

Intra-sectoral and Intersectoral Parity Issues in Pricing of Agricultural Crops: A Preliminary Analysis

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I. INTRODUCTION

Intersectoral terms of trade play a crucial role in determining the sectoral distribution of income and resource allocation in the developing countries. The significance of intra-sectoral terms of trade for the allocation of resources within the agricultural sector is also widely accepted by research scholars and policy-makers. In the context of planned development, the government specifies production targets for the agricultural sector and for different crops. The intervention of government in the field of price determination has important implications for the achievement of planned targets.

In Pakistan, there is a feeling among many groups including farmers and politicians with a rural background that prices of agricultural crops have not kept their parities intact over time and that prices generally do not cover the costs of production. The feeling that production incentives for agriculture have been eroded is especially strong for the period since the early 1970s. It is argued that strong inflationary pressures supported by a policy of withdrawal of government subsidies on agricultural inputs have resulted in rapid increases in the prices paid by agriculturists and that increases in the prices received by farmers were not enough to compensate them for the rising prices of agricultural inputs and consumption goods.

The main purpose of this paper is to present new evidence on changes in intersectoral and intra-sectoral terms of trade for the period 1969-70 to 1986-87. The changes in income terms of trade indicate the potential possibilities with respect to resource mobilization, while changes in net barter terms of trade for the entire sector or for different crops highlight the nature of changing signals for resource

*The author is Joint Director, Pakistan Institute of Development Economics, Islamabad. He is grateful to Mr Manzur Ahmad, the official discussant, for his penetrating and critical comments on an earlier draft of the paper. Helpful comments of Dr Abdul Salam, Divisional Chief, Agricultural Prices Commission, Islamabad are also acknowledged. This draft has been completely revised in the light of Mr Manzur Ahmad's comments. However, any errors and omissions that may still remain are the sole responsibility of the author.

allocation. The evidence on output-input price ratios and income parities for different crops and/or crop combinations provides a preliminary identification of crops which may have been unduly handicapped during the period of study.

II. DATA AND METHODOLOGY

We can be brief in the discussion of issues relating to the choice of items and weights and the sources of data for the construction of terms of trade indices for different crops and for the entire crop sub-sector. Twelve crops and five inputs were selected for computing price indices. The data on prices of different crops and inputs are based on unit values and not on price quotations received from different markets. The basic source of data for the unit values are the official national accounts published by the Federal Bureau of Statistics, Government of Pakistan. The weighted average of index numbers of prices paid by the farmers was constructed by assigning weights to the implicit price deflators for seeds, fertilizer, pesticides, water and transport charges. The weights for different inputs were based on the expenditure on each input as a percentage of total expenditure on the five inputs during 1969-70. The unit value for each of the twelve crops was computed by dividing the gross value added for a crop by its units of production. The index of the price received for the crop sub-sector was computed by weighting the price indices of different crops by the share of gross income of each crop in gross income from all twelve crops in 1969-70. Income per acre for different crops was obtained by dividing gross value added of each of the crops by its cropped area. The ratios of gross income indices for different crops and/or crop combinations provide us with measures of inter-crop gross income parity. Since information on crop-wise use of different inputs is not available, it is not possible to compute the inputs price indices for different crops separately. The price indices of each of the crops and the entire crop sub-sector were deflated by the aggregate input prices index to obtain price parity series. Time-series data on the costs of production and the farm harvest price were taken from the studies of the Ministry of Food and Agriculture.

III. MOVEMENTS IN AGRICULTURE'S TERMS OF TRADE

In an earlier study by the author (Qureshi 1985) after reviewing the past published works on terms of trade, had presented estimates of net barter terms of trade and income terms of trade for the period 1951-52 to 1983-84. The weights used were for 1959-60. The insensitivity of computed terms of trade to wide variations in the weighting scheme was a convenient finding. Since the economy has experienced substantial structural change, the use of weights for the year 1959-60 may not be appropriate for measuring trends in terms of trade for the recent past. In this section, terms of trade indices are computed with weights derived for the year 1969-70. The

indices have also been updated to 1986-87. Table 1 presents information on terms of trade for the period 1969-70 to 1986-87.

The net barter terms of trade show consistent improvement till 1978-79 as the index rises to 213 by that year. There is a mild falling trend in the terms of

Table 1
Terms of Trade for Agriculture: 1969-70 to 1986-87

Years	Index of Prices Paid by Agricul- tural Inputs	Prices Received Index	Net Barter Terms of Trade	Income Terms of Trade	
				Alternate I Gross Income- Input Prices Parity Index	Alternate II Net Barter Terms of Trade Times Index of Agricultural Output
(1)	(2)	(3)	(4)	(5)	(6)
1969-70	100.00	100.00	100.00	100.00	100.00
1970-71	101.13	108.35	107.14	98.74	100.23
1971-72	102.46	110.54	107.89	112.35	106.15
1972-73	116.82	132.82	113.70	119.61	114.92
1973-74	136.13	183.40	134.73	124.68	141.97
1974-75	157.75	198.38	125.72	130.40	126.40
1975-76	165.47	224.74	135.82	136.14	145.31
1976-77	177.86	271.37	152.58	133.05	166.53
1977-78	195.02	291.01	149.22	143.34	167.67
1978-79	170.35	362.32	212.69	180.16	250.42
1979-80	169.09	349.81	206.88	203.36	265.83
1980-81	192.98	369.98	191.72	196.13	256.66
1981-82	217.86	396.00	181.77	190.91	252.13
1982-83	249.73	404.71	162.06	183.30	235.25
1983-84	264.75	479.60	181.15	170.75	230.82
1984-85	275.78	436.84	158.40	192.76	234.19
1985-86	284.44	436.94	153.62	209.80	246.12
1986-87	293.27	435.32	148.44	210.75	253.78

