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Prices, Terms of Trade, and the Role of Government in Pakistan's Agriculture

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ALSTRACT

Despite the importance of agriculture to the national economy of Pakistan and the major role played by the government in its development, a number of key issues have not been adequately addressed by existing studies. This paper provides an empirical basis for discussion of changes in the agricultural terms of trade, growth of agricultural productivity and incomes, pricing of agricultural inputs and outputs, and subsidization and taxation of agriculture.

The paper notes that the terms of trade between agriculture and the other sectors have not significantly deteriorated during the period 1960-83. Indeed, in absolute terms, farmers' purchasing power whether measured in terms of the quantity of output or per unit of productive effort, has actually improved, even if gradually. Hence, the farmers' ability to pay for agricultural inputs, despite gradual increases in their prices, did not erode over the years.

Net returns to farmers have increased, until recently, because of increases in crop prices and because of substantial government subsidies for inputs. The recent sharp increases in fertilizer prices have reversed this trend, but they should not affect the continued profitability in the use of fertilizer even at higher prices. Similarly, despite increases over the past four years, water charges remain a small proportion of total production costs and are in any case, substantially less than the estimated scarcity value of irrigation water to the farmer.

Until 1977, agriculture contributed more in taxes to the economy than it took out through financial subsidies, but the position has reversed since then. There has been a decline in net subsidies, particularly after 1981, mainly because of reduction in fertilizer subsidies. With the government committed to eliminate fertilizer subsidies by 1985, this trend is expected to continue. However, the economic taxation of wheat and basmati rice (as a result of setting domestic prices below their international levels) in contrast to the economic subsidies provided to sugar (to offset higher domestic prices relative to imports) should be a matter of concern. The paper argues that appropriate price policies that are responsive to changes in international prices are likely to have as salutary an effect as any attempt to reduce financial subsidies or to increase taxes.

EXTRACTO

Pese a la importancia de la agricultura para la economía de Pakistán y la gran influencia del Gobierno en el desarrollo del sector agropecuario, hay varios aspectos fundamentales que no han sido abordados debidamente en los estudios que se han realizado. Este trabajo proporciona una base empírica para examinar las variaciones en la relación de intercambio de este sector, el aumento de la productividad y los ingresos agrícolas, los precios de los insumos y productos agrícolas, y la subvención y tributación de la agricultura.

En el trabajo se observa que la relación de intercambio entre la agricultura y los demás sectores no se deterioró en medida significativa durante el periodo de 1960-83. En realidad, en términos absolutos, el poder adquisitivo de los agricultores --medido en función de la cantidad de producto o del costo de los insumos-- ha mejorado, aunque gradualmente. Por consiguiente, la capacidad de los agricultores para comprar insumos agrícolas no ha disminuido con el tiempo, pese al aumento gradual de sus precios.

Hasta hace poco, los ingresos netos de los agricultores aumentaron, debido a incrementos de los precios de los cultivos y a las considerables subvenciones gubernamentales a los insumos. Esta tendencia se ha invertido a causa de los pronunciados aumentos recientes de los precios de los fertilizantes, pero esto no debería afectar a la rentabilidad continua del uso de éstos, aun cuando sus precios sean más altos. Asimismo, pese a los aumentos de los últimos cuatro años, las tarifas que se cobran por el agua siguen representando una proporción pequeña de los costos totales de producción y, en todo caso, son muy inferiores al precio en razón de la escasez que, según se ha estimado, tendría que pagar el agricultor por el agua para riego.

Hasta 1977 la agricultura aportó más a la economía en forma de impuestos que lo que recibió de ésta en forma de subvenciones financieras, pero la situación ha cambiado desde entonces. Las subvenciones netas han disminuido, en particular a partir de 1981, principalmente debido a la reducción de las otorgadas a los fertilizantes. Se prevé que esta tendencia continuará, pues el Gobierno está decidido a eliminar las subvenciones a los fertilizantes hacia 1985. Sin embargo, la tributación económica del trigo y el arroz Basmati (como resultado de la fijación de precios internos inferiores a los internacionales), por oposición a las subvenciones económicas que se otorgan al azúcar (para compensar el precio interno, que es más alto que el de importación), debería ser motivo de preocupación. En el trabajo se aduce que unas políticas de precios adecuadas que respondan a las variaciones de los precios internacionales tienen las mismas probabilidades de surtir efectos saludables que los intentos de reducir las subvenciones financieras o de aumentar los impuestos.

Malgré la place que tient l'agriculture dans l'économie pakistanaise et le rôle que l'Etat a joué dans son développement, les études publiées jusqu'à présent laissent sous l'ombre un certain nombre de questions clés. Cette étude fournit des données empiriques et examine quatre paramètres du secteur agricole : variations des termes de l'échange, croissance de la productivité et des revenus, détermination des prix des intrants et des produits, et imposition et subventions.

Il apparaît que les termes de l'échange entre l'agriculture et les autres secteurs ne se sont pas sensiblement dégradés au cours de la période 1960-83. En fait, en termes absolus, le pouvoir d'achat des paysans, mesuré en fonction de la production ou du coût des intrants, s'est même amélioré peu à peu. Bien que les prix des facteurs de production aient progressivement augmenté, les paysans ne sont donc pas moins à même de les payer qu'il y a quelques années.

Jusqu'à une époque récente, les bénéfices nets des exploitants augmentaient, par suite de la hausse des prix des récoltes et des fortes subventions de l'Etat aux intrants agricoles. Cette tendance s'est renversée à la suite de la brusque augmentation du prix des engrais, qui ne devrait toutefois pas compromettre la rentabilité de l'emploi des engrais. De même si les redevances d'eau ont été relevées au cours des quatre dernières années, elles ne représentent toujours qu'une petite partie du coût global de la production, et elles sont nettement inférieures à la valeur de rareté qu'a l'eau d'irrigation pour le paysan.

Jusqu'en 1977, les impôts que l'Etat percevait sur l'agriculture étaient supérieurs aux subventions qu'il lui versait. Mais la situation s'est inversée depuis lors. Aujourd'hui, et surtout depuis 1981, les subventions nettes sont en baisse, du fait surtout de la réduction des subventions aux engrais. Les pouvoirs publics s'étant engagés à éliminer les subventions aux engrais d'ici à 1985, cette tendance devrait se poursuivre. Cependant, la taxation économique du blé et du riz basmati (dont le prix sur le marché national est inférieur à leur cours sur le marché international), comparée à la subvention économique dont bénéficie le sucre (du fait que son prix intérieur est élevé par rapport à celui du sucre importé), est inquiétante. Cette étude montre que des politiques de prix appropriées et modulées en fonction des mouvements des prix internationaux peuvent avoir un effet tout aussi salutaire que toute tentative de réduire les subventions ou d'augmenter les impôts.

PRICES, TERMS OF TRADE, AND THE ROLE OF GOVERNMENT
IN PAKISTAN'S AGRICULTURE

Table of Contents

	<u>Page No.</u>
I. INTRODUCTION	1
II. AGRICULTURE'S TERMS OF TRADE	3
III. OUTPUT GROWTH AND PRODUCTIVITY	8
IV. INPUT/OUTPUT PRICES AND FARMERS' INCOMES	12
V. TAXES, SUBSIDIES, AND RESOURCE TRANSFERS	24
VI. CONCLUSIONS	37

Annex Tables

A.1 - The Growth of the Agricultural Sector in Pakistan, FY70-FY81	42
A.2 - Ratios of Wholesale Price Indices for Food, Raw Materials and Manufactures, FY70-FY81	43
A.3 - Real Total and Agricultural GDP Per Capita, FY60-FY82	44
A.4 - Agricultural Input Price Indices, FY70-FY82	45
A.5 - Procurement and Minimum Prices for Agricultural Commodities and Sale Prices of Fertilizers, FY71-FY82	46
A.6 - The Growth in Agricultural Productivity, FY60-FY81 ..	47
A.7 - Ratios of Crop Price Indices to Agricultural Input Price Indices, FY71-FY82	48

I. INTRODUCTION

Agriculture remains the most important economic activity in Pakistan, accounting for 30% of the gross domestic product (GDP). Crops provide 69% of agricultural GDP, livestock 28%, and fishing and forestry the remaining 3%. Taxes on products of agricultural origin make up roughly 20% of public revenue, while agricultural workers account for over 50% of the workforce. Products originating in the agricultural sector figure prominently in Pakistan's trade; rice, cotton, yarn and cloth are major exports while edible oil and (until recently) wheat are the major imports.

The government plays a major role in the agricultural economy. It sets procurement or minimum prices for crops (wheat, rice, sugarcane, and cotton), and fixes prices for agricultural products (sugar and flour), and for inputs (such as fertilizer and water). Although to a diminishing extent, it participates in the processing, production, import and domestic marketing of agricultural crops and key inputs. Incentives to farmers have been provided through subsidies; in fiscal year (FY) 1980, these subsidies (both producer and consumer) amounted to about Rs 6,000 million, or about 28% of the country's annual development plan. ^{1/}

Despite the importance of agriculture and the major government role, not many studies of its impact on incomes, and on the transfer of resources

^{1/} See "Potential for Irrigated Agricultural Development in Pakistan," mimeo prepared by Tariq Husain, July 1981; Pakistan: Economic Developments and Prospects, April 1982; and Pakistan: Special Agriculture Sector Review, Vol. 1, January 1976. (These are internal World Bank documents with restricted circulation.)

among sectors, have emerged. ^{1/} This appears to be partly the consequence of paucity of data; while terms-of-trade indices between Pakistan and the rest of the world are part of the country's official statistics, up-to-date information on intersectoral terms of trade is less readily available. Even so, a number of views expressed on Pakistan's agriculture appear not to have been based upon any analysis of existing data. Among these views are that agriculture's terms of trade have been declining over the years, that a major factor for the relative stagnation of agriculture is its lack of productivity, that improvements in yields have made only marginal contributions to growth in agricultural output, and that the mobilization of resources in agriculture has been inadequate.

The purpose of this paper is to provide an empirical basis for discussion of four issues.

- o Changing trends in the terms of trade for agriculture.
- o The growth of agricultural incomes and productivity.
- o The prices of agricultural inputs and outputs and their relationship.
- o Subsidies for, and taxation of, agriculture.

These issues are examined in the context of the government's role in agriculture.

^{1/} Among several studies on this subject are Gotsch, C. and G. Brown, Prices, Taxes and Subsidies in Pakistan Agriculture, 1960-1976, World Bank Staff Working Paper Number 387, April 1980; Mahmood Hasan Khan, Underdevelopment and Agrarian Structure in Pakistan, Boulder, Westview Press, 1981.

II. AGRICULTURE'S TERMS OF TRADE

As countries advance economically, there is a progressive decline in the share of agriculture in GDP. In Pakistan, while the real value added in agriculture increased, on the average, 2.7% per year between FY70 and FY82, its share of the total GDP fell from 39% in FY70 to 31% in FY82. In contrast, the share of manufacturing (including mining) increased from 16.5% to 17.9% during the same period.

An important measure of agriculture's position relative to other sectors is its terms of trade (TOT), or the relationship between the prices of goods bought and sold by farmers. There are at least two reasons why economists are interested in agriculture's TOT. First, it indicates whether income is being transferred out of agriculture. Second, it signals the strength of incentives to the agriculture sector to adopt innovations and to produce more.

