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AGRICULTURAL GROWTH  
AND ECONOMIC DEVELOPMENT:  
THE CASE OF PAKISTAN

by

Naved Hamid and Wouter Tims

Research programme on:  
Changing Comparative Advantage in Food and Agriculture

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# AGRICULTURAL GROWTH AND ECONOMIC DEVELOPMENT

## The Case of Pakistan

*by*

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- \* The authors wish to record their gratitude to Sartaj Aziz, formerly the Minister of Agriculture and Chairman of the National Commission on Agriculture, for his assistance and comments

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## SUMMARY

This study examines the role of public investment in determining the pattern of agricultural development in Pakistan. The focus is on investment in irrigation, which is seen to be the key to providing food self-sufficiency and allowing Pakistan to sustain a flows of net agricultural exports. Together with the physical and institutional infrastructure supporting agriculture, these investments set the stage and the pattern for the country's economic development.

Agricultural development in Pakistan has in the past century and a half been driven mainly by horizontal expansion: increasing the area under the plough by increasing water control. Since the late 1960s, intensification has increased, though this has remained limited to individual crops and has not evolved into a broad strategy. Because of the environmental and other limits to further expansion of controlled water flows, the future calls for a strategy of more efficient use of available land and water, and a more comprehensive approach to the entire rural and agricultural system.

## RÉSUMÉ

Cet ouvrage étudie l'influence de l'investissement public sur le mode de développement agricole au Pakistan. Il met l'accent sur l'investissement dans l'irrigation, qui paraît être la clef de l'autosuffisance alimentaire et de l'existence d'un flux net d'exportations agricoles pour ce pays. Liés aux infrastructures physiques et institutionnelles en faveur de l'agriculture, ces investissements marquent une étape dans son modèle de développement économique.

Le développement agricole du Pakistan s'est principalement fondé, au cours du siècle et demi passé, sur une "expansion horizontale" consistant à gagner sur l'eau des surfaces arables. Depuis la fin des années 60, les méthodes intensives ont pris le relais, limitées aux exploitations individuelles et, de ce fait, à petite échelle. En raison des diverses contraintes, notamment environnementales, qui limitent l'extention de la maîtrise des eaux, une stratégie d'utilisation plus efficace des terres et des eaux disponibles s'impose pour l'avenir, ainsi qu'une approche plus compréhensive du système rural et agricole pris comme un ensemble.

## PREFACE

The Development Centre's 1987-89 programme on "Changing Comparative Advantage in Food and Agriculture" brought together analysis of the policies influencing international interactions with those affecting agricultural development on the national level. In this case study, Naved Hamid and Wouter Tims have focused on the factors affecting comparative advantage in Pakistan.

The study analyses the wide range of factors which have shaped the development of Pakistan's agriculture, and provides important perspectives on the significance of different policies. In particular, the importance of government investment in this sector of the economy is emphasized. Investments in the past — notably in irrigation canals, infrastructure and land improvement — created comparative advantage out of desert tracts.

The study builds on the impressive foundations of the research conducted in Pakistan by the National Commission on Agriculture, with which both of the authors were associated. In analysing the factors underlying Pakistan's comparative advantage they provide an important additional contribution to the policy debate. The policy relevance of this study, however, extends well beyond Pakistan. The strong conclusion is that public investment can play a pivotal role in generating and enhancing comparative advantage. The study shows that to ignore the government's part in contributing to change is to omit the key actor from economic analysis. The factors underlying Pakistan's economic growth and agricultural development provide original and policy-relevant insights of far reaching significance.

Louis Emmerij  
President  
OECD Development Centre  
March 1990

## INTRODUCTION

How then do they live? The answer is by the rivers, and by the rivers alone.

But for them the whole tract would be a wilderness.

(Sir Malcolm Darling: *The Punjab Peasant in Prosperity and Debt*, Oxford 1925).

The natural conditions of Pakistan put severe limits on its capacity to support a human population. Over a century of investments in harnessing its major rivers, however, has enabled the country to provide adequate food and work to more than a hundred million people and even sustain a flow of net agricultural exports. Together with the physical and institutional infrastructure supporting agriculture, these investments have set the stage and the pattern for the country's economic development. Since independence in 1947, investments in water supplies have continued to a point where further major additions are unlikely because of environmental risks. Protection of catchment areas and more efficient water use are commanding more attention than the expansion of controlled water flows.

### **Agriculture, Employment and the Rural Economy**

Agricultural growth between 1960 and 1985, measured in value added terms, was maintained at about 3.8 per cent per year, which is among the highest observed during that period in developing countries. Agricultural employment rose by 2.1 per cent per annum in the period, about equal to the growth of the rural labour force, implying an annual increase of labour use per cropped hectare (accounting for higher intensity of land use) by 0.9 per cent per year. Apparently, the changes in production patterns in agriculture and the introduction of new cropping technologies had a net positive effect on labour use per cropped unit of land, and at the same time the higher output reflected a significant increase of labour productivity.

The growth of demand for agricultural labour, particularly when measured per unit of cropped land, has been closely associated with the technological transformations of the past 25 years. The higher yields led farmers to recover land previously rented out to tenants. Land owners found it more profitable to mechanise their operations and use family labour. As a consequence, the need for tenants and hired labour declined, except for casual labour in peak seasons.

There were offsets, however, to these developments. Employment was created by the growing number of tubewells (currently around 250 000). The larger output required more labour for post-harvest operations, transport and processing, in particular because the marketable surplus grew more rapidly than the volume of total output. These employment gains may have more than compensated for the negative impact of the shift away from tenancy to owner operations.

In any case, rural wages have gone up in real terms in recent years, suggesting that labour is becoming less abundant. Although increased labour demand appears to be part of the reason, especially in the livestock and non-agricultural sectors, there has also been some reduction of labour supplies. The heavy migration to the Middle East clearly played a role, both because of the direct reduction of domestic labour and the diminished need to find work for those rural families benefiting from remitted earnings.

No noticeable progress has been made over the past 25 years in rural education: literacy has remained at a low level, even compared to that of other countries at the same or lesser stages of development. This is a major handicap for the lower income strata, even if the labour market develops in a manner that promises reasonably full absorption of supplies. Also, health extension services are scarce and in most cases inefficiently used. Access to rural health facilities appears in fact to have declined.

There is a remarkable contrast in Pakistan between the attention paid to the improvement of its agricultural base and on-farm capitalisation and the relative neglect of the supporting environment. Little care has been given to people or the social infrastructure. Lately a better balance has been sought or has come about naturally. The time of the large irrigation investments has come to an end, because of both physical and political constraints. Also, during the Sixth Plan (1983-1988) the Pakistani Prime Minister launched his five-point programme that focused on rural roads, education, health, water supply and housing. It consisted of about half of all public sector development outlays. It is not certain that the programme will continue under the new government, but even if it does, it will take time and considerable effort to correct Pakistan's imbalance.

### **Agricultural Price Policies**

Since independence, governments have adopted policies that maintained low domestic prices for agricultural products, helping both the consumers (including industrial users like the cotton textiles industry) and the government (in the case of exports — except where self-sufficiency was not reached and imports were required). More recently, the government has also borne the costs of domestic price stabilization in the face of fluctuating international prices.

Agriculture was always the main export sector, so the use of currency overvaluation, export taxes, high tariffs and quantitative restrictions on imports was an almost classic case of turning the terms of trade against agriculture to promote manufacturing. Domestic industry responded to this sector's high profitability, and large-scale manufacturing grew about 23 per cent per annum between 1949/1950 and 1955/1956. The growth was led by cotton textiles, with yarn and cloth production increasing 50 and 40 per cent per annum respectively. By the mid 1950s almost all the domestic demand for mass consumption items like textiles was met by local production.

The agricultural sector paid a heavy price for this industrial development. Transfers from agriculture to the rest of the economy were over 30 per cent of the value added in agriculture around 1955. In the second half of the 1950s, following the devaluation in 1955, agriculture's terms of trade improved somewhat, and around 1959/1960 agriculture probably transferred over 15 per cent of its value added.

During the 1950s, the agricultural sector in (West) Pakistan grew at about 1.5 per cent per annum, with almost the entire increase coming from expansion of cropped area. This was well below the population growth rate, and as a result export surpluses were eroded and food deficits emerged in a region that prior to partition was the bread basket of the subcontinent. The high growth rates (over 7 per cent per annum, of which only about half came from expansion of area) across the border in the Indian Punjab during this period indicate that the poor performance on the Pakistani side was not due to a bad weather cycle or other natural factors.

In the 1960s the situation changed. Price-related transfers as a proportion of the agricultural value added were less than 9 per cent in the 1960s, compared to 15 to 30 per cent in the 1950s. Moreover, these were largely compensated by massive public sector investments in agriculture and water (over 45 per cent of the total public investment in the economy) during this time. The reduction in transfers out of agriculture in the 1960s resulted in an upsurge in private investment in agriculture (over 70 000 private tubewells were installed during the decade) and improvement in the agricultural growth rate. In the first half of the 1960s this rate was just under 4 per cent per annum, and in the second half of the decade it increased to over 6 per cent per annum. The improvement was chiefly due to the introduction of High Yield Varieties of wheat (1966/1967) and rice (1968/1969), but undoubtedly the impact of the new varieties would have been weaker if returns did not support the investment in private tubewells.

In the 1970s price-related transfers out of agriculture increased again to almost 23 per cent of agricultural value added in the period 1971-1975. After the 1972 devaluation, gains were appropriated by the government through export duties and establishment of state monopolies in export trade of rice and cotton. This was reflected in much larger negative rates of nominal protection for all crops. Similarly, there was a large implicit tax on irri rice that was particularly unfortunate because it discouraged the adoption of HYVs of rice, while across the border in the Indian states of Punjab and Haryana, the new rice varieties were largely responsible for sustaining the momentum of the green revolution through the 1970s. In Pakistan, this momentum was lost and the agricultural growth rate for 1971-1975 fell to less than 1 per cent per year.

In the second half of the 1970s the transfers were somewhat smaller in absolute terms and as a proportion of agricultural value added they declined to 18 per cent. This amelioration was principally due to higher subsidies on fertilizer and other agricultural inputs. The Tarbela Dam was completed during this period, adding considerably to water availability, and as a result cropped area expanded at 1.8 per cent per annum. The agricultural sector growth rate also rose, to 3.9 per cent per year, with yield increases coming primarily from wheat and irri rice.

In 1980, a new agricultural policy was announced. One of its objectives was to "promote agricultural development by gradually increasing domestic agricultural prices to bring them at par with world prices." In 1981, an Agricultural Price Commission (APCOM) was established to advise the government in setting support prices for major crops. Unfortunately, APCOM adopted "cost of production" as the primary basis for its recommendations. Relative profitability of different crops and their export and import parity prices were also calculated, but this information was mostly ignored. Consequently, APCOM has done little to reduce transfers out of agriculture; in fact, these transfers actually increased from 1981 to 1985 to about 20 per cent of the agricultural value added.

It seems that Pakistan's agricultural growth, though impressive, has been below potential since 1947, except during the 1960s. To argue that large transfers of resources out of the agricultural sector had little effect on its growth would require the assumption that either investors in the agricultural sector are not sensitive to returns in the sector, or that agricultural growth is independent of investment. Both assumptions seem unreasonable but have been implicit in the thinking of economic policy makers in Pakistan. The belief that the farmers' propensity to save (and invest) was low was obviously wrong. It was based on the idea that farmers were generally backward producers of crops for household subsistence, and overlooked the very uneven distribution of land ownership. The idea that farmers were not price-responsive or innovative was partly based on the same simplistic model and proven wrong in the 1960s. However, Pakistani planners continued to follow discriminatory price policies



towards agriculture even after those years. A possible explanation for this can be traced to the linking of agriculture to external markets. Exports remained dominated by the agricultural sector and export pessimism was the dominant view, suggesting that a more favourable price policy would not generate more foreign exchange earnings and that development strategies requiring much foreign exchange input should be eschewed.

Finally, not only did the government's price policies slow down agricultural growth but their impact on income distribution was negative. Average per capita income in rural areas (where 70 per cent of the population resides) is currently less than half that of urban areas, and value added per worker in agriculture (which employs 50 per cent of the labour force) is less than one-third that of the rest of the economy. Thus, by suppressing agricultural prices and transferring income from rural to urban areas, the government made the income imbalances worse.

As for price variability, there is no doubt that government intervention insulated farmers from international price fluctuations, especially in the case of sugar, irri rice and wheat. Intervention had a positive effect on the growth of the agricultural sector because better price stability meant less risk and uncertainty, and thus encouraged farmers to buy more inputs and adopt new technology more rapidly. However, it is difficult to assess the benefits of government price interventions.

### **Technological Developments**

Technological developments have been a primary reason for the changes in cropping patterns made possible by increased irrigation water supplies. Improved seed varieties were initially confined to wheat, in later years to rice and cotton, and this damaged the relative profitability of other cereals and pulses. Price policies played a role as well, notably for sugarcane. Technological progress is subject to constraints, as the physical and climatic conditions differ considerably from one part of the country to another. Cropping patterns and crop rotations are therefore quite specific to each area.

Wheat is Pakistan's major crop, occupying more than 35 per cent of total cropped area. It is the basic staple food for its entire population, accounting for one-third of all household expenditures on food and one-sixth of total household consumption. Wheat provides fully half the average person's calorific intake. These features justify the characterisation of Pakistan as a "wheat economy," as well as the attention paid to wheat by Pakistan's government.

Between 1965 and 1970 there was a breakthrough in the production of this grain, with about half its planting area using new varieties, a quadrupling of total fertilizer use and a 50 per cent increase in average yields per hectare. The attractiveness of new wheat varieties compared to other rabi crops grew and led to a 20 per cent increase of acreage under wheat, partly at the expense of minor cereals.

Wheat yields continued to rise after 1970, though less dramatically. Between 1959 and 1985, production went up by 5 per cent per year and yields by an average of 3.4 per cent. Wheat imports rose in the early 1960s to more than 20 per cent of total availability, declined gradually to less than 5 per cent in the early 1980s and are currently negligible, self-sufficiency having virtually been achieved. The most important change, however, was the shift from an almost exclusive reliance on increased acreage to an awareness of the much greater potential for yield increases as the engine of agricultural growth.

This new approach was not limited to wheat, but included more and more crops, notably rice and cotton. Price and subsidy policies were used from the beginning.

The government raised the procurement price of wheat about 26 per cent before the 1967/1968 rabi season, resulting in a domestic price well above the international one, and guaranteed that the price would be maintained in real terms for at least the next three years. As a consequence, for five years the domestic price of wheat exceeded the border price (at prevailing exchange rates) whereas the opposite was true for almost all other major crops. This enhanced the relative returns of growing wheat and had a significant impact on wheat acreage and the rate of adoption of the new technology.

Subsidy policies were not crop-specific but basically concerned the major inputs: fertilizer, water and credit. Still, most of these subsidies benefited the wheat crop, as price policies particularly in the late 1960s made wheat growing and its use of inputs attractive. Well into the 1970s more than 50 per cent of total fertilizer used in Pakistan was applied to the wheat crop.

Further improvement of wheat yields is hampered by the competition of other valuable crops, particularly on smaller farms, which usually have a much higher cropping intensity. Growing several crops in succession between seasons puts severe strains on the farm economy at planting and harvesting time, and the problem can be solved only by sacrificing part of the output from each crop to maximize the total return from each cropped hectare.

Crop-centred policies have drawbacks when distinct regional cropping patterns are used. Research to improve wheat varieties has focused on drought and pest resistance and a shorter growing season that suits the cropping pattern. Similar efforts for competing crops have not been made, even though these could be equally beneficial. Expansion of wheat production has been at the expense of minor foodgrains which, because of lower market prices, were important in the diet of the landless poor. It has also led to smaller production of traditional oilseeds that used to be intercropped with wheat varieties. Finally, it has reduced the growing of rabi fodder crops, with an erosion of the nutritional value of animal feed.

The country is now faced with a growing import dependence on fats and oils that will take long-term efforts to overcome. At the same time, the demand for livestock products is accelerating and no real attempts have been made to insure supply. A more coherent policy to promote agricultural growth could have shown better results even in wheat production. It is estimated that under the existing crop systems and with the available varieties, yields could still be increased by 40 per cent, particularly by replacing older strains with more resistant and shorter-growing ones.