Notes: (1) Weights for prices received are proportions of gross income of each crop in gross income for twelve crops of wheat, rice, bajra, jowar, maize, barley, gram, sugar-cane, rapeseed and mustard, sesamum, cotton and tobacco during 1969-70. Weights for prices paid by agriculture are expenditure on each input relative to total expenditure on five inputs of seeds, fertilizer, pesticides, water and transport charges during 1969-70.

(2) Income terms of trade were computed in two alternative ways. For Alternative I, gross income indices for twelve crops were divided by the aggregate input prices Parity Index. According to Alternative II, income terms of trade were obtained by multiplying net barter terms of trade in column (4) with an index of agricultural output. The index of agricultural output is published by the Federal Bureau of Statistics in its *Monthly Statistical Bulletin*.

trade after 1978-79. The parity index falls to 148 in 1986-87. However, the important point to note is that the output prices outpace the input prices. Both the farmers' income and the incentives for production seem to have been protected in the face of rising prices of agricultural inputs.

The income terms of trade show consistent improvement for the period of study for either of the two alternative methods of measurement. The use of different methods of computation changes the magnitude of movement but does not alter the general pattern of the movements in the income terms of trade.

IV. PARITY INDICES OF PRICES OF AGRICULTURAL CROPS AND INPUTS

The parity approach to fixation of the price of any agricultural product requires that the price be fixed at a level that results in the maintenance of a certain parity between prices received and prices paid by the farming community. Inter-sectoral commodity terms of trade for agriculture presented in the previous section are at the national level and are for the entire agricultural crop sub-sector. These terms of trade are helpful in understanding the country-level changes for the agricultural crop sector but are of limited usefulness for understanding the patterns of growth at the commodity level as they smother the differences in relative prices for major crops. The parity indices presented in Table 2 make a modest attempt in this direction.

The parity between the prices received and the prices paid for different crops reveals a lot of divergence from the pattern noted for the entire crop sector in the previous section. While the parity index for the terminal year of the study is significantly higher than the index for the base year for all crops, the time trend of the parity indices for different crops shows a divergent picture. The parity indices for tobacco, rape-seed and mustard, sugar-cane, gram and rice show a figure of less than 100 for a number of years during the early to mid-1970s. For some crops, i.e. bajra, jowar, maize, barley, gram, sesamum and cotton, very high values of parity indices are found for a number of years indicating that output prices for these crops had outpaced increases in input prices by a significant margin.

V. TRENDS IN GROSS INCOME OF CROPS AND INTER-CROP GROSS INCOME PARITY INDICES

Gross income per acre for 12 selected crops is shown in Table 3. The income per acre from all crops increased by 518 percent over the period of study. The gross income has shown the maximum increase of (808 percent), in the case of bajra and the minimum increase of 273 percent in the case of tobacco during the period 1969-70 to 1986-87. The ranking of crops in descending order is: bajra (808

Table 2
 Parity Price Indices of Major Agricultural Commodities
 Relative to Prices of Agricultural Inputs: 1969-70 to 1986-87

Years	Repeased &										Tobacco	
	Wheat	Rice	Bajra	Jowar	Maize	Barley	Gram	Sugar-cane	Mustard	Sesamum		Cotton
1969-70	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1970-71	104.64	94.18	94.56	102.43	98.30	101.71	75.83	107.41	97.20	140.63	118.76	97.58
1971-72	110.54	86.89	106.98	124.38	109.90	115.79	85.95	150.00	96.72	130.13	119.76	96.10
1972-73	108.57	100.71	108.01	130.99	113.45	112.30	99.86	162.33	95.98	144.57	127.78	93.12
1973-74	120.84	107.94	108.88	82.29	90.93	136.42	92.52	81.37	113.39	141.48	172.74	80.97
1974-75	161.01	101.62	188.59	130.44	144.63	116.70	92.67	75.68	129.16	162.00	132.59	98.74
1975-76	147.32	109.97	178.63	118.83	130.16	131.75	87.91	92.88	126.94	151.39	157.30	98.04
1976-77	134.13	114.08	143.46	118.46	107.24	107.28	88.13	93.26	129.58	158.26	198.78	96.05
1977-78	163.27	101.08	156.04	103.95	115.30	133.32	137.50	85.04	133.71	157.77	184.26	92.45
1978-79	183.92	123.89	192.68	127.50	157.99	186.93	129.50	99.03	206.69	249.91	293.71	121.95
1979-80	194.91	135.16	265.44	163.73	150.29	213.71	142.91	115.22	247.60	304.35	263.73	136.08
1980-81	169.75	143.78	269.58	157.05	141.52	234.24	274.15	115.74	151.30	181.69	224.91	164.23
1981-82	175.56	142.16	206.09	154.85	173.09	191.85	332.75	110.82	112.41	132.00	209.50	135.64
1982-83	159.58	126.04	242.34	147.16	156.23	167.14	259.59	99.26	105.84	132.67	190.87	108.49
1983-84	150.93	113.38	198.12	160.35	190.54	145.20	200.51	198.79	123.17	193.99	245.30	92.70
1984-85	158.72	114.18	153.11	173.40	202.78	169.27	206.70	186.15	129.22	200.30	189.01	103.72
1985-86	163.25	122.09	215.07	201.85	200.23	177.36	235.15	178.71	120.81	191.67	163.10	132.17
1986-87	158.65	120.19	301.36	200.69	214.99	147.33	165.03	185.75	111.68	171.76	153.26	145.01