Four terms-of-trade concepts are used in this section. The first and most common index of TOT is the net barter terms of trade, which is an index of the ratio of prices of agricultural products to the prices of manufactured goods. ^{1/} This index is estimated for FY60-FY83 in column 1 of Table 1. In the early 1950s, trade-restricting policies have turned the terms of trade against agriculture. From the mid-1950s to mid-1960s, this

^{1/} See UNCTAD, "Terms of Trade and the Concept of Import Purchasing Power of the Exports of Developing Countries," Geneva, March 1966, Appendix I, for a discussion of terms-of-trade concepts.

situation is reversed on account of the slower growth of agriculture relative to industry, bad weather and a decline in the import of American wheat under PL-480 followed by a slight decline toward the end of the 1960s in the years marked by the onset of the "green revolution." ^{1/} However, despite some variations shown in column 1, a declining trend in agriculture's terms of trade has not been observed over the past two decades.

^{1/} Lewis, S.R. Jr. "Recent Movements in Agriculture's Terms of Trade in Pakistan," The Pakistan Development Review, Autumn 1970.

Table 1: AGRICULTURAL TERMS OF TRADE IN PAKISTAN, FY60-FY83

Fiscal year	Net Barter Terms of Trade/ <u>a</u>	Output Index (FY60=100)	Income Terms of Trade/ <u>b</u>	Total Factor Productivity Index (FY60 = 100)	Single Factorial Terms of Trade/ <u>c</u>
1960	100	100	100	100	100
1961	106	100	106	91	96
1962	100	109	109	95	104
1963	95	119	113	98	93
1964	101	118	119	99	100
1965	106	128	136	102	108
1966	100	127	127	99	99
1967	108	135	146	103	111
1968	104	157	163	117	122
1969	94	168	158	125	118
1970	95	186	177	140	133
1971	94	174	164	129	121
1972	94	183	172	131	123
1973	100	188	188	129	129
1974	100	196	196	131	131
1975	90	187	166	125	112
1976	87	199	173	130	113
1977	87	203	179	130	114
1978	93	209	194	131	122
1979	99	219	217	128	127
1980	93	239	222	135	126
1981	92	249	232	136	125
1982	100	258	258	n.a.	n.a.
1983/ <u>d</u>	100	n.a.	n.a.	n.a.	n.a.

/a Calculated from ratios of GNP deflators, with FY60=100.

/b Net barter terms of trade x quantum index of output

/c Net barter terms of trade x productivity index.

/d Estimated.

Sources: (1) Statistics Division, Government of Pakistan.

(2) Wizarat, S., "Technical Change in Pakistan's Agriculture: 1953-54 to 1977-78," Research Report No. 120, Pakistan Institute of Development Economics, Feb. 1981.

Table 2: RATIOS OF WHOLESALE PRICE INDICES FOR AGRICULTURE TO THE WHOLESALE PRICE INDEX FOR MANUFACTURES, FY70-FY82/a

Fiscal year	Food	Raw materials	Wheat	Rice	Sugar	Cotton	Meat	Vegetables
1970	100	100	100	100	100	100	100	100
1971	102	105	100	95	96	118	115	130
1972	105	103	111	97	90	125	114	102
1973	106	114	100	128	105	133	111	91
1974	112	113	96	125	114	150	120	229
1975	124	109	127	123	121	115	142	130
1976	119	113	112	122	121	125	145	132
1977	118	112	98	123	108	142	142	178
1978	123	114	108	135	104	157	147	160
1979	120	123	112	114	97	178	142	143
1980	118	113	99	101	86	142	140	140
1981	115	113	95	110	111	140	149	132
1982	129	114	110	121	126	144	n/a	n/a

/a For all wholesale price indices, FY70=100.

Source: Ministry of Finance, Planning and Economic Affairs.

The other three terms-of-trade indices used to determine the relative status of agriculture are:

- o Wholesale price ratios. Agricultural prices relative to the price index of manufactured goods were higher in FY82 than in FY70, the base year (see Table 2).
- o Income terms of trade. This is a measure of the purchasing power of agriculture. As a result of the rising trend of agricultural output, there was steady improvement in purchasing power (over 250% between FY60 and FY82) as measured by the income TOT.

- o Single factorial terms of trade. 1/ This index reflects the purchasing power of agriculture per unit of productive effort. The gradual, if erratic, increase in this index (shown in column 6 of Table 1) is mainly the result of improvements in the productivity of inputs used during the past two decades.

The overall trends in these terms-of-trade indices indicate that in absolute terms, farmers' purchasing power, whether measured in terms of the quantity of output, or of the unit of productive effort, has increased. Hence, farmers' ability to pay for agricultural inputs has not been eroded over the years, a conclusion also emphasized by other studies. 2/ However, because of the ways they are defined, these indices are not the most direct measures of farmers' welfare, nor can they be used to infer whether farmers are better off than those in the nonagricultural sector. These major issues, however, are the subject of the rest of this paper.

1/ This is defined as the product of the net barter index by an index of factor productivity. For Pakistan's agriculture, Wizarat has constructed a total productivity index which is the ratio of an index of agricultural value added to an aggregate index of agricultural inputs. The inputs considered are land, labor, and capital. The last is approximated by number of tubewells and the livestock population. Three alternative definitions for land--cropped area, net area sown, and cultivated area--were used. Clearly, the usefulness of the single factorial index depends on the validity of the productivity index. See Wizarat, S., "Technical Change in Pakistan's Agriculture: 1953-54 to 1977-78," Research Paper No. 120, PIDE, Feb. 1981.

2/ See, for instance, Chaudhary, M.A. and M.M. Ashraf, "A Study of the Level and Structure of Agricultural Pricing and Taxation with Particular Reference to Water Charges," PIDE, March 1980; and Ljung, P., "Water Charges: Problems Projects Review" - Fall 1979, South Asia Region, (an internal World Bank document with restricted circulation).

III. OUTPUT GROWTH AND PRODUCTIVITY

Of the factors influencing the agricultural terms of trade, output recorded higher growth during FY70-FY82 than in earlier decades. This growth has often been attributed to expansion of acreages rather than to improvements in yields. ^{1/} As Table 3 shows, however, this judgment is not always consistent with the evidence, and is, in any case, an oversimplification. Over the period FY70-FY82, growth in yields was more important in contributing to growth in output in 5 out of 6 years for cotton, 6 out of 8 for rice, 9 out of 11 for wheat, and 3 out of 9 for sugarcane.

At the same time, the decline in yields played a dominant role in the fall in output in 6 years out of 7 for cotton, 3 out of 4 for rice, 2 out of 2 for wheat, and 3 out of 4 for sugarcane. Even when averages are taken, the results vary significantly among crops and time periods. For cotton and wheat, improvements in yields played a major role in increasing output regardless of the time period selected. The reverse is true for rice and sugarcane, but in both cases, yields improved after FY79. Insofar as improvements in productivity are associated with an increase in yield, the evidence from Table 3 points to a greater role for productivity in the historical growth of agricultural output than is often admitted.

^{1/} Pakistan: Economic Development and Prospects, op cit.

Table 3: THE SHARE OF IMPROVED YIELDS IN THE GROWTH OF OUTPUT OF MAJOR CROPS, FY70-FY82

Fiscal year	Cotton		Rice		Wheat		Sugarcane	
	Rate of Growth (%)	Share of Yield Growth (%)	Rate of Growth (%)	Share of Yield Growth (%)	Rate of Growth (%)	Share of Yield Growth (%)	Rate of Growth (%)	Share of Yield Growth (%)
1970	1.32	56.82	18.16	76.27	10.21	89.03	20.02	27.07
1971	1.31	195.42	-8.37	12.30	-11.22	63.90	-12.15	121.23
1972	30.63	57.82	2.87	210.99	6.39	147.10	-13.83	4.49
1973	-0.79	324.05	3.00	59.33	8.01	58.05	-0.08	-4300.00
1974	6.16	-42.69	5.36	54.48	2.51	0.00	19.87	-4.73
1975	-3.69	347.42	-5.58	203.53	7.59	1003.39	11.16	132.08
1976	-19.99	58.88	13.14	48.78	13.25	58.04	20.12	62.77
1977	-15.36	108.53	4.54	53.08	5.21	12.48	15.56	16.84
1978	32.19	111.84	7.78	-15.17	-8.50	91.06	1.88	-128.11
1979	-17.66	116.59	10.92	38.19	18.92	66.54	-9.15	7.76
1980	53.86	75.64	-1.71	133.92	9.17	61.29	0.63	853.97
1981	-6.10	43.11	-2.89	-80.97	5.67	82.89	17.68	13.74
1982	9.42	28.66	5.88	74.71	1.11	151.35	12.99	6.54
<u>Average:</u>								
FY70-FY79	-1.38	60.14	3.43	27.11	3.46	77.17	0.44	-397.45
FY79-FY82	16.65	72.61	-0.40	-122.50	5.90	77.12	9.99	28.83
FY70-FY82	2.96	69.14	2.46	33.33	4.07	77.15	2.79	-21.51

Note: A negative share for yield implies an increase in yield corresponding to a decrease in output or vice-versa.

Source: Planning and Development Division, Government of Pakistan.

Further support for this view is provided in Table 4. ^{1/} The data in the Table show that the increase in the use of inputs is the major factor in only 10 out of 17 years that the agricultural value added has increased since FY60. Taking the entire period FY60-FY81, the increase in the agricultural input index accounted for 65% of the increase in output, but this share is less than 50% if the period FY70-FY78 is excluded. (During the latter period, output soared 152% during the eight years.) These findings, however, are in no way inconsistent with the perception that the growth in productivity has been erratic and disappointing, that the growth of real output per capita has been much slower in agriculture than in other sectors (see Annex, Table A.3), and that considerable potential remains for improving yields.

^{1/} Since productivity is treated as a residual, the well-known problems apply when measurement is attempted. Under fairly restrictive assumptions, the share of productivity change in total output growth is equal to one minus the share of increase in total inputs. In Table 4, no attempt has been made to quantify productivity. The lower the share of agricultural input in total output growth, however, the greater the likelihood that productivity is important.

**Table 4: THE SHARE OF PRODUCTIVITY IN OUTPUT GROWTH IN AGRICULTURE,
FY60-FY81**

(Percent)

<u>Fiscal year</u>	<u>Annual Growth of Agricultural Value Added</u>	<u>Annual Growth of Agricultural Input Index/a</u>	<u>Ratio of Growth Rates: Input/Value Added/b</u>
1960	-1.0	1.1	-110.0
1961	-1.4	8.7	-621.4
1962	8.9	3.7	41.3
1963	7.0	3.9	55.9
1964	2.8	1.4	52.2
1965	6.7	4.4	65.6
1966	-0.4	2.0	-500.0
1967	7.2	2.9	40.7
1968	16.5	2.5	15.3
1969	5.9	-0.7	-11.9
1970	12.5	0.8	6.0
1971	-5.1	2.6	-51.0
1972	4.5	3.3	72.7
1973	1.2	2.3	187.9
1974	5.3	3.7	70.0
1975	-3.1	1.9	-61.3
1976	5.9	2.1	35.4
1977	2.0	1.5	77.7
1978	2.1	1.2	56.3
1979	2.6	5.3	202.7
1980	8.3	2.4	28.5
1981	3.8	3.5	92.3
<u>Average:</u>			
FY60-FY70	6.4	2.9	45.7
FY70-FY78	1.5	2.3	151.9
FY79-FY81	6.0	2.9	48.6
FY60-FY81	4.3	2.8	65.3

/a Calculated by Wizarat in her paper "Technical Change in Pakistan's Agriculture: 1953/54 to 1977/78," Research Paper No. 120, PIDE, Feb. 1981.