The most troublesome area remains livestock and its products. Research is needed to introduce higher-yielding fodder crops, the quantity of animals needs to be limited and their productivity raised, trade measures need to be promoted that exclude valuable feed exports to the EEC and include imports of oilseeds (rather than oils) to generate more feed supplies. In addition, the entire network for processing and marketing livestock products is highly deficient and must be reorganised to promise maximum benefits to small livestock owners.

## **Future Trends and Policies**

Rapid population growth and the limited scope for expansion of cultivated area and irrigation water supplies will affect Pakistan's agricultural development over the next ten to fifteen years. Current estimates put population growth at 3.1 per cent per annum. It will require substantial effort to reduce this to a more sustainable rate. Meanwhile, it is unlikely that the expansion of cultivated area can be maintained — 1.4 per cent per year (though gradually declining) over the past 25 years. Since 1980, expansion has been only marginal. If Pakistan took all available opportunities to increase the flows of

irrigation water, while accounting for certain factors that are bound to reduce that flow in coming years, cultivated area could increase at most by 1 per cent yearly. Even that modest rate could be achieved only with high, continuous investment in water conveyance, drainage systems and better water use efficiency.

Past yields and productivity trends, combined with possible area expansion, would provide barely 3 per cent growth per year, or just enough to maintain current food supplies on a per capita basis. This presents the risk that import dependence on vegetable oils and fats, sugar and dairy products increases or extends to other commodities. Higher incomes, particularly for lower income groups, will raise food demand above domestic production, causing a drain on the balance of payments or rising relative prices of agricultural products. Also, at this rate of agricultural growth there is hardly any room for diversification towards higher value added crops and livestock products.

The plans for economic growth in Pakistan that are sometimes proposed and adopted usually overlook the fact that they require a considerably faster agricultural development than the 3 per cent apparently feasible with available irrigation water supplies and past yield trends. Past performance suggests GNP growth in the coming years of around 6 per cent per annum. To satisfy domestic demand for agricultural products and at the same time improve the sector's contribution to exports and the overall trade balance requires agricultural production growth of 4.5-5 per cent per year.

There are no easy answers that indicate how to achieve this figure. It will undoubtedly call for intense investment, better agricultural and macroeconomic policies and stronger institutions. Choosing a strategy will demand an assessment of the international climate for trade in agricultural products, the country's export potential, its need of foreign exchange and the possibility that significant agricultural policy adjustments will be agreed to as part of the present Uruguay Round of Trade Negotiations.

### **The External Setting**

Pakistan is heavily dependent on its agricultural sector for foreign exchange earnings. When exports of raw and processed agricultural products are counted — including the raw material content of yarn and cloth — the sector provides up to 70 per cent of export earnings from merchandise trade. Two commodities — rice and cotton (including processed products) — account for three-quarters of all agricultural exports. The remaining quarter consists of a variety of commodities including leather, wool carpets, fruits and vegetables. Merchandise export earnings are therefore quite vulnerable to international prices of cotton and rice, as well as protective policies for textiles in the industrial countries. Still, export volume growth has amounted to an impressive 5.2 per cent per year over the past 25 years.

Estimates of domestic resource costs of major agricultural commodities seem to support the view that Pakistan's agriculture is efficient at world prices. This presumption of competitiveness is given credibility by the simple fact that agricultural production and exports have grown so much. Policies no doubt retarded growth and depressed the value of agricultural land (and possibly rural wages because of income transfers from rural to urban areas). With these responses to negative protection taken into account, however, a margin of profitability remained for most major crops.

Comparative advantage questions concerning agricultural products in a country at Pakistan's level of economic development are difficult to address. A general decline in international prices for agricultural products will cause a terms-of-trade loss, necessitating exchange rate adjustments and cost reductions. Like small farmers who

cannot afford to lose their food supplies, the country as a whole cannot afford to lose competitiveness in international agricultural markets.

### **Meeting the Demands**

The growth of domestic demand for food is central in agricultural production forecasts. An increase of consumption by 4.5 per cent per year implies at least the same growth of production, even more if there is an increased demand for livestock products or stronger promotion of agricultural (net) exports. The National Commission on Agriculture, which submitted its report in April 1988, analysed the bottlenecks to yield growth for each agricultural commodity and recommended ways to cope with them. In each case it laid out programmes in which public and private sector roles are clearly identified.

Apart from the obvious need for better varieties of crops, improved animal breeds and efficient use of water, fertilizer and other inputs, there has been room for improvement in the physical and institutional infrastructures supporting agriculture. The National Commission on Agriculture report is not limited to irrigated crops, but for the first time provides a detailed analysis of the livestock sector, the use of rainfed lands, range and watershed management. It considers the problems of small farmers, the provision of rural non-agricultural employment, land reform and the organisation of agricultural marketing and processing. It creates agricultural strategy within the context of rural development, going well beyond the scope of a traditional sector study.

Agricultural development in Pakistan in the past century and a half has been driven mainly by horizontal expansion: widening the area under the plough by increasing water control. Since the late 1960s some successful attempts have been made towards intensification, but it has remained limited to individual crops. Restrictions on extensive growth call for more intense cropping, more efficient use of available land and water, and the broadest possible approach to the entire agricultural production system.

Technological and institutional barriers need to be crossed when implementing a new strategy, and this directly concerns the government, as recently acknowledged by its National Commission on Agriculture. Capital scarcity demands an approach that raises yields faster than capital inputs. Extensive growth requires many people doing the same work over a wide area, but intensification can succeed only if the quality of the farming population is high. Agricultural development greatly depends on improvements in education, organised networks, communication of knowledge and co-operation at the village level. Pakistan's people have traditionally been dependent on water. Assuring they make the best use of it in the years ahead puts a high priority on investments in Pakistan's human resources.

## THE PAKISTAN ECONOMY

### **Introduction**

After British rule came to an end in 1947 and Pakistan was carved out from the Indian subcontinent as a separate Moslem state, doubts about its economic viability were strong. It was a poor country with few natural resources, two provinces divided by cultural and language differences and 2 500 kilometres of Indian territory. The tenuous relationship between the two provinces broke down in 1971 when Bangladesh established itself as an independent nation, and Pakistan was reduced to its present borders.

The creation of a distinct Moslem state was disruptive for traditional economic relations. The Punjab, which became a large part of Pakistan, had for decades provided surplus food to other sections of the subcontinent. Cotton production in that region used to supply textile mills, most of which ended up on the Indian side of the border at the time of partition. A similar situation existed for jute, mainly produced in what is now Bangladesh but processed in mills in the Calcutta area. Separation also led to flows of refugees in both directions, resettlement problems and even bloodshed. Many of today's ethnic tensions and outbursts can be traced to these upheavals.

Development of the economy was a priority from the beginning. A government administration was established to ensure stability and a minimum of economic organisation. The tradition of law and order left over from the colonial period led to direct government controls and interventions through licensing, quotas, permits, etc. Still, a substantial part of economic activity remained in the private sphere, in trade, banking and industry. Manufacturing production expanded rapidly, initially concentrating on textiles but eventually diversifying behind protective barriers. Government attitudes and policies have coexisted with a dynamic private sector, but their relationship has always been uneasy. Nationalisations and unforeseen market interventions have occasioned private risk assessments that have hampered investments except when quick returns could be made.

For a country with limited resources and political uncertainty there has been surprisingly good economic performance, characterised primarily by an average rate of growth since independence of more than 5 per cent per year with some acceleration over time. First the strongest impetus came from industrial production growth, but from the mid 1960s agricultural growth took over. Rapid economic improvement should, however, be compared to population growth that amounts to almost 3 per cent per annum on average. With the low *per capita* income base at the time of independence, economic performance has not been good enough to lift Pakistan out of the category of poorest countries.

Economic growth has not been accompanied by much improvement in the main social indicators. Literacy and education levels have remained very low; most health indicators show only modest gains and both rural and urban housing and sanitation facilities have remained far below reasonable minimum standards. The strict limits on land for agricultural uses and its skewed ownership distribution have contributed to increasing rural landlessness and urban drift. Although public sector plans have consistently stressed the need to address these issues more effectively, actual policies have not shown the same inclination. Government resources for development have been chronically short, partly because of the perceived need for a strong defence and

partly because the government's interventionist stance has not always encouraged resource mobilisation or increased investments.

In recent years there has been a gradual shift away from direct economic controls towards more reliance on the private sector and on less constrained market forces. More frequent exchange rate adjustments, an end to government trade and export monopolies, tax reform and reduced border protection are the most visible signs of this policy change. These measures are intended to provide more incentives to investment and exports, ameliorate government resources and improve the living conditions of a rapidly growing population.

Notwithstanding the diversification of past decades, the agricultural sector has remained the backbone of the economy in terms of employment, exports and the supply of raw materials to industry. At the present stage of economic development in Pakistan and with further policy changes to be expected in coming years, critical issues have been raised concerning the future role of agriculture within the economy.

### ***The Agricultural Base***

The arid climate in most of Pakistan limits capacity for agricultural production and indeed the support of a human population. What little rainfall occurs is unreliable. The fact that today more than one hundred million people live there and that the country is a net exporter of agricultural products is the result of a century of efforts to harness the country's rivers and underground water resources. The Moghul emperors had already begun irrigation in the Southern Punjab over 300 years earlier, though more for their personal enjoyment than for public benefit (Darling, 1925, p. 112). After the Punjab came under British governance in 1849, canal construction advanced quickly, and has continued to the present day. It has become the world's largest contiguous irrigated area.

The importance of investments, both public and private, to improve the farming infrastructure hardly needs to be emphasized. They are not restricted to supplying irrigation water but provide for transport, storage and marketing and initiate credit, research and extension. They have permitted the horizontal expansion of agriculture as well as higher cropping intensities, and have opened the door to new technologies.

Investments are the origin of the agricultural transformation that has taken place in Pakistan during the past 40 years. Whether or not investments created new comparative advantages can be deduced from looking at the policies and development strategies adopted over the years. These often show whether the best use was made of comparative advantages and whether producers were made sufficiently aware of them.

The changing physical environment and government policies have determined the pattern of agricultural growth, especially the adoption of new cropping technologies. They have also influenced changes in the patterns of land tenure and ownership, the size of holdings, farm productivity and the generation of employment. The next section of this study explores these developments.

### ***Building the Conditions for Agricultural Growth***

At the time of independence in 1947, Pakistan already contained almost 11 million hectares of cultivable land that was commanded by irrigation systems from the Indus river and its tributaries. The country also inherited a mostly domestically staffed institutional structure capable of managing these systems. This made it possible to continue the expansion of the irrigated area after 1947. A barrage built on the Indus

permitted the completion of a new irrigated tract and three more barrages were constructed with canal supply systems.

A number of irrigation systems received their water supplies from headworks in India. Conflicting claims to these supplies were resolved in 1960 when both countries signed the Indus Water Treaty. The World Bank led a special consortium that committed substantial sums to Pakistan to give up all rights to the waters of the three easternmost rivers while retaining full rights to the other major three, including the Indus itself. Engineering solutions were designed to transfer water from the latter three to feed the canals that had relied on the three eastern rivers. The treaty provided for the construction of five new barrages, eight link canals and one syphon, besides the remodelling of some existing canals and barrages.

The treaty also provided for the construction of dams and reservoirs on the Indus and Jhelum rivers. This would improve the water supply that was so scarce during winter months, but at the same time would require considerable irrigation development and the replacement of water transferred to India. The storage facilities became operational in 1967 and 1976, adding new irrigation supplies and increasing the flexibility of the entire system.

The Indus Waters Treaty allocated water rights to Pakistan amounting to an annual average surface flow of around 140 million acre-feet (MAF)<sup>1</sup>. At independence about 64 MAF were diverted into the canal systems; after the commissioning of Tarbela Dam on the Indus this rose to an average of 104 MAF and, in good years, about 110 MAF. Diversions in the kharif (summer) season increased after 1975 by about 15 per cent and rabi (winter) diversions by about 50 per cent, permitting a considerable increase in cropping intensities.

The magnitude of these efforts is demonstrated by the claims that investments in agriculture and irrigation made on public resources. In the First Plan period (1955-1960) when most activities consisted of the completion or implementation of pre-independence projects, agriculture and irrigation took close to 30 per cent of public investment. In the Second and Third Plan periods (1960-1970) when the Indus Water Treaty was put into effect, this share went up to 46 per cent. Since then, it has declined rapidly, to 17 per cent in the Sixth Plan (1983-1988). The fertilizer subsidies listed under development expenditures in the government accounts are excluded from these numbers. Although the current share of 17 per cent of public investment compares favourably to that of most other developing countries, it nevertheless suggests a failure to move from initially large but declining irrigation investments to other public sector activities directly supporting agricultural development.

Very little is known about private investment in the agricultural sector. In the mid 1960s it was estimated at around two-thirds of public investments, but data from the Agricultural Census of 1980 indicate a very slow growth since then, far behind the growth of public investment. Still, the numbers suggest that Pakistan maintained an overall level of investment in agriculture and irrigation around 3-4 per cent of its GDP and around 20-25 per cent of total investment. Investment as a proportion of GDP was highest in the 1960s, but has since fallen to between 16 and 18 per cent. Irrigation investment declined as a percentage of total public investment, as indicated above.

Private investment has contributed significantly to irrigation potential. Large sections of irrigated areas were found to be underlaid by a vast aquifer of groundwater that has increasingly been tapped as a source of water supplies. As there is substantial loss of surface irrigation during conveyance through seepage to the subsoil, the aquifer is not only tapped but replenished. Public tubewells have played a role in supplying groundwater, but private tubewells are dominant and number around 250 000. Public tubewells are gradually being phased out. Table 1.1 presents an overview of water

Table 1.1: WATER SUPPLY AND IRRIGATED AREA

	1960-61	1967-68	1977-78	1985-87 average
<b>Farm gate availability of water (in MAF<sup>1</sup>)</b>				
Canal supplies	48.4	56.8	61.6	61.4
Public tubewells	0.5	2.0	6.2	8.8
Private tubewells	3.7	9.8	21.6	32.1
<b>Total</b>	<b>52.2</b>	<b>68.6</b>	<b>89.4</b>	<b>102.3</b>
<b>Growth rate of water supply (% p.a.)</b>				
	3.9	2.7	1.6	
<b>Irrigated area (million acres)</b>	<b>25.7</b>	<b>30.9</b>	<b>35.1</b>	<b>39.8</b>
<b>Growth rate of irrigated land (% p.a.)</b>				
	2.7	1.3	1.5	
<b>Average water supply (feet/acre)</b>	<b>2.0</b>	<b>2.2</b>	<b>2.6</b>	<b>2.6</b>

1. MAF: million acre-feet.

Source: Report on the National Commission on Agriculture, Government of Pakistan, March 1988.



supplies reaching the farm gate from different sources over the years and the changes this brought about in water availability per cropped acre.

These data show first of all that canal supplies, though expanding, contributed less than 30 per cent of the increased farm-gate availability of water over the past 25 years. Their contribution is larger if independence is taken as the point of departure. The biggest contribution was made by private tubewells, with more than half the increase of total supplies. In spite of the growth of water supplies from all three sources, their overall growth appears to have slowed considerably. As land continued to be added, there was some improvement of average supplies per cultivated acre but this came to a halt after the mid 1970s.

Another factor is the large conveyance losses in the canal irrigation system mentioned above. Between the point of diversion and the farm gate, canal water losses amount to 35-40 per cent of diverted water. Not all of this is truly lost, as some is added to the aquifer, then pumped up for irrigation by tubewells. Nevertheless, this involves considerable capital and energy costs which could be partly avoided through more efficient conveyance. All public tubewells and one-third of private ones are electrically operated, laying a considerable load on power supplies generated mostly from main water reservoirs. The remaining tubewells are diesel operated and require fuel imports. As the private tubewells particularly are located close to the farmers' fields, water losses in this case are small.

For many years the public sector resisted the growth of private tubewells, ostensibly because they would pump water from the aquifer and lower groundwater tables uncontrollably. The installation of much larger tubewells by the public sector was promoted instead. Most of these were part of area development programmes, SCARPs<sup>2</sup>, that were designed to push back increasing salinisation and waterlogging in the canal-irrigated areas. Over the decades, apparently, seepage of surface water into the subsoil raised the groundwater table, bringing salts with it. Vertical drainage over large areas to lower the water table was seen as the best way to control the problem.

