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NOTES ON THE CURRENT STATUS
AND FUTURE DEVELOPMENT OF
WEST PAKISTAN AGRICULTURE

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Abstract

Notes on the Current Status and Future Development of West Pakistan Agriculture

This paper discusses the growth experience of West Pakistan agriculture in the 1960's, and considers the likely prospects for its continued development. The author first analyzes the sources and distributive effects (regional and class) of previous agricultural growth. In order to consider future developments, an analytical model of a rural system is presented, in which four major factors affect the distributive impact of growth: the nature of technology in use, the control of land assets, the functioning of rural institutions (especially credit and research institutions), and the type of social and political organization in the rural areas.

The author concludes that, in the absence of deliberate social reform, the trends of the 1960's will continue, leading to increased migration and serious unemployment.

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NOTES ON THE CURRENT STATUS AND FUTURE DEVELOPMENT OF
WEST PAKISTAN AGRICULTURE

Introduction

Growth in West Pakistan's agricultural sector continues to be a bright spot in Pakistan's otherwise confused and uncertain development picture. Despite considerable fluctuation -- understandable in a decade that has witnessed war, unprecedented drought and in recent years a high degree of political instability -- increases in the gross value of the major crops continue to be on or around the trend rate for the last decade of about 6 percent per annum. Also, judging from the increased acreage under fodder, the past rate of increase in livestock products (3.5-4.0 percent per annum) is being maintained.¹ This latter point is significant both for what it says about the aggregate growth rate in the agricultural sector (livestock products make up about one-third of the total value added in agriculture) and what it implies about the improvement in the nutritional value of West Pakistani diets.

Statistics on the use of modern inputs are also impressive. The rate of annual growth in fertilizer offtake has slowed as one would expect, but the incremental sales have continued to be above fifty thousand tons per year. Although for various reasons the public tubewell program has lagged, the number of private tubewells in operation far exceeds all but the most optimistic² projections made in the mid-60's. By 1971 improved wheat seeds are being used on nearly 90 percent of the land sown to wheat and it is anticipated that within the next several years, the entire rice acreage will also be under varieties

with significantly improved genetic potential. Even pesticides -- an input that is more difficult and complicated to use -- are being applied to a significantly larger portion of the land under crop each year.

Despite this evidence, there is a growing uneasiness about the long-run implications of the growth process that is so obviously underway. The sources of concern are several. First, there is the question of the ability to sustain the demand for the increased agricultural output, especially that of wheat and rice. This has not been the immediate problem that projections based on the harvest of 1967/68 suggested it might be. In addition to less favorable weather conditions, sales during the past several years have increased somewhat above expectations, largely as a result of the continuing food deficit in the East Wing. Moreover, at the moment, the substantial increase in the price of cotton -- which competes for land with both wheat and rice -- can be expected to hold down the acreage committed to these two crops. Nevertheless, the current situation should probably be viewed as a breathing spell.

Secondly, concern over the distributive effects of growth in the agricultural sector is becoming more widespread. As Table 1 shows, the evidence regarding regional disparity is mixed when measured at the Provincial level. However, these regional aggregates do not really tell the tale; variation in growth rates is much greater within Provinces than between them. For example, the dryland areas of the Punjab continue to fall further behind the central or mixed farming areas. Likewise, the newly colonized areas of the Sind are barely managing to sustain a

subsistence economy, let alone keep up with the rapidly increasing incomes in the Khaipur and Rohri areas.

Even more disturbing are the implications of technical change for the social and economic structure of the entire rural society. Recently, for example, there have been widespread reports of tenant evictions as medium and large farmers sought to resume their land for personal cultivation. In part, this is a result of the profitability of a combination of high yielding varieties, water, mechanization and good farm management. Without question, it also reflects a response to the growing militancy of the tenant class.

As for the small owners, several studies suggest that, for the most part, they have participated widely in the simplest manifestations of the "green revolution." For example, most farmers, regardless of size, now use improved seeds and at least some nitrogen fertilizer. Many, however, do not know what the optimal input combinations are, or do not have access to the resources to take full advantage of input complementarity. (Perhaps of greatest importance for small farmers is the lack of a really widespread, competitive market(s) for supplementary water). The majority of the small farmers also have little knowledge or access to the next round of improvements such as mixed fertilizers and the plant protection measures that have shown themselves to be so profitable when applied to cotton, oilseeds, corn and rice. It does not, of course, take long for productivity differentials to be capitalized into perceived differences in land purchase or rental values -- differences which can form the basis for land agglomeration for

Table 1: Growth in the Gross Value of Production of Major Crops
By Regions of West Pakistan

	Annual Growth Rate		Percentage of Total G.V.P.	
	<u>1960-65</u>	<u>1965-70</u>	<u>1964-65</u>	<u>1969-70</u>
Baluchistan	6.2	8.9	0.8	0.9
N.W.F.P.	3.9	1.9	8.3	6.5
Punjab	6.2	8.8	69.8	70.4
Sind	4.9	7.7	21.1	22.2

several different classes of farmers even before the introduction of mechanized equipment possessing significant economies of scale.

In the following pages, I shall comment at greater length on the issues raised above. The first part will be concerned with adding greater detail and interpretation to the previously cited growth statistics. In particular, I shall contrast the recent performance with that described in an earlier paper by Falcon and Gotsch.⁴ In the second section, I shall develop a simple conceptual framework to speculate about the future. Considering the present uncertainty regarding the direction of the political processes in the country, this is not an inappropriate characterization of the analysis. For while one may have some confidence in statements about the future where international demand based on comparative advantage is concerned, the distributive aspects of growth are intimately linked with the outcome of the current political struggle and scenarios involving structural change are highly dependent on them.

