agricultural inputs or purchased goods. Infrastructure may also expand the labour market and increase the demand for unskilled labour. Good transportation can allow the poor to take advantage of jobs in urban areas.

The transportation network is central to the timely delivery of inputs and outputs, as well as to promoting commercialisation. Telecommunications play an important role in commercialisation and information dissemination. Energy becomes increasingly important as agriculture becomes more mechanised. Investment in rural areas has been a hallmark of the East Asian success story. The balance between rural and urban public investment in roads, water, and sanitation facilities has been less even in Pakistan than in the Republic of Korea or Thailand.

Transportation. Road volume in Pakistan is among the lowest in the world. Less than a third of Pakistan's 45,000 villages have access to wholesale trading centres through the network of all-weather roads and some areas are cut off from the rest of the country throughout the year. Although overall rural road length increased by 70 percent between 1981 and 1991, the roads remain largely inadequate and the road network is in poor condition. More than half of the network is still unpaved and more than two thirds of the paved arterial roads do not have enough carriage way width for two lanes.

Poorly maintained roads are estimated to increase transport costs by 30–40 percent. The distances between villages and marketing and transportation points would not pose a serious problem if roads were of high quality, but the poor state of the rural road network severely inhibits the timely transport of inputs and outputs. Such constraints are likely to be particularly important as Pakistan seeks to improve its position in the high-value foods sector, which includes perishable fruits and vegetables. A study by Vesque (1994) used a multiple regression model on Pakistani household data to show that higher road status (metal paved or rock paved rather than unpaved roads) has a positive influence on the production of two key staples, wheat and rice.

In a careful study of Indian districts Binswanger *et al*. (1993) found that a 1.0 percent increase in road provision led to a 0.2 percent increase in output. Infrastructure provision also had important indirect effects on output: according to the study, a 1.0 percent increase in road provision produced a 0.8 percent expansion in banking services.

Improved management of Pakistan's ports to facilitate timely transportation of inputs and outputs is also needed, as is rehabilitation of the railway network, which is in steady decline.

Energy. Reliable energy supply is vital to the agriculture sector. Tubewells guarantee timely water delivery only if their power source is ensured. The prompt harvesting of crops is particularly important in Pakistan's double-cropping system: losses in wheat yields from late harvesting of cotton are considerable. A more intensive livestock sector and a move toward production of high-value foods will also require greater energy input for cooling milk and preserving perishable crops.

Pakistan faces significant energy supply constraints compared with other developing countries. Converting all forms of energy consumption to kilograms of

oil equivalent, energy consumption per capita was 243 kilograms in 1991, well below the South Asian average of 289 kilograms. Electric power cuts affect the rural sector for up to ten hours a day, forcing rural residents to rely on generators, which are very expensive to operate. Many problems—notably the under pricing of energy and state control—can be traced to Pakistan's energy sector policy, which has led to crowding-out of public and private capital formation.

Research and Extension

Research. Agricultural research is underfunded in Pakistan, with operational funds particularly scarce. In many provinces the ratio of wage to operational (nonwage) expenditure in agricultural research is 80:20, much higher than the target ratio of 60:40. The effectiveness of research has declined because of lack of material support, effective planning, monitoring, and evaluation of the research programme. Researchers lack the proper equipment and journals (notably foreign journals), creating an inadequate research environment. Different research institutes have overlapping responsibilities and duplication of research is common.

Crop management research emphasises increases in productivity through research on such issues as land preparation, harvesting, and timing and method of application of input. Resource management research focuses on preservation of the natural resource base. For most crops in Pakistan, it is difficult to find good examples of these types of research that have been applied to farmers' fields. Much evidence indicates that key inputs, such as water and fertiliser, are inefficiently used. Crop and resource management research lacks a systems perspective. Specialised research tends to ignore interactions between different crops and different agronomic issues. Important long-term issues, such as necessary natural resource investments, are generally ignored.