Interesting developments since the late 1960s, when groundwater use started in earnest, are the recent completion of a soil survey and some government decisions on groundwater. A detailed analysis of soil from the irrigated and adjacent areas has shown that salinity and waterlogging, though widespread, are less menacing in regions with good soils as was earlier suggested by the Water and Power Development Authority (WAPDA). This is the same organisation that promoted the SCARP approach to groundwater development for many years, implementing a series of large-scale area development projects. In the late 1960s when all this began, the World Bank played a decisive role by expressing its preference for public tubewell development, particularly in its report on the feasibility of the Tarbela Dam on the Indus.

The government has recently decided to change its groundwater development policies and to privatise public tubewells. The SCARP approach was designed to help saline and waterlogged areas be reclaimed and restored to full productivity. In fact it became a heavily subsidised programme for sweet groundwater development, in no way capable of competing with private tubewells. The government has focused more and more on better efficiency of water use and on the construction of surface drainage systems which can reduce the silting of the lower Indus while lowering the groundwater table and removing salts.

There are still possibilities for expanding surface irrigation. A large quantity of Indus water flows off to the sea, particularly in the summer months. Winter and early spring supplies are, however, the critical bottleneck, and expansion would require storage dams, one of which is currently under study at Kalabagh on the Indus, below Tarbela. For a number of reasons its construction may never take place. First of all, for

years there has been a dispute over the allocation of water between the Punjab in the North and the Sind to the South, a dispute that now seems almost beyond resolution. Second, the Kalabagh reservoir would flood part of the cultivated area in the North-West Frontier Province (NWFP), which makes agreement by the provincial government unlikely. Finally, it will reduce even further the outflow of river waters towards the sea, and this entails even more saltwater intrusion in the Sind's Indus delta. In the process, the mangrove swamps which have been shrinking on Pakistan's southern coast would probably disappear entirely, and the large shrimp catch in that zone, much of which is exported, would cease.

These potential problems along the lower reaches of the Indus hamper additions to surface irrigation. There are problems emerging in the upper reaches as well that threaten availability of useable surface water and supply. The hill and mountain areas are becoming more densely populated and more accessible from the plains as the road network is extended. Some of these roads were constructed primarily for military purposes but make the movement of goods and civilians (and many tourists) possible. In the river catchment areas erosion is increasing because of road construction, improper felling of timber and harvesting of firewood (exported to the plains), and overgrazing. The silt content of the runoff from these areas has risen sharply and endangers the irrigation capacity of the reservoirs, canals and diversion structures. Not much is being done to reverse these trends. Conservation and afforestation, extension services to hill and mountain farmers and area development initiatives are the responsibility of several government organisations under provincial authority, and they operate within geographic boundaries that have little to do with the location of watersheds.

Water has played a crucial role in Pakistan's agricultural growth. It has also caused a number of problems that need to be vigorously dealt with in future years. Water use efficiency is the main issue, increasingly combined with the ecological deterioration that is both cause and consequence of an improperly maintained supply system.

### ***Complementary Investments***

Most of the land now covered by irrigated crops was developed during the first half of this century. It was colonised by farmers who were carefully selected from the best agriculturists in the Punjab. As one of the colonial selection officers wrote, inspecting the would-be farmers, "A show of hands is a simple method for discovering the real workers among the community". In the first years, there was hardship in clearing the land, levelling and embanking and building the water courses. The water might not come, or it refused to run. Rebellions and epidemics also took their toll. Even when a crop did grow and there were enough hands to harvest it, it had to be moved by the same paths which the settlers took.

Much has changed since, as roads and railways now cross the agricultural regions, market towns have developed, storage has improved and an institutional structure has been established to move inputs to the farmer and to handle his marketable surplus. This infrastructure, however, has become inadequate to handle agricultural growth itself. The legal and institutional framework is outdated, and government regulation has become not only pervasive, but has made the system inefficient and in some ways exploitative.

**Roads:** An estimate presented in 1982 in the Sixth Five-Year Plan concludes that only 16 per cent of all villages in Pakistan are linked by an all-weather road and less than 30 per cent by an all-weather connection. Compared to less than 150 000 kilometres of roads of all types in that year, the need was for around three times that

much, including 350 000 kilometres of tertiary roads. The construction of a network that can integrate the majority of the villages to the outside world is a colossal task. Although the government puts a high priority on tertiary roads, only 15 000 kilometres could be built during the Sixth Plan, and the goal will not be reached until well into the next century.

**Marketing and storage:** Most of the marketing facilities in Pakistan were designed for a different agricultural economy, with much smaller flows of produce of a few staple crops. These markets have consequently grown in an unexpected way, are unorganised, congested and lack most of the basic amenities. This discourages farmers to sell there, and they employ itinerant traders instead who sell at lower prices in the villages where there is no competition. When the farmer comes to the market, he is forced to confront a lack of regulation, no produce grading, no proper information about prevailing prices and trading middlemen who thrive in such an atmosphere, charging unreasonable commissions. Tolls, market access charges and legal fees levied by the local government or marketing boards add insult to injury.

Storage facilities, mainly for staple crops, have expanded near urban centres and railway heads in the past two decades. Village storage is either primitive or nonexistent, and can cause losses in both quantity and quality. With the diversification of agricultural production into perishable horticultural products and dairy products, proper storage is a big problem, and diversification ends up being centred around cities within easy reach of fresh produce.

**Credit:** Traditionally, credit served generally negative purposes, like overcoming distress situations. To obtain loans, farmers had to deal with a fragmented market and non-institutional supplies of credit at unfavourable conditions. Improved agricultural technologies and their promotion entailed the need for production credit, preferably from institutional sources. Particularly during the last ten years, the government has made efforts to supply credit resources to farmers. As a result, the level of new credits rose from only 4 per cent of agricultural GDP in 1976/1977 to 13 per cent in 1986/1987. Nevertheless, this impressive growth cannot hide the fact that the credit level remains low and may still be one of the major obstacles to agricultural growth. At the same time, institutional credit which was practically non-existent until the early 1970s reached close to one-third of total credit outstanding in 1986/1987.

Investment distribution is skewed, with small farmers apparently having less access than larger ones. Non-agricultural rural households that now constitute more than half the rural population have fared the worst. Since credit is subsidised, demand exceeds supply, particularly in the case of interest-free loans, and in the resulting competition for institutional credit small farmers and landless households tend to be squeezed out by the larger farmers. The lack of collateral of lower income groups is one barrier to credit, but the Rural Credit Survey of 1985 reveals that this is only part of the reason and that cumbersome procedures are also responsible. Passbooks are issued stating the ownership titles of the holder and serve as a title deed for the banks. These can increase access for small farmers and avoid multiple lending to large ones. However, only 9 per cent of farmers have been able to obtain passbooks; the proportion is less than 2 per cent for those with holdings below 3 hectares. Farmers with 60 hectares and above fare better, one out of every two having a passbook.

More credit is needed, and the objective stated by the National Commission on Agriculture (1988) to raise its level to 20 per cent of agricultural GDP by the end of the century may be modest. The real difficulty lies not in its expansion but in its distribution and efficiency, and the forming of a more direct relationship between the lender and the borrower.

**Labour resources:** The most important resource in agriculture is the people who are active in it. The agricultural sector provides the bulk of employment to Pakistan's labour force, even though its share continues to decline (from an estimated 61 per cent in 1961 to around 54 per cent in 1986, for example). Data on employment and rural labour markets are scarce and not easily interpreted. Some points are still worth making here, however, particularly concerning trends in rural employment compared to agricultural development, technology choices, changes in land ownership and tenancy and labour migration.

Agricultural growth between 1960 and 1985, measured in value added terms, stood at about 3.8 per cent per year, which is among the highest observed during this period in developing countries. Agricultural employment rose by 2.1 per cent per year during the same period, about equal to the growth of the rural labour force, implying an annual increase of labour use per cropped hectare (accounting for higher intensity of land use) of 0.9 per cent per year. Apparently, the changes in production patterns in agriculture and the introduction of new cropping technologies had a net positive effect on labour use per cropped unit of land, and at the same time the higher output reflected a significant increase in labour productivity.

The growth of demand for agricultural labour, particularly when measured per unit of cropped land, has been closely associated with the technological transformations of the past 25 years. Two phases can be distinguished in this process. The first one is the well-known "green revolution" of the early 1970s, when improved seeds were introduced first for wheat and then rice. The higher yields induced farmers to recover land previously rented out to tenants. Land owners found it more profitable to operate their farms with family labour and to mechanise their operations. As a consequence, the need for tenants and hired labour declined, except for casual labour in the peak seasons.

There were, however, offsets to these developments. Local manufacture of diesel-driven tubewells led to fast growth of the rural industrial sector in the production, assembly and installation of engines, pumps and accessories. Increasingly, employment opened up for the maintenance of operating tubewells (which currently number around 250 000). The larger output required even more labour for post-harvest operations, transport and processing, especially since the marketable surplus increased faster than the volume of total output. These employment gains may have exceeded the negative impact of the shift away from tenancy to owner operations.

As mentioned, tractorisation started during this first phase, but its real use came during the second phase of the transformation. Large farmers were the first to mechanise, expanding their operations by cropping previously uncultivated land and acquiring new land. Recently, smaller farmers have made more and more use of tractors through hiring. Government policies assisted farm mechanisation with free imports and subsidised credit. In 1960 less than two thousand tractors were in the field, multiplying to about 20 thousand by 1970 and almost 200 thousand at present. Meanwhile the number of bullocks has decreased perceptibly.

Opinions vary about the effects of tractorisation on employment in rural areas. Some estimates assess employment reduction at 11 manyears per tractor, but others are much lower. In any case, there is a striking difference with tubewells, a domestic technology that boosts rural industry: tractorisation is based mainly on imports. An unfortunate policy to encourage local manufacturing banned imports of small and medium-sized tractors. As a matter of fact no domestic production of any significance was undertaken in the case of small tractors; smaller farmers were simply deprived of suitable equipment. Two brands of medium-sized (35-45 hp) tractors are now being

locally produced, and there have been no shortages in the last few years. However, their price and quality may be under par compared to imports.

Indirect effects of tractorisation should also be considered. Training of drivers, repair, maintenance and hiring services have added to rural employment, partly negating the labour displacement in some of the field operations. There has been strong development in rural industry in the manufacture of tractor-drawn implements and equipment such as tillers, plows, trolleys and threshers. Of course, the latter have a labour-displacing effect in the field. Nonetheless, tubewells and tractors have allowed higher crop intensities and larger yields, both of which increased field labour demand for non-mechanised operations and off-field employment in transport and processing. Finally, tractors are used extensively for hauling, thus easing the infrastructural constraints of a poorly developed road network. They have been useful in getting inputs (fertilizers, seeds, oil, diesel for tubewells) to the fields and produce to the market, and have therefore contributed to agricultural incomes and off-farm employment. Another effect has been the reduction in the number of bullocks. This has permitted a transfer of scarce feed and fodder to milk-producing animals, adding significantly to livestock productivity.

Actual employment trends in the rural areas are not easily traced, nor easily attributed to specific labour market developments. Increased employment, particularly outside the peak seasons, may absorb previous underemployment. More use of on-farm family labour may not affect the labour markets at all. Prolonged increases of labour demand may at some point affect real wages. In fact, in recent years rural wages did rise in real terms, suggesting that labour is becoming less abundant. Higher labour demand appears to be one reason — especially in the livestock and non-agricultural sectors — but there is also some reduction of labour supplies. The large migration to the Middle East definitely played a role, partly because of the direct fall in domestic labour supply and partly because of the diminished need to find work for those rural families benefiting from remitted earnings.

When future trends in agriculture-related technologies are assessed in light of land ownership, employment prospects will be considered more carefully. Rural education, too, affects employment prospects, of course; unfortunately no noticeable progress has been made in this sector over the past 25 years. Literacy has remained at a low level even compared to other countries at the same or lesser stages of development. This is a major handicap for lower income groups, even if the labour market improves and promises reasonably full absorption of supplies. Even more seriously, health extension services are scarce and in most cases inefficiently used. Access to rural health facilities appears in fact to have declined.

In conclusion, there is a remarkable contrast between Pakistan's focus on improving its physical base and on-farm capitalisation and its relative neglect of the supporting environment. Little attention is paid to people or the social infrastructure. Still, a better balance has been sought in recent years.

## AGRICULTURAL PRICE POLICIES AND THEIR CONSEQUENCES

Since independence, governments in Pakistan have consistently adopted policies of low domestic prices for agricultural products, helping consumers (including industrial users like the cotton textiles industry) and the government (in the case of exports — except when self-sufficiency was not reached and imports were required). The government has also carried the costs of domestic price stabilization in the face of fluctuating international prices.

The origins of this policy probably lay in the economic circumstances prevailing at the time of Pakistan's birth. It was subsequently pursued as a saving strategy that transferred income from the "low saving sector" (agriculture) to the "high saving sector" (manufacturing), or as an easy way of raising revenue by governments too weak to tax agriculture directly. These implicit transfers have been numerous since independence. Their extent, how they have changed over time and their consequences on agricultural development are examined in this section.

At the time of partition between Pakistan and India in 1947, the Pakistani side had been producing raw materials and food for the rest of the subcontinent. Thus, initially, Pakistan exported agricultural products and imported virtually all its manufactures requirements (mostly from India). Pakistan, though a member of the Sterling block, refused to follow Britain and India's example and devalue its currency in 1949, so India suspended trade, breaking what had been until then a "customs union". However, because of the Korean war boom Pakistan was able to switch its exports to world markets. Foreign exchange earnings increased, enabling Pakistan to import its requirements of manufactured goods from the rest of the world. The government also levied export duties on raw cotton and jute, which made up most of Pakistan's exports at the time, and earned substantial revenues. With the collapse of the Korean boom in 1952 export earnings began to decline precipitously, but the government again chose not to devalue, and instead established a complex system of quantitative controls on imports.

Since agriculture was the main export sector, the use of currency overvaluation, export taxes, high tariffs and quantitative restrictions on imports was an almost classic case of turning the terms of trade against agriculture in favour of manufacturing. Domestic industry responded to the high profitability of the sector, and large-scale manufacturing grew at about 23 per cent per annum between 1949/1950 and 1955/1956. The growth was led by cotton textiles, with yarn and cloth production increasing at 50 and 40 per cent per annum respectively. By the mid 1950s virtually all the domestic demand for mass consumption items such as textiles was met by local production.

The agricultural sector paid a heavy sacrifice for this industrial development. According to Lewis (1968), around 1954/1955 "agriculture received Rs 3.76 per \$ for its marketings but paid Rs 9.00 per \$ for its purchases" i.e. agriculture received about 42 per cent of the value its sales would have generated if they could have been traded internationally without government limitations. Thus, even on the conservative assumption that only 20 per cent of the agricultural production was marketed and value added was 90 per cent of output value, transfers from the agricultural sector to the rest of the economy were over 30 per cent of the value added in agriculture at the time. In the second half of the 1950s, following the 1955 devaluation, agriculture's terms of trade improved somewhat, and around 1959/1960 agriculture "received Rs 5.06 per \$

for its marketing but paid Rs 8.59 per \$ for its purchases". This still implied a transfer from agriculture of over 15 per cent of its value added. Considering the small size of the manufacturing sector (less than 10 per cent of the GDP) these transfers were huge, and the sector's phenomenal rate of growth during the first half of the 1950s was not surprising. However, the concern here is not industry but the impact these transfers had on the development of the agricultural sector.

During the 1950s, the agricultural sector in West Pakistan grew at about 1.5 per cent per annum, with almost the entire increase coming from expansion of cropped area. This was well below the growth rate of population, and as a result, export surpluses were eroded and food deficits emerged in a region that prior to partition was the bread basket of the subcontinent. The high growth rates (over 7 per cent per year, of which only about half came from expansion of area) over the border in the Indian Punjab during this period indicate that the poor performance on the Pakistani side was not due to bad weather or other natural factors. Government policies that resulted in large transfers out of the agricultural sector in Pakistan were largely responsible for its poor performance.

In the 1960s the situation changed. Table 2.1 shows estimates of transfers out of agriculture through the price mechanism for the period 1961-1987. Price-related transfers as a proportion of the agricultural value added were less than 9 per cent in the 1960s, compared to 15 to 30 per cent in the 1950s. Moreover, they were largely compensated by the massive public sector investments in agriculture and water (over 45 per cent of the total public investment in the economy) during this period. The reduction in transfers out of agriculture in the 1960s caused an upsurge in private investment in agriculture (over 70 000 private tubewells were installed during the decade) and a better agricultural growth rate. In the first half of the 1960s this rate was just under 4 per cent per annum, i.e., more than twice the growth rate of the 1950s, and in the second half of the decade it rose to over 6 per cent per year. The increase in the growth rate in the latter half was mostly due to the introduction of HYVs of wheat (1966/1967) and rice (1968/1969), but undoubtedly the impact of the new varieties would have been weaker if the investment in private tubewells had not already taken place.