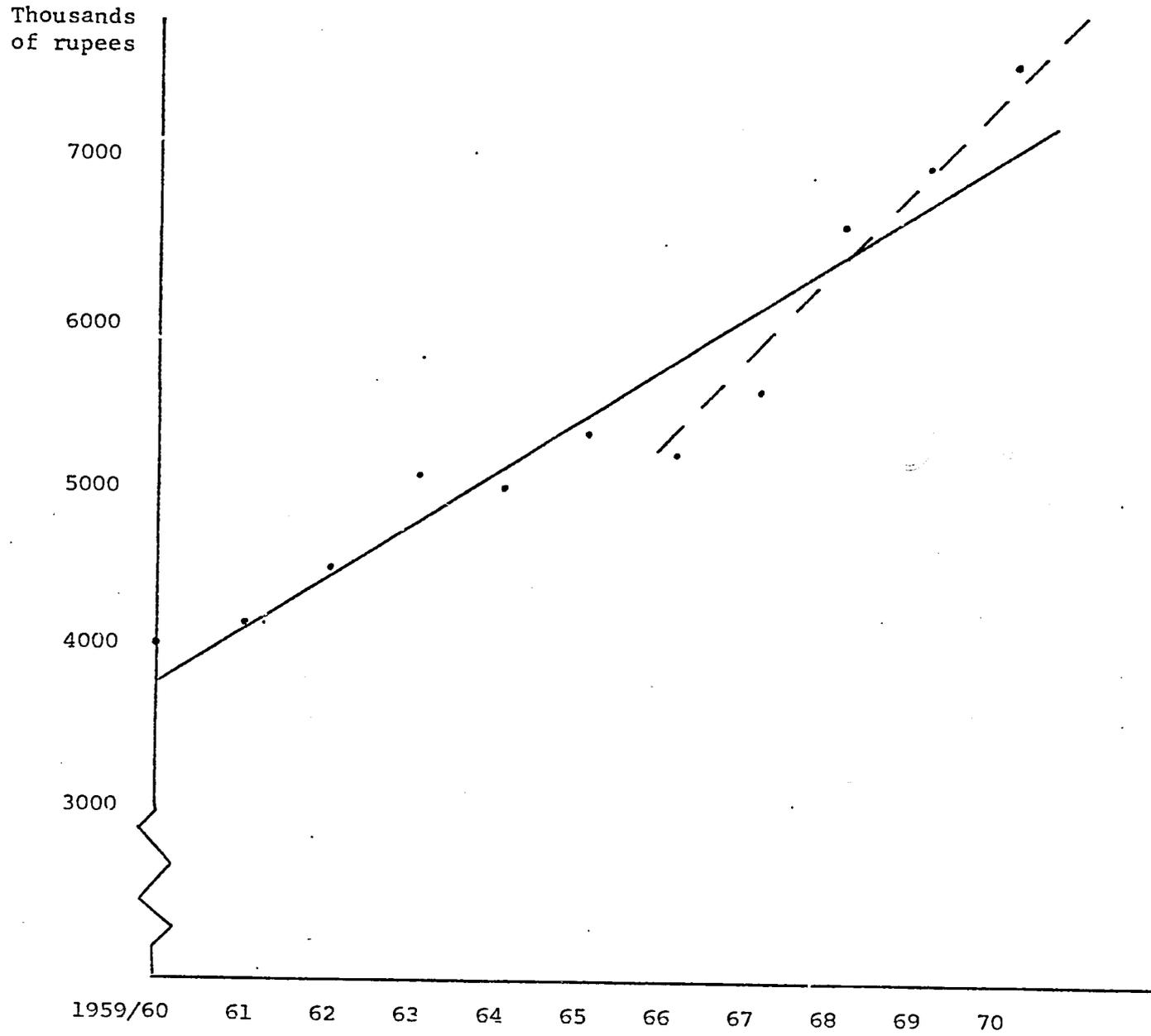
Current Status of West Pakistan Agriculture

The scope of these notes does not permit an exhaustive examination of the recent performance of the agricultural sector. My observations are therefore quite selective and confined to those elements of the present scene that appear to have the greatest relevance for future developments.

Sources of Growth

Figure 1 provides a graphic picture of growth in the gross value of production by major crops during the last decade. (See Table A.1, Appendix A, for the data in tabular form). Since the actual trend calculations are

Figure 1: GROSS VALUE OF PRODUCTION OF MAJOR CROPS

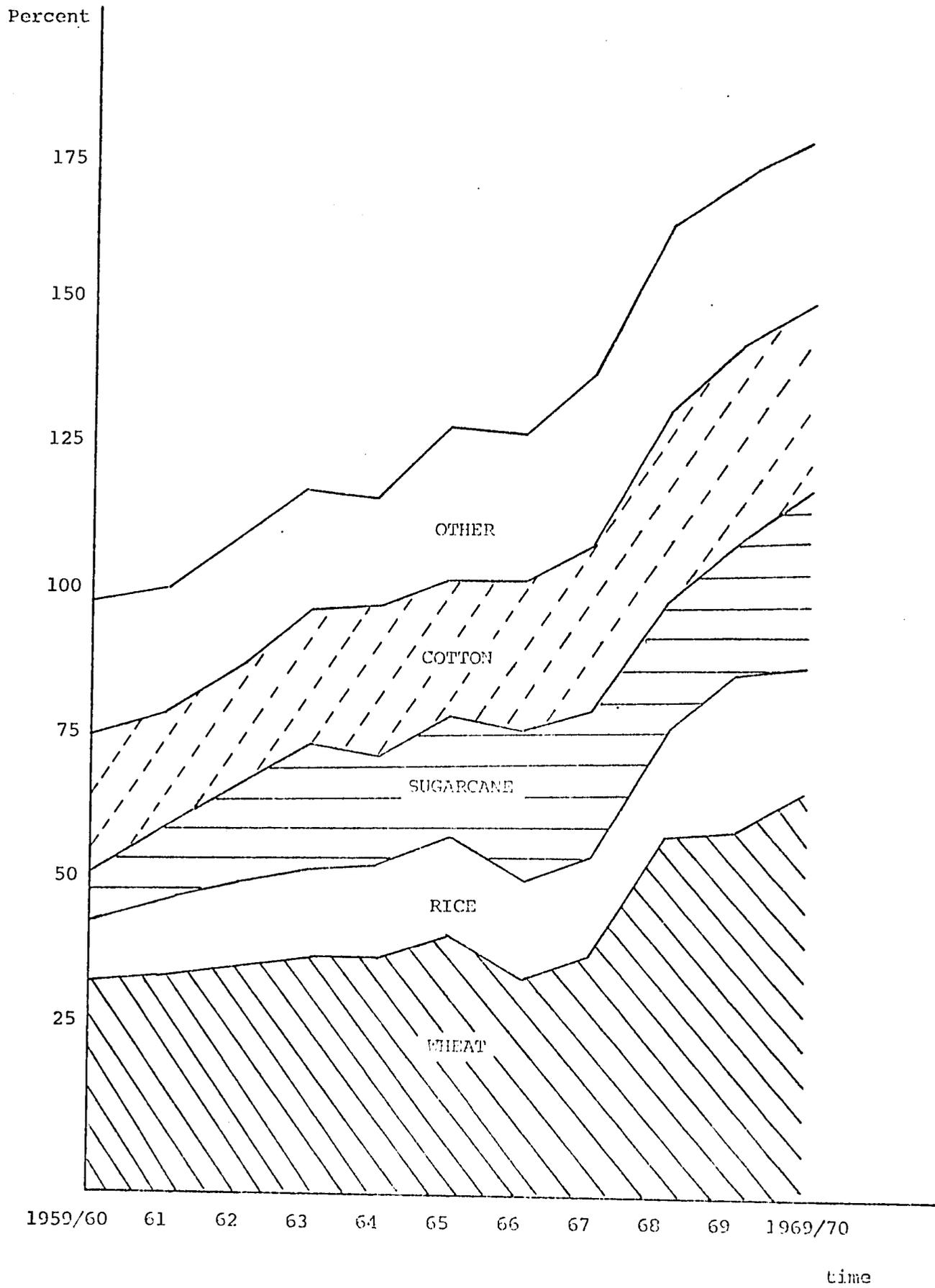


quite sensitive to the periods and end points chosen, especially for small samples, it is well to examine the data directly.