Table 3
Gross Income per Acre of Major Crops in Pakistan

(Rupees)

Years	Repesed & Mustard										All Crops	
	Wheat	Rice	Bajra	Jowar	Maize	Barley	Gram	Sugar-cane	Sesamum	Cotton		Tobacco
1969-70	221.35 (100.00)	521.47 (100.00)	87.87 (100.00)	90.67 (100.00)	182.36 (100.00)	103.11 (100.00)	166.59 (100.00)	886.42 (100.00)	128.96 (100.00)	158.36 (100.00)	168.52 (100.00)	2765.68 (100.00)
1970-71	216.74 (97.91)	490.86 (94.13)	83.10 (94.57)	95.74 (105.59)	197.29 (108.18)	103.33 (100.21)	126.63 (76.02)	824.67 (93.03)	222.98 (97.39)	208.88 (131.89)	483.51 (123.06)	2633.87 (94.55)
1971-72	254.46 (114.96)	487.25 (93.44)	95.44 (103.62)	122.93 (135.58)	221.85 (121.65)	121.15 (117.50)	144.00 (86.44)	1158.38 (130.68)	228.27 (99.70)	202.35 (127.78)	534.98 (145.17)	2420.26 (86.88)
1972-73	298.83 (135.00)	652.44 (125.12)	115.06 (130.95)	144.88 (159.80)	256.62 (140.72)	135.72 (131.63)	193.79 (116.33)	1476.32 (166.55)	259.19 (113.20)	256.31 (161.85)	629.40 (170.79)	2244.25 (80.56)
1973-74	388.08 (175.32)	840.45 (161.17)	130.30 (148.29)	112.68 (124.28)	265.32 (145.49)	197.41 (191.46)	211.85 (127.17)	854.51 (96.40)	361.66 (157.96)	318.85 (201.35)	1014.05 (275.17)	2230.16 (80.06)
1974-75	633.86 (286.36)	814.70 (156.23)	266.58 (303.39)	192.80 (212.65)	491.04 (269.26)	202.35 (196.25)	246.64 (148.05)	785.35 (88.59)	480.80 (209.99)	404.70 (255.56)	788.28 (213.91)	3200.13 (114.88)
1975-76	655.36 (296.06)	881.46 (168.21)	267.85 (304.84)	181.94 (200.68)	493.47 (270.60)	237.16 (230.01)	250.10 (150.13)	1169.00 (131.87)	513.19 (224.14)	448.06 (282.94)	872.12 (236.66)	3012.77 (108.15)
1976-77	645.30 (291.53)	1118.54 (214.50)	224.83 (255.86)	192.84 (212.70)	413.13 (226.54)	211.65 (205.27)	283.84 (170.39)	1295.25 (146.12)	565.33 (246.91)	512.62 (323.71)	995.58 (270.16)	3523.27 (126.48)
1977-78	791.00 (357.72)	1078.77 (206.87)	277.17 (315.44)	173.55 (191.42)	497.85 (273.00)	293.23 (284.38)	457.73 (274.76)	1264.81 (142.69)	642.41 (280.57)	569.11 (359.37)	1353.53 (367.29)	3627.03 (130.20)
1978-79	881.24 (398.11)	1200.72 (230.26)	289.86 (329.89)	182.93 (201.77)	585.26 (320.92)	359.23 (348.40)	296.25 (177.83)	1277.60 (144.13)	867.34 (378.81)	800.60 (505.56)	1510.94 (410.00)	4240.92 (152.24)
1979-80	952.60 (430.55)	1236.77 (237.17)	406.86 (463.05)	255.45 (281.75)	561.15 (307.71)	417.438 (404.84)	204.68 (122.86)	1555.11 (175.43)	1087.45 (474.94)	967.76 (611.11)	1883.48 (511.10)	5172.06 (185.67)
1980-81	1017.43 (459.64)	1579.23 (302.84)	503.38 (572.89)	277.33 (305.88)	609.41 (334.18)	478.14 (463.73)	646.18 (387.88)	1825.81 (205.97)	761.85 (332.74)	653.04 (412.37)	1777.38 (482.31)	7115.19 (255.42)
1981-82	1131.51 (511.18)	1893.86 (363.18)	401.08 (456.46)	303.52 (334.77)	839.52 (460.35)	463.03 (449.08)	721.91 (433.34)	1943.59 (219.26)	643.79 (281.18)	517.64 (326.87)	1861.73 (505.20)	6832.84 (245.28)
1982-83	1264.10 (571.08)	1931.22 (370.34)	558.08 (635.14)	327.91 (361.67)	878.05 (481.48)	457.02 (443.24)	1089.02 (653.71)	1842.89 (207.90)	724.48 (316.41)	572.16 (361.30)	2095.39 (568.60)	6188.95 (222.17)
1983-84	1119.41 (505.71)	1766.18 (338.70)	441.29 (502.23)	377.79 (416.68)	1133.97 (621.81)	418.86 (406.24)	920.25 (552.40)	4192.73 (473.00)	424.66 (192.66)	956.56 (604.04)	1754.55 (476.11)	6149.68 (220.76)
1984-85	1334.02 (602.66)	1839.47 (352.75)	363.29 (413.46)	436.46 (481.39)	1257.12 (689.34)	504.81 (489.59)	900.00 (540.25)	3803.91 (429.13)	1037.99 (453.34)	1035.55 (653.92)	2830.74 (768.14)	7171.28 (257.43)
1985-86	1650.89 (745.81)	1916.52 (367.58)	529.81 (587.84)	516.52 (584.35)	1264.44 (693.35)	556.73 (539.95)	1159.25 (695.87)	3783.43 (425.82)	1052.68 (459.76)	1006.28 (635.44)	2862.00 (776.63)	9184.23 (329.71)
1986-87	1658.81 (749.39)	2099.31 (402.58)	798.24 (908.46)	540.27 (595.89)	1520.48 (833.76)	474.55 (460.24)	838.17 (503.13)	4438.95 (500.77)	1003.92 (438.46)	917.32 (579.26)	2882.64 (782.23)	10390.23 (372.99)