The establishment of the People's Party government in 1971 initiated dramatic changes in government price policies. Price-related transfers out of agriculture increased to almost 23 per cent of agricultural value added in the period 1971-1975 (Table 2.1). The transfer mechanisms also were different. In the 1950s and 1960s they basically consisted of currency overvaluation, but in 1972 a large devaluation occurred that slashed the overvaluation of the rupee (Table 2.3). The gains were not passed on to the agricultural sector in the form of higher prices, but were appropriated by the government through export duties and the establishment of state monopolies in export trade of rice and cotton. This is reflected in the much larger negative rates of nominal protection for all crops (Table 2.2)<sup>4</sup>. These ranged from -26 per cent for cotton to -42 per cent for basmati rice. This meant, in the case of basmati rice, for example, that the farmer received 58 per cent of the price he would have obtained if there had been no export duties or state monopoly on the trade of rice. Similarly, there was a large implicit tax on irri rice that was particularly unfortunate because it discouraged the adoption of HYVs of rice, while across the border, in the Indian states of Punjab and Haryana, the new rice varieties helped sustain the momentum of the green revolution through the 1970s. In Pakistan, the momentum of the green revolution was lost — the agricultural growth rate for 1971-1975 declined to less than 1 per cent per year. This was probably a period of adverse weather cycles with drought and floods, but the large resource transfer out of agriculture made matters worse.

Table 2.1 : RESOURCE TRANSFERS FROM AGRICULTURE 1961-1987  
(5 YEAR AVERAGES)

Years	Price related transfers (RS in millions - 1985/86 prices)	Transfers out of agriculture as a per cent of:	
		Agricultural value added	GDP
1961-65	4 607	8.5	3.6
1966-70	5 764	8.7	3.3
1971-75	17 966	22.7	7.8
1976-80	16 732	18.4	5.7
1981-85	21 108	19.7	5.3
1986-87 <sup>1</sup>	12 379	10.3	2.4
Average of 1961-87	13 127	16.0	5.0

1. Average of two years

Source : Hamid; Nabi and Nasi (1989)

Table 2.2 : NOMINAL RATES OF PROTECTION<sup>1</sup> FOR MAJOR CROPS, AS  
PERCENTAGES (5 YEAR AVERAGES)

Year	Wheat	Basmati rice	Irri rice	Cotton	Sugarcane
1961-65	-3	-16	-	-14	279
1966-70	27	-10	-	-15	448
1971-75	-15	-42	-27	-26	16
1976-80	-26	-46	-38	-23	-26
1981-85	-30	-54	-32	-21	-26
1986-87 <sup>2</sup>	-21	-61	-2	-14	20
Average of 1961-87	-10	-38	-29	-19	124

1. Defined as  $(P_j^d/P_j^w - 1) \times 100$  where  $P_j^d$  and  $P_j^w$  are the domestic and world prices (at the official exchange rate) for crop  $j$  respectively (adjusted to farmgate). Sugar cane and wheat (in most years) are considered as importables and cotton and rice as exportables. In years of wheat self-sufficiency a simple average of import and export parity prices is used.

2. Average of two years.

Source: Hamid, Nabi and Nasim (1989).



Table 2.3 : EXCHANGE RATE OVERVALUATION IN PAKISTAN : 1961-1978 -  
RUPEES IN U.S. \$ (5 YEAR AVERAGES)

Years	Actual exchange rate (Rs : \$)	Equilibrium exchange rate	Exchange rate distortion [(2)/(3)-1] x 100
(1)	(2)	(3)	(4)
1960-65	4.76	7.64	-37.6%
1966-70	4.76	7.76	-38.6%
1971-75	7.98	10.56	-24.4%
1976-80	9.90	13.59	-27.2%
1981-85	12.37	16.21	-23.7%
1986-87 <sup>1</sup>	16.65	20.60	-19.2%
Average of 1960-87	8.60	11.85	-27.4%

1. Average of 1960-87

Source : Hamid, Nabi and Nasim (1989).

Table 2.4 : COEFFICIENT OF VARIATION OF PRODUCER PRICES  
(PERCENTAGES)

Crop (1)	Pp/PNA (2)	P'p/PNA (3)	P*p/PNA* (4)
Basmati	18.30	36.20	29.84
Cotton	19.28	26.29	23.65
Irri	11.34	54.37	52.79
Sugarcane	15.71	79.17	76.64
Wheat	8.88	29.14	23.61

1. Pp is the actual producer price and P'p and P\*p are the prices which the producers would have received (in absence of direct government intervention) at official and equilibrium exchange rates respectively.
2. PNA and PNA\* are the price indices for the non-agricultural sector at official and equilibrium exchanges rates respectively.

Source : Hamid, Nabi and Nasim (1989)

In the second half of the 1970s the transfers were somewhat smaller in absolute terms and as a proportion of agricultural value added they declined to 18 per cent. This improvement, which occurred despite a small increase in overvaluation of the currency (Table 2.3) and a widening of the gap between domestic and international prices of wheat and rice (Table 2.2), was chiefly caused by bigger subsidies on fertilizer and other agricultural inputs. The Tarbela Dam was completed in this period. It boosted water availability, and cropped area expanded at 1.8 per cent per annum. The agricultural sector growth rate also improved to 3.9 per cent per annum, with yield increases coming primarily from wheat and Irri rice.

In 1980, a new agricultural policy was announced. One of its objectives was to "promote agricultural development by gradually increasing domestic agricultural prices to bring them at par with world prices". In 1981, an Agricultural Price Commission (APCOM) was formed to advise the government in setting support prices for major crops. Unfortunately, APCOM adopted "cost of production" as the primary basis for its recommendations. Relative profitability of different crops and their export and import parity prices were also calculated, but this information was generally ignored by APCOM. Although the establishment of APCOM has helped systematise the process of setting support prices for major crops, it has done little to reduce the transfers out of agriculture. In fact, as can be seen from Table 2.1, they actually increased from 1981 to 1985 to about 20 per cent of the agricultural value added<sup>5</sup>.

It is obvious that between 1971 and 1985 the transfers out of agriculture were very large (18 to 23 per cent). During this time the growth rate of the agricultural sector was about 2.8 per cent per annum, i.e., far below the growth rate of the 1960s. Punjab, despite all its political problems, averaged about a 4 per cent per year agricultural growth rate during these years. Although the growth rate in Pakistan in the 1976-1985 sub-period was higher (3.8 per cent per annum) than for its 1971-1985 period, it too was much lower than the concurrent growth rate across the border (5 per cent per annum).

It seems that Pakistan's agricultural growth, though impressive, has been below potential except for in the 1960s. There has been the problem of sizeable resource transfers through price mechanisms in all periods except the 1960s, when transfers were relatively small and often compensated by public investment in agriculture. Thus, there appears to be a causal link between the two. To argue that such large transfers out of the agricultural sector had little effect on its growth would mean that either investors in the agricultural sector are not sensitive to returns or that agricultural growth is unrelated to investment. These assumptions seem unreasonable, but have been implicit in the thinking of economic policy makers in Pakistan. The belief that the farmers' propensity to save (and invest) was low was clearly wrong. It was based on the idea that farmers were generally backward producers of crops for household subsistence, and it overlooked the uneven distribution of land ownership. The idea that farmers were not price responsive or innovative was partly based on the same simplistic model and proven wrong in the 1960s. However, Pakistani planners continued to follow discriminatory price policies against agriculture even after those years. A possible explanation for this can be found in the tying of agriculture to external markets. Exports were dominated by the agricultural sector and export pessimism was the dominant view, implying that a more favourable price policy would not generate more foreign exchange earnings and that development strategies requiring much foreign exchange input should be eschewed.

Were there other alternatives, and did these policies make a great difference to the development of the agricultural sector? Possibly in the early 1950s no alternative was at hand; the manufacturing sector was small and investment resources had to be obtained from agriculture (which accounted for around 50 per cent of the GDP). After

the 1960s, however, there seems to have been little economic justification for continually manipulating prices against agriculture to extract its resources. The actions of the People's Party government were dictated by ideology and political necessity. The government committed itself to a massive investment programme for public sector industry, and the funds had to be obtained from somewhere. The main constituency of the party was the urban working class and they had to be protected from food price increases, an extremely difficult task in view of the worldwide inflation following the 1973 oil shock. By the 1980s the need for change had become clear (and was recognised by the New Agricultural Policy), but the vested interests that benefited from the transfers (urban consumers, industry, and parastatals such as Cotton and Rice Export Corporations) made it very hard to bring about fundamental changes.

By how much did growth in the agricultural sector stay below its potential? Only a rough guess can be made. Average transfers out of agriculture between 1971 and 1985 were 20 per cent of value added. Even assuming that these are overestimates and actual transfers were only 75 per cent of the estimated amount, they still come to 15 per cent of agricultural GDP. If these transfers had not occurred and only 20 per cent of the additional income had been reinvested in agriculture by the recipients, it would have increased the growth rate of the agricultural sector by at least 1 percentage point (assuming ICOR equal to 3). In addition, there would have been indirect effects, as the higher agricultural incomes would have resulted in greater spending on education and health, and the higher perceived return to investment in agriculture (because of higher prices) may have induced stronger public investment in the rural infrastructure. Since it is these very areas that are the principal bottlenecks in agricultural development, the indirect effects could also have been significant.

Finally, not only did the government's pricing policies slow agricultural growth but their impact on income distribution was negative. Average per capita income in rural areas (where 70 per cent of the population resides) is currently less than half that in urban areas, and value added per worker in agriculture (which employs 50 per cent of the labour force) is less than one-third that in the rest of the economy. Thus, by suppressing agricultural prices and transferring income from rural to urban areas the government widened the income gap.

So far, only the negative side of the government's agricultural pricing policies has been examined. These policies did have some positive aspects, such as subsidies on inputs and diminished producer price variability. The direct transfers to the agricultural sector due to subsidies have, as far as possible, been taken into account in estimating the net transfers on which the earlier discussion was based<sup>6</sup>. There may have been indirect benefits (the justification, after all, for the subsidies) to consider in a complete assessment of the role of agricultural pricing policies. Therefore, before concluding this section, subsidies and reduced price variability will be briefly discussed.

Sizeable input subsidies exist on irrigation, credit and fertilizer. Irrigation is subsidised because the revenue from water rates does not fully cover the cost of operation and maintenance (O & M) of the canal system and public tubewells. However, there are no indirect benefits here; in fact, low water rates resulted in insufficient allocations to O & M, leading to the canal system's deterioration, so there was a negative externality to the subsidy on irrigation.

Agricultural credit in 1969/1970 was equal to only 1 per cent of agricultural value added. Since then it has expanded rapidly and as a proportion of agricultural value added it increased to 5 per cent in 1979/1980 and 12 per cent in 1986/1987. Of the total credit about two-thirds is for production loans (i.e., short-term loans for inputs like fertilizer, seeds and pesticides) and one-third for development loans (medium- and long-term credits). There has always been an implied subsidy on agricultural credit, as

the lending rate did not cover the cost of funds and administration. However, the subsidy has increased sharply in the 1980s because of interest-free production loans (which rose from 15 per cent of total agricultural credit in 1979/1980 to 40 per cent in 1986/87). It is estimated that the implied subsidy on credit during the Sixth Plan period was as much as Rs 8 billion<sup>7</sup>, i.e. more than the development expenditure on agriculture (excluding water and fertilizer subsidies).

The indirect benefits of the credit subsidy depend on who is getting the credit and for what purpose. Interest-free credit (which accounts for 60 per cent of the subsidy) is directed to small farmers so that they can purchase inputs such as fertilizer and pesticides. Nevertheless, all studies conducted so far show that very little of the credit is reaching the small farmers (for a recent survey on the subject, see Scott and Redding, 1988). Most of the credit is either appropriated by the medium and large farmers or non-agriculturists. As far as the former are concerned, they have the resources to purchase the inputs themselves and therefore the effect of the subsidy is merely to reduce their costs. This resembles the fertilizer subsidy effect (discussed below) inasmuch as the portion that goes to non-agriculturists not only does not benefit agriculture but results in an overestimation of both the agricultural credit subsidy and (therefore) transfers to the agricultural sector. Development loans, mostly used to buy tractors, are directed to the medium and large farmers. We have already discussed the impact of tractorisation on agricultural development — the effect is mixed; there are some gains in expansion of area and cropping intensity and some losses in employment and land distribution. One can conclude that the subsidy on credit has not generated enough output because of an inability to reach target groups and misplaced emphasis on tractor loans.

Fertilizer subsidy is the most consistent element in the government's agricultural policy. In the 1960s it equalled 50 per cent of the development expenditure on agriculture (excluding fertilizer subsidy and water); in the 1970s the proportion increased to about 80 per cent and in the Sixth Plan period it reached over 120 per cent. In other words, fertilizer subsidy has been taking an increasing amount of the resources directed to agriculture. It has probably encouraged the use of fertilizer, but has it been the best use of limited public sector resources available? Given the neglect of research and extension, marketing and rural infrastructure during this period, one can only say that it was not. Again, one cannot say with confidence that the indirect benefits outweighed the costs.

As for price variability, there is no doubt that the government's agricultural price interventions insulated the farmers from international price fluctuations. Table 2.4 presents coefficients of variations of producer prices (i.e., government fixed procurement prices) and those the farmers would have received without intervention. Assuming the farmers did receive the government procurement prices, it is evident that price variability declined steeply because of government intervention, particularly in the case of sugar, irri rice and wheat (compare column 2 to columns 3 and 4). Better price stability lowered risk and uncertainty and encouraged farmers to use more purchased inputs and adopt new technology more rapidly. In this sense, government price intervention had a positive impact on growth of the agricultural sector. Still, it is difficult to measure the benefits, or guess their magnitude.

In sum, since 1947 agricultural price policies in Pakistan have caused transfers of substantial resources from the agricultural sector. These transfers have hurt agricultural growth and rural-urban income distribution. The effect has been mitigated to some extent by a reduction in the price variability faced by farmers and, possibly, by subsidies on inputs and credit. Price policies have been tied to general macro-policies that promote import-substituting industrialisation. There has been some recognition of the need to take corrective action, but because of the vested interests that have developed over time, progress has been slack. Pakistan has been turning towards a more neutral regime of agricultural pricing policies, but the new government could slow, or even reverse the change.

### ***Technological Developments and their Economic Effects***

New cropping patterns have emerged over the past 35 years. Higher-valued crops like rice, cotton, sugarcane, wheat, fruits and vegetables have augmented their share of total cropped area from 50 per cent in 1949/1950 to a recent 65 per cent. The main losers have been coarse grains, gram, other pulses and fodder crops. The increases gain in significance against a background of a plus 50 per cent expansion in total cropped area during this period: crops that expanded their share increased their acreage by almost 2 per cent per year, whereas others expanded their acreage by little more than 0.2 per cent annually.

Technological development has been a primary factor in the changes in cropping patterns. First, more irrigation water supplies intensified cropping and boosted production. Improved seed varieties (limited to wheat and later, rice and cotton) contributed to higher yields, but at the expense of other cereals and pulses. Price policies played a role as well, notably for sugarcane. A fuller understanding of the changes that occurred and the constraints to technological progress requires a detailed approach, as physical and climatic conditions differ widely from one part of the country to another. Cropping patterns and crop rotations are quite specific to each area.

In almost all parts of the country, wheat is the predominant crop in the rabi (winter) season. Therefore the crops planted in the kharif (summer) season provide the basis for the distinction of zones. In the irrigated areas the two most important kharif crops are rice and cotton. In areas of high groundwater tables, heavy soils and greater rainfall, rice tends to dominate, and in drier areas cotton is the main crop. Typical rice/wheat areas are the Northeastern Punjab and the right bank of the Indus in Sind. The Southern Punjab is characterised by a cotton/wheat rotation, as is the Indus left bank of Sind Province. The fifth major agricultural zone is the central Punjab, which is flexible; it can grow either rice or cotton in the kharif season. To these five irrigated regions, four can be added which divide the rest of the country according to agricultural potential. One is the partly irrigated North West Frontier Province, another is the Western Punjab. The plateaus to the north of the Punjab that depend almost exclusively on rainfall constitute the Barani area, characterised by sharp fluctuations in yields and a low crop intensity of land use. The largest region is Baluchistan Province, which has very limited rainfall and scope for irrigation.

