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Agricultural Terms of Trade in Pakistan: Issues of Profitability and Standard of Living of the Farmers

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1. INTRODUCTION

In the wake of the liberalised trade regime, Pakistan is undergoing structural adjustments. At the heart of the adjustments is liberalisation of markets and prices, including freeing the currency market, reducing industrial protection, and introducing financial austerity and macroeconomic stability. The agricultural sector is also undergoing these changes, which include eliminating export taxes and other trade restrictions and reducing producer subsidies (input and output subsidies). Such changes in the sector are critical as agriculture is the largest sector of Pakistan economy.

Due to the dominance of the agricultural sector in the economy and its linkages with other sectors, the changes in value-added, employment, and prices in this sector would significantly affect the overall economic growth and employment in the country. The standard of living in the country in general and in rural areas in particular are also affected by such changes. Variations in the prices of agricultural outputs and inputs affect income distribution, both within agriculture sector and also between the agricultural sector and the non-agricultural sectors. Pricing policies of the government and the local and international trade environment, have a major impact on profitability in the agricultural sector. Thus, changes in agricultural prices affect living standards, employment, incomes, and poverty levels in the rural areas. An increase in the producer prices increases the profitability and improves the standard of living of the people depending on crop income, and vice versa, keeping fixed other factors such as the quantity of goods. If the rate of increase in consumer prices is more than the rate of increase in

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producer prices then the farmers' purchasing power declines. On the other hand, an increase in the prices of inputs (which are costs to the farmers) results in a decline in the profitability from agricultural production. In short, the farmers gain if producer prices increase more than consumer prices and input prices, keeping quantity fixed. However, under market clearing assumptions when per capita production rises to an extent that it offsets the decline in relative prices, the total gains to the farmers increase.

This paper aims to compute the relative price changes in the crop sector to explore whether profitability in this sector has improved or deteriorated. It also aims to gauge the impact of price changes on the standard of living of the farmers. For this purpose, various terms of trade are calculated. The terms of trade for crop sector are defined as the ratio of the index of prices received by the crop sector to the index of prices paid by the sector. In order to determine profitability in the sector, the relative price changes between the prices received by the crop sector for its products and the prices paid by the sector for the major inputs used in the crop sector have been used. To ascertain changes in the standard of living, the terms of trade between the prices received by the crop sector and the prices paid by the farmers for consumer goods and services are calculated. In order to account for changes in productivity and population 'real per capita income terms of trade' are also calculated. A significant aspect of this paper is that it studies the impact of partial (only output side) free-trade scenario on the agricultural prices. It probes how movements in international crop prices affect the profitability in the sector and the standard of living of the farmers. For this purpose two further indices have been calculated using international crop prices with respect to domestic consumer and input prices.

The paper is divided into five sections. Section 2 reviews the literature; in Section 3 we briefly describe the methodology and the data; Section 4 presents results and discusses them and finally Section 5 concludes the paper.

2. LITERATURE REVIEW

The debate over agricultural prices revolves around two different views. One view is that the government must support the agricultural prices and the farmers must be protected from the decline in market prices of the agricultural commodities. Qureshi (1985) mentions that high farm prices not only benefit the large producers but also the small farmers. Higher prices in agricultural sector not only have implications for an efficient use of resources but can also shift the production function upwards by price-induced technological and institutional innovations and infrastructure investment in rural areas. Brown (1978) has shown a link between public investment and farm prices in agriculture. Financial rate of return on agricultural projects increases when prices for agricultural produce increase. This justifies increased allocations for the agricultural sector.

Chaudhry and Chaudhry (1997) have criticised the pricing policies of the government, arguing that the adverse pricing policies followed by the government had a greater negative impact on small farmers than on large farmers. They argue that, except for the 1960s, agricultural commodities have generally been under-priced. This has led to lower profit margins for the farmers and as a consequence declining employment opportunities for agricultural labour.