Notes: 1. Share of gross income from each crop in total gross income from all crops during 1969-70 was used to assign weights to producer price indices of each of the crops to calculate overall weighted index of prices received by the agricultural sector.

2. Figures in parenthesis are the index numbers with base year 1969-70.

percent), maize (734 percent), cotton (682 percent), wheat (650 percent), jowar (496 percent), sesamum (479 percent), gram (403 percent), sugar-cane (403 percent), rice (303 percent) and tobacco (273 percent).

The trends in gross income for different crops reflect, to an extent, public policy in the area of crop pricing which was designed to reduce disparity in the value productivity of major crops. Sugar-cane, an inefficient user of resources from the society's perspective,¹ was the second most profitable activity for farmers in 1969-70. By 1986-87, the disparity in the value productivity of rice, wheat, cotton and maize as compared with sugar-cane was considerably reduced. In fact, cotton and rice were earning more income per acre than sugar-cane. The other important finding is that the prices of crops whose physical productivity increased markedly due to widespread adoption of high-yielding new varieties were relatively restrained with a view to passing on part of the benefits of technological advance to the consumers.

The crop calendar in Pakistan is complex and a farmer can choose from various combinations of crops. There are two main crop seasons known as *Rabi* and *Kharif*. In the *Rabi* season, crops are sown in the fall and harvested in the spring. The main crops in this season are wheat, gram, barley and rape and mustard seed. The main crops in the *Kharif* season are rice, cotton, jowar, bajra, maize and tobacco. These crops are sown in the beginning of summer and harvested in the fall. Sugar-cane is an annual crop. The sole reliance on changes in the relative prices of competing crops as a measure of changes in relative profitability for crops can be deceptive situation when differential growth in the physical productivity of different crops is experienced. A better measure in such cases is that of inter-crop gross income parity. Such indices for various crops combinations are given in Table 4.

Within the *Rabi* season, the gross profitability of wheat is compared to two crops, i.e. gram and rape and mustard seed. The gross profitability of wheat is, by different magnitudes, higher as compared to its competing crops. The parity index of wheat, corresponding to gram, is less than 100 in 1982-83 and 1983-84 while for all other years, the index is higher than 100. Similarly, profitability of wheat relative to rape and mustard seed is higher than 100 for all years except 1979-80 when the value is 90.61. The sharp rise in profitability of gram and rape and mustard seed in two years is due to the sharp rise in prices of these two crops in those years. For the remaining years of the study, the sustained and high rise in physical productivity of wheat explains high levels of its profitability relative to the competing crops.

For the *Kharif* season, the relative profitability of rice, maize and cotton is measured. Cotton is more profitable as compared with rice for all years, except in 1972-73. Cotton is also more profitable when compared with maize for all years of

¹ The domestic resource cost (DRC) coefficient for sugar-cane is found to be higher than DRC's for many other crops in Pakistan.

Table 4
Indices of Inter-crop Gross Income Parity

Years	Gross Income Parity Index of									
	Wheat to Gram	Wheat to Rape & Mustard	Rice to Cotton	Rice to Maize	Cotton to Maize	Sugar-cane to Rice & Wheat	Sugar-cane to Wheat & Cotton	Sugar-cane to Wheat & Maize		
1969-70	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1970-71	128.81	100.54	76.49	87.00	113.75	97.66	81.88	90.72	81.88	90.72
1971-72	133.00	115.31	64.36	76.81	119.33	130.88	97.64	110.76	97.64	110.76
1972-73	116.05	119.26	73.26	88.91	121.37	130.05	105.84	121.05	105.84	121.05
1973-74	137.87	111.00	58.57	110.78	189.13	58.29	40.55	59.56	40.55	59.56
1974-75	193.42	136.37	73.04	58.02	79.44	45.43	36.75	31.80	36.75	31.80
1975-76	197.22	132.09	79.53	69.55	87.46	59.85	50.93	46.34	50.93	46.34
1976-77	171.10	118.07	79.40	94.68	119.25	61.54	52.53	55.73	52.53	55.73
1977-78	130.19	127.50	56.32	75.78	134.54	56.66	39.23	44.67	39.23	44.67
1978-79	223.87	105.09	56.16	71.75	127.76	51.42	35.54	39.68	35.54	39.68
1979-80	350.26	90.61	45.40	77.08	166.10	59.52	36.49	46.79	36.49	46.79
1980-81	118.50	138.14	62.79	90.62	144.32	58.92	43.47	51.11	43.47	51.11
1981-82	117.96	181.80	71.89	78.89	109.75	53.84	43.21	44.91	43.21	44.91
1982-83	87.35	180.48	65.13	76.91	118.10	48.76	36.50	39.18	36.50	39.18
1983-84	91.55	119.08	71.14	54.47	76.57	121.76	97.03	84.74	97.03	84.74
1984-85	111.55	132.94	45.92	51.17	111.43	100.45	60.78	66.86	60.78	66.86
1985-86	107.18	162.22	47.33	53.01	112.01	88.87	55.79	69.11	55.79	69.11
1986-87	148.94	170.91	51.46	48.28	93.81	98.98	65.04	63.59	65.04	63.59