Wheat is Pakistan's major crop, occupying more than 35 per cent of total cropped area, somewhat less in Sind, more in the irrigated parts of the Punjab, and more than half in the Northern Barani areas. It is the basic staple food for the entire population, consumed at around 120 kg per person per year. It accounts for one-third of all household expenditures on food and one-sixth of total household consumption. Wheat provides fully half the average person's calorific intake. Those features justify the characterisation of Pakistan as a "wheat economy", as well as the attention paid to

wheat by the Pakistani government. The previous section has already provided ample evidence in this respect.

Agricultural production increased by barely 2.4 per cent per year during the first 15 years following independence (up to the mid 1960s), lagging behind population growth. Acreage expansion averaging about 1.8 per cent per year accounted for most of the increased production. The remaining 0.6 per cent reflected a turn towards higher-value crops and little yield increase for major crops. Agriculture development was virtually stagnant in terms of technology. Import dependence, including wheat, was growing and traditional export surpluses were becoming endangered by domestic demand exceeding domestic supply.

Accordingly, the government tried to promote agricultural development to safeguard the country's foreign exchange resources and reduce import dependency, especially on wheat. Almost 80 per cent of exports were agricultural (both semi- and processed products). Up until the early 1960s wheat imports made up an average of 10-15 per cent of total wheat supplies, a large part of which was food aid by foreign donors. As the Punjab in particular was a net-exporting region in undivided India, there was a strong conviction that import dependence was avoidable. Most of the measures taken by the government fostered extensive agricultural growth. The creation of the Agricultural Development Corporation (ADC) helped production in newly irrigated areas; the land reform of 1959 attempted the cultivation of land left unused by bigger landowners; and the Indus Waters Treaty with India in 1960 presented an opportunity to irrigate more land, rather than intensify agriculture.

The mid 1960s in fact were the most critical period. Drought years led to unprecedented import requirements and the 1965 war with India caused the suspension of food aid. As a consequence the balance of payments and the government budget came under pressure. The first trials with new wheat varieties took place at this point. These varieties were developed by the wheat and maize research institute (CIMMYT) of Mexico and adapted to Pakistani conditions. The Mexipak variety, followed by a number of locally-bred grains in subsequent years, was found to be very suitable when used with an adequate, well-timed water supply and enough fertilizer. Between 1965 and 1970 this led to a breakthrough in wheat production, with about half the area under wheat using new varieties, a quadrupling of total fertilizer use and a 50 per cent increase in average yields of wheat per hectare. The attractiveness of growing new wheat varieties compared to other rabi crops increased, and led to a 20 per cent rise in acreage under wheat.

The higher wheat yields continued after 1970, though less dramatically. Between 1959 and 1985, wheat production increased by 5 per cent per year, and wheat yields by an average of 3.4 per cent. As a consequence, wheat yields now range around 1800 kg/ha, whereas in all the years of this century prior to 1960, average yields fluctuated around 850 kg/ha. Wheat imports rose in the early 1960s to more than 20 per cent of total availability, declined gradually to less than 5 per cent in the early 1980s and currently are negligible, self-sufficiency having virtually been achieved. The most important change, however, is the shift from an almost exclusive reliance on increased acreage to an awareness of the much greater potential of yield increases as an engine of agricultural growth.

The policies governing the introduction of the new wheat varieties in the 1960s set the stage for similar applications for many other crops. Some of these policies produced a number of economic and social consequences that could hardly have been foreseen at the time, but that now must be taken into consideration by the government in the design of its agricultural policies.

We have mentioned that price and subsidy policies have been used from the beginning. The government increased the procurement price of wheat by about 26 per cent before the 1967/1968 rabi season, making it much higher than the international price. The government also guaranteed that the procurement price would be maintained in real terms for at least the next three years. Consequently, for five years the domestic price of wheat exceeded the border price (at prevailing exchange rates) whereas the opposite was true for almost all other major crops(8). This enhanced the relative returns of growing wheat and spurred an increase in wheat acreage and the rate of adoption of the new varieties.

Subsidy policies were not crop-specific but applied more to major inputs: fertilizer, water and credit. Still, most of these subsidies benefited the wheat crop, as price policies particularly in the late 1960s made wheat growing and the use of inputs for wheat attractive. Well into the 1970s more than 50 per cent of total fertilizer used in Pakistan was directed towards the wheat crop.

There are two features of the new policy mix that deserve discussion. One is the policy's crop-specificity, which focuses first on wheat, then on rice and cotton. As mentioned earlier, each crop has a distinct place in an often intricate pattern of cropping which itself is tied to the holding of livestock and to the supply of household energy, particularly on the predominant small farms. Policies geared to promoting one crop at a time are therefore bound to run into physical problems because of the nature of the agricultural system in each region. Farmers' decisions to adopt a new crop-technology are made in the broad framework of household needs, especially when the farm is small.

The second feature concerns these policies' effects on the distribution of resources and incomes, and the impact of price and subsidy policies on different-sized holdings (especially smaller farms). Lipton and Longhurst (1986) concluded from their survey of the literature that the distributional effects of new agricultural technologies depend on the socio-economic environment of the country where the technology is introduced. This needs to be verified in the case of Pakistan.

Further improvement of wheat yields is hampered by competition from other major crops, particularly on smaller farms, where cropping intensity is usually high. Growing several crops in succession between seasons puts severe strains on the farm economy at planting and harvesting time, and some output from each individual crop must be sacrificed to maximize the total return from each cropped hectare. Wheat planting after November 20 can result in a yield reduction of 20 to 40 per cent. When wheat follows rice or cotton, wheat-planting time depends on the harvest date of the preceding crop and on the farmer's ability to prepare the seedbed after harvesting. When wheat follows cotton, the trade-off is an additional picking of cotton versus higher wheat yields. Relative prices could influence the farmer one way or the other. In the Punjab rice/wheat zone, 60 per cent of farmers report sowing wheat at the optimal time. Only 45 per cent of farmers are able to do so if they grow the traditional long-grained basmati rice, compared to 94 per cent of farmers who grow the new variety of irri rice. Most farmers plant late in the Punjab cotton/wheat zone, with over 40 per cent planting after mid December. In the North West Frontier Province most farmers manage to plant early, but those planting wheat after sugarcane are much later than farmers who plant wheat after maize.

All these differences point to the limitations of crop-centred policies. Of course, research to improve wheat varieties has targeted drought and pest resistance and a shorter growing season that suits the cropping pattern. Similar efforts for competing crops, however, have not been made, although these could be equally beneficial. Expansion of wheat production has taken place at the expense of the minor foodgrains

which, because of lower market prices, were important to the diet of the landless poor. It has also led to diminished production of traditional oilseeds that used to be intercropped with wheat varieties. Finally, it has eclipsed the growing of rabi fodder crops, with an erosion of the nutritional value of animal feed.

Perhaps complementary policies on research, extension and prices for negatively affected crops could have avoided some of these problems. The country now faces a growing import dependence on fats and oils that will take long-term efforts to overcome. Demand for livestock products is accelerating but no efforts have been made to insure supply. A more coherent policy to promote agricultural growth could have had better results even in wheat production. It is estimated that under the existing crop systems and with the available varieties, yields could still be increased by some 40 per cent, particularly by replacing older strains with more resistant and shorter-growing ones.

How did these government policies affect different groups of farmers? The distribution of land holdings has always been uneven in Pakistan, notwithstanding certain pattern changes that will be discussed later. What is important here is the scale-neutrality of the new crop technologies. When viewed purely in terms of costs versus returns, there is no reason to believe that they would be more favourable applied on a larger scale.

Small farmers are less free to choose their crop rotations. In 1980 the Agricultural Census registered 2.9 million farmers with holdings of 5 hectares or less, out of a total of 3.8 million farmers. Thus, the majority of farmers base their cropping pattern on the subsistence needs of their households. For some of the crops they have always preferred to grow — maize, other coarse grains, pulses, oilseeds and fodder crops — no new varieties or technologies have become available. Small landowners' cropping intensity has traditionally been highest, and thus they have experienced the problems of timely harvesting and planting within the limitations of household labour availability. Recent surveys have found a high female labour participation in the rural areas, which may seem surprising in an Islamic country but is understandable when the labour demands of a typical small farm are assessed.

Small farmers usually own a relatively large number of animals compared to the size of their holdings, and the supply of feed and fodder is essential to produce milk, an important element in the rural diet. Animals do provide some meat and cash income when sold for slaughter, and naturally animals are needed to work the fields and provide transportation. Thus, the food needs of the household and of the animal stock, together with the limited amount of household labour, tend to determine small farmer cropping patterns, limiting the possibility of adopting a new technology for a single crop.

In a policy sense, it is of more concern that those small farmers who are willing to innovate may not be able to do so. Their problems start with limited access to credit, because they possess no acceptable collateral. Remote distribution points for credit, seeds and fertilizers and the absence of a transport infrastructure are additional handicaps. Expansion of rural credit plus government subsidies on this credit and on fertilizers thus benefits mostly the larger farmers.

To a large extent the same holds true for irrigation water: canal supplies tend to be pre-empted by larger farmers near the distribution channels, while small farmers occupying the far reaches of the system may receive inadequate and unreliable supplies. Similarly, tubewells for groundwater pumping belong mostly to larger farmers who can afford their costs. Joint ownership by small farmers does occur, but again the general picture suggests skewed access.



Therefore, a technology which by itself may be scale-neutral results in fact in a distribution of benefits that leaves the small farmer behind, both because of the subsistence character of his operation and by unequal access to the major inputs. Traditionally, yields of small farmers used to exceed those of large farmers because of manure use in the fields and a higher labour input per hectare. Nowadays, their yields are lagging as modern technologies, including mechanised farming, multiply the yields on large farms.

Three successive land reforms which took place in 1959, 1972 and 1977 tried to re-balance the scales, at least to some degree. Revenue-free estates were abolished in 1959 and a ceiling was placed on individual ownership of 200 ha of irrigated or 400 ha of unirrigated land. In 1972 these ceilings were further lowered, with certain exemptions, to 60 and 120 ha respectively. As a result, close to 10 per cent of private land was taken over by the government. Half of this was redistributed, the other half remained under public control, often leased again to its former owners. The land reform proposed in 1977 that was to reduce individual ownership ceilings further was not implemented.

Table 2.5 provides a comparison of land ownership data for 1958 and for 1980. The comparison suffers from the fact that data are from different sources, requiring reclassification of size groups for presentation.

It should be noted that the total privately owned area declined between the two dates. Part of the difference (of 1.7 million hectares) concerns the land reclaimed by the government under the land reforms but not as yet redistributed (close to 1.0 million ha), and the remainder is probably a good estimate for land lost to agriculture because of urban growth and infrastructure uses.

The effects of land reforms indicated at the lower end of the table show that large holdings decreased in average size while middle-sized holdings increased in both number and average size, suggesting that many of the largest farms were divided. The most startling find is the reduction in the number of small holdings by almost half, which accounts for the overall reduction in landowners from 5.1 million in 1958 to less than 3.8 million in 1980. It is doubtful that almost half of all small farmers gave up farming; the 1958 data are taken from the register of land records, thus counting the number of plots rather than owners. As the 1980 data are from a survey, the multiple counting of owners is avoided. As will be seen, the number of small owner-operated and owner-cum-tenant farms in fact increased over this period. Ownership, even of small plots, does not imply that the owner operates owned land. In fact, ownership of small holdings may result from the subdivision of land property at the time of inheritance and may therefore represent part-ownership of a larger farm. As the 1959 and 1972 land reforms prohibited division of land ownership below holding sizes of economic viability, the data may also reflect this legal barrier that has accelerated a process begun years earlier: more and more land is held by multiple owners who confer the right to operate the land on one person and agree on a sharing arrangement for the benefits. Before 1959, many small (co-)owners did report such small properties, but after the land reforms they may no longer have done so for legal reasons. Only the person operating the land would report it, if the holding was small.

At the other end of the scale many of the larger landowners have formally subdivided their land (i.e., in their registration with the agency recording land rights) among relatives to escape confiscation under the land reforms. As land entitlements are higher for owners who have installed tubewells and use mechanised equipment, the land reform measures have created an incentive. This voluntary subdivision of large holdings and the subsequent co-ownership arising when one of the owners dies or wants to sell his share contributes to the complexity of the situation, and trying to

Table 2.5 : LAND OWNERSHIP IN 1958 AND IN 1980<sup>1</sup>  
(No. in '000 and land in '000 ha)

Size of holdings (ha)	1958		1980		1958	1980
	Number of owners	Area owned	Number of owners	Area owned	Average size of holdings (ha)	
< 2	3 266	3 006	1 783	1 567	0.92	0.88
2 < 5	1 119	3 917	1 131	3 532	3.50	3.12
5 < 10	333	2 332	500	3 351	7.00	6.70
10 < 20	174	2 036	230	2 969	11.70	12.91
20 < 60	152	4 016	119	3 531	26.42	29.67
> 60	24	4 383	25	3 030	182.62	121.20
	5 068	19 692	3 788	17 980	3.89	4.75

1. Data for 1958 from Federal Land Commission as presented in the Report of the National Commission on Agriculture (1988), page 466 and adjusted for size categories through interpolation. Data for 1980 from the Census of Agriculture for that year (table 12.1).

interpret this data from land records or an agricultural census becomes nearly impossible.

Therefore the data on land ownership cannot provide much information on the effects of technological change. It would in any case be wrong to interpret the decline in the number of small holdings as an indication that small farms were pushed out of existence because of technological developments. This conviction is further supported by an analysis of the operational status of farms as revealed by successive agricultural censuses. This analysis can show more clearly what actually happened in terms of access to land, particularly for the poorer groups of farmers.

Comparing the results of agricultural censuses is somewhat unreliable because of the different methods used to compile them. This applies in particular to the 1960 census compared to those of 1972 and 1980. Nevertheless, a number of conclusions can be drawn with confidence. The first is that the number of small farms continued to increase throughout the 20-year period (1960-1980), whether measured in terms of farms with less than two, less than three or less than five hectares. Within this category, the number of pure tenant farms declined and the number of farms operating only owned land increased. The average size of small farms did slowly but unmistakably decline.

Comparing these data with those on land ownership, the conclusion must be that a large number of owners of small parcels of land in the early 1960s who used to rent out their land have either reclaimed their land to farm it themselves, or sold it to others. The available data strongly suggest that these sales have not been to larger farmers, because in all categories above 5 hectares the number of owner-operated farms and their average sizes declined, reducing their share in total operated land. Small farms have been the only category with rapidly increasing farm numbers and a growing share of total operated land. Smaller farms are evidently becoming the dominant mode of operation.

The trend towards owner-operation of farms is also revealed in the data on medium and large farms, particularly at the expense of share-cropping. In 1960 the total land area operated on the basis of share-cropping (all farm sizes together) was almost equal to the area operated by the owners themselves. For farms in the middle category of 5-20 hectares, tenancy used to be the major mode of operation, and this was even more prevalent in the class of large farms with more than 20 hectares (including some of 1,000 ha and more, largely worked by tenants). This is where the most significant changes occurred, as already by 1972 a large number of tenants lost their access to land, with further losses in the years through 1980. It is in fact the same trend observed in small landowners who reclaimed their land for their own use, though reclaimed land area is small. On the medium and large farms, however, it applied to about 15 per cent of total agricultural land and around a quarter of the land operated in the medium and large farm classes. Up to one million tenant-farm families may have lost access to land.

The reasons for this shift can also be attributed to developments in agricultural technology. The new technologies required that much more care be taken of land sown with the new varieties, as precisely timed planting and harvesting, multiple water applications and the use of fertilizers and pesticides became necessary. The owner of the land — and of the water rights — may in fact be more assured of proper care and higher yields if he regained the land for self-cultivation. From his point of view, the implicit labour costs under a crop-sharing arrangement may become so high that he is induced to use wage labour. The possibilities to do so, even for fairly large tracts of land, are greatly enhanced with the introduction of mechanised farming combined with family labour and some hired workers.