/b A negative ratio indicates that agricultural value added and the agricultural input index change in opposite directions.

IV. INPUT/OUTPUT PRICES AND FARMERS' INCOMES

While output and income terms of trade are important measures of agricultural performance, farmers' net incomes are a more appropriate measure of their welfare. The data in Table 5 show that net returns of average farmers in Pakistan rose for all major crops during the last decade; increases for leading farmers in the Punjab were even higher.

The data also show that in the Punjab, Basmati, the finer-quality and higher-value rice, had an advantage over other varieties, which explains why the leading farmers, in particular, have been switching to the higher-value crop in the last few years. This conclusion, based on the data in Table 5, however, needs to be regarded as tentative. ^{1/} In general, however, better returns and higher yields from the seed-fertilizer revolution have significantly altered the allocation of resources among various crops. Some crops, such as wheat, have retained or extended the acreage that had customarily been devoted to winter cereals. Just as Basmati has replaced coarser rice, in many areas other high-yielding rice varieties (Irri-6, for example) have replaced cotton in traditional cotton-growing areas.

^{1/} The small sample sizes used in Table 5 (see footnote (a)) raise questions about how representative these samples are, while differences in the characteristics of the two types of farmers measured would make direct comparisons hazardous.

Table 5: TRENDS IN NET RETURNS PER ACRE FOR MAJOR CROPS, FY70-FY81

(Rupees)

Fiscal year	<u>Wheat</u>	<u>Rice Paddy</u>		<u>Cotton</u>	Sugarcane
	(Maxi-Pak)	Basmati	Coarse	(American)	
<u>Average Farmer, Pakistan /a</u>					
1970	54	42	8	32	187
1976	259	206	120	94	335
1978	193	60	84	194	554
1979	167	209	196	377	102
1980	196	159	240	449	726
<u>Average Leading Farmer, Punjab /b</u>					
1975	342	707	660	496	629
1976	372	456	565	701	812
1977	398	460	539	632	842
1978	361	429	513	960	991
1979	570	591	497	1,007	771
1980	1,093	753	458	1,315	1,854
1981	1,198	909	588	1,173	2,236

/a "Average farmer" data was obtained from farmers selected by a multi-stage sampling design with districts, villages and farmers making up the sampling units from each stage. The FY76 data came from 1,209 farmers located in 152 villages and 10 districts.

/b "Average leading farmers" are those who possess land holdings generally between 12.5 acres and 25 acres. Generally such farmers produce marketable surpluses of agricultural commodities.

Source: Food and Agriculture Division, Ministry of Food and Agriculture; Survey Reports of Cost of Production of Major Crops.

The increases in crop prices have been partly responsible for the rising trend in net returns, (see Annex, Table A.5). At the same time, the prices of agricultural inputs have also declined in relative terms as a result of very considerable government subsidies (more in the next section). As Table 6 shows, the ratio of fertilizer prices to major crop prices has remained relatively stable over the last decade. ^{1/} This indicates that prices of both fertilizers and crops have moved closer together. The exceptions are the years FY73-FY75 for wheat and Irri-6 rice, when sharp increases in the price of fertilizer raised the ratio substantially. The further increase in fertilizer prices in February 1980 is reflected in the higher ratio for FY80, but upward adjustments in crop prices were able to partially offset this increase, so that even after two upward revisions in fertilizer prices in FY82 and FY83, ratios would be no higher than the levels reached in FY80.

Because output prices in Pakistan have generally kept pace with input prices, it is difficult to determine the price-induced effects on input use. Gotsch and Falcon have suggested that input demand responses are of two types. ^{2/} For example, if the price of fertilizer is lowered, farmers already using fertilizer may use more of it, or farmers not previously using chemicals

^{1/} See also Annex, Table A.7.

^{2/} Gotsch, C.H. and W.P. Falcon, Agricultural Price Policy and the Development of West Pakistan, Vol. 1, final report (Cambridge, Mass: Organization for Social and Technical Innovation, 1970).

Table 6: RATIOS OF FERTILIZER PRICES TO CROP PRICES, FY70-FY82/a

Fiscal year	Wheat	Rice		Sugarcane/c	Seed Cotton/d
		Basmati	Irri-6/b		
1970	1.26	0.61	1.02	7.77	-
1971	1.36	0.72	1.10	8.41	-
1972	1.36	0.61	1.10	9.25	-
1973	1.68	0.61	1.36	6.71	-
1974	1.79	0.65	1.49	8.93	-
1975	1.64	0.68	1.52	11.68	-
1976	1.35	0.55	1.25	8.68	-
1977	1.27	0.90	1.56	8.17	0.38
1978	1.27	0.49	1.02	8.17	0.34
1979	1.04	0.42	0.96	8.17	0.34
1980	1.49	0.63	1.43	9.98	0.51
1981	1.28	0.54	1.18	7.71	0.47
1982	1.42	0.55	1.14	8.85	0.49
1983	1.47	0.62	1.06	9.79	0.54

/a (Sale price of urea-minimum or support price of crop) x 100, in Rs per lb.

/b Superior grade.

/c Millgate price, Punjab.

/d Variety AC 134-NT.

Source: Planning and Development Division.

may now decide to apply them. Though both types of response are important, little is known about either of these effects, particularly the latter. It is, however, generally believed that the price elasticity of demand is low for fertilizer and that its negative price effect is more than offset by the positive income effect. 1/ Support for the latter is found in numerous benefit-cost analyses which have demonstrated the continued profitability of using fertilizer (see Section V).

Table 7: VALUE-COST RATIOS OF FERTILIZER USE FOR AVERAGE LEADING FARMER, PUNJAB, FY78-FY82/a

Fiscal year	Wheat	Rice		Cotton	Sugarcane
		Basmati	Irri-6		
1978	2.50	5.25	3.00	6.40	5.56
1979	3.29	6.56	3.23	8.75	5.99
1980	5.38	12.48	6.09	5.05	8.73
1981	4.38	11.81	5.48	3.99	7.93
1982/b	3.94	11.60	5.68	3.83	7.15

/a The value-cost ratio is the ratio of the value of output of a crop to the cost of fertilizers used to produce it. Average leading farmers own 12.5 to 25 acres of land and have marketable surpluses of agricultural commodities.

/b Estimated on the basis of fertilizer-crop price ratios in Table 6 and grain-nutrient ratios for FY81.

Source: Planning and Development Division, Government of Pakistan, "Cost of Production of Major Crops under Irrigated and Unirrigated (Barani) Conditions."

1/ See Suleiman, R.H.V., "Prospects of Fertilizer Demand and Supply in Pakistan," National Fertilizer Development Centre, Islamabad, October 1981.

The charges for water, another important input, vary widely depending on crops and areas. The charges for sugarcane are about three times those for wheat; those in the areas of salinity control and reclamation projects (SCARP) are about twice those in areas with canal and tubewell water supplies (see Table 8). All water rates have increased about twofold between FY66 and FY79. Crop prices however, have risen, on the average, three to four times over the same period, so that in FY80, water charges formed an even smaller part of the gross returns to farmers than they did in FY70 (see Table 9); these charges have also fallen in real terms. Table 10 shows that in canal command areas, water rates in constant prices for wheat had, by FY75, fallen to a third of its value in FY66; while for maize and oilseeds they had fallen to one-fourth. The sharp increase (of 75%) over the last four years should reverse this trend, but water charges remain only a small proportion of total production costs, and an even smaller proportion of the value of total water used. 1/

1/ See Chaudhary and Ashraf, op.cit., Chapter IV, for estimates of the value of irrigated water supply. Taking all crops together, they estimated water charges to be only 2.5% of the total value of irrigated water. This was obtained by multiplying the marginal value product of water (estimated by regression) by the average volume of water used.

Table 8: WATER CHARGES FOR MAJOR CROPS IN SELECTED AREAS, FY66-FY79

(Rupees per acre/feet)

Crop	SCARP Areas			Canal & Tubewell Water		Supply
	FY66	FY70	FY79	FY66	FY70	79
Wheat	14.40	20.80	26.00	7.20	10.40	13.00
Cotton	24.00	32.00	40.00	2.00	16.00	20.00
Rice	22.40	33.72	42.15	1.20	16.86	21.08
Sugarcane	48.00	71.20	89.00	4.00	35.60	44.50
Maize	17.28	19.20	24.00	8.64	9.60	12.00
Oilseeds	17.60	20.80	26.00	8.80	10.40	13.00

Source: Chaudhary, M.A. and M.M. Ashraf, "A Study of the Level and Structure of Agricultural Pricing and Taxation with Particular Reference to Water Charges," PIDE, March 1980.

Table 9: SHARES OF FERTILIZER AND WATER IN TOTAL COST AND RETURNS FOR MAJOR CROPS, FY70-FY80

(Percent)

Crop/ Fiscal Year	As % of Total Production Cost/ <u>a</u>	As % of Gross Return	As % of Net Return/ <u>b</u>
<u>Fertilizer</u>			
<u>Wheat (Maxi-Pak)</u>			
1970	6.0	5.1	n.a.
1976	12.8	9.3	n.a.
1978	10.4	9.5	67.0
1979	12.2	9.5	89.2
1980	10.8	8.5	71.3
<u>Rice Paddy (Basmati)</u>			
1970	5.6	5.0	n.a.
1976	7.6	6.0	n.a.
1978	8.1	7.8	198.0
1979	8.6	6.9	42.2
1980	11.0	9.6	103.3
<u>Cotton (American)</u>			
1970	5.9	5.4	n.a.
1976	13.5	12.2	n.a.
1978	10.9	9.7	115.0
1979	12.0	9.2	49.3
1980	10.0	7.1	26.5
<u>Sugarcane</u>			
1970	4.6	3.8	n.a.
1976	11.4	9.7	n.a.
1978	6.6	5.6	36.8
1979	8.6	8.1	220.7
1980	5.9	4.6	23.8

/a Production cost net of value of byproducts.

/b Gross returns less total production cost.

Table 9 (cont'd)

<u>Crop/ Fiscal Year</u>	<u>As % of Total Production Cost/a</u>	<u>As % of Gross Return</u>	<u>As % of Net Return/b</u>
<u>Water</u>			
<u>Wheat</u>			
1970	9.4	8.0	n.a.
1976	7.8	5.7	n.a.
1978	3.5	3.0	18.0
1979	4.5	3.4	10.5
1980	5.8	4.6	8.6
<u>Rice Paddy (Basmati)</u>			
1970	23.5	21.1	n.a.
1976	21.7	16.5	n.a.
1978	9.7	9.3	236.0
1979	8.5	6.8	41.5
1980	6.4	5.6	60.3
<u>Cotton (American)</u>			
1970	6.6	6.1	n.a.
1976	5.1	4.6	n.a.
1978	4.1	3.7	34.9
1979	4.2	3.3	17.4
1980	4.4	3.1	11.6
<u>Sugarcane</u>			
1970	6.5	5.3	n.a.
1976	4.3	3.7	n.a.
1978	3.6	3.0	29.0
1979	2.7	2.5	68.0
1980	3.9	3.0	15.5

Source: Government of Pakistan, Ministry of Agriculture and Cooperatives, Food and Agriculture Division, "A Study on Cost of Production of Crops."