The contrasting view is that the support prices and subsidies have made the agriculture sector highly dependent on government support and in order to survive in the WTO trade regime the sector must become highly competitive, efficient, and self dependent. The proponents believe that by reducing the level of protection, domestic resources would automatically shift to the areas of comparative advantage. Chishti and Malik (2001) argue that when government takes measures to reduce duties and subsidies on agricultural trade, it results in increased efficiency in agricultural production due to increased competition from other countries. Producers of those agricultural products, which can fetch higher prices in international market, generally gain from the increased prices and larger market. Consumers in this case have to pay higher prices. When the prices in the international market are lower than the domestic market the free trade brings reduced profits for the farmers but greater purchasing power for the consumers. In both cases i.e. whether the prices in the international market are higher than the prices in the local market or lower than the prices in the domestic market, the society reaps the net gain.

Earlier studies such as [Lewis and Hussain (1967) and Lewis (1968)], focus on the terms of trade between the agricultural sector and the manufacturing sector. Afzal (1977) has addressed the impact of relative price changes on the agricultural sector for overall Pakistan. He has covered the period 1966-76 to see the movements in the terms of trade in agricultural domestic prices only.

Cheong and D'Silva (1984) have computed the terms of trade indices by using the estimates of GDP at factor costs in current prices originating in agricultural and manufacturing sectors and their corresponding estimates at constant prices. The main purpose of their study is to assess the performance of agricultural sector in the light of government policy. Qureshi (1985) has calculated three types of terms of trade for the agricultural sector, for the period 1951-64: (a) net barter terms of trade, (b) income terms of trade, and (c) single factorial terms of trade. The net barter terms of trade of the agriculture sector are computed by dividing the GDP deflator for the agriculture sector by the GDP deflator for the manufacturing sector. The income terms of trade for any sector measure the purchasing power of that sector. The income terms of trade are defined as the ratio of the value of sales by a sector to its average import price. Since no data series exists for the marketed surplus, Qureshi (1985) has measured the income terms of trade as a product of the net barter terms of trade and an index of agricultural output. Single factorial terms of trade, is the net barter terms of trade adjusted for changes in the productivity of agricultural inputs.

Our paper is based on the methodology used by Zahid and Hyder (1986), which studies the effects of relative price changes on the agricultural sector. Zahid and Hyder (1986) have covered the period 1973–84 and have calculated agricultural terms of trade based on producer prices, input prices, and consumer prices. The results of Zahid and Hyder's study show that the domestic terms of trade with respect to consumer prices improved over the base year–1973-74 for only three years i.e.1975–77 and 1978-79, and for the remaining periods the domestic terms of trade declined over the base year. The real per capita income terms of trade remained below the base year for first six years from 1974 to 1980 and then improved for three years from1980 to 1983 and declined in the last year of the study i.e. 1983-84. The terms of trade index with respect to input prices remained above the base throughout the study period. This shows that the rate of increase in prices of agricultural output was more than the rate of increase in prices of agricultural inputs, providing greater margin to farmers. When we see their results of international prices received by farmers it appears that if the international prices had prevailed in the domestic market, the agricultural sector would have had more rapidly declining terms of trade and the standard of living would have substantially declined relative to the base year. The index of international producer prices shows that there is a continuous decline in the prices of agricultural outputs. They believe that the agricultural sector in Pakistan appears to have become relatively worse off during the period 1973–83.

The study of Zahid and Hyder was in the context of a fixed exchange rate regime. Since then, the economy has gone through various structural changes and the role of international trade has also become prominent. Moreover, the study of Zahid and Hyder does not discuss in detail the implications of variations in agricultural output and input prices for the farmers in particular and the rural population in general. In this paper we have addressed these issues. The paper covers the twenty years period from 1983-84 to 2002-03. The analysis is partial in the sense that it covers only the crop sector in agriculture, but the crop sector alone generates around 50 percent of the agriculture value added. The dynamics of exchange rates are now different from the seventies and early eighties, and this paper incorporates these. The results stand very useful because there is no other latest study available regarding agricultural terms of trade.