The difficulties associated with the introduction of new technologies in a tenancy system would undoubtedly have led to more owner operation, as is the case in the Indian Punjab. The land reforms of 1959, however, considerably strengthened the arguments. These reforms, which in principle and sometimes in practice made hiring out land less attractive to landowners, attempted to provide more security to tenants. Through imposition of ceilings on individual ownership of agricultural lands, through land transfers to the government and through the breaking up of large holdings into smaller ones owned by relatives, the size of holdings was reduced. Maximizing the revenues from these smaller holdings added to owner rather than to tenant operation.

The land reforms of 1972 contributed strongly here, not only by further reducing land ownership size but by its specific provisions regarding owner-tenant relationships. All payment of land revenue, charges, water rates, levies, taxes and surcharges on land and the provision of seed was made the liability of the owners; the costs of fertilizers and pesticides were to be equally shared and owners were forbidden to levy any charges on tenants or to take free labour from them. As we have said, ceilings on land ownership did have upward flexibility in case of ownership of tubewells and mechanised equipment. Together these provisions add up to a good incentive to owner-operated modernisation and a disincentive to tenancy. The 1977 land reforms (which were never implemented) would not have had much effect since they merely would have reduced ceilings further and required large farmers to pay a multiple of the land revenue. These payments would have been a small proportion of these farmers' incomes. Since then, land revenue has been replaced by a tax on all farms, irrespective of size.

The number of farm families between 1960 and 1980 increased by only 22 per cent, as compared to a 39 per cent increase in rural families. Consequently, farm families now constitute only 47 per cent of the rural population, against 53 per cent in 1960. In contrast, the number of families relying mainly on non-agricultural incomes in addition to hiring themselves out for agricultural labour increased by over 30 per cent. The strongest growth was in the number of households relying mainly on livestock (usually a few head of cattle for milk and meat production): their number probably doubled during this time, and these households now account for more than 20 per cent of all rural households.

The limits on the amount of land available for agriculture and the relentless growth of the rural population has led on one hand to smaller farms increasing their standing in the rural economy, and on the other to increasing landlessness and reliance on livestock holding. Technology and land reforms together resulted in a substantial reduction in tenancy and operation of land by owners, reducing access to farm land, particularly for poorer households. Mechanisation has reduced not only tenancy, but also labour inputs per hectare, decreasing opportunities for the landless to find alternative employment.

The most significant consequence is probably that a strategy to combat rural poverty by focusing on small farmers and tenants that would have been appropriate 25 years ago, no longer can reach the majority of the poor. The report of the National Commission on Agriculture recognises this, and calls for a rural employment strategy of much broader dimensions. Within the agricultural sector this requires either neutral policies or those that do not favour labour-saving technologies. Also, the promotion of higher-valued crops — an issue raised in 1983 by the Sixth Plan — and policies to promote the livestock sector can provide more employment. Most employment opportunities, however, must be found outside agriculture. The same report pleads for a carefully defined strategy to ensure that rural industries — particularly those processing agricultural products — are made attractive and managed as much as possible by the rural population itself. At the same time, it realises that rural education should be promoted for that purpose. No employment opportunities will arise for an illiterate and

unskilled rural labour force, nor is there any hope that rural industries can be owned by illiterate farmers. Education is essential to avoid a rural industrialisation policy that slants its benefits towards the well-endowed and educated few, as was the case for the new agricultural technologies.

Two side effects of developments in the past 25 years should be noted here, although they do not have a direct bearing on the agricultural sector itself. One concerns the social effects of owners and co-owners of large tracts of land recovering land for self-cultivation. Former tenants used to be highly dependent on landowners, not only for access to land and part of the produce, but also for housing and minimal amenities. In most areas these relations no longer exist and former tenants have been forced to set up their own accommodations, mostly along the roadside where opportunities to earn money are within reach and products from a few head of livestock can be sold. Most of these families live in conditions of severe poverty, but one should not overlook the fact that the virtual bondage that previously characterised their lives no longer exists. In fact, it is remarkable that many farmers who are looking for tenants, either because of old age or because they are absentee landlords with employment in urban industry, the military or the civil service, find it hard to locate them. Apparently rural economic development has been brisk enough to provide more rewarding opportunities than tenancy, particularly when owners insist on the rigorous application of new technologies. Increased farm incomes, mostly enjoyed by bigger landowners, have brought new demand into the rural economy, combined with mainly non-agricultural employment opportunities.

This apparently positive trend in rural labour markets may, however, be only temporary. In the 1970s some 3 million Pakistani workers migrated to the Middle East in the wake of the oil boom, drastically reducing labour supplies. Real wages — at least for casual labour — have risen in the rural areas, but there is reason to doubt that this is a lasting phenomenon. In addition to the reduction of labour supplies through migration, there is the assumption that remittances received by migrant families in the rural areas, apart from increasing rural demand, may have reduced the willingness of remaining labour to work in the rural labour market. Even if these trends are not sustained in the years ahead, the social implications of greater independence from the landholding classes are bound to remain. In the long run this may be more important than the behaviour of the rural labour market itself.

A second effect, less publicised but nevertheless important, is increased insecurity in rural areas. Under the old tenancy system, absentee landowners employed armed guards to oversee their estates and the tenants operating them. In new owner-operated farms, guards were no longer needed and had to find other ways to earn money; it seems that many of them now use their firearms to extract an income by illegal means. Roads have become unsafe and robberies, often violent, are reported daily. This has coincided for several years with urban unrest and violence due to a large number of Afghani refugees and their involvement in lucrative drug trafficking. In addition, a heavy inflow of arms and ammunition for Afghan resistance groups is frequently used to settle ethnic disputes among the mixed urban population. All this adds to the government's difficulties in maintaining law and order and promoting rural development under stable and secure conditions.

The preceding section dealt with innovations concerning wheat, Pakistan's major food crop. In fact — as alluded to earlier — innovation did not stop there, but was followed in the late 1960s and early 1970s by a similar though less pronounced development in rice. For many years, breakthroughs remained confined to these two crops. Since the mid 1980s a new approach appears to be evolving for crop-wise innovation, this time applying to cotton and relating particularly to the timing of pesticide spraying.

Innovations have led to stronger agricultural growth: up to the early 1960s the growth rate for gross agricultural output was around 2.4 per cent per year, then it increased to 3.8 per cent on average in the next 25 years, or to 3.6 per cent when measured in terms of value added at constant prices. The latter figure is lower because of the faster growth of input uses compared to output growth. The rate of output growth has been rather uneven, with very high rates in the late 1960s and a period of slow growth in the years 1970-1977. After 1977 agriculture performed at the average rate for the entire period.

Growth was also uneven by subsectors and by provinces. Wheat production increased between 1960 and 1985 by around 5 per cent per year, virtually making the country self-sufficient. Rice production, which grew by 4.4 per cent per year on average, was slower because yields of the traditional long-grain basmati variety that practically monopolises the export market hardly increased, whereas the irri variety, which yields almost twice the quantity per hectare, can only be exported with a subsidy. Domestic demand for basmati rice has soared, while consumers consider irri rice inferior; therefore much effort has been put into new basmati varieties promising higher yields, apparently with some initial success.

Cotton production has grown the fastest, at an average of 5.7 per cent during 1960-1985, but with strong cyclical characteristics due to weather, pests and the absence of a stable long-term price policy. The fourth major crop, sugarcane, increased by 3.8 per cent per year, mainly because of strong price support policies. In the case of cotton and especially sugarcane, expansion of cropped area was vital in the growth of output.

These four crops have been the focus of price policies and (except for sugarcane) of agricultural research. As a consequence, their share in the total cropped area increased from 53 per cent around 1960 to 62 per cent in 1985. Except for fruits and vegetables, which claim only a very minor share of total cropped acreage, all other plants saw their share of cropped land reduced. In absolute terms, acreage under all crops increased by 1.2 per cent per year, whereas the four major crops claimed an increase of their land use by 1.9 per cent per year, leaving only an increase of 0.3 per cent for all other crops. If account is taken of the area expansion under fruits and vegetables, all other crops were confined to an almost stagnating area. These included maize, minor cereals, pulses, oilseeds and fodder crops. Yield increases for these crops were small or negligible, or even negative in the case of pulses. This stagnation of both acreage and yields resulted in their share in agricultural output declining even more, from about 20 per cent of value added by crops in 1960 to less than 10 per cent in 1985.

Unevenness of growth by provinces is another characteristic of past agricultural development. Punjab traditionally supplied more than two-thirds of Pakistan's agricultural output, followed by Sind's almost 20 per cent and the North West Frontier Province's 10 per cent, with a small residual of less than 2 per cent for Baluchistan. Sind has shown the largest gains since 1960, chiefly because almost 60 per cent of all irri rice is grown there, its wheat yields increased faster than in Punjab, and sugarcane area expanded more rapidly with higher-than-average yield growth. As a result, Sind's share around 1980 had increased to a full one-fourth, gaining what was lost in terms of provincial share by Punjab.

The attention paid to a few major crops has not only been at the expense of other crops that consequently lagged behind: it has also implied much neglect of the livestock sector. This sector's growth of 2.8 per cent per year, though rising gradually over time, clearly trailed behind the major favoured crops. Within the livestock area a considerable contribution to overall performance was begun in the early 1960s by the

poultry sector, which has maintained annual production growth rates of 15-17 per cent. Still, at present it supplies only 12 per cent of total meat sales, in addition to a major share in egg supplies to the market.

The neglect of this area is almost a standard example of the government's approach to the rural development problem. Livestock keeping has traditionally been (and still largely is) the occupation of small farmers trying to meet some of their basic dietary and work performance requirements through their own resources. Generating some cash income from the sale of meat and sometimes milk may be a second objective. Both farmers and rural non-farm households usually own a small herd of animals that depends for its feed requirements on locally grown fodder and crop residues. The main characteristic of the livestock sector is its subsistence orientation, notwithstanding the growing importance of the modern large-scale poultry sector, the existence of specialised peri-urban milk-producing units and the large flocks in pasture outside the irrigated areas. For example, only 20-25 per cent of all milk produced (the most valuable output of the subsector) ever enters marketing channels.

Livestock provides an important element of rural nutrition: for very poor households, expenditures on milk rank second only to the cost of wheat consumed, and out of average household incomes milk may equal or exceed all other items of food expenditure, including wheat. As an important part of the diet, particularly in rural areas, it exhibits a surprising income elasticity. Farmers will carefully weigh the benefits and costs of new crop technologies in terms of feed and fodder for their livestock and for their own diets, and in terms of a need for animal power or cash income. Government policies aimed at single crops may appear justified by national priorities, but make limited sense in the context of a farmer's decision-making. These policies may also miss opportunities to improve the incomes and the nutritional status of the rural poor, as an overwhelming part of their dietary requirements is met from their own animals.

The focus on several crops instead of many and the lack of interest in the livestock subsector has been costly for national supply and demand balances. In the case of wheat, though self-sufficiency has been reached at a domestic farm-gate price significantly lower than the import parity price, it is still well above export parity even when international wheat prices are assumed to recover the real level of 1982 to 1985. If the government achieves a small export surplus of wheat, it must decide whether to subsidise wheat exports or let domestic procurement and consumer prices fall to the export parity level which in 1985/1986 implied a 20 per cent price reduction. Since then international prices have increased significantly and the real exchange rate has depreciated, and could possibly even lead to domestic prices of wheat below the export parity level.

In the case of rice, it has been mentioned that the increase of acreage and yields stemmed from the use of irri rice, resulting in surpluses that in recent years of low international rice prices could only be sold in the world market at a heavy subsidy. At the same time, the very valuable basmati variety showed little yield growth and domestic consumption has reduced its exportable surplus. As basmati rice is produced exclusively in the Northern Punjab, and irri rice mainly in Sind, an element of regional policy is added to the problem. Higher international prices at the level of 1982-1985 would avoid the subsidisation of rice exports; given the premium for basmati rice in international markets, a higher procurement price is suggested, particularly when higher-yielding varieties can be successfully introduced. Still, there is the lingering question whether rice of standard variety should be produced for the export market, for two reasons. One is that actual production costs are close to the procurement price and sharp fluctuations in world prices would entail export subsidies in some years. The other is the share that rice cultivation takes in scarce water resources (more than twice that of wheat), posing the question of alternative water uses.

In the case of cotton there can be no doubt that Pakistan is a low-cost producer, particularly if the gains from new varieties and application of pesticides in recent years can be maintained. International cotton prices range widely and the government's policy has in the past insulated farmers from these fluctuations. At the same time an increasing quantity of cotton is exported as yarn, cloth or textile products. Low international prices in 1985/1986 and 1986/1987, falling under the equivalent domestic (procurement) price, implied subsidies on cotton exports. The government did make a large export profit at higher world prices in 1987/1988. Against that background, procurement prices could be cut to avoid a recurrence of losses, particularly since yield increases have greatly reduced production costs.

The growth of sugarcane production has been promoted by the government's price policies, but in the absence of higher-yielding varieties, almost the entire expansion took place through increased acreage. Like rice, sugarcane requires relatively large quantities of irrigation water. Domestic costs of production vary across the country, with lowest costs measured in Sind; in all cases, however, these costs are high compared to the import parity price, mainly because of the generally low yields. They would be even higher if the scarcity of water was reflected in the production costs of sugarcane. Clearly, the present price policy which permits high prices to be paid by sugarmills to farmers and then passes on these prices to consumers cannot be sustained, since scarce water is being used on a currently uncompetitive crop. Research to develop higher yielding varieties is crucial, together with lower procurement and consumer prices more in line with world market prices. If yields cannot be increased within a few years, the government should turn to sugar imports rather than continue a wasteful policy.

Pakistan faces a situation in which rising domestic demand for a number of agricultural commodities, with stagnating or slow-growing production, raises the spectre of rapidly rising import dependence. This may be the case for maize and other minor cereals, for pulses and even for milk and meat, due to inadequate attention to fodder crops and to the processing chains from producers to consumers. The country already needs to import about 15 per cent of its sugar needs and there may be sound economic reasons not to worry too much about that. But for many years the government has worried, and probably rightly so, about the increasing import dependence on vegetable oils: at present imports account for over 60 per cent of domestic consumption and even with the best efforts it is unlikely that the country could meet even half of its requirements from domestic production before the end of the century.

There is progress in some of these areas. Maize is now being multiplied from imported synthetic and hybrid varieties by commercial enterprises that carefully control contract growers. Expansion of the small cultivated area may considerably boost production; yields are already twice the national average. Non-traditional oilseeds are being introduced with some success over an expanding area and steps are being considered for procurement arrangements at remunerative prices. Little is being done, meanwhile, in the area of pulses or minor grains important for their protein content.

How these imbalances will or will not be dealt with in the future is the topic of the next chapter. Government options will be analysed against the background of past experience. The future will hold even less scope for mistakes than the past, as the population is now much bigger and growing rapidly, as water and land resources are bound to be even more limited and as the balance-of-payments no doubt remains a restricting factor, exerting pressure on the agricultural sector to continue generating a net inflow of foreign exchange resources.



## FUTURE TRENDS AND POLICIES

Two aspects of Pakistan's agricultural development in the next ten to fifteen years are the rapid population growth and the restrictions on further expansion of cultivated area. Current estimates put population growth at 3.1 per cent per year and a tremendous effort appears to be necessary before it can be reduced. At the same time, it is unlikely that cultivated area can maintain its rate of growth that has averaged 1.4 per cent per year over the past 25 years (though gradually declining). Since 1980, area expansion has been only marginal. Taking all available opportunities to increase the flows of irrigation water and accounting for certain factors which are bound to reduce that flow in coming years, cultivated area at most could increase by 1.0 per cent annually. Even this modest rate of growth can be achieved only with continued, strong investment in water conveyances, drainage systems and better water efficiency.

The tasks associated with agricultural development are demonstrated most clearly by projecting past yields and productivity trends into the future. Possible area expansion combined with agricultural growth would amount to barely 3 per cent per year, or just enough to maintain present food supplies on a per capita basis, with the risk that present import dependence on vegetable oils and fats, sugar and dairy products increases or even extends to other commodities. Efforts to reduce import dependence by increasing domestic production can easily be made at the expense of exportable agricultural surpluses or the creation of other import needs. Income increases, particularly for lower income groups, will raise food demand above domestic production, causing a drain on the balance of payments or rising relative prices of agricultural products. Also, at this rate of agricultural growth there is hardly any room for diversification into higher value-added crops and livestock products.