First, Figure 1 suggests that dating the green revolution in West Pakistan from the mid-60's and attempting to measure its impact from that time on would be quite inappropriate. It is clear that the two drought years 1965/66 and 1966/67 are significantly below the trend for the decade; indeed, the radical increase in output in 1967/68 (particularly of wheat) would perhaps be better seen as a year of recovery than as a year of revolution. Put in a slightly different way, if one were to compare, say 1959/60 with 1964/65 and the latter year with 1969/70, one would conclude that a significant break in the data had occurred that could properly be pointed to as a fundamental discontinuity in the growth picture. As I shall point out later, there may be grounds for such a view but it does not emerge from any simple before and after comparison of the figures on the value of aggregate output.

Secondly, it is instructive to examine the makeup of the increase in crop output. As Figure 2 shows it has by no means been constant over the last decade. In the early and middle sixties, for example, the leading edge of growth appears to have been sugarcane. The average index of increased output for cane in 1964/65-1965/66 stood at 154 (1959/60 = 100); while, for the same period, rice stood at 148, wheat at 116, cotton at 140, and all other crops at 112. Then came the year of Mexi-Pak (1967/68) when both the acreage and the yield of wheat jumped radically.

Figure 2: INDEX OF GROSS VALUE OF PRODUCTION
 BY MAJOR CROPS IN WEST PAKISTAN
 (1959/60 prices; 1959/60=100)



The index of wheat production in that year rose to 170, largely at the expense of sugarcane. In the most recent past, increases in wheat output have slowed somewhat and rice and sugarcane have regained their position as crops with rapid growth rates. Cotton alone has remained outside the affected commodities and has continued to grow at about the same rate in all periods.

A third perspective on the nature of recent growth can be derived by breaking down the changes in output between any two periods into acreage effects, yield effects and cropping pattern effects. As Table 2 indicates, such an exercise suggests that, while there is little to differentiate the early and late sixties on the basis of aggregate growth statistics, there is also little doubt that different growth processes were at work. For example, the increases in production that occurred from 1959-60 to 1964/65 were still heavily dependent upon increases in cropped acreage (35 percent). In contrast, growth in the period 1964/65 to 1969/70 was almost entirely a result of increases in yields and changes in the cropping pattern. The former (the yield effect) is largely a reflection of the improved varieties of wheat and rice since neither sugarcane nor cotton have exhibited significant improvements in yields. The latter (cropping pattern effect) is interesting because it shows once again that West Pakistani farmers are quick to make shifts in their enterprise combinations when the potential for higher returns to their farming activities shows itself.

Table 2. Disaggregation of Growth in the Gross Value of Major Crops

	Change from 1960 to 1965		Change from 1965 to 1970	
	Rs. (000)	Percent	Rs. (000)	Percent
Change in the Gross Value of Production	1,319	100	2,363	100
Area Effect	459	35	157	7
Yield Effect	705	53	1,753	74
Cropping Effect	108	8	465	20
Interaction	47	4	-12	-1

Note: For method of calculation, see Minhas [8].

Growth and Distribution

As one might expect, the distributive aspects of growth are much more difficult to assess than the magnitude of the increase in inputs and outputs. However, by taking as a point of reference the size distribution of land and relating various aspects of the new technology to holding size, a good deal of evidence exists to support the intuitive conclusion that income disparity is increasing. This is not to deny, of course, that nearly everyone engaged in agriculture -- with perhaps the exception of evicted tenants -- is currently better off absolutely. The absence of severe price effects from increased output has meant that greater production has been accompanied by increased revenues to producers. Moreover, the increases in labor demand that have resulted from tubewell-related increases in cropping intensity, and from seed/fertilizer related increases in yield, are surely greater than the displacement of labor resulting from the rather limited effects of tractorization. Thus the welfare of full or part-time farm laborers has probably also improved in an absolute sense.

It is the relative position of a number of groups in the agricultural sector that has declined. Leaving value judgements regarding equity aside, this may seem in the short run to be a minor matter. In the long run it is important; relative incomes provide much of the momentum behind the sectoral transformation of the society. The experience of developed and less developed countries alike is that decisions to migrate and sell out are

based on a comparison of opportunities. People leave an occupation or an area, not because they have been unable to improve their circumstances at all, but because they have not improved relative to their expectations of the possibilities that are apparent elsewhere. Indeed, such mobility is an asset and desirable in a society provided that the costs of the necessary additions to the social services of the cities and the detrimental effects of crowding together large numbers of people newly separated from the land are properly taken into account. Given the likely pattern of growth in the large cities of West Pakistan, it appears that this mobility condition will be difficult to meet, a point to which I shall return in the final section.

The increasing disparity in incomes has both regional and class dimensions. First, as district data indicate, some areas--notably those with relatively assured water supplies-- have been growing more rapidly than others. This comes as no surprise; farm management studies throughout South and Southeast Asia show clearly that the green revolution, with its accent on high levels of plant nutrients, has been successful only when moisture levels are also high relative to plant requirements. This does not, of course, necessarily imply irrigation. As Rochin's / 12./ work in Hazara District shows, when the dwarf wheats are introduced into a dryland area whose mean rainfall is 30 40 inches with a good seasonal spread, significant yield improvements can be obtained. But these are rather unusual conditions for the rain-fed lands of West Pakistan and much of the wheat acreage that could potentially be put under improved

varieties cannot be expected to respond as dramatically.

A similar picture is presented by another traditionally backward area of West Pakistan, i.e., the Province of Sind. The new rice varieties have shown themselves to be unusually adapted to the dry, sunny climate of the area. Although, as in NWFP, there appears little possibility of crop diversification, farm incomes can be expected to improve significantly in areas where the soil salinity is not too great and ample water supplies exist. However, not all parts of the Sind are suitably endowed. In the southern-most parts, particularly in the canal commands under the Ghulam Mohammad Barrage, the quality of the soil and water is such that cultivators are lucky to maintain themselves and their animals from one year to the next.

The real beneficiaries of the fruits of technical change have been the farmers located in the areas of the Central Punjab underlain by usable ground water. Not only have they been able to take advantage of the increased productivity associated with the seed-fertilizer revolution, access to supplementary irrigation water via tubewells has made it possible to alter cropping patterns in the direction of higher valued crops.