The goal of this study is to answer the following questions:

- Are crop incomes declining for farmers?
- Are the living standards of farmers, that are dependent on farm income only, improving?
- Has the purchasing power of farmers increased?
- Has profitability in the crop sector improved over the last twenty years?
- Are the agricultural terms of trade contributing to rising rural poverty?[1]

[1]Although poverty is not directly discussed, yet the answers to the research questions will be helpful for deriving useful conclusions about poverty in rural areas.

3. RESEARCH METHODOLGY

(a) Sources of Data

Data are taken for the period from 1983-84 to 2002-03. There are two reasons for taking 1983-84 as the base year. First, the exchange rate mechanism shifted to floating rate regime during the early eighties. Second, there is no study available for the period after 1983-84.

Data for the calculation of indices are taken from secondary data sources. Domestic prices of agricultural products are taken from *Pakistan Economic Survey, Statistical Year Book, Agricultural Statistics of Pakistan*, and *Monthly Statistical Bulletin*. The Consumer Price Index was taken from *Pakistan Economic Survey* and was adjusted for 1983-84 as the base year. The world prices for the agricultural produce are taken from *International Financial Statistics* (IFS). Prices of four inputs—fertiliser, water, light diesel oil and pesticides were taken from *National Accounts of Pakistan*, *Pakistan Economic Survey*, *Pakistan Energy Year Book*, *Agricultural Statistics of Pakistan*, and Estimates of Receipts for all Provinces, for various years. The data for index of rural population was taken from *Pakistan Economic Survey*.

(b) Terms of Trade

Six types of term of trade are used in the analysis.

(i) Ratio of the Domestic Prices Received by Farmers to the Prices of Consumer Goods and Services

First, the index of domestic prices received by farmers and the index of consumer prices are calculated. To calculate index of domestic prices received by farmers, 20 agricultural commodities were selected.[2] A simple index of prices of each commodity was derived for the base year 1983-84. The weights were calculated by the values of the production of these commodities in the base year. The prices of the commodities taken for this index are the average annual wholesale prices that farmers receive for their produce.[3]

The indices were calculated as follows using Laspeyres Formula (with 1983-84 as the base year).

$$PI = \sum_{j=1}^{20} W_{oj} \times \left(P_{ij} / P_{oj}\right) \times 100$$

[2]These commodities were wheat, rice, maize, bajra, jowar, barley, sugarcane, cotton, gram, moong, mash, masoor, onion, potato, tomato, mango, banana, apple, guava and citrus.

[3]The use of average annual wholesale prices overestimates the real value received by the farmers for their products. But because of lack of data on the government procurement and support prices and the changes in government policies regarding such prices, it was convenient to take wholesale prices. It must also be kept in mind that under the new emerging trade scenario the importance of market prices has increased. Also, the data for average annual wholesale prices is more reliable.

Where, PI = Price Index for any group, j = commodity and i = year (1983-84 to 2002-03), Woj = Weight of commodity 'j' in the base year 'o', Pij = Current year price of commodity 'j'and Poj = Base year price of commodity 'j'.
And also,

$$W = q_{oj} \times P_{oj} / \sum_{j=1}^{20} q_{oj} \times P_{oj}$$

Where, W is the weight of commodity *'j'*, qoj = base year quantity of commodity 'j'.

The formula stated above was used to calculate all the price indices.

(ii) Ratio of the International Prices of Crops to the Prices of Consumer Goods and Services

The indices used to calculate these terms of trade are the index of international prices of crops that farmers can get in the international market (under unrestricted trade scenario) and the index of consumer prices of goods and services. Eight commodities were selected to calculate the index of international prices received by farmers. Due to insufficient data on international prices of other crops, more commodities could not be added in this list.[4] This, however, will not affect the significance and reliability of our analysis as the selected commodities covered a major portion of the crop production of Pakistan. The prices of these commodities were converted into rupees from dollars on the basis of prevailing exchange rates of the respective periods. In the denominator the adjusted consumer price index was used.