Research has failed to increase input efficiency. Outcomes from well-controlled experiments need to be better tailored to farmer conditions. Merely issuing technical packages to large, heterogeneous groups of farmers is insufficient. Farmers must be given the means to adapt these packages to their own circumstances.

Extension. Most studies indicate that farmer inefficiency is caused mainly by lack of knowledge and skills. As emphasis switches from input intensification to input efficiency, improvements in information and skills play a larger role in increasing productivity. Small farmers may find it more expensive to acquire knowledge; public extension can equalise access to new methods.

Many farmers question the usefulness of the elaborate extension system in place for crops. The more than 5,000 village extension workers often lack adequate training and extension workers with higher education and communication skills are likely to be assigned administrative responsibilities. Moreover, the system now

succeeds in transferring technology to only a few poorly chosen farmers. Women and small farmers are often ignored and feedback from farmers is poor. Organisational problems are severe (especially lack of accountability) and operational funding for extension workers is low.

Although much effort was made in the 1980s to implement the training and visit (T&V) extension system, the system's centralised, hierarchical approach limits feedback and adaptability to local conditions and the system has had only modest success. Measures of farmer contact did rise and extension services may have had an impact on increasing pesticide use. But Hussain *et al.* (1994) could find little evidence that T&V had improved the quality of extension advice. Some of the success of the T&V system can be explained by the poor state of extension service before the system was introduced. By introducing organisational discipline and some additional funding, the T&V system was able to improve the previously deficient extension services. Less clear, however, is whether the system represented the most cost-effective use of resources.

The notion of extension as a top-down supply-driven process needs to be revised. The goal should instead be to create a demand for information among farmers and to satisfy that demand through the efforts of extension workers. The service should concentrate more on participatory problem solving with farmers at the local level, which will require substantially improving the education levels of farmers and extension workers.

Research-Extension Linkage. The research-extension linkage is weak in Pakistan. In Punjab the research and extension services collaborate each year in creating a recommended crop package, which is then issued to farmers. Because many farmers are illiterate, these packages (issued in the form of a leaflet) are difficult for many farmers to implement. Moreover, issuing an all-embracing technical package represents an overreliance on the recipe approach to delivering extension messages. Restructuring research and extension must be done simultaneously. Crop and resource management research will require greater on-site specificity and decentralisation, but will be effective only if the extension service delivers site-specific information.

A STRATEGY FOR THE FUTURE

Given the problems facing agriculture in Pakistan, what policies and programmes should the government adopt to sustain and improve agricultural growth? Before specific strategies are adopted, the appropriate role of the government should be clearly defined as limited to encouraging the development of a smoothly functioning market through institutional and regulatory reforms that facilitate private sector activities and market efficiency. In cases in which market failure is not an issue and intervention has led to market inefficiency, the best

strategy is to reduce the government's role through policy reforms and the strengthening of the process of market liberalisation. Thus, intervention failures should not result in a situation worse than that without intervention.

Recognising the Role of the Private Sector

A key component of the government's strategy must be to reshape investment and public expenditure on agriculture. Spending should be focused on the provision of public goods and the correction of market failures, not on activities better suited to the private sector, even if such activities may be profitable. In areas such as poverty alleviation and environmental protection, where the government has a legitimate role to play, market-friendly policy reforms should be adopted to ensure economic efficiency and growth and to achieve the government's social goals.

Changing Policies Affecting Incentives

Policies that affect incentives distort both input and output markets and result in a sub-optimal allocation of resources. Changes in price policy, trade policy, and fiscal policy are needed if agriculture in Pakistan is to continue to grow.

Price Policy

As part of the structural reform, agricultural output prices should be determined by the market, thereby allowing market signals to be transmitted to farmers without distortion. The government should remove all price supports and controls, not only because they distort market signals and represent a drain on the budget, but also because such liberalisation will improve production incentives for crops in which Pakistan has a comparative advantage. Price fluctuations that result from market liberalisation can be stabilised by other means, such as promoting on-farm storage, private sector storage, and futures trading.