It would be worth pursuing the implications of the observed regional growth patterns for the overall development process. However, at this point I will merely note that many of the districts that have shown the slowest growth, i.e., made least use of the green revolution technology, are also those in which average holding sizes are small. In terms of

country-wide Lorenz curves, therefore, it means that a large number of small farmers will be weighted in with lower traditional incomes simply on the basis of their regional location.

A second major distributive issue involves the apportionment of income between various classes of farmers. A number of empirical studies done during the past several years make it possible to offer at least some tentative conclusions about the impact of technology to date. ⁷

1. There is little or no difference in the percentage of farmers in different size categories with respect to the adoption of improved seeds and fertilizer. Where data on the rate of or speed of adoption are available, it appears that there is a slight lag in the subsistence farmer category but it is not striking.

2. Of greater concern is the evidence in several of the studies that the level of application of fertilizer per acre was somewhat lower among subsistence farmers than among those who would fall into a surplus category.

3. Respondents in the small farmer category were unanimous regarding the difficulties involved in securing supplementary irrigation water.

4. Few of the smaller farmers had applied, or even knew anything very concrete, about pesticides.

The overall conclusion to be drawn from these surveys and other empirical materials is that the distributive effects of such simple, divisible technology as an improved variety will be minor, that the effects of somewhat more complicated innovations such as fertilizer

is currently not in the lag but rather in the level that is used, and that it may take quite some time for the more complicated but still divisible technology such as pesticides to filter down. When the technology has involved considerable lumpiness as in the case of tractors and tubewells, the adoption rate takes on an additional dimension that small farmers have difficulty coping with. The problems associated with buying water mentioned by most respondents is a case in point.

An Anatomy of the Green Revolution

From the foregoing observations, the following scenario is a plausible reconstruction of agricultural growth during the decade of the 60's.

1. The beginning of the green revolution can be dated somewhere around 1960.⁸ Undoubtedly aided by several good weather years, this period nevertheless marks the use of discernible quantities of fertilizer and the spread of privately installed tubewells. As would be expected, (a) an important growth element was increased acreage under crop, and (b) sugarcane, a crop with high water and fertility requirements, benefitted most from these inputs and became the cutting edge of the increased output.

The distributive effect of this period was overwhelmingly in favor of the larger farmers since (a) tubewells are "lumpy" inputs requiring significant capital investments, (b) the percentage of cash crops on large farms unconstrained by subsistence requirements is much larger.

(c) fertilizer stocks were short and adequate supplies required the use of influence and bribery.

2. This initial impetus -- which established the approximate trend line for the decade -- was interrupted by two drought years, 1965/66 and 1966/67. Although these years saw a significant decrease in output as a result of weather, the impact on the use of inputs was less severe. Indeed, there is undoubtedly a good deal of truth in the argument that the prolonged drought stimulated the installation of tubewells as nothing else could have.

3. The year 1967/68 was the year of Mexi-Pak. The Government launched an all-out campaign, sometimes bordering on coercion, to diffuse the Mexican wheat seeds as widely as possible. Good weather, a record off-take of fertilizer and the water from some 60 thousand tubewells boosted wheat output from an average of 3.8 million tons obtained during the first part of the decade to 6.3 million tons, an increase of 65 percent. Although certain other crops, notably sugarcane, suffered in the process, the net result was a recovery from the slump caused by the drought plus an increment that re-established the trend value for the earlier period.

4. The most recent period has witnessed the resurgence of rice, sugarcane and cotton as the leading growth crops. Due to the domestic over-valuation (200% above world prices) cane has a comparative advantage over all other crops when supplementary water supplies are available. Growth therefore continues to be the response to a disequilibrium condition that began with the introduction of tubewells. Because of the lack of

improved sugarcane technology, it continues to be associated with large increases in sugarcane acreage. The output of rice has also increased rapidly, particularly in the Province of Sind. However, unlike sugarcane, its comparative advantage has been tremendously enhanced by rising productivity. Yields in the two years ending in 1969/70 have increased by 44 percent over their 1967/68 level.

The increased acreage under wheat, rice and cotton has come mainly at the expense of other crops. Acreage devoted to oilseeds, gram, jowar, bajra, etc., has declined significantly from its 1950/60 level. In general, this reflects a movement away from a risk-averting subsistence agriculture and towards a higher degree of specialization and commercialization.

The distributive effect of the later period tended to be somewhat less in favor of the large farmers simply because they had already adopted many of the improved practices. Small farmers improved their position relatively by "catching up" to what had gone on before.

Future Developments in West Pakistan Agriculture

The previous section consisted of a number of comments about events and statistics of the past few years. Speculation about the future, however, requires that these observed trends be pursued in somewhat greater detail. Such an effort need not involve a model in any formal sense but there must be some clearly articulated set of questions that probe more deeply the underlying forces that have shaped the past and will continue to shape the future.

Describing a Rural System

In the following paragraphs, four sets of questions are posed whose sum total is the outline of a rural system. Each of the sub-elements is itself worthy of study; maximum mileage from the data, however, will require particular attention to the dynamic relationships between them. They are:

(1) What is the nature of the current and potential agricultural technology? This issue has two basic facets. First, there is the obvious question of technical divisibility. For example, as indicated earlier, seeds and fertilizer are highly divisible and can in principle be used with equal effectiveness on any size of holding. Tubewells and tractors, on the other hand, are not, and will thus exhibit significant economies of scale. Second, it is important to know something about the extent to which the technology embodies a substitution of capital for labor. Historically, lumpy capital inputs that have been profitable only on large farms have also tended to displace labor. But an excellent counter example is the tubewell which requires both a significant capital investment and yet (other things being equal) drastically increases the demand for labor. Indeed, even the tractor, where the timely application of additional power makes a significant increase in cropping intensity possible, may add to labor requirements. The lesson is obvious: no prognosis of the future structure of agriculture can be taken seriously that is not thoroughly grounded in a detailed analysis of production relationships.

With respect to the question of economies of scale, recent farm management studies in West Pakistan suggest that the optimal size of a farm (1) located in an irrigated area of the Punjab, (2) possessing a single pair of bullocks for power, and (3) using improved seeds and fertilizer would lie on the 15 to 18 acre range. This is somewhat higher than the conventional wisdom seems to indicate, and is made possible by some slight shifts in the normal cropping pattern to permit bullocks to be used more intensively.