(iii) Ratio of the Domestic Prices Received by Farmers to the Prices of Major Agricultural Inputs

Index of prices of agricultural inputs was calculated to find the price trends of the agricultural inputs that farmers purchase domestically for crop production. Four major inputs i.e. fertiliser, light diesel oil (which covers most of the operational cost of mechanical technology i.e. tractors, tube-wells, and other machines), water, and pesticides were selected to compute this index. First, separate simple price indices were calculated for each input. Then the weights were found by using the base year value of each input's consumption. Due to the unavailability of reliable data on seeds and the common practice of the farmers of making their own seeds from the crops, we have not included seeds in our analysis. It is worth mentioning that although seeds are an important input for the crop sector, even with the inclusion of seeds the remaining four inputs would weigh around 80 percent in total.

Quantity of fertiliser was available in nutrient tonnes and the prices were available for 50Kg bags, hence prices were calculated per nutrient kilogram. A

[4]The commodities selected for international prices received by farmers were rice, wheat, cotton, jowar, citrus fruits, banana, barley, and maize. The prices taken were producer prices.

weighted index was calculated for the three types of nutrients and this weighted index was taken as the overall indicator of fertiliser price trends. To calculate the index of water charges, per acre water charges were calculated by dividing the 'Revenue from Irrigation' with 'Irrigated Area Sown'.

(iv) Ratio of the International Crop Prices to the Prices of Major Agricultural Inputs

These terms of trade are calculated using the price index of eight agricultural commodities assuming that the farmers sell the commodities directly in the international market. In the denominator we have the price index of four agricultural inputs.

(v) Real Per Capita Income Terms of Trade (Domestic)

The terms of trade mentioned from (i) to (iv) reflect changes in the profitability and living standard of farmers, only on the basis of price changes. The gains however, are also affected by changes in productivity of the farmers and the output levels. For instance, the prices may decline for a period but an increase in per capita production would result in higher gains despite of low margins. To account for changes in productivity and population, we have calculated 'Real Per Capita Income Terms of Trade' for both domestic and international prices. Real per capita income terms of trade were calculated by using Quantum Index of crop production and rural population index. Quantum Index of Agricultural Produce was calculated by taking the production of the same 20 crops listed earlier for all years and their prices for the base year. The weights were same as the weights in index of domestic prices received by farmers. This index shows the output trends keeping the prices constant.

To compute the index of rural population, the rural population for all relevant years (1983-84 to 2002-03) was estimated on the basis of inter-censal growth rates between the 1981 and 1998 Census. Then the real per capita income terms of trade index was calculated based on the annual change in rural population.

The formula for quantum index is given below:

$$QI = \sum_{j=1}^{20} Woj \times \left(q_{ij} / q_{oj}\right) \times 100$$

Where, QI = Quantity Index , Woj = Weight of commodity 'j' in the base year 'o', qij = output of the commodity 'j' for the current year. And;

$$W_{oj} = q_{oj} \times P_{oj} / \sum_{j=1}^{n} q_{oj} \times P_{oj}$$

Population index was calculated by using this formula.

$$Pop\,I = \left(Pop_i / Pop_o\right) \times 100$$

Where, $PopI$ = Population Index, Pop_i = Current year population, and Pop_o = Base year population.

(vi) Real per Capita Income Terms of Trade Based on International Crop Prices

Method of calculation of these indices was same as the real per capita income terms of trade based on domestic crop prices. The only difference was that in order to calculate this index on the basis of international prices we took quantum index of those eight commodities of which the international prices are available. The quotient of quantum index and rural population index was multiplied with the terms of trade based on international crop prices and domestic consumer prices.