The government should also consider ending the subsidy on wheat imports. Such a policy change would likely have little effect on consumers, since the price of flour is already determined by the market and is close to import parity. It would, however, help farmers by moving the producer price of wheat toward the import parity level. At the same time the government would need to eliminate quantitative import restrictions on wheat and flour. Another desirable step would be to remove protection of sugarcane by eliminating support prices and sugar import restrictions, thus allowing scarce resources (such as water and land) to be used more productively.

Before it removes price supports, the government must ensure that a competitive and efficient private sector is ready to step in as it withdraws. Where competition is not possible (as in sugarcane processing, for example), strict regulation of the monopoly will be necessary; if emerging monopolies are not

adequately regulated the move toward privatisation will be discredited and the reform process will suffer.

Trade Policy

Rather than striving for self-sufficiency in industrial output, Pakistan should direct its resources to their most efficient uses across sectors and exploit agriculture's comparative advantage to finance import requirements. Trade policy reform, which must be completed rapidly, should be structured so that products in which Pakistan has a comparative advantage are not penalised and products in which Pakistan lacks a comparative advantage are afforded no protection. In particular, the government should consider removing taxes on cotton exports, duties on sugar imports, and quantitative restrictions on both. Any loss of revenue could be offset by eliminating the wheat subsidy. In addition, the sectoral terms of trade could be improved for agriculture by reducing industrial protection. Experience in other East Asian economies shows the considerable benefits of a much smaller bias against agriculture in trade policies. Ideally, the current system of high and heterogeneous duties and barriers should be replaced with a uniform duty [World Bank (1992)].

Fiscal Policy

Tax reform will need to ensure that all sectors are treated equally in terms of the tax burden. All special agricultural tax exemptions should be eliminated, especially once intersectoral transfers have taken place following the removal of distortions. The system of agricultural income and wealth taxation that has been proposed should be put in place as soon as possible and extended to meet the goals of equity and efficiency. The tax base should be periodically reassessed to ensure that the poor are not taxed too heavily and that taxes do not create intersectoral distortions and inequity.

Changing Policies Affecting Input Markets

The government should consider reducing its level of intervention in agricultural input markets, as it has begun to do in moving toward privatising urea production and distribution. Additional efficiency could be achieved by making the National Fertiliser Corporation more commercially oriented or by divesting it to the private sector.

Privatising the import of phosphatic fertiliser should be accelerated. The ability of the private sector to take over imports effectively will depend on it being able to compete fairly with the government during the transition. Given the strategic importance of fertiliser the government should strive to ensure that private firms are given the same facilities as the public sector. A smooth transition to a market dominated by the private sector may also require the elimination of public sector

imports; policy reform in other sectors will likely include removal of price controls on natural gas and fertiliser, which is likely to lead to price increases that reflect full economic pricing.

Government involvement in the marketing of improved (certified) seed is unwarranted and should be ended. Government seed corporations should be run along commercial lines and privatised as soon as possible. In the meantime private firms should be given the same facilities as public sector companies. A legitimate role for government does exist in providing quality control and certification of seed; this role needs to be fully funded and strengthened as use of improved seed increases.

The irrigation system should be decentralised. At the distributary level downstream operations and maintenance should be handled by water user associations, which should provide timely and efficient water delivery. Upstream, at canal command (areas covered by main and branch canals), operations should be handled by commercially oriented public utilities that enter into explicit contractual obligations with the user associations. At the provincial level autonomous water authorities should be responsible for major provincial storage, link canals, off-farm and provincial drainage, and flood control and management.

Irrigation charges can be raised to reflect the cost of service provision, the quality of service provided, and the cost of competing alternatives. Disputes between the different groups using the irrigation system could be resolved by powerful, politically unbiased regulatory authorities. A legal and institutional framework for the market exchange of water rights could also be established. Although off-farm drainage (a true public good) must continue to be the responsibility of the government its costs can be recovered from farmers.