Table 10: WATER CHARGES IN CANAL COMMAND AREAS, FY66-FY78

(in constant 1978 rupees)

Fiscal year	Wheat	Cotton	Rice	Sugarcane	Maize	Oilseeds
1966	34.26	57.12	53.31	114.24	41.13	41.89
1967	30.95	51.58	48.14	103.15	37.13	37.82
1968	30.45	50.76	47.38	101.52	36.55	37.22
1969	29.52	49.20	39.92	98.40	35.42	36.08
1970	42.80	64.61	68.08	143.75	38.76	42.00
1971	41.37	63.64	67.06	141.60	38.18	41.37
1972	40.76	62.70	66.07	139.52	36.62	40.76
1973	36.00	55.38	58.35	123.21	33.32	36.00
1974	24.76	38.06	40.11	84.69	22.84	24.74
1975	10.10	24.78	26.12	57.14	14.87	16.11
1976	14.66	22.56	23.77	50.20	13.54	14.66
1977	12.85	19.77	20.84	44.00	11.86	12.85
1978	10.40	16.00	16.86	35.60	9.60	10.40

Source: Chaudhary, M.A. and M.M. Ashraf, "A Study of the Level and Structure of Agricultural Pricing and Taxation with Particular Reference to Water Charges," PIDE, March 1980.

The pricing of irrigation water continues to arouse controversy in Pakistan. Although water charges have been increased from time to time, they have never risen as fast as the prices received for agricultural commodities. Consequently, the scarcity value of the water being supplied is still substantially above the cost charged to the farmers. One indication of this is the sale of water by private farmers who own tubewells; these charges are some three to ten times those collected by the Irrigation Department. ^{1/}

^{1/} Gotsch, C.H. and W.P. Falcon, Agricultural Price Policy and the Development of West Pakistan, op cit.

The issue of appropriate water charges has been extensively discussed in several papers. Several analytic studies in the 1960s have estimated the "real," or scarcity value of additional irrigation water in Pakistan. 1/ In 1970, Gotsch and Falcon, using the marginal value concept, estimated Rs 2 per acre-inch as a "fair approximation to long-run marginal cost" for obtaining additional water from both public and private wells. 2/ The government charged, on the average, Rs 0.4 per acre-inch, while the value to farmers often exceeded Rs 5 per acre-inch. These studies are unanimous in their conclusion that water charges should be raised to cover at least the operation and maintenance costs of irrigation wells. The main supporting arguments for this view are summarized below.

1. Farmers are now better able to pay for the use of water, partly because increases in crop prices have exceeded the increases in water rates, and partly because productivity (and hence the efficiency of water use) has improved. This conclusion needs to be tempered to the extent that average figures for net returns

1/ A Bank study, based on SCARP IV, estimated the value in the range of Rs 0.5 and Rs 3 per acre-inch. Harza Engineering's estimates, valued at the spillway of Tarbela Dam, was Rs 15.6 per acre-inch. Tipton and Kalmbach's estimate (also for the SCARP IV area) was Rs 2.6 per acre-inch. These differences arise because of the use of different concepts and methods of measurements under different soil conditions. But whatever the differences, it is clear that what the government charged during that period--ranging from Rs 0.31 per acre-inch for rice to Rs 0.87 for oilseeds--was way below the scarcity value.

2/ Ibid.

to farmers mask considerable variations among farmers and among holding sizes.

2. The distributional impact of water charges is often highly skewed. However, water charges form only a small proportion of the cost of production (as shown in Table 9), so that farmers' ability to pay may not be severely compromised by even a sizable increase in water rates.
3. For the same reason, raising water charges need not reduce farmers' incentives over the long run. Farmers are fully aware of the benefits of irrigation and raising charges is unlikely to affect aggregate production. As with fertilizers, estimates of the price elasticity of demand for water have been less than one in value. 1/

1/ See Naqvi, S.H.H., et al., "Econometric Model of Pakistan's Economy (1959-60 to 1978-79)," PIDE, December 1981; and Hicks, N., "A Long-term Projection Model for Pakistan," September 1977.

V. TAXES, SUBSIDIES, AND RESOURCE TRANSFERS

In Pakistan, the role of government in creating infrastructure for agriculture has been extremely important because the proper allocation of water is of paramount importance to agricultural production. While both agricultural output and input prices have been major instruments of government policy, the government also intervenes in agriculture through taxes and financial subsidies.

The government's financial transfers affecting agriculture consist of taxes on, and subsidies to, the sector. Prior to the devaluation of the rupee in 1972, agricultural taxation was light, and no duty was levied on exports. Discrimination against agricultural exports, however, took the form of unfavorable exchange rates in the country's multiple exchange rate "bonus" system. Export duties on rice and cotton were introduced after devaluation and they made up the bulk of all taxes on agriculture in the first half of the 1970s. Profits from the rice and cotton export corporations (RECP and CECP, respectively), established in 1973, also became, with rising prices, major sources of revenue to the government (see Table 11). The decline in international prices for Pakistan's major exports and the need to protect Pakistan's agricultural producers led to the removal of export taxes in FY78. Profits of the export corporations became the predominant sources of export

Table 11: TAXES AND SUBSIDIES IN THE AGRICULTURAL SECTOR, FY75-FY83

(Rs million)

	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82/ <u>b</u>	FY83/ <u>c</u>
<u>Taxes</u>	<u>1,865</u>	<u>1,432</u>	<u>896</u>	<u>814</u>	<u>1,080</u>	<u>1,710</u>	<u>1,606</u>	<u>1,757</u>	<u>1,029</u>
Export Duties:									
Rice	333	241	58	-	-	-	-	-	-
Raw Cotton	535	340	1	-	-	-	500	150	462
Profits of Export Corporations:									
Rice (RECP)	769	591	39	504	789	538	530	377	348
Cotton (CECP)	-	-	662	185	-	-	350	-	-
Land Revenue	228	260	136	125	291	172	226	230	219
<u>Subsidies</u>	<u>515</u>	<u>1,043</u>	<u>728</u>	<u>1,147</u>	<u>2,222</u>	<u>3,084</u>	<u>3,119</u>	<u>2,601</u>	<u>2,359</u>
Fertilizer	326	607	87	617	1,692	2,454	2,457	1,819	1,600
Plant Protection	112	241	421	347	267	218	62	-	-
Tubewells	16	43	48	37	24	22	20	24	24
Wheat Seeds	-	6	6	25	8	29	2	8	8
Net Irrigation Costs/ <u>a</u>	61	146	166	121	231	361	578	750	727
<u>Net Taxes /d</u>	<u>1,350</u>	<u>389</u>	<u>168</u>	<u>-333</u>	<u>-1,142</u>	<u>-1,374</u>	<u>-1,513</u>	<u>-844</u>	<u>-1,330</u>

/a Operations and maintenance costs less water charges.

/b Revised estimates.

/c Budget estimates.

/d Taxes less subsidies.

Source: Planning and Development Division.

taxation. There was virtually no direct tax on agricultural incomes. A land tax was levied, but despite restructuring to increase progressivity in 1975, revenues stagnated throughout the decade. 1/ Water charges were also levied, but revenues from these represented only a fraction of the total operations and maintenance cost of the country's irrigation system.

Subsidies for the import of fertilizers and for the use of pesticides and herbicides are the major subsidies given to agriculture. The rationale for subsidizing inputs is to provide "incentives" to agriculture. Unlike higher commodity prices, it is argued, subsidies do not raise directly food and raw material prices paid by urban consumers and the growing industrial sector; they also ensure that the benefits of government expenditures accrue only to cultivators using inputs to expand production. 2/ On the

1/ Farmers on irrigated land were exempt from land taxation if their holdings were less than 11 acres. Farmers with holdings between 25 and 50 acres had rates of assessment increased 50%. Those with more than 50 acres had rates increased 100%. Since the winter of 1982, the government has introduced a new levy called ushr based on the gross value of agricultural production. To make an allowance for production costs, the levy is restricted to 75% of the value of production and is collected from landowners and leaseholders (but not tenants) at a rate of 5% of their share of the produce. Farmers who produce 948 kg of wheat (or its equivalent in value) are exempt. It is too early to make any judgment on the impact of ushr on the transfer of resources from agriculture to other sectors, or on the resources it has raised for the government. See Jetha, N., S. Akhtar, and M.G. Rao, Domestic Resource Mobilization in Pakistan: Selected Issues, World Bank Staff Working Paper No. 632, Washington, 1984.

2/ Gotsch, C.H. and W.P. Falcon, Agricultural Price Policy and the Development of West Pakistan, *op cit*.

other hand, subsidies are a burden on scarce public resources. ^{1/}

In the case of fertilizers, the rate of growth in its use has been phenomenal and, along with the use of new seeds, has been primarily responsible for spectacular increases in grain production between 1964 and 1969. Throughout the 1950s and 1960s, Pakistan maintained a "cheap" fertilizer policy with subsidies, during much of this time, amounting to as much as 50%. The subsidy decreased in FY70 to about 30%, but rose thereafter, particularly between FY73 and FY75; this rapid growth can be attributed to at least three factors:

- o Farmers' purchase price of fertilizer was kept low after devaluation to minimize the effect of devaluation on domestic prices of basic foods.
- o The increase in oil prices after 1973 made fertilizer imports more expensive.
- o Fertilizer imports increased rapidly after FY75 as domestic production was unable to meet demand.

Government subsidies for irrigation also increased, particularly after FY76, reflecting the increasing need for maintenance of Pakistan's aging irrigation system.

^{1/} This is particularly true for fertilizers. Evidence from India suggests that 15 years of subsidy ought to be long enough for most farmers to have a good acquaintance with that input. See Shetty, N.S., "Agricultural Innovations: Leaders and Laggards," Development Digest, April 1969.

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Despite the increases in input prices, taxes collected from agriculture were substantially larger than financial subsidies provided to the sector up to FY77, resulting in a net transfer of public resources out of agriculture. This situation was reversed after FY78, when total financial subsidies exceeded total tax revenue from agriculture. The decline in net subsidies after FY80 has been due mainly to reduced fertilizer subsidies, although reductions in subsidies for pesticides and irrigation were also contributory factors. With government plans to phase out the fertilizer subsidy by 1985, under the Three Year Public Sector Development Program, and major increases in the price of irrigation water (an increase of 75% in the past four years), the level of subsidies is expected to decline in the next five years.

In addition to financial subsidies, farmers receive an economic subsidy if the prices for their products are higher than those that obtain in the international market. The size of this subsidy to producers is given by the difference between the output value at domestic (procurement) prices and that at world prices. The higher the nominal rate of protection (that is, the ratio between domestic and border prices), the larger is the economic subsidy. ^{1/} The total subsidy given to producers is the sum of financial and economic subsidies.

^{1/} For consumers, the subsidy is measured by the difference between the value of consumption at world prices and that at domestic (market) prices.

The ratios of domestic prices to international prices for the major crops shown in Table 12 indicate that price discrimination has historically been most severe for wheat and for rice, particularly Basmati. 1/ But with the procurement prices raised significantly since FY81, domestic prices for these crops have moved somewhat closer to international prices. The extent of nominal protection for cotton was influenced considerably by wide fluctuations in the international price; the recent experience has been a very close alignment between the two prices. The only major crop which was protected was sugar; domestic prices since FY81, whether in export or import parity terms, have been substantially above international prices. Since the extent of nominal protection is as much a function of exogenous price trends as one of domestic price policies, a strategy of aligning domestic prices to international prices will not only minimize the degree but also the variance of price discrimination against protection of major crops. 2/

1/ For the export crops of rice and cotton, incidentals and other unit costs have been added to procurement prices to yield export parity prices. For wheat and sugar, import parity prices have been used.

2/ This does not mean that domestic prices should be allowed to respond to short-term fluctuations in international prices, but rather that they should be aligned to trends in international prices.