Model studies corroborated by field surveys indicate that the full utilization of a one-cusec tubewell requires between 60 to 100 acres, depending on the area, the crops grown, and the availability of surface water. Farmers installing tubewells on less land must either (1) sell part of their water, or (2) must accept higher costs of water per acre. This does not imply, of course, that wells on holdings of even 25 acres are not profitable. But the margin is much less than on the larger holdings. (An important caveat here is that where possibilities for selling water exist, investments in excess capacity may actually be turned into a substantial return on capital. Indeed, in some parts of the northern rice tract -- Gujranwala and Sialkot -- a number of wells have been sunk by townspeople owning no land at all.)

To date, the wells that have been sunk in the private sector are virtually all of the one-cusec centrifugal pump type. When they are sunk into the ground 10 to 15 feet, they are capable of fairly efficient deliveries where the water table is at a depth of 25-35 feet. However,

as the water level declines, as it surely will in many areas during the next decade, the type of technology needed to supply supplementary water will be altered significantly. Instead of relying on shallow centrifugal wells, it will be necessary to install deep turbine pumps at a cost of 5 to 10 times that of existing installations. (To capitalize on the economies of installing capacity with this type of well, they will almost surely be larger than one cusec in size).

It is impossible to go into detail regarding alternatives involved in the choice of water producing technology as the water table declines. Suffice it to say that if the decision is left completely with farmers in areas where no program for the public installation of tubewells exists, the lumpiness of this technology is likely to have extremely adverse distributive consequences. In an arid area such as West Pakistan, water, not land, is the scarce resource, and control over it will be instrumental in determining the ultimate structure of the farming community.

With respect to the other major facet of technological change already available in West Pakistan, namely, tractors, the evidence regarding its impact in the longer run is as yet unclear. Tractors and their associated implements, if valued at the shadow price of capital, would not be unequivocally profitable. For example, in the areas where the aquifer is saline and supplementary water for irrigation is not available, the ability to prepare a seedbed for the rabi crop with a minimum delay is of marginal value. As indicated above, water, not land, is the binding constraint, and without the availability of ground water, mechanization

alone is insufficient to increase the cropping intensity. On the other hand, in the areas that have the potential for double cropping, advanced farming systems that incorporate improved seed varieties, fertilizer, tubewells and mechanization appear to be highly profitable even where all imported materials are valued at the social cost of capital.

The forces that have prompted the rapidity of the initial efforts at mechanization were undoubtedly fueled by (1) the substantial subsidies associated with the importation of capital items, and (2) the status enhancement that accompanied the ownership of the equipment. However, as indicated previously, during the recent past an additional force for tractorization is to be found in the form of sporadic tenant and labor militancy. Such activities as refusing to pay the rent to the landlord or striking against the owner-operator need not be widespread to produce what amounts to an increase in the perceived cost of labor by the larger farmers. When the expected private cost of labor exceeds its social cost and the private cost of capital is below its social cost, it is little wonder that the demand for tractors as measured by application to the Agricultural Development Bank has been several times the available supply.

(2) Who controls the land? Again this is a question that must be broken into several parts. First, it is important to ascertain both the absolute size and the size distribution of the holdings. The former is important because of its direct relationship to the earlier question of input divisibility. The latter is significant as a first approximation of the distribution of income and political power.

In addition to the distribution of land, it is important to ascertain the extent of various types of control, i.e., the extent to which the land is operated by farm-owners, by sharecroppers, etc. This distinction is particularly important when the potential for the introduction of technology with substantial economies of scale exists. Depending on the labor requirements of the technology, the rapid displacement of tenants is then a distinct possibility and the overall impact of technical change will be significantly affected by percentage of land that is operated by sharecroppers.

Unfortunately, the Agricultural Census of West Pakistan does not provide the data required to ascertain exactly who controls (i.e., owns) the land; only the distribution of operated units is presented. However, as Alavi [1] has pointed out, all tenants must be the tenants of someone, and since they will undoubtedly be the tenants of large rather than small landowners, it is possible to make at least some crude calculations regarding the extent of control by holding size. As an example, Columns 2 and 4 in Table 3 give the distribution of farming units by operator size for Sahiwal District. It shows that approximately 27 percent of the land is operated in holding sizes of 25 acres and above. However, after the land reportedly farmed by tenants and owner-cum-tenants is distributed among the ownership categories, a conservative estimate would put approximately 54 percent or over half the land in that category. This does not mean, of course, that the land is in contiguous blocks and can readily be farmed in units of that size; the problem of extensive fragmentation exists in Sahiwal District

Table 3: SIZE DISTRIBUTION OF HOLDING IN SAHIWAL DISTRICT, WEST PAKISTAN BY TENURE STATUS (1960)

Size (Acres)	Operated				Owned			
	(1) Number (000)	(2) Percent	(3) Area (000)	(4) Percent	(5) Number (000)	(6) Percent	(7) Area (000)	(8) Percent
under 5.0	95	43	184	9	48	43	98	5
5.0 - 7.5	29	13	164	8	21	19	200	10
7.5 - 12.5	43	19	399	20	19	17	295	15
12.5 - 25.0	42	19	693	35	17	15	305	16
25.0 - 50.0	12	5	364	19	6	5	782	40
50.0 above	2	1	149	8	1	1	273	14
	223	100	1953	100	112	100	1953	100

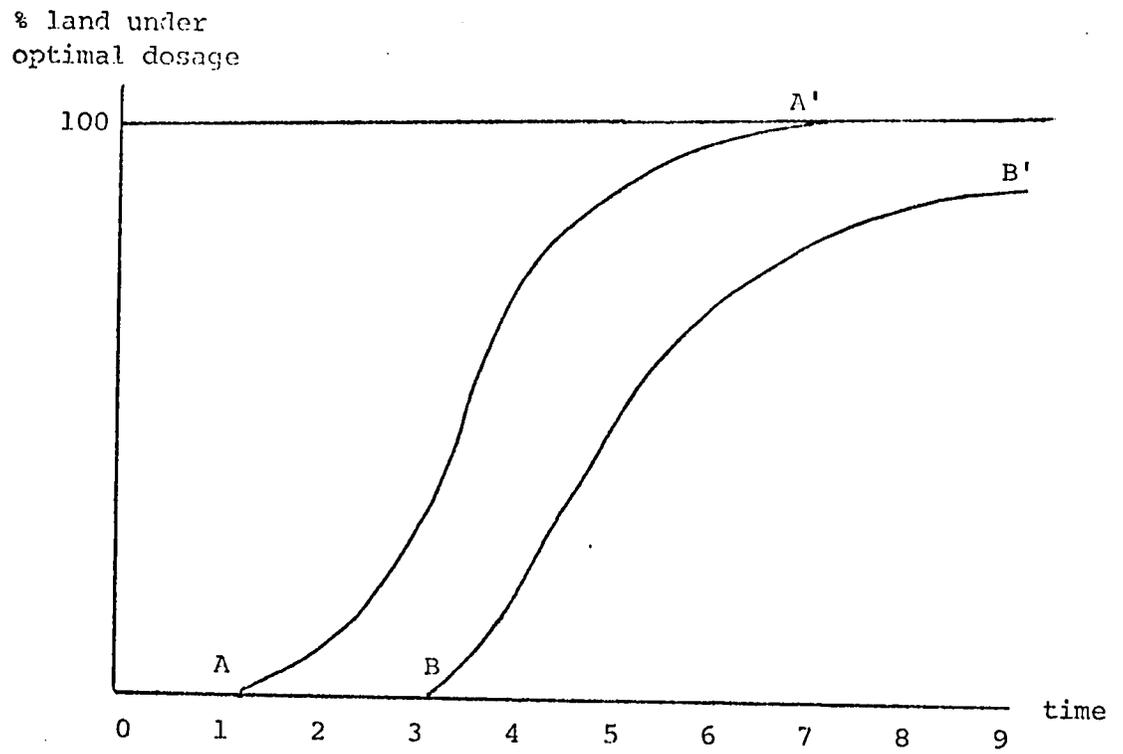
as elsewhere. However, it does indicate that much of the land is in hands that have command over the resources necessary to purchase modern inputs such as tractors.