A careful study of the costs and benefits of land reform should be initiated. Some immediate measures, such as elimination of low machinery prices and improved access to credit (the lack of which makes it difficult for small farmers to expand their holdings), should be adopted to correct land market distortions. Removing these distortions would increase opportunities for farming and for wage labour on employment-intensive farms. The land title process should be modernised and streamlined through the establishment of a system of permanent title deeds to land. Security of tenure should be ensured without creating new disincentives to rent out land. These measures would likely facilitate long-term investment, especially investment in natural resource management.

Directed credit in any form should be eliminated. Groups that have difficulty gaining access to credit could be assisted by a scheme under which the initial set-up costs of extending credit could be underwritten by the government in order to reduce transaction costs. Recurrent credit subsidies should not be provided, however. Credit policies should be set with a view to ensuring high loan repayment rates and sustaining lending activities, special credit arrangements should not interfere with liberalisation of interest rates. The government should also consider developing an institutional and legal framework that would allow efficient lending to agriculture,

unhindered by highly restrictive collateral requirements and seasonal credit regulations.

RECOGNISING THE ROLE OF THE PUBLIC SECTOR

Most subsectors of Pakistani agriculture have entered a post-green revolution stage of development that requires new strategies to enhance input efficiency and to maintain and improve the quality of the resource base. By most measures of productivity Pakistan's institutions have not evolved to meet this challenge. Reform in public spending is critical to achieving these institutional changes. The government's new role will require institutional changes but no independent institutional reform should be needed. Some institutions (such as output marketing agencies) will have to be phased out as the reform programme progresses, however.

Research

Support for research should continue, but expenditure needs to be restructured so that salaries do not absorb most of the available funds. Research institutions should be made more autonomous, salary restrictions should be lifted, and other funding sources should be mobilised. Training programmes for research professionals should help them understand the problems of farming systems, including irrigated agriculture, and publicly funded research should focus on growth-enhancing public goods, environmental impact, poverty reduction, and the transfer of technology.

Greater importance should be attached to research on cropping systems. Wheat fields, for example, are a breeding ground for pests that attack the cotton crop, calling into question the viability of the cotton-wheat system. Improvements in the major cropping systems to overcome such problems as delayed planting and depletion of soil organic matters are needed. Adaptive research (which should be a part of the extension service) should provide site- and season-specific recommendations and information to individual farmers.

Both productivity and sustainability can be enhanced by improvements in crop and resource-management research. Greater attention to local conditions can be achieved by defining major agroecological zones and subsystems within these zones, rather than within political boundaries. Such zones could then serve as the basis for organising crop and resource-management research aimed at monitoring changes in the resource base at the farm level.

Universities should continue to play a key role in providing manpower training for research, and producers, NGOs, and other participants from the private sector should be encouraged to take part in setting research priorities. Research that can be profitably financed by the private sector need not be underwritten by the limited public budget, although joint public-private funding of research is desirable. Private and public sector research financing could, where possible, be provided on a competitive basis, so that funding to institutions would be tied to performance.

Monitoring of research—albeit under a system that allows for greater decentralisation—and coordination among both national and provincial research institutions needs to be improved so that unnecessary duplication is avoided.

Extension Services

Some reduction in the size of the extension service may be necessary, particularly among the cadre of extension agents at the Union Council level, and continued public funding should be contingent on improved organisational capability. Extension already being undertaken by private sector companies and NGOs, such as the provision of advisory services by adaptive research institutions to medium and large farmers on a fee basis, should be encouraged.

Operational management of extension services needs to be decentralised, farmers need to be encouraged to play a larger role in controlling and evaluating these services, and services need to be geared to the problems of all farming systems, including livestock, forestry, and water management, not just those of major crops. A more diversified approach to extension that responds to the needs of farmers, including women farmers, and makes use of all sources of extension services, including the private sector, is desirable.

The "contact farmer" approach, which makes extensive use of audio-visual teaching methods, extensive on-farm demonstrations, and farm fairs, should be reconsidered. A group approach to message delivery would complement groups in other areas, notably in water and credit provision.