Table 12: RATIOS OF DOMESTIC TO INTERNATIONAL PRICES, FY74-FY82/a

(percent)

Fiscal year	Cotton/ <u>b</u>	Rice/ <u>c</u>		Wheat/ <u>c</u>	Sugar/ <u>d</u>
		Basmati	Irri-6		
1974	62	46	35	34	-
1975	90	41	46	58	-
1976	102	61	77	56	-
1977	82	99	97	72	-
1978	117	93	75	85	-
1979	130	52	75	73	-
1980	97	56	74	61	-
1981	87	65	70	64	-
1982	113	66	94	75(102)	163
1983/ <u>e</u>	95	68	97	74(98)	206

/a For rice and cotton, domestic prices are compared with equivalent export parity prices. For wheat and sugar, comparisons are with import parity prices; export parity comparisons for FY82 and FY83 are shown in parentheses. International prices for rice, cotton and sugar are the averages of third and fourth quarter prices in the fiscal year. Those for wheat are the averages of the fourth quarter price in the fiscal year and the first quarter price in the following fiscal year.

/b Based on wholesale price of lint, Karachi market.

/c Based on procurement prices.

/d Based on rationshop sales price.

/e International prices based on World Bank commodities price projections.

Source: World Bank data.

Tables 13-15 show calculations of total subsidy equivalents for wheat and rice between the years 1972 and 1981. 1/ In reviewing these calculations, the following observations should be noted:

- o In the case of wheat, a part of the marketed produce is procured by government for sale in ration shops at issue prices (assumed to be equal to procurement prices) and the remainder is sold in the open market at wholesale or retail prices. 2/ In the case of rice, procurement for export is undertaken by RECP and the balance is sold in the open market.
- o The calculations take into account producers who are also consumers by considering only marketed output, but do not explicitly recognize middlemen as a group. The latter buy marketed output at around procurement prices and sell at wholesale or retail prices; they are grouped together with consumers.
- o No account is taken of the effects of price distortions on demand or supply.

Table 13 shows that if price discrimination is taken into account, producer subsidies for wheat are all negative, although the price appears to

1/ Corresponding estimates for FY72-FY76 were calculated by Gotsch and Brown, op cit. However, these were based upon somewhat different assumptions.

2/ If the issue price is below procurement price, the assumption understates the cost to the government of intervening in the market. Past experience shows that the error resulting from this assumption has been insignificant.

have improved from FY74. This is because of the narrowing gap between domestic prices and import parity prices. Despite this, the adverse effects of price discrimination considerably outweighed the favorable impact of financial subsidies to the sector. As recently as FY82, the proportional subsidy equivalent--the value of the subsidy equivalent as a proportion of the value of marketed production in domestic prices--was as high as -43%.

Much the same picture is presented in Table 14, which shows corresponding calculations for Basmati rice. Up to FY76, both government taxation and a very large gap between domestic and international prices contributed to a transfer of resources out of agriculture valued at almost, or more than, the value of production in domestic prices. As with wheat, price discrimination has been reduced by a closer alignment between international prices and export unit cost. For Irri-6 rice, these prices have become almost identical by FY82, so that a positive subsidy equivalent--about 9% of the value of marketed production at domestic prices--was recorded. However, this close alignment between domestic and international prices has resulted mainly from a sharp fall in the latter rather than from an adjustment in the domestic price. Whether future pricing decisions will be more responsive to international price trends remain to be seen.

Table 13: PRODUCER SUBSIDY EQUIVALENTS FOR WHEAT FY74-FY82/a

	FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82
Total Production	7629	7674	8691	9144	8367	9954	10805	11473	11420
Marketed Production/ ^b	3357	3376	3824	4023	3681	4378	4754	5048	5025
of which:									
Government Procurement	1342	1253	1236	2376	1842	1786	2376	2955	3989
Open Market Sales	2015	2123	2588	1647	1839	3192	2378	2093	1036
Imports	1288	1164	1167	499	1035	2276	602	304	
Procurement price	22.50	37.90	37.00	37.00	37.00	45.00	46.45	54.12	54.12
Average Wholesale Price	26.27	41.47	38.67	39.73	49.09	50.77	51.14	52.89	62.26
Import Unit Cost, Local Market/ ^c	77.02	63.08	62.69	51.18	59.35	71.66	78.64	80.18	89.58
Value of Marketed Production, Domestic Prices/ ^d	2227	3601	3906	1108	4245	5787	6228	7251	7512
of which:									
Government Procurement	809	1242	1225	2355	1826	1309	2970	4285	3784
Open Market Sales	1418	2359	2681	1753	2419	4478	3258	2966	1728
Value of Marketed Production, Import Prices/ ^e	6927	5706	6423	5516	5853	8405	10016	10844	12060
Price Protection/ Economic Subsidy/ ^f	-4700	-2105	-2517	-1408	-1608	-2618	-3788	-3593	-4548
Direct Producer Subsidies/ ^g	64	200	398	114	387	1023	1494	1582	1300
Total Equivalent Subsidy	-4636	-1905	-2119	-1294	-1221	-1595	-2294	-2011	-3248
Proportional Subsidy:									
Financial	2.5	5.5	10.2	2.8	9.1	17.7	24.0	21.8	17.3
Economic	-211.0	-58.5	-64.4	-34.3	-37.9	-45.2	-60.8	-49.6	-60.5
Equivalent	-208.2	-52.9	-54.2	-31.5	-28.8	-27.6	-36.8	-27.7	-43.2

^a Production in thousand metric tons, prices in rupees per maund, values in million rupees, proportions in percent.

^b Assumed equal to 43% of total production. See Ministry of Food and Agriculture, Government of Pakistan, "A Study of Utilization Patterns of Agricultural Commodities, 1977-78," March 1980.

^c Based on price of U.S. Red Winter, f.o.b. Gulf ports to which was added estimated freight and other costs to local markets in Pakistan. Import price is for last two quarters of fiscal year.

^d Value of government procurement is quantity procured x procurement price. Value of open market sales is quantity of open market sales x average wholesale price.

^e Quantity marketed x import unit cost, local market.

^f Value of marketed production, domestic price - value of marketed production, import price.

^g Assumed equal to 7% of fertilizer subsidy and 40% of net irrigation cost. The former share is based on fertilizer usage and the latter on irrigated acreage.

Table 14: PRODUCER SUBSIDY EQUIVALENTS FOR BASMATI RICE FY74-FY82/a

	FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82
Total Production	486	602	643	660	560	878	887	980	10
Marketed Production/b	316	391	418	479	364	571	577	637	6
of which:									
Government Procurement	216	287	319	201	193	394	387	309	3
Open Market Sales	100	104	99	228	171	177	190	328	3
Exports	235	184	311	510	298	181	315	410	2
Procurement Price	62.00	90.00	90.00	95.00	95.00	110.00	110.00	127.82	139.
Average Wholesale Price	86.21	95.09	99.31	119.23	145.53	173.64	132.17	172.16	185.
Export Unit Cost, f.o.b. Karachi/c	80.53	115.47	117.08	124.98	126.29	144.36	146.60	169.64	186.0
Export Price, f.o.b. Karachi	173.00	281.00	170.00	126.00	136.00	276.00	264.00	261.68	318.0
Value of Marketed Pro- duction, Domestic Prices/d	747	1224	1236	1584	1463	2273	2379	2138	375
of which:									
Government Procurement	466	888	1001	673	653	1524	1520	1404	190
Open Market Sales	281	336	335	911	810	749	859	734	188
Value of Marketed Pro- duction, Export Prices/e	1465	2943	2128	1448	1376	4222	4081	3064	584
Price Protection/ Economic Subsidy/f	-718	-1719	-892	136	137	-1949	-1702	-926	-205.
Net Direct Subsidies/g	-233	-178	-100	-22	51	136	201	218	187
of which: Subsidies	6	23	54	18	53	136	201	218	187
: Taxes	-239	-208	-154	-40	-	-	-	-	-
Total Equivalent Subsidy	-951	-1847	-992	114	190	-1813	-1501	-708	-1867
Proportional Subsidy:									
Financial	-31.2	-14.5	- 8.1	-1.4	3.6	6.0	8.4	10.2	4.9
Economic	-96.1	-140.4	-72.2	8.6	9.4	-85.7	-71.5	-43.3	-54.2
Equivalent	-127.3	-150.9	-80.3	7.2	12.9	-79.8	-63.1	-33.1	-49.2

/a Production in thousand metric tons, prices in rupees per maund, values in million rupees, proportions in percent.

/b Assumed equal to 66% of total production. See Ministry of Food and Agriculture, Government of Pakistan, "A Study of Utilization Patterns of Agricultural Commodities, 1977-78," March 1980.

/c Procurement price plus incidentals and transportation to Karachi.

/d Value of government procurement is quantity procured x procurement price. Value of open market sales is quantity sold on the open market x average wholesale price. Both prices are converted to export unit costs.

/e Quantity marketed x export price, f.o.b. Karachi.

/f Difference between value of marketed production in domestic prices and in export prices.

/g Subsidies are taken to be 7% of total fertilizer subsidy and 8% of net irrigation cost. The former is based on fertilizer consumption, the latter share on irrigated acreage. Taxes consist of export duties on rice, with Basmati's share being 50%.

Table 15: PRODUCER SUBSIDY EQUIVALENTS FOR IRRI RICE FY74-FY82/a

	FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82
Total Production	1299	1107	1290	1315	1671	1949	1958	1796	1906
Marketed Production/b	585	498	580	592	752	877	881	808	858
of which:									
RECP Procurement	288	301	320	430	714	806	742	696	706
Open Market Sales	297	197	260	162	38	71	139	112	152
Exports	362	294	471	435	582	834	772	834	689
Procurement Price	27.00	40.00	40.00	46.00	46.00	49.00	49.00	62.18	77.19
Export Unit Cost, f.o.b. Karachi/c	37.28	53.95	54.92	62.89	63.58	67.92	69.28	85.85	104.21
Export Price, f.o.b. Karachi/f	163.93	117.75	69.99	71.61	107.18	86.42	115.60	139.60	103.41
Value of Marketed Pro- duction, Domestic Prices/d	584	720	853	998	1283	1596	1635	1858	2395
Value of Marketed Pro- duction, Export Prices/e	2569	1438	1088	1136	2159	2031	2729	3022	2377
Price Protection/ Economic Subsidy/g	-1985	-718	-235	-138	876	-435	-1094	-1164	18
Net Direct Subsidies/h	-219	-109	-33	0	53	136	201	218	187
of which: Subsidies	6	23	54	18	53	136	201	218	187
Taxes	-225	-132	-87	-18	-	-	-	-	-
Total Equivalent Subsidy	-2204	-827	-268	-138	-823	-299	-893	-946	205
Proportional Subsidy:									
Financial	-37.5	-15.1	-3.9	0.0	4.1	8.5	12.3	11.7	7.8
Economic	-339.9	-59.7	-27.5	-13.8	-68.3	-27.2	-66.9	-62.6	0.8
Equivalent	-377.4	-114.9	-31.4	-13.8	-64.1	-18.7	-54.6	-50.9	8.6

/a Production in thousand metric tons, prices in rupees per maund, values in million rupees, proportions in percent

/b Assumed equal to 45% of total production. See Ministry of Food and Agriculture, Government of Pakistan, "A Study of Fertilization Patterns of Agricultural Commodities, 1977-78, March 1980.

/c Procurement price plus incidentals and transportation charges to Karachi.

/d Quantity marketed x export unit cost, f.o.b. Karachi.

/e Quantity marketed x export price, f.o.b. Karachi.