Several important size groupings emerge from the figures presented in Table 3. First, there is the group that will almost certainly require access to non-market institutions that can supply resources, information, management help, and the services of otherwise lumpy inputs if they are to participate in the increases in productivity that the new technology has made possible. Although any quantitative distinction is somewhat arbitrary, I would include in this category most farmers with less than 10 acres. (Whether it be defined as operator or owner units, in Sahiwal District this would involve on the order of 50 percent of the cultivators actively engaged in farming.)

A second group, composed of farmers having 10-30 acres are in a position where a reasonably functioning market mechanism would give them access to most of the divisible inputs needed to increase their output substantially. At least one would not expect that short-run production credit and access to information would present the kind of problem that it poses for subsistence farmers. The only real difficulty they are likely to encounter is the purchase of water in situations where they are surrounded by several larger farmers who use virtually all the water from the tubewells they have installed for themselves.

The third group, i.e., farmers with over 30 acres, are in a size group that has relatively little need of non-market institutions other

Figure 3: FARM SIZE AND THE DISTRIBUTION OF INFORMATION AND CREDIT



than those that develop new forms of technology, provide for rural infrastructure in the form of roads, marketing facilities, educational and medical facilities, etc. This is the really innovative group whose efforts are likely to continue to spearhead the green revolution.

(3) What is the magnitude and the distribution of benefits from the institutions that serve farmers? I have in mind here several easily quantifiable elements and several that are not so easily measured. The most obvious in the first category are access to information and knowledge and access to capital markets. For example, there is a good deal of evidence that Figure 3 illustrates a source of income disparity even when the basic technology is perfectly divisible. AA' is the illustrative diffusion curve of large farmers who (1) learn first about new technology and its use because of their access to the extension-research institutions, and (2) are able to reach optimum factor combinations by their access to credit. BB' farmers, on the other hand, being less likely to come in touch with knowledge -- or more prone to discount it -- (1) start later, and (2) don't move as far up on the production function. The result is a basic disparity-creation mechanism that is reinforced by the subsequent dynamics of the system.

Unfortunately, even a casual field trip and some conversations with officials in the various government agencies indicate that in West Pakistan there is a pervasive bias against the small farmer in almost every institution he confronts. Part of this is due to ability of the larger farmers to bring their social and political influence to bear

on local officials. However, the handicaps under which the Government representatives labor is equally important. For example, the Department of Agriculture's extension staff is vastly understaffed and inadequately equipped. Since there is no way for the field agents to see everybody, it is only natural that they visit those who have the resources necessary to make the recommended changes, and who can provide amenities such as transportation, travel, etc. (In return, influential farmers receive not only information but services in the form of government subsidized plant protection.)

The biases in the size distribution of institutional credit are equally evident. First, the Agricultural Development Bank, which until 1968/69 distributed 30-40 percent of the credit (Table 4) has been charged primarily with the granting of medium term loans i.e., credits for the purchase of tractors and tubewells. Although there have been several collateral modifications during this period, when coupled with a corruption problem that has not yet been brought under control, the result has invariably been the placement of subsidized capital with farmer owners in the over 25 acre category.

Cooperative loans, although ostensibly designed to provide production credit to poor and subsistence farmers, have also been misused. Again, part of the problem can be traced to the overt actions of larger farmers as they used various methods of exploiting the organization for their own benefit. However, equally important has been the natural tendency of loan officers to look carefully to the repayment rates on all of their

Table 4: LOANS PROVIDED TO AGRICULTURALISTS THROUGH
VARIOUS INSTITUTIONAL CREDIT AGENCIES

<u>Year</u>	<u>Taccani</u>	<u>Percent of Total</u>	<u>Coops</u>	<u>Percent of Total</u>	<u>ABD</u>	<u>Percent of Total</u>	<u>Total</u>	<u>Index</u>
1960/61	11.04	7.4	107.28	71.6	31.51	21.0	149.83	100.0
1961/62	10.69	7.2	90.23	61.1	46.91	31.7	147.83	98.7
1962/62	10.34	7.2	92.48	64.4	40.67	28.4	143.49	95.8
1962/64	12.37	7.4	108.83	64.8	46.65	27.8	167.85	112.0
1964/65	21.07	16.3	67.97	52.5	40.47	31.2	129.53	86.4
1965/66	10.74	7.1	71.63	47.7	67.97	45.2	150.34	100.3
1966/67	9.58	4.6	99.24	47.4	100.48	48.0	209.30	139.7
1967/68	12.88	5.0	137.45	53.6	106.25	41.4	256.58	171.2
1968/69	11.16	3.7	200.72	68.8	82.10	20.0	293.98	196.2

Source: Government of Pakistan [11]

lending activities. Through bitter experience, the Cooperative Department has learned that defaults on a substantial scale can mean harsh administrative reprimand. As one would expect, the result of this attitude, when coupled with inadequate staff to investigate the circumstances of a large number of small farmers, is to produce policies that insure that money will be lent only to those who will obviously have the capacity to repay it. Translated into concrete terms, it means that farmers who fall roughly into the subsistence category are passed over when limited loan funds are allocated among a large number of applicants.