Education

Greater investment in formal schooling will be critical in raising technical efficiency and productivity. In the short run functional education of farmers can be improved through adult literacy programmes and training by government fieldworkers. Such training will also prepare farmers for the increased organisational burden that will be placed on them as a result of the formation of water user associations and other user groups. In the long run more emphasis on primary education will help increase human capital in rural areas.

Rural Infrastructure Provision

Government's role in providing rural infrastructure needs to be strengthened. The increased revenue from tax reform and savings from the rationalisation of public expenditures on agriculture could be used to finance farm-to-village road construction, which would improve the distribution of inputs and the marketability of outputs, especially high-value (often perishable) foods.

Poverty Alleviation

Swift alleviation of rural poverty depends on rapid agricultural growth, which in turn depends on government policy; price reforms that improve the incentives

facing farmers are especially urgent. But to achieve growth additional reforms are required to maximise poverty reduction. In a labour-abundant economy such as Pakistan, subsidies on capital (tractors, combine harvesters, and so on) are inappropriate because they distort factor markets and lead to labour displacement. Incentives to mechanise that displace labour without increasing output significantly should be removed.

Provinces should be encouraged to better target their development spending toward the rural poor by giving districts with the largest concentration of poor people higher priority in the allocation of public investment (such as rural roads and health and education facilities).

Rural credit policy should ensure that viable small-scale rural investment opportunities can be efficiently financed. Directed credit, quotas, and interest rate ceilings should be terminated, and the private sector should be relied on for credit provision wherever possible. The government should also consider removing land market distortions, which impair efficiency as well as restrict access to land by the poor.

Participatory community-based organisations also offer great promise in terms of reducing poverty. These organisations could be integrated with groups that provide rural credit. Institution building in rural communities will complement the increased reliance on user groups in water and extension services.

Environmental Protection

To protect the environment the government must place more emphasis on natural resource management problems in agriculture. The lessons of successful resource management suggest that policy interventions should be based on three principles:

- Adjusting prices for scarce natural resources to provide appropriate incentives for conservation.
- Identifying regulatory mechanisms that could be effective in addressing market failures, bearing in mind the poor record of existing regulatory agencies.
- Restructuring public expenditures to focus on natural resource management priorities.

Government needs to phase out policies, such as the underpricing of irrigation water, that give private agents incentives to use natural resources suboptimally. Factor price distortions that lead to labour displacement and increased environmental stress (farming on marginal land or rural-urban migration, for example) should also be removed. Elimination of subsidies—such as the sapling subsidy, the rationale for which no longer exists—would release resources for natural resource management projects.

Environment and natural resource management problems are often associated with market failure and require public regulation. Increased pesticide use has created growing resistance among pests and destroyed natural predators. One approach would be to adopt integrated pest management techniques that would be more effective against pest problems as well as more environmentally friendly. An effective institutional mechanism for transmitting knowledge about integrated pest management is essential.

Increasing the regulatory powers of government agencies will be counter-productive if they continue to protect the politically powerful, seek rents for themselves, and enforce laws selectively. It may, therefore, be wise to include NOGs in Pakistan's environmental strategy and to support them wherever appropriate and according to their comparative advantage. NGOs have had considerable success in increasing farmers' awareness of environmental issues, have played an important role in formulating environmental policy, and have recorded some notable victories in the civil courts.

Lack of property rights and institutions to manage common property resources can result in one-site damage and create negative externalities. Successful watershed management projects need to be extended and community management institutions established to address common property resource management problems. Government intervention should be limited to providing incentives for the adoption of sustainable resource management techniques, such as new technologies that enhance the physical status of common property resources.

Core Elements of the Strategy

Although all components of this strategy must be implemented to ensure sustainability certain elements should be implemented first.