the study except five years. In terms of relative profitability, the ranking of summer crops shows cotton to be followed by maize and rice.

As mentioned previously, sugar-cane is an annual crop and competes for the use of land with both summer and winter crops. The indices of profitability of sugar-cane, relative to rice plus wheat, and to wheat plus cotton, and to wheat plus maize, show that sugar-cane's advantage in the early years of the study was rapidly eroded as the inter-commodity gross income parity moved against sugar-cane *vis-à-vis* in all its competing crop combinations.

VI. COSTS OF PRODUCTION AND PRICE DETERMINATION

Terms of trade for the entire agricultural crop sector and different crops have shown considerable improvement since 1969-70 as is clear from the empirical evidence presented so far. The farming community in general, and its lobby in particular, however, maintains that farming is a losing business concern. It argues that the terms of trade need to be considerably improved by fixing prices of crops at levels that not only cover the 'costs of production' but also guarantee a reasonable level of profits for crop producers. The limited objective of the present section is to collate together the existing information on this aspect to see the validity of the contention of farmers regarding the pricing of agricultural output.

The state of the art in the estimation of costs of production data for different crops in Pakistan is still in its initial stage of development. The Agricultural Prices Commission has conducted a few large-scale farm surveys to determine the cost of production of some crops for recent years. The studies conducted by the Ministry of Food and Agriculture on costs of production of different crops cover a longer time period. However, these studies are based on small samples. The findings of these studies, in the light of the sampling and non-sampling errors, should be taken with the proverbial pinch of salt. The source of data on farm-gate prices are also studies carried out by the Ministry of Food and Agriculture.²

Table 5 provides information on cost of production and price-cost ratios for five major crops, viz., wheat, rice, cotton, sugar-cane and maize for selected years between 1969-70 and 1983-84. The index numbers of costs of production and sale price per maund, with 1969-70 as the base year, are also presented.

The table shows that the costs of production for all crops have increased considerably during the 1970s. However, quite divergent rates of increase in the costs

²The conclusion that crop prices were high enough to cover the average cost of production holds broadly even when data on producer prices given in Appendix Table 1 are used in the analysis. The observation of the official discussant that producer prices have no relationship whatsoever to the support prices announced by the Government is based on data given in the earlier version of Appendix Table 1. The deviations between support prices and producer prices are minimal.

Table 5
Cost of Production and Cost-Price Ratios for Selected Crops

Years	Wheat			Paddy Course			Paddy Fine			American Cotton			Sugar-cane			Maize		
	Cost per Maund	Sale Price	Cost-Price Ratio	Cost per Maund	Sale Price	Cost-Price Ratio	Cost per Maund	Sale Price	Cost-Price Ratio	Cost per Maund	Sale Price	Cost-Price Ratio	Cost per Maund	Sale Price	Cost-Price Ratio	Cost per Maund	Sale Price	Cost-Price Ratio
1969-70	16.16 (100.00)	16.50 (100.00)	0.98	13.32 (100.00)	13.12 (100.00)	1.01	21.00 (100.00)	22.32 (100.00)	0.94	37.38 (100.00)	38.41 (100.00)	0.97	1.99 (100.00)	2.23 (100.00)	0.89	15.46 (100.00)	15.47 (100.00)	1.00
1975-76	30.45 (188.43)	37.00 (228.24)	0.82	23.84 (178.98)	25.00 (190.55)	0.95	43.58 (207.52)	51.90 (232.53)	0.84	93.79 (250.91)	100.00 (260.35)	0.94	5.10 (256.28)	5.50 (246.64)	0.93	27.63 (178.72)	40.00 (258.50)	0.69
1976-77	35.43 (219.25)	43.05 (260.90)	0.82	27.73 (208.18)	31.75 (242.00)	0.87	43.33 (206.33)	51.58 (231.09)	0.84	113.32 (303.16)	123.90 (322.57)	0.91	4.14 (208.04)	5.99 (268.61)	0.69	41.58 (268.95)	50.99 (329.61)	0.82
1977-78	40.82 (252.60)	50.34 (305.09)	0.81	28.43 (213.44)	31.69 (241.54)	0.90	47.93 (228.24)	51.74 (231.81)	0.93	128.90 (344.84)	148.23 (385.92)	0.87	4.41 (221.61)	5.85 (262.33)	0.75	45.68 (295.47)	51.84 (335.10)	0.88
1978-79	36.98 (228.84)	47.25 (305.09)	0.78	26.83 (201.43)	33.20 (253.05)	0.81	50.37 (239.86)	62.78 (281.27)	0.80	140.89 (376.91)	177.35 (461.73)	0.79	5.28 (265.33)	7.65 (343.05)	0.69	43.92 (284.09)	60.24 (389.40)	0.73
1979-80	41.68 (260.00)	49.67 (301.03)	0.84	25.00 (187.69)	33.00 (251.52)	0.76	51.52 (245.33)	59.00 (264.34)	0.87	108.21 (289.49)	152.44 (396.88)	0.71	5.61 (281.91)	8.51 (381.61)	0.66	38.18 (246.96)	57.00 (368.46)	0.67
1980-81	44.49 (274.88)	56.50 (342.42)	0.79	37.49 (281.46)	44.00 (335.36)	0.85	71.32 (339.62)	75.00 (336.02)	0.95	114.34 (305.89)	166.00 (432.18)	0.69	7.01 (352.26)	10.00 (448.43)	0.70	49.70 (319.53)	54.26 (350.68)	0.91
1981-82	50.24 (310.89)	59.25 (359.09)	0.85	44.66 (336.79)	51.00 (388.72)	0.88	73.66 (350.76)	88.00 (394.26)	0.64	149.46 (399.89)	184.50 (480.34)	0.81	6.93 (348.24)	10.15 (455.16)	0.68	52.50 (378.40)	67.00 (433.10)	0.87
1982-83	NA	NA	NA	41.23 (309.38)	48.75 (371.57)	0.85	72.50 (345.24)	86.00 (385.30)	0.84	NA	NA	NA	NA	NA	NA	62.65 (405.24)	75.50 (488.04)	0.83
1983-84	51.83 (320.73)	68.00 (412.12)	0.76	45.177 (343.62)	50.00 (381.10)	0.92	75.33 (358.71)	84.00 (376.34)	0.90	NA	NA	NA	7.20 (361.81)	9.50 (426.00)	0.76	62.92 (406.90)	75.00 (464.81)	0.64