/f Assumed equal to 75% of price of Thai rice, 5% broken, f.o.b. Bangkok.

/g Value of marketed production, domestic prices minus value of marketed production, export prices.

/h Subsidies are taken to be 7% of fertilizer subsidy and 8% of net irrigation cost. The former is based on estimated usage and the latter on irrigated acreage. Taxes consist of export duties, with Irri's share assumed to be 50%.

Similar calculations have not been made for cotton and sugarcane. Data required for quantifying total subsidies for cotton are not available; however, the ratios between domestic and international prices for cotton (shown in Table 12) suggest that of the four major crops, cotton may be least subject to the distortionary effects of price policy. Since the domestic price referred to ginned cotton, however, it is by no means obvious that this has benefited cotton growers who sell their produce to ginners. These remarks apply also to sugarcane, which appears to receive the heaviest protection from government pricing.

Two final points need to be noted. First, for all four major crops, incidental unit costs represent sizable components of total domestic prices ranging from 23% to 38%. Clearly, greater administrative efficiency will cut these costs and may lead to higher prices for producers. Second, although discussion of taxes and subsidies does not give a clear picture of resource transfers for the entire agricultural sector, large groups of farmers were subject to price discrimination in excess of direct financial subsidies the government provides to them.

VI. CONCLUSIONS

In the preceding sections, secondary data on agricultural prices and productivity, government taxes, and subsidies were analyzed. The analysis attempts to highlight several interesting implications. These are summarized below.

The terms of trade between the agriculture sector and nonagriculture sectors have not significantly deteriorated over the last decade. Indeed, if it is taken into account, the purchasing power of agriculture has actually improved in absolute terms, even if gradually. Similar improvements are shown when productivity increases are incorporated into the terms-of-trade index. However, the limitations of the terms-of-trade index should be clear; the purchasing power of agriculture has worsened if compared with other sectors, partly on account of the more rapid growth of nonagricultural sectors.

The slow growth in productivity remains a major concern, particularly since the experiences of the "green revolution" period in Pakistan (1965-71), and those of other countries, have demonstrated that a much higher rate of improvement in productivity can be sustained. This has frequently been discussed in the context of yields making a major contribution to the growth in output among the major crops. Empirical evidence, however, provides no support for this conclusion. In the 1970s, improvement in yields is at least as important as expansion of acreages in promoting the growth in output. Similarly, in the light of available data, it cannot be convincingly

argued that growth in output in recent years has almost exclusively been accounted for by higher levels of inputs. Nevertheless, the need for measures to raise productivity--such as improving the timeliness and quality of inputs, better management techniques, efficient use of resources, and minimizing distortionary effects of policy measures--is not diminished by these findings.

3. Government's policies on prices for crops and inputs have, in general, been based on the principle of a fair return to farmers. Changes in input prices have, therefore, always been accompanied (or followed) by adjustments in output prices in the same direction. This has contributed to a gradual increase in farmers' incomes, although empirical evidence in support of this conclusion is, at best, partial and tentative. The observation that farmers are more able to pay for inputs because of improvements in their net returns finds some support in the data on "average leading" farmers in Table 5. However, an important qualification should be noted. Wide variations in farm sizes, in output per farm, and in agricultural incomes make generalizations from the findings for "average leading farmers" hazardous.

4. The argument that sharp increases in fertilizer prices will prove a disincentive to farmers has some validity, especially if farmers perceive that increases in the prices of inputs will exceed any corresponding increases in the prices they get for their crops; this, at best, will be a short-term view. The gradual improvements in agricultural incomes and (still) highly favorable benefit-cost ratios in the use of fertilizer should,

however, point to the continued increase in the use of inputs in the medium or long term.

5. A similar conclusion applies to water charges, and for the same reasons. Having said this, the principle of relating cost recovery to operation-and-maintenance expenditures appears to be no more than an empirically convenient rule of thumb. An economically optimal change can well lead to one which recovers both fixed and variable costs. Major determinants of this optimum are the demand for water and the existence of a budget constraint. 1/

6. The picture of government financial subsidies to agriculture has changed dramatically over the decade. In the early 1970s, the sector was taxed much more than it was subsidized, but the position was reversed after FY76. The future level of net financial subsidies to producers will be affected by two major developments. The first is the movement of domestic prices closer to border prices which will affect the profits of the state

1/ See George, K.D. and J. Shorey, The Allocation of Resources, London, Allen and Unwin, 1978. Where there are constraints on the budget, where user charges are low and the demand for the service is in excess of supply, there is a need to raise the user charges to at least the marginal cost of providing the service. The additional revenue thus garnered can be used to expand the service. It has also been shown that "raising user charges in line with the efficiency rule suggested will result in more of the poor benefiting as compared to the rich." See Thobani, M., Charging User Fees for Social Services: The Case of Education in Malawi, World Bank Staff Working Paper No. 572, Washington, 1983.

trading corporations. The second is the success of the stated policy of reducing the fertilizer subsidy and its eventual elimination after 1985.

7. Increases in the net financial subsidies to agriculture has been used to support arguments that the sector is lightly taxed. As the calculations of economic subsidies have shown, such arguments are extremely misleading. The extent of economic subsidization or taxation depends on the ratio of domestic to international prices. For wheat and rice, domestic prices historically have been substantially below their international levels. For sugarcane, producers have been heavily protected. In the absence of similar calculations for other crops and activities, the picture for the sector as a whole is unclear. However, what can be emphasized is that while massive increases in the fertilizer subsidy have raised the financial burden of the government in the last three years, appropriate price policies that are responsive to changes in international prices are likely to have as salutary an effect as any attempt to reduce financial subsidies or increase taxes.

8. The calculations of subsidy equivalent values are based on a number of simplifying assumptions and should therefore be regarded as indicative. They do nevertheless provide a rudimentary framework for analyzing the effects of government policies on prices and taxes/subsidies on resource transfers.

9. The data presented here do not permit any conclusions to be drawn on the impact of policy interventions on income distribution. However, to the extent that all producers benefit from higher prices, while benefits from subsidized inputs tend to accrue to larger producers, an even stronger case can be made for according price policies the highest priority.

10. Finally, the calculations in the tables and annexes highlight the pitfalls of relying upon findings of other studies. Despite the scarcity of data, the existing data base should be able to support much more quantitative and qualitative analysis of major sources than exist at present.

Table A.1: THE GROWTH OF THE AGRICULTURAL SECTOR IN PAKISTAN, FY70-FY81

Fiscal year	Agriculture in GDP Constant Factor Prices		Agriculture as % share of Total GDP	Total GDP Constant Factor Prices % Change	
	Million 1960 Rupees	% Change			
1970	12,574	-	38.9		-
1971	12,188	-3.1	37.6		0.1
1972	12,611	3.5	38.4		0.9
1973	12,821	1.7	36.4		7.2
1974	13,357	4.2	35.2		7.7
1975	13,074	-2.1	33.2		3.9
1976	13,659	4.5	33.6		3.3
1977	13,998	2.5	33.5		2.5
1978	14,364	2.5	32.0		7.4
1979	14,789	2.9	31.5		4.6
1980	15,814	6.9	31.5		7.0
1981	16,412	4.4	31.1		5.7
1982	17,363	5.1	30.8		6.2

Source: Planning and Development Division.

Table A.2 RATIOS OF WHOLESALE PRICE INDICES FOR FOOD,
RAW MATERIALS AND MANUFACTURES, FY70-FY81

(FY70 = 100)

Fiscal year	<u>Food</u> Manufactures	<u>Raw Materials</u> Manufactures
1970	100.00	100.00
1971	102.43	104.66
1972	105.05	103.26
1973	106.32	114.04
1974	112.42	113.42
1975	124.48	109.22
1976	119.84	113.24
1977	118.34	112.13
1978	123.21	114.46
1979	120.08	123.24
1980	118.41	112.76
1981	114.98	113.14

Source: Pakistan Economic Survey.

Table A.3: REAL TOTAL AND AGRICULTURAL GDP PER CAPITA, FY60-FY82

(1960 Rupees)

Fiscal year	Value (Rs)		Index (FY60=100)		Ratio of Per Capita Agricultural to Total GDP
	Total	Agriculture	Total	Agriculture	
1960	373	171	100	100	100
1961	381	166	102	97	95
1962	393	172	105	101	96
1963	409	176	110	103	94
1964	424	175	114	102	89
1965	450	179	121	105	87
1966	471	175	125	102	81
1967	472	179	126	105	83
1968	490	195	131	114	87
1969	507	198	136	116	85
1970	542	211	145	123	85
1971	527	198	141	116	82
1972	518	199	139	116	83
1973	539	196	144	115	80
1974	564	199	151	116	77
1975	569	189	152	110	72
1976	571	192	153	112	73
1977	568	191	152	112	74
1978	592	190	158	111	70
1979	603	191	162	112	69
1980	628	198	168	116	69
1981	648	200	174	117	67
1982	671	202	180	118	66

Source: National Accounts of Pakistan.

Table A.4: AGRICULTURAL INPUT PRICE INDICES, FY70-FY82

(FY60=100)

Fiscal year	Fertilizer	Seed	Water/ <u>a</u>	Transportation Charges	Pesticides	All Inputs/ <u>b</u>
1970	255	125	200	128	46	195
1971	272	128	200	133	46	205
1972	257	136	201	143	46	204
1973	195	179	219	168	79	221
1974	216	219	226	201	129	231
1975	278	296	270	258	196	277
1976	260	291	265	276	291	279
1977	262	322	268	301	326	285
1978	252	355	300	337	336	312
1979	237	373	298	364	453	305
1980	255	386	320	383	500	326
1981	332	432	371	418	630	382
1982	428	477	454	477	600	466

/a Based on data on irrigation revenues in the Punjab. These revenues account for some two-thirds of total irrigation revenues collected by the provincial governments. Data on the value of irrigation water in the national accounts included land revenue, and could not be used. All other input prices are based on value of inputs data in the national accounts.

/b Adjusted for /a.

Source: National Accounts of Pakistan; Government of Punjab.

Table A.5: PROCUREMENT AND MINIMUM PRICES FOR AGRICULTURAL COMMODITIES
AND SALE PRICES OF FERTILIZERS, FY70-FY82/a

Fiscal year	Wheat	Rice		Cotton (Seed Cotton)/b	Sugarcane/c	Fertilizer (Urea)/d
		Basmati	Irri-6			
1970	17.00	35.00	21.00	-	2.75	582.00
1971	17.00	32.00	21.00	-	2.75	630.00
1972	17.00	38.00	21.00	-	2.50	630.00
1973	17.00	46.00	21.00	-	4.25	777.00
1974	22.50	62.00	27.00	-	4.52	1,100.00
1975	37.00	90.00	40.00	-	5.25	1,660.00
1976	37.00	90.00	40.00	-	5.75	1,360.00
1977	37.00	52.00	30.00	120.00	5.75	1,280.00
1978	37.00	95.00	46.00	132.00	5.75	1,280.00
1979	45.00	110.00	49.00	134.00	5.75	1,280.00
1980	46.65	110.00	49.00	134.00	7.00	1,904.00
1981	54.12	127.82	58.78	145.56	9.00	1,890.00
1982	54.12	139.90	67.64	154.80	9.00	2,094.00
1983	59.72	142.76	83.05	163.29	9.00	2,399.00

/a Crop prices in rupees per maund, fertilizer price in rupees per long ton.

/b Local varieties.

/c Factory gate, Punjab.

/d Domestic. Prices for domestic and imported fertilizers are the same from FY76.