Allowing the Market to Operate

Policy reforms that support the ongoing structural adjustment should be given top priority. These reforms include all actions that involve government withdrawal from activities better suited to the private sector. Market forces should be allowed to determine agriculture output and input prices. Trade and tariff policy reform will improve the incentives to the agricultural sector, ending distortionary policy-induced intersectoral transfers out of agriculture. To make the tax system equitable and nondistortionary agriculture must contribute its fair share to government revenue, a change that will also improve Pakistan's internal balance and increase stabilisation. These reforms will not only help adjustment (including stabilisation) but will improve agricultural efficiency and growth as well.

Addressing the Irrigation Crisis

Irrigation is the life-blood of agriculture in Pakistan. To address the crisis in irrigation management market-determined incentives (that is, water prices) must be

allowed to determine resource allocation within the irrigation system. The scope for raising water charges is considerable and reform here can be implemented quickly. In the longer term decentralisation of water provision is essential and preparatory steps should be taken immediately. The government will also have to establish enforceable property rights to water and legalise water markets, thereby making the opportunity cost of water transparent and encouraging more efficient use of water. Administering institutions will have to be restructured along commercial lines.

The best option is to develop autonomous, commercially oriented public utilities on a canal command basis, ensuring cost recovery of all current operations and maintenance and future capital expenditures. Since the government cannot collect all costs of operations and maintenance from farmers, farmers must become responsible for operations and maintenance through water user associations, which will better maintain the system.

Reforming Extension

Given the potential of increasing productivity of most crops by 30–50 percent effective diffusion of existing technology and best farming practices is paramount. Reform of extension is critical in four key areas:

- Establishing closer links with research institutions.
- Reducing the number of front-line extension workers and replacing them with fewer, better-trained workers who are more responsive to the needs of farming systems.
- Providing consulting services by adaptive research institutes to better-off farmers on a cost-sharing basis.
- Using mass media and other group approaches to communicate basic messages about available technology and better farming systems.

Correcting Distortions in the Land Market

Full-fledged land reform is difficult to enact and can be considered only after a comprehensive study of costs and benefits. Some important measures can be implemented immediately, however. Foremost is providing security of tenure to many farmers, especially tenants-at-will, thereby improving responsiveness to incentives and creating better incentives for long-term investments. Property rights can also be reinforced by improving and streamlining land registration by establishing a system of permanent title deeds. Finally, the government needs to consider eliminating artificial incentives to large holders, such as low machinery prices and unequal access to credit.

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Comments

1.

The thrust of Mr Rashid Faruqee's paper is: how the agriculture sector has performed in the past, prospects in the future issues and constraints facing the sector and strategic reforms to boost its performance in the future. He points out that historical growth rate in agriculture has been around 3 to 4 percent per annum which in view of the comparatively better endowment of natural resources could have been higher. In view of the higher growth rate in population it is imperative to accelerate the growth rate in agriculture sector. In the past increase in agricultural production has been achieved through extending margins of cultivation rather than crop intensification, and technical progress has been slow. In view of the limited scope for increasing irrigation water there is not substantial potential for horizontal expansion in cultivated area. Accordingly, the sources which have previously contributed to the growth in the sector may not be relied upon in future. Thus, future growth will have to come from productivity enhancing measures and resource allocation in favour of crops in which the country enjoys a comparative advantage, Mr Faruqee has concluded.

No doubt, the scope for horizontal expansion of crop area and agricultural production is limited but there is still a vast scope for increasing farm production through the adoption of known technology and judicious mix of inputs as indicated by wide gap existing between the crop yields of 'progressive' farmers, constituting around 30–35 percent of the farmers, and the vast majority of the 'average' and 'traditional' farmers. The surveys conducted by the Agricultural Prices Commission have indicated that average yields of 'progressive' farmers because of their improved crop husbandry, judicious use of inputs, adoption of improved technology, etc. are more than double the yields of traditional farmers (relying on outdated methods and inadequate use of inputs) and 30 to 50 percent higher than those of 'average' farmers, who have not yet adopted the complete technology package. What is important in this context is to bridge this yield gap by removing the constraints and supply bottlenecks of the average and traditional farmers so as to facilitate their graduation to progressive farmers. The supply side constraints where fertilisers, quality seed, weedicides, pesticides, improved implements have been in short supply and unavailable to the vast majority of farmers at the right time have thwarted the progress of agriculture. The sector has also witnessed tremendous resource transfers to other sectors due to the manipulation of inputs and output prices as imperfect market structures and administrative interventions have deprived the sector not only of the resources but also resulted in an environment which did not foster investment, notwithstanding input subsidies which have also been phased out.