Source: Cost and Sale Price data for different crops are taken from Studies on Cost of Production of Crops. Ministry of Food, Agriculture and Cooperative. Government of Pakistan (Various Issues)

Note: 1. Cost of Production includes expenditure on: (i) Preparatory tillage, (ii) Seed bed preparations, (iii) Seeds, (iv) Sowing operations, (v) manuring, (vi) Fertilizing, (vii) Watering, (viii) Plant protections, (ix) Water charges, (x) Harvesting, (xi) Threshing, and (xii) Artisans.

2. Figures in parenthesis are the index numbers with base period 1969-70.

are found for different crops. The percentage increase is the highest for maize (307 percent) which is followed by cotton (300 percent), sugar-cane (262 percent), paddy fine (259 percent), paddy coarse (244 percent) and wheat (221 percent). The cost-price ratios for all crops for almost all years are less than one, indicating that the prevailing price was at a level that had covered the costs of production and had produced a positive level of profit to the farmers.

The finding that prices have been high enough to produce positive profit levels should not be taken too seriously in debates on price policy for the farming sector. In addition to the data problems, inherent in any survey, it is important to understand that there is a schedule of costs of cultivation of each crop and that this schedule varies by type of farm, agro-climatic zones and level of output. Which cost of production then is relevant for price fixation? While there is nothing sacrosanct about the average cost of production, it is generally used as a yardstick in fixing prices for different commodities by the price-fixing authorities. It is interesting to note that the prices of all crops in almost all years had covered the average cost of production.

VII. CONCLUSIONS AND POLICY IMPLICATIONS

The foregoing analysis has some obvious implications for both public policy and the research agenda that needs to be highlighted. The evidence on changes in the gross income-input prices parity index and output-input parity index for all crops, supports the major conclusion reached in the earlier studies on trends in intersectoral terms of trade, that there has been a substantial improvement in both the net barter terms of trade and the income terms of trade for the agricultural sector. In the estimation of the parity indices in the present study, weights for outputs and inputs were computed for 1969-70 while weights in earlier studies were for the year 1959-60, [Stephen Lewis and Hussain (1967)]. The coverage of outputs and inputs in the present study is narrower than was the case for computation of terms of trade in earlier studies. It is comforting to note that the variations in the method of analysis with respect to the use of weights for a later year, does not affect the major conclusion of an improvement in the terms of trade experienced by the agricultural sector.

The improvement in the barter terms of trade for the entire crop sector was more or less reflected in the parity indices for all crops, as deflated prices for each of the crops improved over the period of study. The parity indices in the terminal year were higher than the base year of 1969-70 for each crop. The prices of crops are shown to be affected by public policies in the fields of pricing and technological development and market forces of demand and supply for the crops. The incentives provided to sugar-cane producers were drastically curtailed, probably to improve the allocative efficiency of resource use in the agricultural sector. There seemed to be an

attempt by policy-makers to pass some of the benefits of technological advance in the high-yielding crops of wheat and rice to consumers as their prices were somewhat restrained relative to competing crops

The restraint in prices of some of the major crops did not, however, mean that their producers were put to any major disadvantage. The non-price measures in the area of technology and irrigation resulted in the maintenance of high gross income parity in favour of the crops whose prices were restrained. In view of the shortage of pulses and oilseeds and the inherent nature of risk involved in the cultivation of these crops, the policy of maintaining a high income parity in favour of wheat vs. gram and wheat vs. oilseeds may need to be revised. However, it is to be noted that gram and oilseeds have registered high values of parity price indices but have failed to experience production gains. The inherent limitation of price policy as a policy instrument for increasing production is obvious in the case of such crops. The favourable price policy environment requires to be supplemented by a proper technology policy and infrastructure development in regions suited to the cultivation of these crops. Last, but not the least, there is an urgent need to improve the data base in areas of costs of production and building up of price series for both the outputs and inputs at a disaggregated regional level.