The plans for economic growth which are from time to time proposed and adopted in Pakistan require a considerably faster agricultural development than the 3 per cent apparently feasible with available irrigation water supplies and past yield trends. Real GNP increased between 1960 and 1985 by 5.6 per cent per annum, with some acceleration in recent years. Growth during the Sixth Plan (1983-1988) reached about 6.5 per cent per year and the current objective is a gradual acceleration to around 7.0 per cent by the mid 1990s. A reasonable range for exploring agricultural growth patterns therefore lies between the bounds of 5.6 to 6.6 per cent rates of economic growth for the remaining years before the end of the century. To satisfy domestic demand for agricultural products and at the same time improve the contribution of the sector to exports and the overall trade balance requires production to grow at 4.5-5.0 per cent per year.

There are no easy answers to this problem. Certainly it will require major investments, more cohesive agricultural and macro-economic policies and stronger institutions. The international climate for trade in agricultural products must be assessed, with regard for the country's export potential, its needs for earning foreign exchange and the possibility that significant agricultural policy adjustments are agreed to as part of the current Uruguay Round of trade negotiations.

### ***The External Setting***

Pakistan remains heavily dependent on its agricultural sector for its foreign exchange earnings. When exports of raw and processed agricultural products are taken

together — including the raw material content of yarn and cloth exports — the sector still provides up to 70 per cent of export earnings from merchandise trade. Two commodities especially — rice and cotton, including processed products — account for three-quarters of all agricultural exports; the remaining quarter consists of a wide variety of commodities including leather, wool carpets, fruits and vegetables. Merchandise export earnings are therefore quite vulnerable to international prices of the two main export commodities, cotton and rice, and to the protective policies concerning textiles in the industrial countries. Still, export volume growth amounted to an impressive 5.2 per cent per year over the past 25 years.

Beneficial policies to promote wheat production have already been described; after a long interval of import dependence, the country has now basically reached self-sufficiency, with surpluses added to stocks in good years and limited imports in others. The picture gets blurred somewhat by the continuing imports — mainly under aid grants — of wheat for the estimated 3 million Afghani refugees in the Western border areas.

Import demand for other agricultural products has been rising. When imports for the agricultural sector are added — in particular fertilizers, pesticides, tractors and farm equipment — these amount to almost 85 per cent of direct agricultural exports. The net contribution by the agricultural sector to the trade balance is therefore small, though still positive. The main area of concern is growing import dependence on sugar and edible oils, but there are also concerns about imports of powdered milk and beef, maize and pulses. There are also heavy costs in imports of non-competing agricultural products like tea, cocoa, coffee and jute.

There is reason to believe that Pakistan will remain dependent on its agricultural sector for exports in the years ahead. Its manufacturing sector remains small (20 per cent of GDP, rising only modestly) and grew under the wing of close protectionism, which makes most of its outputs uncompetitive in world markets. Restructuring the manufacturing sector and revamping government policies to promote competitiveness has been a stated objective but actual progress is slow. Even an acceleration of action in that direction would yield sluggish export earnings, partly because of the vast adjustments needed in this sector and partly because of the vicissitudes of exporting to protected markets overseas. The bulk of export earnings, therefore, will still have to be obtained from agricultural commodities.

The need to promote these exports is given additional weight because of the decline expected in remittances from abroad. These rose steeply from the mid 1970s as Pakistani nationals found employment in the Middle East; for several years in the 1980s their remittances even exceeded earnings from merchandise exports. Recently, however, the oil price decline has begun to affect the level of remittances, which began to fall in 1986. The presently accepted supposition that oil prices will remain under pressure due to oversupplies implies that these remittances will no longer be a positive element in the growth of foreign exchange earnings, and may even continue to decline and require compensating increases from other sources. This too adds to the importance of agricultural export prospects.

(The government's view as expressed in the Seventh Five-Year Plan, studies by the Agricultural Prices Commission (Apcom), and analyses by others (for example PIDE, 1983) all agree on the competitiveness of Pakistan's agriculture. Estimates of domestic resource costs of major agricultural commodities and careful comparisons made by Apcom between domestic costs and prices and international prices seem to support the view that Pakistan's agriculture is efficient at world prices. These approaches have their limitations, particularly in a country whose price policies and border protection have for many years distorted patterns and costs of production. Still,

the presumption of competitiveness is given credibility by the simple fact that agricultural production and exports have grown so much, notwithstanding the strong bias to negatively protect agriculture. Those policies no doubt retarded growth, depressed the value of agricultural land and possibly rural wages (by transferring income from rural to urban areas). With these responses to negative protection taken into account, a margin of profitability remained for most major crops.

Comparative advantage questions concerning agricultural products in a country at Pakistan's level of economic development are hard to answer. There is no doubt that higher relative prices for agricultural products elicit a positive output response by farmers, and that lower prices have the opposite effect. In Chapter 1 this relationship was shown to be true for Pakistan in the wedges driven by government policies between international and domestic prices of both agricultural commodities and manufactured goods.

Factor markets are affected first of all by a reduction in the relative price of cultivated land and possibly by the real value of irrigation water. Agricultural wage rates may decline as well, constituting cost reductions which offset the lower prices to some extent. In this way incomes are shifted from agricultural producers to consumers and from rural to urban areas. These effects may be mitigated however by the behaviour of small farmers (and small livestock holders) who have no alternative employment or sources of food supplies for their households. They will tend to maintain their production of staples, including milk, for subsistence over a wide range of market prices and factor costs because of their focus on household food supplies, which cannot reasonably be secured in any other way. In economic terms one can say, somewhat cynically, no doubt, that subsistence products for them have an absolute advantage. For many people in the rural population there is no comparative advantage: alternative uses of their resources which provide food security fail to exist.

Supply in the aggregate does undoubtedly respond to prices; Chapter 2 has emphasised this point. Sound price policies can draw more capital and higher skills to the sector, promoting better use of scarce land and water and stimulating technical progress. One should not lose sight however of the restrictions that exist in the scope for adjustment, upward and downward, of the many small farmers who have hardly any choice except to meet subsistence needs. These effects on aggregate supply responses are probably slight, as the share of small farmers in total agricultural output is small and has been declining.

The preceding discussion arises from the fact that about 70 per cent of Pakistan's exports derive directly or indirectly from the agricultural sector. A general decline of international prices for agricultural products would cause a terms-of-trade loss which would necessitate adjustment of the exchange rate. Whatever loss of competitiveness remained after taking account of subsequent cost reductions may need to be compensated by devaluation of the currency. As small farmers cannot afford to lose their food supplies, the country cannot afford the loss of competitiveness in international agricultural markets. Failure to adjust, which occurs in many developing countries, demonstrably reduces agricultural exports.

Given a set of factor prices prevailing at a certain point— however much these may be depressed by negative protection — one can ask what these suggest as production costs for individual crops and livestock products and how these costs compare to international prices. This is generally what is done each year by Apcom, high intercorrelation of past agricultural prices. Studies in recent years suggest on the basis of the best available estimates that cross-price effects cannot be neglected (Hamid, Pinckney c.s., 1987; Nabi, Hamid and Nasim, 1989; Tweeten, 1985). In fact,

price increases which may be needed to promote the production of basmati rice, oilseeds and milk may negatively affect the wheat growing, or alternatively require an increase in the wheat price as well to maintain the export margin over self-sufficiency.

In its final report (April 1988) the National Commission on Agriculture had to make a number of difficult choices regarding future agricultural trade, as is clear from the preceding analysis. Maintaining a small net-export posture for wheat appears to be within reach and is attractive in terms of domestic wage costs, improving (or at least from that angle not distorting further) the competitive position of manufactured goods. Maintaining prices of other agricultural products at present ratios to the wheat price, however, can lead to substantial imports of vegetable oils and livestock products. It may also erode exports of basmati rice. And even with high prices paid to sugarcane growers, sugar imports are bound to rise. Upward price adjustments for products other than wheat to avoid excessive import dependence or reduced export growth may in turn make wheat self-sufficiency illusory.

Looking at the main export crops against that background, attention first turns to cotton. Starting again from Apcom's detailed estimates of production costs, competitiveness in international markets appears strong, particularly in Sind where costs of production are lower than in Punjab due to differences in land rent and irrigation costs. Taking account of ginning and marketing costs, returns from cotton seed and the 10 per cent export duty, export costs amounted in 1986/1987 to about 63 US cents per kilogram of lint from Sind and US\$1.02 per kg from Punjab. In fact, the support price for cotton is marginally above production costs in Punjab and only slightly lower in Sind, which makes cotton growing in the Sind quite profitable, given the much lower production costs. Actual prices for comparable qualities in the world market ranged between 78 and 90 US cents, which was exceptionally low and in fact so much below the equivalent procurement price that it forced the government to subsidise cotton exports. In earlier years cotton exports through the public sector export monopoly was a substantial source of income. Price recovery in the international cotton market in 1987 and 1988 restored profitability.

Recently a breakthrough in the use of pesticides combined with new varieties has sharply raised cotton yields, in particular in the Punjab. Its effect is a major reduction of the costs of production per unit of product in Punjab (it has not been translated into lower procurement prices). As a consequence the profitability of growing cotton in Punjab has improved, providing an incentive to expand cotton acreage at the expense of other summer crops. Pakistan today supplies about 15 per cent of total world cotton trade and therefore can influence world prices, which calls for caution in expansion of raw cotton exports. Considerable care is required in setting domestic procurement prices, as high profitability may lead to expansion of cotton production and exports beyond sustainable levels, combined with a decline of world market prices. The appropriate policy measure is deregulation of trade and efforts to improve the quality of cotton, both in variety terms and through better grading, ginning and handling. In that way cotton production can maintain a major contribution to foreign exchange earnings and also to the containment of import dependence on vegetable oils.

Rice produced in Pakistan is not a homogeneous commodity: the staple basmati rice is a traditional export product which fetches a price about three times that of commonly traded types of rice. It is grown in one part of Punjab and has in the past exhibited yields per hectare one-third below the modern varieties and with hardly any yield increase over time. Since the late 1960s modern varieties ("irri rice") have been introduced and an export surplus of these rice varieties was generated which in quantity terms (but not in value) exceeds exports of basmati rice. Government price policies are set separately for the two types of rice.

Table 3.1: DEMAND AND SUPPLY OF AGRICULTURAL PRODUCTS  
1987/88 AND 2000

Product	Base year (1987/88) production (mln. tons)	Income elasticity of demand	Export/import target in 2000 (mln. tons)	Required production growth (in % p.a.)	Estimated yield growth (in % p.a.)
Wheat	13.50	0.19	0.20	3.5	3.0
Cotton	1.31	0.81	0.85	3.9	3.2
Rice, basmati	0.84	1.00	1.00	7.7	4.8
Rice, irri	2.45	-0.05	1.00	2.6	2.2
Sugar (refined) <sup>1</sup>	1.31	1.37	-0.32	3.5	2.6
Edible oil	0.44	0.89	-0.95	7.8	4.1
Fruits	3.50	1.11	0.35	7.0	2.6
Vegetables	3.65	1.11	0.24	7.0	3.2
Meat	1.25	1.40	-	6.4	5.8 <sup>2</sup>
Milk	12.70	0.66	-	5.2	3.8 <sup>2</sup>
Total agriculture	....	0.67 <sup>3</sup>		5.0	3.9

1. At the income elasticity used, and projected production growth, imports in 2000 will exceed the stated target.

2. Production per capita.

3. Declining over time.

Source: National Commission on Agriculture, 1988.

Again, starting from Apcom's detailed estimates of production costs, the lower basmati yields result in higher costs. The procurement price marginally exceeds these production costs, but does not at all reflect the high export price. As a result, there is a very substantial profit for the monopoly which the government exerts through the Rice Export Corporation of Pakistan (RECP). Procurement prices for irri rice are also set at a level marginally above production costs; it appears that the margin is somewhat larger for Sind than for Punjab. However, the prices obtained for exports of these varieties in 1986/1987 fell below the domestic procurement and processing costs and required an export subsidy. Higher world market prices for rice have since restored a modest margin of profitability for irri rice exports. The government's intention is not to encourage the growth of irri rice and to maintain procurement prices which are in line with international prices. At the same time, it is expected that better, higher-yielding basmati varieties could be introduced which would increase profitability and gradually increase the surplus for exports. This will need to be accompanied by higher producer prices in order to limit domestic consumption of preferred rice. As there is a good and very profitable market for basmati rice but a very small and unreliable one for irri rice (which must compete with traditional exporters like the USA and Thailand) this appears to be the appropriate direction for future price policies.

Fruits and vegetables (including processed) have for many years captured the attention of policy makers in Pakistan as a potential source of foreign exchange earnings. At the present time they contribute to only 1 per cent of agricultural exports. No doubt the quality and variety produced is promising but major bottlenecks exist in processing, grading, marketing and transport. The fact that there is a large market in the Middle East is a good reason to strengthen the infrastructure for fruit and vegetable exports. Nevertheless even a very successful effort would raise the contribution to agricultural export earnings to no more than 5 per cent.

Pakistan is a net-importing country for most of its other foods: sugar, vegetable oils, milk and meat. It may well also become a net importer of maize, pulses and feed for livestock. The issues in this case concern the relative attractiveness of these crops in economic terms and the appropriateness of present price policies. Costs of production will again be taken as the starting point.

Imports of sugar recently amounted to about half a million tons, about 15 per cent of domestic consumption. The government is worried that stagnating yields in sugarcane areas — as noted for the last 25 years — will lead to increasing import dependence. Issues of pricing are controversial, however, and involve both cane growers and mill owners. Inefficiencies in the handling of cane lead to high costs of sugar, as do excise taxes levied on the mills.

Low yields and large demands for irrigation water make the crop itself of doubtful value. The Apcom has not published any detailed estimates of production costs, but only the results from a 1985 survey which shows widely different cost levels. Progressive farmers in Sind produced sugarcane at Rs 120 per metric ton at one extreme, with traditional farmers in Punjab at the other extreme with Rs 235/MT. The average, which is dominated by farmers using traditional methods, ranged around Rs 230/MT, including the costs of transporting cane to the mill-gate. The recovery factor at the mills (sugar per ton of cane) is a very low 8.5 per cent, so cane costs at mill-gate per ton of sugar are Rs 2,685, to which the costs of the mill (excluding taxes) must be added (Rs 4 655/MT of sugar), giving an ex-factory price of sugar of Rs 7 340/MT or US\$432/MT at the then prevailing exchange rate. Compared to world market prices in that year — which no doubt were depressed at the time — imported sugar could be delivered at the factory gate for a price 40 per cent below domestic costs, excluding taxes. Higher world market prices and a depreciation of the currency have since

narrowed this gap. Taxes are not relevant because just as there is excise duty on domestic production there is an import duty on imported sugar.

Turning the calculation around and estimating the cane price for growers that would make sugar competitive, and assuming that there is no excise tax, the farm-gate price for cane could not exceed Rs 130/MT in 1985, which would permit only the most efficient producers in Sind to survive, given the estimates of their production costs. Translated into current prices and exchange rates, a farm-gate price of around Rs 200/MT would be indicated, even higher if major policy changes towards the sugar trade were made in industrial countries, making significant long-term upward price movement possible. Therefore the present support price of approximately Rs 320/MT at the mill-gate is quite difficult to defend, even though it purports to reflect production costs.

The heart of the problem is inefficiency, both at the farm and the mill. Extraction rates of 12-14 per cent are possible but require better scheduling of cane arrivals and processing; it would permit a significantly higher cane price than can be afforded at present. At the farm level the low and stagnating yields are to be overcome by improved cane varieties and better crop practices. Both these courses of action take considerable time and effort. In the longer run these may establish sugar production as an economically viable activity, but for the moment it clearly is not, except in some parts of Sind. Therefore measures to improve yields and mill efficiency should be pursued with vigour, but it would not be advisable to increase farm-gate prices. The rise in imports expected in the next few years probably constitutes a lesser cost to the nation than expanding production further in the same inefficient way. Irrigation water demand, which is high for sugarcane, adds strength to this argument as more land under sugarcane reduces availability of water for potentially more valuable crops like rice.

The fact that detailed cost accounts are not available leaves a number of open questions. As to farm costs, it is not known in what way sugarcane tops — a valuable fodder — are accounted for, nor whether a second harvesting of the same crop ("ratoon") is allowed for. As to the mills, the costs per ton of sugar are quite high, and this raises questions not only about the assumed capacity utilisation, but about the valuation of by-products: bagasse, used as fuel, and molasses, mainly exported. Complete accounts may alter the conclusions somewhat of the acceptability of sugarcane as an economic crop in Pakistan, but in their absence it still appears that prices paid to farmers under a long-standing government policy have been too high.