4. EMPIRICAL FINDINGS

1. Standard of Living

(i) Ratio of the Domestic Prices Received by Farmers to the Prices of the Consumer Goods and Services

From the results in Table 1, we can see that the terms of trade for farmers have shown a mixed trend. The terms of trade declined from 1983-84 to 1986-87 and

Table 1

Domestic Terms of Trade (Consumer Goods Price Index in Denominator)

Period	Terms of Trade	Index of Producer Prices	Index of Consumer Prices
1983-84	100.00	100.00	100.00
1984-85	97.22	102.73	105.67
1985-86	94.63	104.35	110.27
1986-87	93.92	107.29	114.24
1987-88	96.49	117.17	121.43
1988-89	96.28	129.05	134.04
1989-90	92.32	131.22	142.14
1990-91	92.09	147.47	160.13
1991-92	95.13	166.99	175.53
1992-93	93.94	180.16	191.78
1993-94	98.91	210.89	213.21
1994-95	95.69	230.37	240.76
1995-96	92.18	245.90	266.76
1996-97	97.46	290.65	298.23
1997-98	100.71	323.83	321.54
1998-99	103.95	353.37	339.96
1999-00	101.01	355.74	352.17
2000-01	96.61	355.22	367.68
2001-02	97.13	369.76	380.70
2002-03	99.61	390.96	392.50

improved in 1987-88. They started deteriorating again in 1989-90 and this trend continued till 1996-97. However, in all these years the index remained below the base year. There was a period of only three years from 1997-98 to 1999-00 during which the terms of trade improved over the base year. In 1996-97 there was a significant drop in agricultural production of many crops due to pest attack. This resulted in an increase in producer prices in the subsequent years. There was a marginal increase in agricultural production in 1998-99, as is shown by the index of agricultural production (see Table 2). In 1999-00 there was a bumper crop and due to excess supply the result was a decline in producer prices. In other words, for most of the years the index of consumer prices increased more than the index of producer prices. The domestic terms of trade depict that, assuming constant quantity and changing prices the purchasing power of the farmers has relatively decreased over the base year. It shows that the farmers are worse off and, as measured by this criterion their standard of living has worsened for most of the years except for the years 1997-00.

Table 2

Real per Capita Income Terms of Trade (Domestic Prices)

Period	Quantum Index of Agricultural Production (Domestic)	Index of Rural Population	Terms of Trade of Domestic Prices Received by Farmers and CPI	Real per Capita Income Terms of Trade (Domestic)
1983-84	**100.00**	**100.00**	**100.00**	**100.00**
1984-85	115.03	102.23	97.22	109.40
1985-86	122.69	104.51	94.63	111.10
1986-87	126.66	106.84	93.92	111.34
1987-88	129.71	109.22	96.49	114.59
1988-89	136.13	111.66	96.28	117.38
1989-90	138.44	114.15	92.32	111.96
1990-91	143.95	116.69	92.09	113.61
1991-92	162.01	121.35	95.13	127.01
1992-93	146.60	123.86	93.94	111.18
1993-94	151.92	126.32	98.91	118.96
1994-95	160.42	128.75	95.69	119.22
1995-96	173.70	131.25	92.18	121.99
1996-97	168.95	133.86	97.46	123.00
1997-98	179.60	136.63	100.71	132.38
1998-99	180.31	140.70	103.95	133.21
1999-00	197.23	143.73	101.01	138.61
2000-01	186.33	147.00	96.61	122.46
2001-02	177.58	150.18	97.13	114.85
2002-03	185.63	153.26	99.61	120.64

In Table 1 the index of producer prices and the index of consumer prices show that in all the years except for the period 1997–00 consumer prices have increased more than the producer prices, although there is not a very significant gap between the two. Similarly, Figure 1 depicts that the domestic terms of trade with respect to consumer prices have neither deteriorated significantly nor have they improved. The producer prices and consumer prices have increased simultaneously but the rise in consumer prices was more than the rise in producer prices in most of the years as shown by the gap between consumer prices and the producer prices.

Fig. 1. Domestic Terms of Trade Using Consumer Prices.