The whole problem of the distribution of institutional resources and knowledge is put so eloquently by former President Ayub's Study Group on Agricultural Policy[11] that the relevant passages deserve to be quoted at some length:

"One of the major elements to be taken into consideration in the creation of a viable institutional structure of rural credit is the need to reach the very large number of small farmers dispersed all over the country-side. In concentrating upon the small farmer, and emphasizing the need for supervised credit, the terms of reference have got to the heart of the problem. The big farmer is in little need of further support on the credit side as in addition to his own resources, a large volume of non-institutional credit is available to him and he also has full access to the present credit system. The really important category of farmers upon whom efforts

must be concerned is that with economic, subsistence and below subsistence holdings, that is to say, the medium and small farmer."

Further on:

"It is necessary, therefore, that any real effort for provision of credit in the agricultural sector should consist of major institutional changes so that all loans for the smaller farmer are in the form of supervised credit. As we have discussed in the introductory chapter, the major factor in such institutional re-organization is the fact that urban-based bureaucratic institutions cannot reach out to the individual farmers with small holdings scattered throughout the country. It is only if there are viable organizations of farmers themselves that this institutional problem can be solved. Cooperation is the only possible method of organization by which individual ownership can be combined with the benefits of common management and institutions created which are in a position to take advantage at the appropriate level from the various private and public sector organizations serving agricultural needs. A reform and re-direction of the Cooperative Movement in both wings of the country is, therefore, the fundamental requirement in developing a viable institutional framework for undertaking supervised credit."

However, still further on:

"... we anticipate [subsequent] conclusions here by saying that in East Pakistan the problem [of organizing cooperatives] seems to be comparatively less formidable, after the success of the Comilla experiment and its adaptations in Rangunia and other areas. For West Pakistan, we are not recommending large-scale introduction of cooperatives on a similar pattern until successful models can be developed... For West Pakistan, therefore, we do not see any short term solution to the problem of supervised credit."

(4) Lastly, how is the social and political life of the village organized? To a certain extent, of course, the distribution of power that is observed will simply reflect the distribution of land and/or wealth. (In traditional societies where the technology was basically the same across farms, the two were more or less synonymous. One of the significant effects of the green revolution has been to create a mechanism where, by the intensive application of technology, wealth can be more equitably distributed than land. One would expect that this in turn would produce a redistribution of political power.)

But not all power is obtained, at least in the short run, by control over property; there is also the power of status or role. In Western societies this tends to be minimized, but in traditional communities where the extended family, the kinship lineage, the caste or the tribe are still basic units of social relationship, this aspect of power must be accounted for as explicitly

as possible. In many cases, it is the key to successful organizing activities at the grass roots level.

As Hamza Alavi [1] has pointed out, politics in the Punjab has a distinctly factional flavor. That is, individuals in the village do not form groups or allegiances because they have a common goal that their cooperation would serve, but because they are "recruited" by one or another of the local political leaders who offers some sort of transactional relationship. "Recruitment" takes two forms: among those who have a choice in the matter and among those who do not. The latter are epitomized by the sharecroppers and landless laborers whose dependence upon the favor of the landlord for their livelihood pre-determines their allegiance.

For others, namely the small and medium land owners, there are certain choices to be made. It is around this group that intense political competition between rival faction leaders takes place. No holds are barred in this struggle: cattle are stolen, women are abducted, buildings are demolished, etc. The use of "goondas" or hoodlums as "enforcers" is widespread. Frequently, when two equally powerful individuals are competing for the allegiance of a particular kinship lineage (biraderi) composed largely of small holders, a virtual state of siege may ensue. In some cases, the pressures are such that the kinship group, which is the basic unit of social interaction in Punjabi Muslim villages, may have to divide against itself politically in order to acquire the "protection" of competing leaders.

Obviously, the vertical alignment of political factions is in direct conflict with the horizontal alignment of social classes. Where economic

dependence is the rule, as in the case of share croppers and landless laborers, the latter alignments are virtually impossible. But from Alavi's description, class alignments would also be extremely difficult for small land owners. The necessary conditions would appear to be (1) a biraderi that was composed largely of such small farmers, and (2) the physical proximity of the group in a single village or other contiguous area. (The latter element is necessary in order that they may be able to protect themselves.) Unfortunately, such distributions of holding size and kinship characteristics are not the normal pattern in the Punjab. The result is domination of village life--and the institutions that serve farmers at the local level--by the various faction leaders..

A Scenario for the Future

Solon Barraclough [2] has distinguished three basic national development strategies whose assumptions provide a useful background against which to speculate further about the future of the rural areas of West Pakistan:

Modernization strategies assume that rural development can be achieved by adopting the technologies of the developed countries without simultaneously reforming social structures. Although there is some acknowledgement that social changes may be required in the future, existing power relationships, traditional land tenure systems and class structures are accepted as the starting point for development.

Reformist strategies are characterized by a significant alteration in one particular aspect of the economic environment, say, the distribution of land. However, while the land reform may seriously curtail the incomes and

status of the agrarian elite, the basic structure of wealth and power in the society remains intact.

Strategies of deep-seated structural change involve profound alterations, not only in the land tenure system, but in the entire social structure. For example, in addition to controlling the land they cultivate, farmers, through their cooperatives and political parties, would have a dominant voice in all facets of agricultural policy, including those associated with agribusiness.

The current situation in West Pakistan conforms most closely to the first of these three classifications. The green revolution does not--for the most part--involve an indigenous technology. And, as the answers to the questions on farm size, institutional services and village organizations imply, the technology is being applied in a situation where almost no attempts to alter the existing social structure have occurred. These elements form the basis of a prognosis that in the short run the forces that have produced past trends will continue to dominate the process of structural change. Some of these will undoubtedly be accelerated. For example, the potentials for utilizing more advanced technology on the larger holdings will certainly continue to produce further land agglomeration. The result, at least in a number of areas, will be to increase further the rate of migration to the urban areas.

Undoubtedly, efforts will be made to dampen the undesirable effects of this dynamic system. I would be surprised, for example, if some sort of progressive taxation scheme for agriculture was not implemented during the

next decade. The siphoning off of surpluses for general development purposes would both decrease the incentives to invest in expensive labor displacing technology and more land, and increase the job potential in the urban areas.

Agricultural prices are also likely to be adjusted and brought more into line with world market prices; the country is too poor to do otherwise. Should surpluses of wheat, rice and other commodities build up--as they are likely to--Pakistan will have to follow a Canadian-style solution to its surplus problem. That is, the Government will operate a storage and marketing program but the returns to farmers will be what the commodity brings on the world market.

With respect to input prices, those subsidies still remaining will be eliminated within a relatively short time. The instrument in bringing both sets of prices in line could well be a devaluation of the rupee in the not-too-distant future. Until this occurs agriculturalists have a powerful argument against the industrialists and planners who consider agricultural prices as being distorted.

Lastly, I would expect that some sort of land reform is in the cards for West Pakistan. But I would speculate that it will be confined to eliminating only the very large landlords, say those above 150 acres and would be only marginally effective in altering the basic power structure of the rural areas. (In the event that the 100-150 acre limit were to apply to individuals and not to families, there would, of course, be little or no effect at all.)