The problem of vegetable oils has existed for a much longer period. Whereas sugar imports used to be a temporary phenomenon (in 1979-1981, and again since 1985), imports of edible oils have been a permanent feature. Between 1970 and 1985 these imports increased in volume terms by more than 10 per cent per year, whereas domestic production increased by only 2 per cent per year. Presently about two-thirds of domestic demand is met from imports. Almost 70 per cent of domestic edible oils production comes from cotton seed, with rape- and mustard seed providing about 20 per cent and the remainder obtained from several traditional and non-traditional sources. Earlier, in the years after independence, consumer preference was for ghee, a semi-fluid clarified butter, but price increases put it outside the reach of most consumers and led to demand for vegetable ghee.

Rape- and mustard seed used to be intercropped with traditional wheat varieties but lost out in the competition against higher-yielding wheat varieties. Yields are low and subject to pests, and only since 1982/1983 has the government considered a price policy for these crops, but no decisions have been taken. Sunflower, safflower and soybeans have been introduced in recent years and support prices were introduced in 1978/1979, but only small percentages of the crops were actually procured.

Procurement prices are too low to induce farmers to shift out of wheat, and also much lower than in neighbouring India. There is a presumption that significant quantities of edible oils, produced in Pakistan or imported into the country, find their way to the Indian market.

Sunflower particularly stands a good chance to meet a major part of the deficit, as its growing season (late winter/spring) can be fitted in because of irrigation water availability in those months, particularly when idle tubewell capacity can be used in sweet groundwater zones to supply saline areas not being cultivated. There is nonetheless also some displacement to be expected of wheat and (basmati as well as irri) rice.

Price policies suggested by Apcom do not differ much in terms of prices per ton of traditional or non-traditional oilseeds, but yields of the non-traditional ones are more promising and therefore offer a higher return to farmers. Recent efforts to promote sunflower suffered, however, from inadequate procurement arrangements. The Ghee Corporation of Pakistan which is charged with that responsibility prefers to import palm oil from abroad because it offers a better profit margin than local procurement of oilseeds. This demonstrates that at present support prices domestic edible oils cannot compete with imports. Domestic consumer prices and the cost of imports therefore need to be raised. Nonetheless, resolving import dependence on edible oils, unless carefully tied to use of currently idle land and water resources, runs the risk of reducing wheat and rice production. Both these crops appear more attractive in terms of farm incomes and balance-of-payments benefits, unless major progress can be made in raising the yields of oilseed crops.

Finally, the prospects for livestock products need to be discussed in the light of increasing net imports. Although imports of (powdered) milk and beef are small, there are signs of rapidly growing domestic demand and inadequate growth of supplies. Most of the livestock sector remains of a traditional kind, closely integrated with the crop sector for draught power, manure and the use of crop residues as fodder. Nomadic herding of livestock is significant outside irrigated areas, and in addition, a large modern poultry breeding sector has established itself in the past 20 years. Overcoming the constraints of a strongly traditional sector of a largely subsistence nature, is necessary to meet rapidly growing demand for meat, milk and other livestock products. Government policies in this area have been characterised most of all by their absence. Progress in this sector is nevertheless of particular interest as there can be hefty gains for large numbers of families who depend on a few head of cattle for most of their livelihood. One element of trade policy requires the livestock subsector to be treated as equal to the crop subsector by abolishing institutional arrangements which restrict its imported inputs. It should, for example, end the positive discrimination of vegetable oil imports as compared to oilseeds, which deprives the livestock sector of a supply of nutritious oilmeals and -cakes. Care should be taken that domestic meat and dairy prices are not allowed to be negatively affected by imports of heavily subsidised surpluses.

### ***Domestic demand***

The growth of population exceeds 3.0 per cent per year, according to estimates by the Pakistan Planning Commission. Some uncertainty surrounds this estimate because the Population Census data are imperfect, with underestimation of women of childbearing age and the youngest age group. If the quality of census data improved — which is likely, but not yet the case — then the population growth rate estimate may be too high. This is not a reason to assume a lower rate for the future, unless there is evidence that major efforts will be made in the implementation of an effective population



policy. As this is a controversial policy issue in Pakistan and the political costs of attempting to step up these efforts may be high, decisive steps are not likely. The Seventh Five-Year Plan contains for the five years through 1992/1993 a number of programme proposals aimed at reducing the population growth rate to about 2.75 per cent by 1993 and to 2.5 per cent by the end of the century. This would be modest progress, compared to the alternative of a continued growth by 3.0 per cent per annum, but even this small improvement in population prospects cannot be taken for granted.

Overall economic growth in the past has been considerable: between 1960 and 1985 an average rate of 5.6 per cent per year is stated in the national accounts. During the Sixth Plan period (1983-1988), the average was higher at 6.5 per cent, and the Seventh Plan sets a target of 6.7 per cent on average, rising to 7.0 per cent after 1993. There are serious doubts about these numbers; the National Income Commission reported in 1986 that no changes were made in the methods of income and product estimates since 1964, and the widening range of relevant data collection since that time has been insufficiently used to improve the national accounts.

The low investment rate, which has been barely 15 per cent of GDP, suggests a very efficient use of investment resources with a capital/output ratio of around 2.5 for past years. Actual information concerning capacity utilisation and less-than-satisfactory public sector investments seem to contradict this, however. It is noteworthy that the services sector throughout the past 25 years contributed about half of total economic growth and increased its share in the GDP from 39 per cent in 1960 to 47 per cent in 1985. This suggests that its value added may be overestimated both in terms of levels and of growth over time. If so, overall growth of the economy is a significant overestimate and the share of investment rose over time.

With that possibility in mind, even projecting the long-term past growth rate of 5.6 per cent into the future may err on the optimistic side and in any case casts serious doubt on the Planning Commission's expectations of accelerated growth, unless from a lower actual GDP-level than is suggested by the national accounts.

Another finding which appears to point also in the direction of an overestimated GDP relates to the main characteristics of food demand. Estimates based on the 1979 Household Expenditure Survey suggest income elasticities for food demand which seem somewhat out of line with Pakistan's estimated level of per capita income (\$380 in 1985, according to the World Bank, 1987). It is a well-known property of cross-section estimates to exceed those obtained from time-series, but a cross-section estimate of elasticity for total food demand to income of almost 0.6 seems very high. If used in conjunction with GDP-growth of 5.6 per cent per year and population growth of 3.0 per cent, food demand would rise by about 4.5 per cent per year, perhaps gradually slowing down to 4.0 per cent as income elasticities decline over time.

The growth of domestic demand for food makes up the major proportion of estimated agricultural production needs. Assuming for the moment that imports and exports of agricultural products will show growth rates comparable to domestic consumption, the conclusion follows that production must grow at least by at least 4.5 per cent as well; since a shift of consumption away from the traditional staples to demand for livestock products would raise overall required growth of agricultural production even higher.

In the past 25 years, the agricultural sector recorded a gross rate of growth of 3.8 per cent per year. A significant part of this came from an expansion of the cultivated area (including increased double-cropping), estimated at 1.4 per cent per year. This leaves a growth of yields by an average of 2.4 per cent, partly the result of shifts in cropping patterns towards crops with faster than average yield growth. Assuming it was possible to maintain this growth of yields, including further shifts of cropping patterns, in

the years ahead, production growth would still fall significantly short of demand as area expansion cannot be maintained. On this basis production would at best grow by 3.5 per cent per year. As a consequence, export surpluses would be eroded and import needs increased, reversing the agricultural trade balance. The balance-of-payments is not likely to permit this reversal, in turn leading to increasing relative prices of food in the domestic market curbing food demand.

A straightforward projection of consumer demand, based on the assumptions discussed above for population trends and GDP growth, combined with a plausible set of income elasticities, is presented here in combination with a set of likely, or "desirable and feasible," magnitudes for imports and exports. Those are then taken as a basis for a discussion of the implications of those demands for production. Ultimately the test of the feasibility of these projections rests with the required increases of yields and productivity in the agricultural sector.

The projections are illustrative of the magnitude of the tasks. Area allocations are based on model estimates (Kutcher, 1987; Hamid, Pinckney e.a. 1987) which take account of seasonality of crops and water balances, relative prices of crops and related net revenues per hectare (Hamid, Pinckney c.s., 1987).

### **Productivity and yield prospects**

There can be no doubt that some of the required increases of productivity and yields are quite high. Comparisons with past trends suggest this, and a more careful look at the actual situation reveals the difficulties implied by these objectives. An exception is cotton, which is passing through a stage of technological innovation promising future yield growth. Little is known about historical trends for fruits and vegetables, so the yields projected may be reasonable; they are low at present and the attention of agricultural policies may increase in future years. Bottlenecks are not inherent to agriculture itself, but pertain primarily to inadequate marketing and grading facilities and lack of appropriate transport. For all other crops, and for the livestock products, the aims presented in Table 3.1 are clearly optimistic. At the same time, one should keep in mind that present yields for most crops remain low by international standards.

A strategy of agricultural growth which meets both domestic demand and balance-of-payments objectives under increasingly severe constraint must necessarily focus on yields. How to accelerate yield growth becomes the central question. The National Commission on Agriculture has therefore analysed the present bottlenecks to yield growth for each separate agricultural commodity and recommended ways to cope with them. In each case it has presented programmes in which public and private sector roles are clearly identified.

Apart from the recognised need for better varieties of crops, improved animal breeds and efficient use of water, fertilizers and other inputs, a number of improvements could be made in the physical and institutional infrastructures supporting agriculture. For the first time the NCA report provides a detailed analysis of the livestock sector (not just irrigated crops), and the use of rainfed lands, range and watershed management. It considers the needs of small farmers, the provision of rural non-agricultural employment, land reform and the organisation of agricultural marketing and processing. It sets agricultural strategy within the frame of rural development and goes well beyond the scope of a traditional sector study.

Some of the important factors that appear to determine yield prospects for coming years can be listed, starting with wheat. Virtually all farmers have already switched to high-yielding varieties and are using fairly adequate quantities of fertilizers.

Obviously, the introduction of better varieties is needed but it is not clear whether these are in the offing. The main argument for rapid yield increases is the observation that agronomic practices differ widely and appear to leave much room for improvement. Average wheat yields are still less than 2.0 tons per hectare, but progressive farmers who sow on time, till properly and use weed control reach or exceed 3.0 tons per hectare. Improving agronomic practices is therefore the obvious route to take. Streamlining water supply timing operations and efficiency — both better managed with tubewells than with canalwater — would also be useful. In fact, yield increases shown in Table 2.5 would lead to average yields in the country by the end of the century, still 10-20 per cent below what progressive farmers are already achieving now.

One additional area of promise is the growing of wheat in the Barani areas where yields are very low (one ton per hectare or less) but can be raised substantially with drought-resistant varieties and the development of small water storage and supply systems. In all areas, rainfed and irrigated alike, mechanisation of threshing can reduce post-harvest losses. All of these factors could be brought together to produce the required yield growth, but it would put a strain on farmers and the government to mobilise their efforts in this way.

The story for rice is rather similar for the irri variety, although the yield objective appears less ambitious compared to past trends. For basmati rice the weight of the argument for very high yield growth rests almost entirely on a new variety now being introduced which combines the taste characteristics and long staple grain with higher yields. As the government has recently permitted private procurement and export of basmati rice, higher prices to farmers may provide the necessary incentive to adopt the new variety and to achieve the yield increase necessary to meet domestic and export demand, but there can be no guarantee of this.

Sugar constitutes one of the most difficult problems, since area expansion and the stagnating yields of the past are no longer possible; only modest extension of area under sugarcane can be permitted and a significant increase of yields must be achieved. Even so, Pakistan will remain a net importing country, meeting at least 10 per cent of its domestic needs from imports, in the projections of the NCA. Improved recovery by the mills can make a contribution to supplies, but this will take a long time because of the organisation of the mills and the rules under which they operate. It may be more realistic to expect the present import dependence of 20 per cent for refined sugar to increase further over time.

Yields in the Indian Punjab are 68 tons per hectare of cane against 38 tons in Pakistan, and hardly any new varieties have been released for the past decade. In this context, a target of 50 tons per hectare by the year 2000 may seem reasonable, but the lack of a well-developed research establishment makes its attainment problematic.

Edible oil production is becoming an increasingly problem as import dependence and foreign exchange costs continue to rise. Non-traditional varieties have much higher yield potentials— particularly sunflower, possibly also soybeans— but the government has not been able to organise procurement in a way that makes procurement prices effective. The objective, it appears, is feasible in purely physical terms, as non-traditional oilseeds may fit into cropping patterns and show net revenues which make their adoption attractive to farmers. One may therefore give the suggested yield increases the benefit of the doubt, noting at the same time that by the end of the century the country will depend on edible oils imports for half its domestic needs.

The most complex area is livestock products. To move a substantial part of the livestock sector from traditional methods to more modern standards is a task which has hardly been begun. Herds are generally undernourished and genetically nondescript

and fed by crop residues. The marketing and processing sector for both milk and meat is very underdeveloped.

The government has not come up with a set of policies for this sector and its only support consists of some veterinary and health services and genetic research. Fodder crops have been no-one's responsibility.

One of the most important objectives should be to reduce the number of animals and to feed the smaller herds better. However, livestock owners put a premium on the number of head of animals, as diseases and death are a main worry. Health services combined with insurance of healthy animals should reverse that perception but such approaches are still in the early stages.

Milk production requires small-scale chilling and transport, rather than large-scale urban milk product factories, to ensure a better income to nearly 1.5 million families who rely on a few cows or buffaloes and their milk for most of their income. With better feed and fodder, such approaches would secure the required growth of milk production.

Meat trade is handicapped by lack of grading of slaughter animals, which stands in the way of efforts to fatten calves. Taxes and trade restrictions by local governments add to these impediments, as do the atrocious conditions in most slaughterhouses. The potential here is considerable but the efforts required to remove bottlenecks (and intermediaries out of entrenched positions) make it unlikely that any ambitious target will be met.

In sum, there is considerable doubt that agriculture can move fast enough to maintain Pakistan's overall growth of GDP at its long-term trend of 5.6 per cent per year. It is not impossible, but it certainly will not be easy to achieve. It tends to put emphasis again on policies to curb population growth, as otherwise little or no diversification will probably occur within agriculture. Consequently there is not enough growth of agricultural incomes to stave off accelerated migration to the urban areas.

### **Final remarks**

Agricultural development in Pakistan has in the past century and a half been driven mainly by horizontal expansion: increasing the area under the plough by increasing water control. Since the late 1960s the first successful inroads have been made towards intensification, although these have remained limited to individual crops and have not evolved into a broad strategy. Because of limits to expansion, the future calls for a strategy leading to higher intensities of cropping, more efficient use of available land and water, and a more comprehensive approach to the entire rural and agricultural system.

The National Commission on Agriculture report recognises that technological and institutional barriers must be hurdled when planning a long-term strategy, and that this directly concerns the government. Extensive growth requires many people doing the same work over a wider area, but intensification can succeed only if the quality of the farming population can be raised. Capital scarcity demands an approach that raises yields faster than capital inputs, and this can be done through human resources. Much depends, in agricultural development, on the degree to which education can be improved, networks organised, knowledge communicated and social relations at the village level harmonized. Pakistan's people have traditionally been dependent on water. Assuring they make the best use of it in the years ahead puts a high priority on investments in Pakistan's human resources.

## NOTES

1. The standard measure used one MAF is one foot of water over an area of 1.0 million acres.
2. Salinity control and reclamation projects.
3. Other transfers into agriculture which have been taken into account in calculating the net flows are the subsidies on inputs (fertilizer, irrigation and credit).
4. Because of increases in international commodity prices, even in the case of sugarcane the domestic price was below the international price.
5. The decline in transfers in fiscal year '86 and '87 was the result of the weakening of international commodity prices. The increase in world prices since the second half of 1987 has no doubt raised the transfers once again.
6. In calculating the transfers not only output but also inputs, such as fertilizer, were valued at international prices. Then from the gross transfers, the subsidies which could not be allocated to individual crops, i.e., on credit and irrigation, were deducted to obtain the net price-related transfers.
7. On the assumption that the cost of funds, including administrative expenses, was 20 per cent and the rate charged on loans (other than interest-free loans) was 12 per cent.
8. The exception applied throughout almost the entire 25-year period to sugarcane, which was heavily protected except in years when world market prices were very high (see table 4.2).

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