Source: Ministry of Finance, Planning and Economic Affairs.

ANNEX

Table A.6: THE GROWTH IN AGRICULTURAL PRODUCTIVITY, FY60-FY81

Fiscal year	Yield Index (FY60=100)				Total Factor Productivity Index/a
	Wheat	Cotton	Rice	Sugarcane	
1960	100.0	100.0	100.0	100.0	100.0
1961	102.2	109.0	105.5	111.5	90.7
1962	101.2	109.0	112.3	120.1	95.3
1963	103.5	125.9	111.1	129.0	98.2
1964	103.5	134.9	111.1	125.6	99.4
1965	103.5	121.7	120.0	137.9	101.6
1966	94.3	125.9	113.4	139.0	99.2
1967	101.2	134.9	116.6	125.6	103.3
1968	133.4	134.9	126.6	137.5	117.4
1969	133.4	143.4	157.8	150.9	125.0
1970	146.0	143.4	178.9	158.0	139.8
1971	134.5	148.1	176.6	135.3	129.2
1972	148.4	169.8	186.6	134.6	130.8
1973	155.2	165.1	190.0	139.0	129.4
1974	155.2	169.8	195.5	137.5	131.4
1975	164.6	148.1	173.3	117.5	124.9
1976	177.2	130.7	184.4	135.3	129.5
1977	178.4	109.9	188.6	139.4	130.1
1978	164.1	147.2	187.1	136.0	131.3
1979	185.5	117.9	194.6	134.9	128.0
1980	194.9	165.1	190.5	142.4	135.3
1981	204.1	165.1	193.8	145.4	135.7

/a The ratio of the index of agricultural value added to the aggregate input index. The latter is a weighted average of land, labor and capital indices. See Wizarat, S., "Technical Change in Pakistan's Agriculture: 1953-54 to 1977/78," Research Report No. 120, Pakistan Institute of Development Economics, Feb. 1981.

Source: Ministry of Food, Agriculture and Cooperatives.

**Table A.7: RATIOS OF CROP PRICE INDICES TO AGRICULTURAL INPUT
PRICE INDICES, FY71-FY82**

(FY60 = 100)

	Rice	Wheat	Cotton	Sugarcane	Major Crops	All Crops
<u>Seed</u>						
1971	1.23	1.02	1.48	0.47	1.68	1.50
1972	1.09	1.01	1.39	0.62	1.04	1.07
1973	1.07	0.86	1.29	0.58	0.90	0.97
1974	1.13	0.88	1.21	0.52	0.93	0.99
1975	0.95	1.04	0.82	0.43	0.89	0.93
1976	1.09	1.01	1.06	0.57	0.97	1.01
1977	1.11	0.93	1.30	0.56	0.94	1.00
1978	0.93	1.06	1.18	0.50	0.97	1.01
1979	0.94	1.00	1.54	0.48	0.99	1.02
1980	0.95	0.98	1.32	0.53	1.00	1.02
1981	0.97	0.91	1.30	0.60	0.97	1.01
1982	1.01	0.98	1.26	0.62	1.00	1.04
<u>Fertilizer</u>						
1971	0.61	0.51	0.74	0.24	0.84	0.75
1972	0.62	0.57	0.79	0.35	0.59	0.61
1973	1.02	0.82	1.23	0.55	0.86	0.93
1974	1.13	0.88	1.21	0.52	0.94	0.97
1975	0.96	1.06	0.83	0.44	0.91	0.94
1976	1.21	1.13	1.18	0.64	1.08	1.13
1977	1.36	1.14	1.01	0.69	1.16	1.23
1978	1.32	1.52	1.67	0.70	1.37	1.42
1979	1.49	1.58	2.45	0.76	1.58	1.62
1980	1.45	1.51	2.02	0.81	1.52	1.56
1981	1.25	1.17	1.67	0.77	1.25	1.30
1982	1.13	1.09	1.40	0.69	1.11	1.16

Table A.7 (page 2)

	Rice	Wheat	Cotton	Sugarcane	Major Crops	All Crops
<u>Water</u>						
1971	0.68	0.56	0.82	0.26	0.93	0.82
1972	0.64	0.59	0.81	0.36	0.62	0.63
1973	0.70	0.57	0.85	0.38	0.59	0.64
1974	0.86	0.67	0.93	0.40	0.72	0.74
1975	0.96	1.05	0.83	0.44	0.90	0.94
1976	0.97	0.90	0.94	0.51	0.86	0.90
1977	1.17	0.98	1.38	0.60	1.00	1.06
1978	0.82	0.95	1.04	0.44	0.85	0.88
1979	0.92	0.98	1.51	0.47	0.97	1.00
1980	0.82	0.85	1.14	0.46	0.86	0.88
1981	0.88	0.82	1.18	0.55	0.89	0.92
1982	0.83	0.60	1.03	0.50	0.82	0.85
<u>All Inputs</u>						
1971	0.79	0.66	0.94	0.30	1.08	0.96
1972	0.72	0.67	0.92	0.41	0.69	0.71
1973	0.86	0.70	1.04	0.47	0.72	0.78
1974	1.05	0.82	1.13	0.49	0.87	0.90
1975	0.95	1.05	0.83	0.44	0.90	0.93
1976	1.07	0.99	1.04	0.56	0.95	0.99
1977	1.13	0.95	1.34	0.57	0.97	1.02
1978	1.02	1.17	1.28	0.54	1.05	1.08
1979	1.08	1.14	1.78	0.55	1.14	1.17
1980	1.12	1.16	1.55	0.62	1.17	1.20
1981	1.07	1.00	1.43	0.66	1.07	1.11
1982	1.05	1.02	1.31	0.64	1.04	1.08

- Notes:
1. Price deflators for crops are for gross output.
 2. Input deflators for seed, fertilizer and water are for major crops only. Deflators for individual crops are not available.
 3. Includes both major and minor crops. Inputs are seed, fertilizer, pesticides, water, transport charges, wastage.

Sources: Statistics Division, Government of Pakistan, National Accounts, 1978/79-1981/82; 1977/78-1980/81; 1975/76-1978/79; 1973/74-1976/77; 1971/72-1974/75; 1969/70-1972/73.

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Agrarian Reforms in Developing Rural Economies Characterized by Interlinked Credit and Tenancy Markets

Avishay Braverman and T. N. Srinivasan

World Bank Staff Working Paper No. 433, October 1980. 32 pages (including references).

Stock No. WP-0433. \$3.00

policies in developing countries and discusses their implications for World Bank operations.

A World Bank Paper, May 1975. 85 pages (including 14 annex tables). English, French, and Spanish.
Stock Nos. PP-7502-L, PP-7502-F, PP-7502-S. \$5.00 paperback.

The Agricultural Economy of Northeast Brazil

Gary P. Kutcher and Pasquale L. Scandizzo

This study, based on an agricultural survey of 8,000 farms, assesses the extent and root causes of pervasive rural poverty in northeast Brazil. The authors review a number of policy and project options; they conclude that courageous land reform is the only effective means of dealing with the problem.

The Johns Hopkins University Press, 1982. 288 pages.

LC 81-47615. ISBN 0-8018-2581-4. \$25.00 (£17.50) hardcover.

Agricultural Extension: The Training and Visit System

Daniel Benor and James Q. Harrison

Describes the Training and Visit System of extension developed by Daniel Benor and introduced in a number of projects assisted by the World Bank in developing countries.

May 1977. 55 pages (including annex). English, French, and Spanish.

Stock Nos. PM-7701-L, PM-7701-F, PM-7701-S. \$3.00 paperback.

Agricultural Land Settlement

Theodore J. Goering, coordinating author

Examines selected issues related to the World Bank's lending for land settlement, and gives estimates of the global rate of settlement and the world's ultimate potentially arable land.

A World Bank Issues Paper, January 1978. 73 pages (including 4 annexes). English, French, and Spanish.

Stock Nos. PP-7801-L, PP-7801-F, PP-7801-S. \$5.00 paperback.

World Bank Staff Working Paper No. 388 April 1980. x + 164 pages (including annex, bibliography).

Stock No. WP-0388. \$5.00.

Agricultural Price Policies and the Developing Countries

George Tolley, Vinod Thomas, and Chung Ming Wong

This book first considers price policies in Korea, Bangladesh, Thailand, and Venezuela, bringing out the consequences for government cost and revenue, farm income, and producer and consumer welfare. Other effects, including those on agricultural diversification, inflation, economic growth, and the balance of payments are also discussed. The second part of the book provides a methodology for estimating these effects in any country. Operational tools for measuring the effects on producers, consumers, and government are developed and applied.

The Johns Hopkins University Press, 1982. 256 pages.

LC 81-15585. ISBN 0-8018-2704-3. \$25.00 (£17.50) hardcover.

Agricultural Project Analysis: Case Studies and Exercises

Case studies and exercises on agricultural project preparation and analysis, developed for, and used in, EDI's rural development and rural credit courses.

World Bank (EDI), 1979, v.1—viii + 711 pages, v.2—lv + 113 pages, v.3—lv + 157 pages. (Available from ILS, 1715 Connecticut Avenue, N.W., Washington, D.C. 20009, U.S.A.) \$9.00 paperback.

Agricultural Research

Points out that developing countries must invest more in agricultural research if they are to meet the needs of their growing populations. States that studies in Brazil, India, Japan, Mexico, and the United States show that agricultural research yields a rate of return that is more than two to three times greater than returns from most alternative investments and cites some of the successes of the high-yielding varieties of rice and

agricultural research and extension, particularly for the production of food and other commodities that are of importance to low-income consumers, small farmers, and resource-poor areas.

Sector Policy Paper, June 1981. 110 pages (including annexes). English, French, and Spanish.

Stock No. PP-8101-Z, PP-8101-F, PP-8101-S. \$5.00 paperback.

A Development Model for the Agricultural Sector of Portugal

Alvin C. Egbert
and Hyung M. Kim

Spatial mathematical programming is used to develop comprehensive and quantitative methods to suggest development strategies in Portugal's agriculture sector.

The Johns Hopkins University Press, 1975. 110 pages (including bibliography).

LC 75-26662. ISBN 0-8018-1793-5. \$6.50 (£4.00) paperback.

Economic Aspects and Policy Issues in Groundwater Development

Ian Carruthers and Roy Stoner

Examines a wide range of economic and policy issues related to development of groundwater for irrigation.

World Bank Staff Working Paper No. 496. October 1981. 110 pages (including annex, bibliography).

Stock No. WP-0496 \$5.00.

NEW

Economic Return to Investment in Irrigation in India

Leslie A. Abbie,
James Q. Harrison,
and John W. Wall

Reports on an investigation into the efficiency of investment in surface and groundwater irrigation in India.

World Bank Staff Working Paper No. 536. 1982. 52 pages.

ISBN 0-8213-0083-0. \$3.00.

Maxwell L. Brown

Clarifies the relation between simple farm income analysis and the broader field of agricultural project analysis and emphasizes the more practical aspects of project preparation and gives guidance to those responsible for planning in agriculture.

EDI Series in Economic Development. The Johns Hopkins University Press, 1980. 154 pages.

LC 79-3704. ISBN 0-8018-2386-2. \$15.00 (£10.50) hardcover; ISBN 8-8018-2387-0. \$6.50 (£4.50) paperback.

Spanish: Presupuestos de fincas. Editorial Tecnos, 1982.

ISBN 84-309-0886-2. 725 pesetas.

Fishery

Highlights the importance of fisheries to the economies of developing countries and recommends that the World Bank provide assistance to those countries that have the fishery resources and are willing to develop them further.