The domestic resource cost co-efficient quoted in the study to indicate the comparative advantage of various crops are almost 10 years old and may have become irrelevant in view of the significant changes experienced in the technical environment coefficients of many crops as well as the substantial changes in the input and output price regimes, both economic and financial, during the intervening years.

The author has identified the resource constraints in agriculture as: (i) inappropriate use of land, partly because of inappropriate incentive policy; (ii) a pattern of land concentration and the absence of secure tenure; (iii) problem plagued irrigation system; and (iv) inadequate human resources and infrastructure.

It may be noted that use of land is conditioned/predicated by a number of technical, social, institutional, cultural and economic considerations. No doubt, economic considerations and incentives have profound impact on resource allocation among competing crops but in developing countries where markets are undeveloped, considerations of food security, risk aversion etc. also play important role in this context. The irrigation system has suffered much because of inadequate investment for its maintenance and poor enforcement of the rules, and deteriorating law and order situation in the countryside. Those dominating the rural landscape have also deprived the tail enders of their water share. The agriculture sector has suffered and continues to do so because of the tremendous drain of resources/capital, both human and physical, on account of a number of push and pull factors. Thus, to improve the policy environment and remove the distortions, the author has rightly pleaded for redefining the role of government and limiting it to ensure the smooth functioning of markets and promote private sector activity. Reforming policies that impose indirect tax on agriculture may result in higher response than those reforms aimed at direct interventions alone, the author contends. No doubt it is imperative to provide a conducive environment for the participation of private sector in the marketing of farm inputs and outputs. But, at the same time, it ought to be recognised that the presence of public sector to prevent the exploitation of the small and marginal farmers by the dominating class of processors and their cartels in situations of market failure has been a crying need of the growers. There has been a number of instances when the traders and processors have manipulated the market to their own advantage but at great cost to the growers. It is going to take considerable time to completely phase out the public sector from the marketing of inputs and outputs which has assumed a critical role in the quest for commercialisation of agriculture. In fact, the presence of public sector organisations in agricultural marketing may be helpful for promoting agricultural growth as left to the vagaries of market functionaries, farmers get a raw deal. The development of physical and institutional infrastructure to support commercial agriculture is going to take time.

The recent experience of structural reforms has provided mixed results. As the input subsidies were phased out, the prices of inputs have increased. However, the

output prices have not increased proportionately and lagged behind. Accordingly, the terms of trade of agriculture sector have deteriorated. With the increasing power tariff, the economics of tubewell irrigation has been adversely affected. Resultantly, many tubewell owners have had either to give up their tubewells or switch over to other sources of energy. In the wake of down-sizing, a number of public sector institutions serving agriculture have been closed. Research organisations facing the resource crunch have not been able to recruit scientific manpower, adversely affecting their activities which have also suffered due to the inadequacy of operational funds. Some of the macro-economic policy targets may have been achieved but what has been the social and economic cost at the micro level is not definitely known. As the instability in the agriculture sector in the 70s could be related to uncertainty characterising the production relationships and policy environment facing the sector at that time, instability in agricultural production during the 90s could be attributed, to a large extent, to the policy environment characterising the marketing of farm commodities.

For sustainable growth in agriculture, it is imperative to provide a conducive environment for farm investment and to have a continuous stream of new technologies, techniques and innovations which will require adequate investment in research and development activities. Regular monitoring of developments and analysis of emerging issues will need development of indigenous institutional capacity to provide policy guidelines. A pragmatic approach based on ground realities rather than a dogmatic one is the need of the hour.