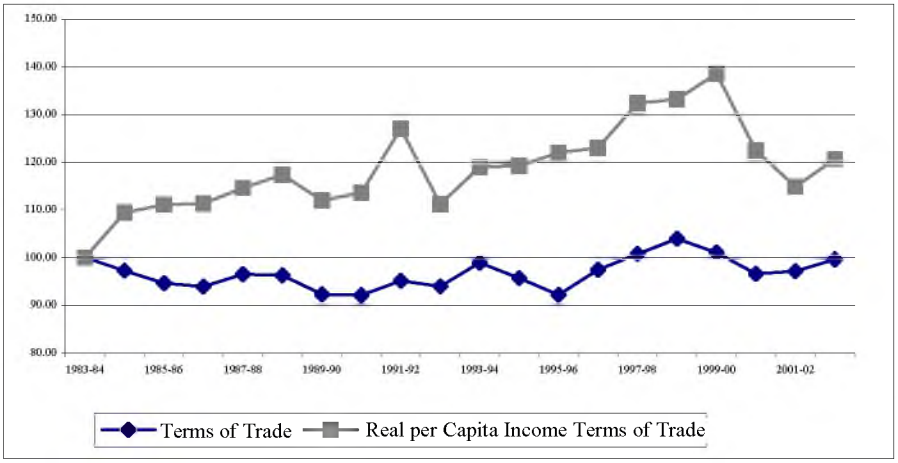
(ii) Real Per Capita Income Terms of Trade Based on Domestic Prices

The real per capita income terms of trade are calculated by multiplying the domestic terms of trade for producer and consumer prices with the adjustment factor. The adjustment factor was computed by dividing the quantum index with the rural population index. The real per capita income terms of trade was computed to take into account the changes in production and population. It is taken as a proxy for real per capita income. If the adjustment factor for any year is greater than one, it means that the per capita production has increased in that year and the value of adjustment factor of less than one would mean that the per capita production has decreased. With greater than one adjustment factor the real per capita income of the farmer might increase despite of the decline in producer prices. This means that the decline

in the prices would be more than offset by the rise in production, and despite of low margins the over all income of the farmer would increase. Similarly significant rise in prices can also offset the decline in production.

Our results show that although the domestic terms of trade based on producer and consumer prices, keeping production (quantity) constant, have decreased over the base year but due to rise in per capita production the overall gains for the farmers have increased (see Table 2). This shows that the real per capita income has slightly increased over time. Two main reasons could be cited for this increase in real per capita income terms of trade for most of the years. First, that the population growth rate has declined in both rural and urban areas and second, that because of the greater use of fertilisers as compared to the seventies and early eighties the productivity has increased. Increase in per capita production despite of a marginal rise in producer prices shows that the efficiency in agricultural production might has improved. Farmers' margins have declined and in order to maintain their standard of living the small farmers have tried to increase their production. There are few years in which rate of increase in production could not outpace the decline in the producer prices relative to consumer prices, for instance 1989-90. In some other years real per capita income terms of trade declined due to decline in quantum index, for instance in 1992-93. In 2000-01 both the relative prices and production declined. The increasing gap between the real per capita income terms of trade and the domestic prices terms of trade, shown in Figure 2, is due to the population control measures and rising production. The producer prices have remained sluggish.

Fig. 2. Domestic Terms of Trade and Real per Capita Income Terms of Trade.