Appendix Table 1
Producer's Price for Major Crops

Year	Wheat	Rice	Bajra	Jowar	Maize	Barley	Gram	Sugarcane	Rapeseed & Mustard	Sesamum	Cotton	Tobacco	All Crops (Indices)
1969-70	17.43 (100.00)	32.48 (100.00)	16.93 (100.00)	14.45 (100.00)	14.35 (100.00)	28.17 (100.00)	1.92 (100.00)	39.66 (100.00)	41.98 (100.00)	111.33 (100.00)	132.86 (100.00)		
1970-71	18.45 (105.82)	30.92 (95.19)	16.19 (95.63)	14.97 (103.59)	16.22 (99.41)	14.76 (76.69)	2.09 (108.65)	38.98 (98.29)	59.70 (142.22)	133.71 (120.11)	131.10 (98.68)		
1971-72	19.74 (113.26)	28.92 (89.03)	18.56 (109.61)	18.42 (127.44)	18.37 (112.60)	17.03 (61.64)	2.95 (153.69)	39.30 (99.10)	55.98 (133.33)	136.53 (122.66)	130.83 (98.78)		
1972-73	22.11 (126.84)	38.21 (117.64)	21.36 (126.17)	22.12 (153.03)	21.62 (132.53)	18.83 (67.31)	3.64 (189.64)	44.47 (112.13)	70.90 (168.89)	166.17 (149.27)	144.53 (108.78)		
1973-74	28.67 (164.50)	47.73 (146.93)	25.09 (148.21)	16.19 (112.02)	20.19 (123.78)	26.66 (94.71)	2.13 (125.95)	61.22 (154.37)	80.86 (192.59)	261.79 (235.16)	146.44 (110.22)		
1974-75	44.27 (253.99)	52.07 (160.31)	50.37 (297.51)	29.74 (205.77)	37.22 (228.15)	41.19 (148.09)	2.29 (119.19)	80.81 (203.75)	107.29 (255.56)	232.85 (209.16)	206.94 (155.76)		
1975-76	42.49 (243.77)	59.11 (181.97)	50.04 (295.59)	28.42 (196.62)	35.13 (215.38)	31.29 (118.00)	2.95 (153.69)	83.30 (210.04)	105.17 (250.51)	289.76 (260.28)	215.54 (162.22)		
1976-77	41.58 (238.56)	65.91 (202.90)	43.20 (255.17)	30.45 (210.70)	31.11 (190.74)	27.39 (97.81)	3.19 (165.88)	91.40 (230.47)	118.17 (281.48)	393.60 (353.55)	226.97 (170.83)		
1977-78	55.50 (318.41)	64.04 (197.13)	51.52 (304.32)	29.30 (202.73)	36.68 (224.87)	37.32 (136.60)	3.19 (165.86)	103.41 (260.76)	129.18 (307.69)	400.05 (359.34)	239.54 (180.29)		
1978-79	54.61 (313.30)	68.56 (211.05)	55.56 (328.22)	31.39 (217.20)	43.90 (269.14)	45.71 (164.45)	3.24 (168.70)	139.64 (352.10)	178.73 (425.73)	557.01 (500.33)	276.04 (207.76)		
1979-80	57.45 (329.58)	74.24 (228.55)	75.98 (443.33)	40.02 (276.85)	41.45 (254.13)	51.87 (188.00)	3.74 (194.83)	166.04 (418.67)	216.05 (514.62)	496.46 (445.95)	305.72 (230.10)		
1980-81	57.10 (327.58)	90.13 (277.47)	88.06 (520.19)	43.81 (303.08)	44.55 (273.11)	64.88 (233.35)	4.29 (223.35)	115.79 (291.96)	147.20 (354.04)	483.20 (434.13)	421.08 (316.92)		
1981-82	66.67 (382.48)	100.61 (309.71)	76.01 (448.98)	48.76 (337.36)	61.51 (377.10)	59.99 (214.93)	4.64 (241.43)	97.12 (244.89)	120.73 (287.58)	508.13 (455.43)	392.65 (295.55)		
1982-83	69.47 (398.51)	102.25 (314.76)	102.45 (605.20)	53.12 (367.50)	63.64 (390.16)	59.91 (214.41)	4.76 (247.88)	104.82 (264.31)	139.09 (331.31)	530.65 (476.66)	359.97 (270.93)		
1983-84	69.65 (399.59)	97.47 (300.06)	87.90 (519.23)	61.36 (424.49)	82.29 (504.46)	55.18 (198.43)	10.11 (526.30)	129.32 (326.09)	215.61 (513.58)	725.93 (652.07)	326.07 (245.41)		
1984-85	76.30 (437.73)	102.28 (314.87)	71.48 (422.25)	69.12 (478.20)	91.23 (559.23)	67.00 (246.82)	9.87 (513.37)	141.33 (356.36)	231.90 (552.58)	580.57 (521.51)	380.04 (286.04)		
1985-86	80.94 (464.36)	112.81 (347.28)	103.56 (611.76)	82.99 (574.13)	92.90 (569.54)	72.41 (266.86)	9.77 (508.32)	136.29 (343.64)	228.89 (545.19)	516.47 (463.91)	499.49 (375.94)		
1986-87	81.10 (465.27)	114.50 (352.47)	149.62 (883.81)	85.07 (588.57)	102.85 (630.50)	62.02 (223.09)	10.47 (544.75)	129.89 (327.51)	211.47 (503.70)	500.38 (449.46)	365.03 (275.27)		

Source : Data are taken from National Accounts of Pakistan (Product and Expenditure), Federal Bureau of Statistics, Government of Pakistan. (Various Issues).