Sector Policy Paper December 1982. ISBN 0-8213-0138-1. \$5.00 paperback.

Food Security in Food Deficit Countries

Shlomo Reutlinger
and Keith Knapp

World Bank Staff Working Paper No. 393. June 1980. 39 pages (including appendix, references).

Stock No. WP-0393. \$3.00.

Forestry

Graham Donaldson, coordinating author

Examines the significance of forests in economic development and concludes that the World Bank should greatly increase its role in forestry development, both as a lender and adviser to governments.

Sector Policy Paper, February 1978. 63 pages (including 7 annexes). English, French, and Spanish.

Stock Nos. PP-7804-Z, PP-7804-F, PP-7804-S. \$5.00 paperback.

Improving Irrigation Agriculture: Institutional Reform and the Small Farmer

Daniel W. Bromley

A model of farmer interdependence is developed to provide suggestions for improving existing irrigation systems, as well as for designing new ones.

World Bank Staff Working Paper No. 531. 1982. 96 pages.

ISBN 0-8213-0064-4. \$3.00

NEW

Increasing Agricultural Productivity

(Proceedings of the Third Annual Agricultural Sector Symposium)

Ted J. Davis, editor

These proceedings are the third in a series of records of Agricultural Sector Symposia presented at the World Bank each January since 1980. Contains the papers presented by the speakers, chairpersons' statements, and summaries of the discussions prepared by the rapporteurs.

1982. 307 pages (including index) ISBN 0-8213-0099-7 \$15.00.

NEW

India: Demand and Supply Prospects for Agriculture

James Q. Harrison,
Jon A. Hitchings,
and John W. Wall

Contains four papers that report on the World Bank's economic work in the agricultural sector in India and the implications of this development both for foodgrains and for other major agricultural commodities. Focuses on the demand for agricultural commodities through the year 2000, the foodgrain economy, the vegetable oil economy, and the sugar economy.

World Bank Staff Working Paper No. 500. October 1981. 133 pages (including 5 appendices, references, annex).

Stock No. WP-0500. \$5.00.

and Yoav Kislev

Examines the role of scientific research and technological change in increasing agricultural productivity.

Yale University Press, 302 Temple Street, New Haven, Connecticut 06520, U.S.A. 1975. xi + 204 pages (including 10 appendices, references, index).

LC 74-15210. ISBN 0-300-01815-0. \$15.00 hardcover; ISBN 0-300-01877-0. \$3.95 paperback.

Spanish: Investigación agrícola y productividad. Editorial Tecnos, 1976. ISBN 84-309-0641-X. 420 pesetas.

Agroindustrial Project Analysis

James E. Austin

Provides and illustrates a framework for analyzing and designing agro-industrial projects.

EDI Series in Economic Development. The Johns Hopkins University Press, 1981. 224 pages (including appendices, bibliography, and index).

LC 80-550. ISBN 0-8018-2412-5. \$16.50 (£10.00) hardcover; ISBN 0-8018-2413-3. \$7.50 (£4.25) paperback.

French: L'Analyse des projets agro-industriels. Economica, 1982.

ISBN 2-7178-0480-3. 49 francs.

Spanish: Análisis de proyectos agro-industriales. Editorial Tecnos, 1981.

ISBN 84-309-0882-X. 600 pesetas.

Argentina: Country Case Study of Agricultural Prices, Taxes, and Subsidies

Lucio Q. Reca

World Bank Staff Working Paper No. 385. April 1980. 72 pages (including 3 annexes).

Stock No. WP-0386. \$3.00.

Programming Studies for Mexican Agricultural Policy

Edited by Roger D. Norton and Leopoldo Solís M.

The principal tool of analysis is the sector model CHAC, named after the Mayan rain god. This model can be used throughout the sector to cover short-cycle crops, their inputs, and their markets. It can also be broken down into submodels for particular localities if more detailed analysis is required. The model helps planners weigh the costs among policy goals, which can vary from region to region. This volume reports the experience of using the CHAC model and also presents purely methodological material.

The Johns Hopkins University Press, 1963. 632 pages.

LC 80-29366. ISBN 0-8018-2585-7. \$35.00 (£24.50) hardcover.

NEW

Building National Capacity to Develop Water Users' Associations: Experience from the Philippines

Frances F. Korten

Over a five-year period, the National Irrigation Administration (NIA) of the Philippines has been building its capacity to develop water users associations on small-scale irrigation systems. This paper details the changes that have been made within the agency as a result of the development of these associations prior to the construction of the physical system and the involvement of association members in the planning and construction stages. It also examines the nature of the learning process that has led to these changes and discusses the implications for donor support of other small-scale irrigation programs and more generally for programs involving village-level work.

World Bank Staff Working Paper No. 528. July 1982. v + 69 pages (including references).

ISBN 0-8213-0051-2. \$3.00.

Edited by Charles H. Winters

Three case studies prepared in conjunction with the EDI's Agricultural Projects Courses in Spanish and intended primarily for teachers of project analysis.

World Bank (EDI), March 1974; revised January 1975. 480 pages (Available from ILS, 1715 Connecticut Avenue, N.W., Washington, D.C. 20009, U.S.A.) \$5.00 paperback.

The Design of Organizations for Rural Development Projects—a Progress Report

William E. Smith, Francis J. Lethem, and Ben A. Thoolen

World Bank Staff Working Paper No. 375. March 1980. 48 pages. English and French.

Stock No. WP-0375-E. WP-0375-F. \$3.00.

The Design of Rural Development: Lessons from Africa

Uma Lele

Analyzes new ways of designing rural development projects to reach large numbers of low-income subsistence populations. The paperback reprinting in 1979 contains a new chapter by the author updating her findings.

The Johns Hopkins University Press, 1975; 3rd printing, 1979. 260 pages (including glossary, appendix, maps, bibliography, index).

ISBN 0-8018-1769-2. \$9.95 paperback.

French: Le développement rural: l'expérience Africaine. Economica, 1977.

ISBN 2-7178-0006-9. 39 francs.

reform, its implications for the economies of developing countries, and the major policy options open to the World Bank in this field.

A World Bank Paper, May 1975. 73 pages (including 2 annexes). English, French, and Spanish. Stock Nos. PP-7503-L, PP-7503-P, PP-7503-S. \$5.00 paperback.

Land Tenure Systems and Social Implications of Forestry Development Programs

Michael M. Cernea

World Bank Staff Working Paper No. 452. April 1981. 35 pages (including references, bibliography). Stock No. WP-0452. \$3.00.

Managing Information for Rural Development: Lessons from Eastern Africa

Guido Deboeck and Bill Kinsey

World Bank Staff Working Paper No. 379. March 1980. vii + 70 pages (including 5 annexes, index). Stock No. WP-0379. \$3.00.

Measuring Project Impact: Monitoring and Evaluation in the PIDER Rural Development Project—Mexico

Michael M. Cernea

World Bank Staff Working Paper No. 332. June 1979. vi + 131 pages (including 3 annexes, appendix, map). Stock No. WP-0332. \$5.00.

NEW

Monitoring and Evaluation of Agriculture and Rural Development Projects

Dennis J. Casley and Denis A. Lury

This book provides a how-to tool for the design and implementation of monitoring and evaluation systems in rural development projects. Because rural development projects are complex, they seek to benefit large numbers of people in remote rural areas,

evaluating them during implementation has been accepted in principle, but effective systems have not heretofore been formulated. The concepts of monitoring and evaluation are differentiated and issues that need to be considered in designing systems to monitor and evaluate specific projects are outlined, emphasizing the timeliness of the monitoring functions for effective management. Elaborates on such technical issues as selection of indicators, selection of survey methodology data analysis, and presentation. It is directed primarily to those working with specific projects and will be useful to project appraisal teams, to designers of monitoring and evaluation systems, and to project staff who work with these systems.

The Johns Hopkins University Press 1982. 145 pages. French and Spanish forthcoming.

LC 82-7126. ISBN 0-8018-2910-0. \$8.50 (\$6.50) paperback.

Monitoring Rural Development in East Asia

Guido Deboeck and Ronald Ng

World Bank Staff Working Paper No. 439. October 1980. 91 pages (including annexes).

Stock No. WP-0439. \$3.00.

Nutritional Consequences of Agricultural Projects: Conceptual Relationships and Assessment Approaches

Per Finstrup-Andersen

World Bank Staff Working Paper No. 456. April 1981. 93 pages (including bibliography, appendix).

Stock No. WP-0456. \$3.00.

Prices, Taxes, and Subsidies in Pakistan Agriculture, 1960-1976

Carl Gotsch and Gilbert Brown

World Bank Staff Working Paper No. 387. April 1980. 108 pages.

Stock No. WP-0387. \$5.00.

Concepts, Asian Experiences

Donald K. Emmerson

World Bank Staff Working Paper No. 423. October 1980. x + 97 pages (including references).

Stock No. WP-0423. \$5.00.

Rural Development

Discusses strategy designed to extend the benefits of development to the rural poor and outlines the World Bank's plans for increasing its assistance in this sector.

Sector Policy Paper, February 1975. 89 pages (including 14 annexes). English, French, Spanish, and Arabic.

Stock Nos. PP-7501-L, PP-7501-P, PP-7501-S, PP-7501-A. \$5.00 paperback.

Rural Poverty Unperceived: Problems and Remedies

Robert Chambers

World Bank Staff Working Paper No. 400. July 1980. 51 pages (including references).

Stock No. WP-0400. \$3.00.

Rural Projects Through Urban Eyes: An Interpretation of the World Bank's New-Style Rural Development Projects

Judith Tendler

This paper describes the Bank's new-style rural development projects, including some of the things that happen in the political environment of a project when governments, assisted by the Bank, redirect their public-sector services and subsidies to the rural poor.

World Bank Staff Working Paper No. 532. 1982. 100 pages.

ISBN 0-8213-0028-8. \$3.00.

Sociocultural Aspects of Developing Small-Scale Fisheries: Delivering Services to the Poor

Richard B. Pollnac

World Bank Staff Working Paper No. 490. October 1981. iii + 61 pages (including references).

Stock No. WP-0490. \$3.00.

**Raj Mishra and G. S.
Raychaudhuri**

*World Bank Staff Working Paper No.
381. April 1980. 62 pages (including
2 appendixes, 5 tables, bibliography).
Stock No. WP-0381. \$3.00.*

**A System of Monitoring and
Evaluating Agricultural
Extension Projects**
Michael M. Cernea and
Benjamin J. Tepping

*World Bank Staff Working Paper No.
272. December 1977. vi + 115 pages
(including 9 annexes, bibliography)
Stock No. WP-0272. \$5.00*

**Thailand—Case Study of
Agricultural Input and
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Trent Bertrand

*World Bank Staff Working Paper No.
385. April 1980. ix + 134 pages
(including 2 appendixes).
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1981): 59-76, and American Journal of Agricultural
Economics, vol. 64, no. 1 (February 1982): 145-47
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Development, vol. 2 (1981): 221-35, 281
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This revision adds a wealth of recent project data; expanded treatment of farm budgets and the efficiency prices used to calculate the effects of an investment on national income; a glossary of technical terms; expanded appendixes on preparing an agricultural project report and using discounting tables; and an expanded, completely annotated bibliography.

EDI Series in Economic Development.

*The Johns Hopkins University Press, July 1982. 528 pages
(including appendixes and glossary/index).*

*LC 82-15262. ISBN 0-8018-2912-7, \$37.50 (£22.50) hardcover;
ISBN 0-8018-2913-5, \$13.50 (£8.75) paperback.*