Before concluding my comments, I would like to thank the Organisers of the Conference for inviting me to discuss an interesting paper.

Abdul Salam

Agricultural Prices Commission,
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2.

It is a neat paper in an important area. However, because it is based on data up to 1994-95—and there have been important changes in the agriculture sector since then, the conclusions drawn in the paper may not be valid any longer. As Dr Faruqee has already pointed out that the paper is based on a book being published, one did not expect analysis of most recent data anyway.

Rashid Faruqee relates performance with strategic interventions in the agriculture sector and examines growth rates and swings in the agricultural output over time in various crops. As the data relate only up to 1994-95, the paper tries to examine factors responsible for an increase in the share of cotton production. Cotton's share in the agricultural output went down up to the year 1998-99, and has started rising only in recent years. It would have been useful to examine trends in the subsequent period.

The average growth rates may conceal more than they reveal because of wild swings from year to year. It would be interesting to analyse dispersion around the mean as well. To what extent dispersion in the growth rate in a particular time-period is reflective of the incentives to the farmers will be of crucial interest.

While the analysis of the share of crops versus livestock is interesting, there is a need to examine if the share of livestock is not overstated. It needs to be understood that the fodder crops are excluded from estimates of the value-added of the crop sector, and this underestimates the output of the crop sector. Because fodder as an input is not considered, the share of livestock in the value-added of the livestock is overstated. While trends in the share of crops vs. livestock need to be analysed, it is pertinent to ask: Why are people moving towards the livestock instead of the crop sector? Is it because they get a better price for livestock as compared to crops?

Three types of results seem to contradict each other, viz., low-yield across all crops, stagnant productivity, and DRCs showing highly efficient agriculture. These seemingly contradictory results can be reconciled. If we are efficient producers of almost all the crops, such as sugarcane, why have we not been able to increase the production per acre up to the international level. What constrains the increase and why has there not been any improvement in the productivity? It needs to be noted that while every exporting country is subsidising agriculture, Pakistan is discriminating against it. This is because we have not provided them the international market prices and, correspondingly, they have not been able to increase the inputs to obtain optimal output per acre. Why is total factor productivity not increasing? Given the same technology, a change in prices with the diminishing return results in a decline in productivity. Obviously, if computed total factor productivity is stagnant

following an increase in the use of inputs as a result of increase in prices, it does indicate an improvement in technology. To what extent has the setting in of diminishing returns been counterbalanced by an improvement in technology needs to be ascertained.

The main thrust of Dr Faruqee's paper is that the production decisions should be left to the private sector, and that it should intervene only when there is a market failure. Of course, that is what the economic theory suggests. That research and extension should be in the public sector is reflective of market failure, and everyone agrees with it. But why is the fixation of prices and procurement by the government not considered a market failure? If the price overshoots, why can't it be called a market failure and why should there be no government intervention? Can it be argued that there is no need for government intervention even when the market signals are imperfect? The market structure has to be relevant for both the producers and consumers. It must reflect long-run prices and a movement towards equilibrium. If one cannot predict prices with reasonable degree of accuracy, there is a case for public intervention.

There is a lot of talk about the cost of public intervention, in terms of the losses a public corporation sustains. When the public sector has to intervene and buy at a price higher than that prevailing in the market, losses cannot be avoided. Probably, what needs to be discussed is not whether to intervene or not, but how we can make the intervention more efficient.

Irrigation facilities have increased productivity over the last ten years. The latest estimates show that there has been a decline in water availability. That may continue because of siltation and all sorts of related problems, and consequently the availability of water may go down. Ten percent increase in irrigation suggested by the author, however, requires massive investment.

In his paper Dr Faruqee presents demand projections, but one wonders if the estimates given in 1988 are still relevant. Overall, this is an interesting paper that needs to be updated.

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