Note : Share of gross income from each crop in gross income from all crops during 1969-70 was used to assign weights to producer price indices of different crops to calculate weighted price index for all crops. Producer prices for each year are obtained by dividing the value of output by the value of production in that year.

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**Comments on
“Intra-sectoral and Intersectoral Parity
Issues in Pricing of Agricultural Crops:
A Preliminary Analysis”**

I am glad that Dr Sarfraz Khan Qureshi has completely revised his original Paper “Intra-sectoral Policy Issues in Pricing of Agricultural Crops: A Preliminary Analysis” taking my comments into consideration. The tables given in the paper have not only been corrected by the author but also updated to include the latest available data. He has also added a new section on costs of production and price determination. There has, consequently, been a fundamental change in his conclusions, so much so that he now concedes that there has been a substantial improvement in both the net, as well as, the income terms of trade for the agricultural sector. This is a welcome change as it is now more in accord with the realities on the ground.

My comments are now addressed to the revised paper, of which a copy has been sent to me directly by the author.

In Section 1, the author has described the purpose of the paper to, present evidence on various concepts of inter-crop input-output prices and income parities for a number of crops for the period 1969-70 to 1986-87 and to identify those crops whose producers have been unduly handicapped. This manner of formulation of the purpose would have been consistent with the original version of the paper when such crops had, in fact, been identified, even though on the basis of wrong data and tables contained in that version. None of the crops examined by the author in his paper now falls in this category.

The author has, in fact, extended the scope of the paper, as is evident from the last section, viz, “Conclusions and Policy Implications”. This is, perhaps, in line with the overall title of the paper to include a recommendation for revising the policy of maintaining a high income parity in favour of wheat compared to both gram and oilseeds (rape and mustard), in view of the shortage of pulses and edible oil in the country. However, further down in this section, the author has realised, and rightly so, that such a revision of policy will not achieve much as what is required is an improvement of technology for the production of gram (particularly development of resistance to the attack of blight disease) and oilseeds (development of high-yielding varieties and pest control strategy) as well as the environment for

its large-scale adoption by the farmers. The author has confined his observations to rape and mustard, when referring to oilseeds, with no mention of non-traditional oilseeds, particularly sunflower and soyabean, both of which can be produced twice a year and only one crop is in competition with wheat. This is despite the fact that a much bigger dent can be made on our import bill on edible oils through a manifold expansion of the areas under these non-traditional oilseeds.

The author has, no doubt, revised Table 2, the source of which has been indicated to be the National Accounts of Pakistan but, *prima facie*, it still gives an incorrect picture in respect of some of the commodities such as wheat and sugar-cane. For example, the figures given for these commodities for the year 1986-87 bear no relationship whatsoever to the support prices, officially announced by the government for these crops. In the case of wheat, this price is Rs 80 per 40 kg against Rs 32.83 per maund shown in the table, and in the case of sugar-cane it is Rs 11.00 per maund against Rs 4.24 indicated in the same table. It is, therefore, not surprising that no use has subsequently been made by the author of the data on producer prices given in this table for the purpose of working out the cost-price ratio in Table 5.

Table 5 is crucial in this paper. While the source of the cost of production data has been indicated to be studies, published by the Ministry of Food and Agriculture (the base of which the author himself has observed to be very narrow and fragile) that of the sale prices has not been indicated. In the absence of this information about the source, it becomes difficult to comment on the quality of the data. The source of data for Table 4 on gross income per acre of major crops in Pakistan has also not been revealed. Yet it has inspired the author to make a number of observations in Section V of his paper.

The author has done well to sound a note of caution at the end of Section VI by saying that "finding that prices have been high enough to produce positive profit levels should not be taken too seriously in debates on price policy for the farm sector". This is warranted, as stated by the author himself, by the fragility of the data base and wide variation in the costs of production and the producer prices. The cost of production is dependent on the size of holdings, type of tenure, agro-ecological zones, adequacy of supporting institutions, availability of inputs and cash resources for their purchase, effectiveness of extension services. Producer prices are dependent on the location of farms from the market, communication and transport facilities, and the adequacy and effectiveness of the government support price system.

I agree fully with the last conclusion of the author on the need to improve the data base on the costs of production and the building up of price series for inputs as well as outputs at a disaggregated level. These data are not only required by independent research economists and research scientists, including those in the Pakistan

Agricultural Research Council but also by planners in the Ministry of Food and Agriculture, the Planning Commission, the Provincial Governments and the Agriculture Prices Commission. A mechanism needs to be devised which should ensure its regular publication with due emphasis on quality, accuracy, reliability and timeliness. The Ministry of Food and Agriculture appears to be the best agency for this purpose.

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