The question that remains, however, is whether these types of marginal economic policies can offset disparities generated by the market phenomena to the extent necessary to synchronize the pace of change in rural areas with the needs of the non-farm sector. As Johnston and Cownie [7] have suggested, on the whole the answer to that question leaves little room for optimism. Using several alternative assumptions about the rate of mechanization, the type of technology in the non-farm sector, the marginal savings rate, etc., they conclude that extension of recent trends would mean 20-25 percent unemployment by 1985.

As it becomes more apparent that the ingredients of the rural system are such that, left to itself, intolerably high rates of unemployment in both the rural and urban areas will emerge, the government, in the interests of self-preservation, is likely to pursue more vigorous attempts to create institutional answers to the distributive effects of agricultural growth. The most plausible initiatives in West Pakistan will involve an attempt to improve the cooperative system, this is the hope that the productivity--and hence the political stability--of the small farmer class can be improved.

From the earlier discussion of the politics of the rural areas, it is likely, in my view, that this attempt will fail. The statement made by the Presidential Study Group indicating that there appeared to be no immediate solution to the problem of supervised credit could be reiterated for the medium term as well. So long as income and power are distributed as they are it will be difficult to organize class-based organizations capable of

mitigating the cumulative effects of technical change on small farmers, particularly those who are tenants. Indeed, injecting additional institutional resources into the rural areas at this time may be counter-productive. It will only mean larger amounts of subsidized capital in the hands of those farmers already actively involved in a continuous sequence of innovation.

The combination of rapid increases in the labor force, labor-displacing agricultural growth and inadequate urban employment opportunities is a nexus of contradictions that the society cannot sustain in the long run. However, it is exceedingly difficult to proceed beyond this point in terms of a scenario. Perhaps the best that can be said is that the conditions under which one would expect the modernization strategy to give way to a reformist one are much less stringent than those associated with deep seated structural change. Consequently, further prediction rests on the question of how the current ruling groups perceive the changes taking place and how flexible they are in accepting short run losses in order to maintain their long run position. Judging from recent events, this kind of forecasting in Pakistan requires nothing short of a crystal ball.

Table A.1: TRENT RATES OF GROWTH BY REGION AND COMMODITY (1959/60-1969/70)

Crop	West Pakistan			N.W.F.P.			Punjab		
	Rate %	R ²	Significance	Rate %	R ²	Significance	Rate %	R ²	Significance
Total GVP	5.9	.94	* *	5.2	.76	*	6.1	.92	* *
Wheat	6.1	.73	* *	1.6	.21	*	6.2	.46	*
Rice	7.9	.86	* *	15.0	.81		9.0	.84	* *
Barley	-3.2	.39	*	-6.0	.46		2.7	.24	
Maize	4.7	.79	* *	4.2	.75		4.2	.56	* *
Jowar	2.1	.45	*	3.8	.32		2.0	.25	
Bajra	-.1	.		2.4	.52		.3	-.03	
Gram	-2.0	.34		-8.9	.26		-3.0	.60	* *
Tobacco									
Sugarcane (Gur)	7.5	.84	* *	5.8	.74		7.3	.82	* *
Cotton	6.7	.96	* *	2.6	.15		7.3	.93	* *
Rapeseed & Mustard	-.2			5.8	.40		-.5	-.02	
Sesamum									

* Significant at 5% level
 * * Significant at 1% level

(continued on next page)

Table A.1: TREND RATES OF GROWTH BY REGION AND COMMODITY (1959/60-1969/70) (cont.)

Crop	Baluchistan			Sind		
	Rate %	R ²	Significance	Rate %	R ²	Significance
Total GVP	7.9	.74		5.8	.95	* *
Wheat	7.8	.62	*	7.4	.79	* *
Rice	9.1	.81	*	6.4	.79	* *
Barley	.4	--		7.3	.58	* *
Maize	6.8	.37		14.2	.90	* *
Jowar	11.1	.84		1.2	.15	*
Bajra				- .9	.01	
Gram				3.0	.37	
Tobacco						
Sugarcane (Gur)				12.5	.68	* *
Cotton				5.1	.66	*
Rapeseed & Mustard				-1.1	.02	
Sesamum						

* Significant at 5% level

* * Significant at 1% level

Notes

1. This estimate is considerably above the official figures. For a justification see Gotsch and Timmer. (6).
2. The one person who correctly anticipated the potential for private tubewell installations was the late Ghulam Mohammad of the Pakistan Institute of Development Economics. His calculations are contained in an unpublished section of the original manuscript of (9).
3. This uneasiness abstracts from the possibility of a completely deteriorating political situation. West Pakistan is not self-sufficient in any of the modern agricultural inputs except perhaps seed. Severe foreign exchange constraints would surely mean significant cutbacks in factor availability--with obvious effects on output. For the longer-run outlook, see Section III.
4. Falcon and Gotsch (4).
5. Shahid Javed Burki has made this point in another context. See Burki (3).
6. One might think that some understanding of the relationship between inputs and outputs could be obtained by looking again at Table 2. For example, since the increase in yields was especially important in the 1964-65-1969-70 period, we could expect that fertilizer and pesticides must have been the main growth factors. Their effect would be almost entirely on yield. On the other hand, increased water supplies would have had an effect on all three elements: acreage, yield and cropping pattern. Since water was particularly

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important during the entire decade, it makes it exceedingly difficult to relate type of input to type of growth.

7. Work by Eckert, Hussain, the Punjab Planning and Development Department's Survey Unit, Rochin and Loudermilk has been summarized in Rochin (13). For a study that shows the impact of proximity to urban areas on small farmers and in addition corroborates the findings reported, see Naseem (10).

8. Burki has suggested that there is a causal link between the advent of the increased use of modern inputs and the advent of avenues of political participation via the Basic Democracies. While such a hypothesis is admittedly difficult to pin down, it deserves extensive investigation for its implications regarding the future political behavior of the innovative groups. See Burki (3).

9. An example of this type of phenomena is the Freedom Summer of 1964 in Mississippi. Based on informal discussions with planters throughout the Delta in 1967, I came away with the strong impression that the rapid adoption of the herbicides that in 1965-1967 eliminated virtually all need for hand labor in cotton was in large part motivated by fear of and retaliation against the militancy of black people that began during the previous summer.

10. The notion of "institutions" used here corresponds to what Gintis has called a "politically integrated decision-making mechanism," i.e., a conscious and articulated apparatus for carrying out the plans and programs of an individual or group of individuals. It is to be

contrasted to the use of the word "institutions" when such concepts as "the market" or "private property" are the focus of discussion. Gintis (5).

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