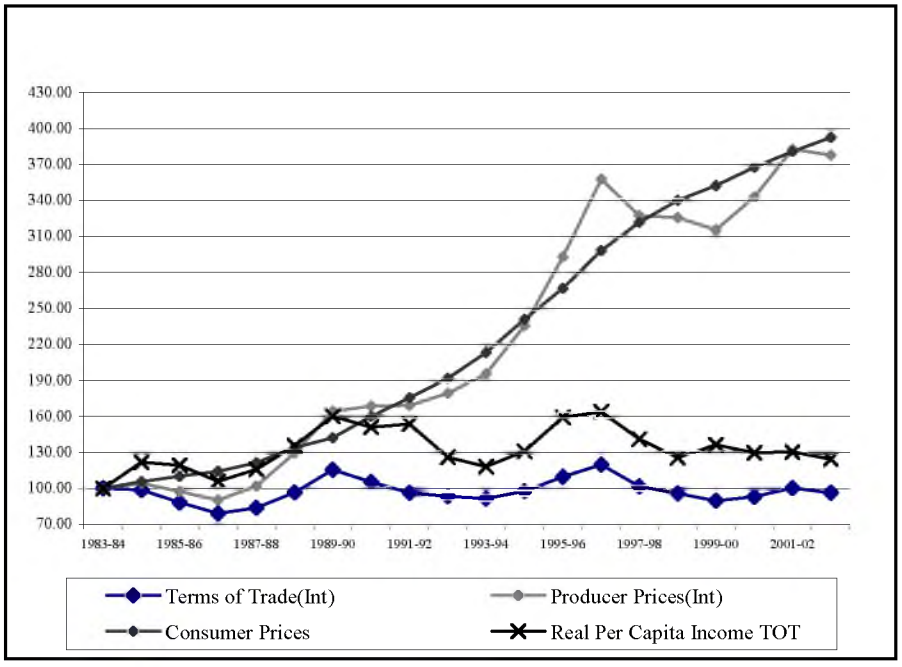


(iii) Ratio of the International Prices of Crops to the Prices of Consumer Goods and Services

These terms of trade are calculated for the purpose of building a scenario in which farmers are allowed to sell their crops in the international market under free trade conditions (and assuming that the developed countries continue to provide agricultural subsidies to their farmers) then what would be the impact on their standard of living.

The results show that the terms of trade were positive (i.e. above the base year value) in favour of the farmers for only six years i.e. 1989-91, 1995-98 and 2001-02 (refer to Table 3, for graphical view see Figure 3). For most of the period the terms of trade with respect to international crop prices and domestic consumer goods prices were below the base year. Another fact is that these terms of trade increased only due to the exchange rate factor, otherwise the prices in the international market are continuously declining over the study period. This shows that the international market is going through momentous price adjustments in the wake of the WTO regime.

Fig. 3. Terms of Trade Using International Crop Prices.



The result of these declining terms of trade is that if the farmers would sell their crops directly in the international market their standard of living would become worse. It is however worth mentioning that if the developed countries remove their subsidies from their agricultural sector the prices of crops would rise sharply in the international market giving a greater margin to Pakistani farmers under free trade scenario. This would naturally have a negative impact on consumers and the farmers also in terms of consumer prices.

If we compare the international prices of crops given in Table 3 with the domestic producer prices of crops shown in Table 1 we can see that the international prices have not risen at the pace domestic prices have increased. This shows how the subsidies provided by developed countries to their farmers have kept the international prices low and have marginalised the farmers of developing countries by distorting the international free market prices.

Table 3

Terms of Trade Using International Crop Prices
(with Consumer Goods Price Index in Denominator)

Period	Terms of Trade	Index of International Producer Prices	Index of Consumer Prices
1983-84	**100.00**	**100.00**	**100.00**
1984-85	98.83	104.43	105.67
1985-86	88.40	97.48	110.27
1986-87	79.09	90.35	114.24
1987-88	83.98	101.97	121.43
1988-89	96.55	129.42	134.04
1989-90	115.65	164.38	142.14
1990-91	105.34	168.68	160.13
1991-92	96.37	169.15	175.53
1992-93	93.44	179.20	191.78
1993-94	91.66	195.42	213.21
1994-95	97.80	235.46	240.76
1995-96	109.78	292.85	266.76
1996-97	119.89	357.54	298.23
1997-98	101.72	327.07	321.54
1998-99	95.74	325.48	339.96
1999-00	89.59	315.50	352.17
2000-01	93.16	342.54	367.68
2001-02	100.49	382.56	380.70
2002-03	96.26	377.81	392.50

(iv) Real per Capita Income Terms of Trade Based on International Prices

These terms of trade were calculated to see how the variation in per capita production affects terms of trade based on international crop prices. The results (in Table 4) show that because the production index has increased more than the population index, the real per capita income terms of trade are increasing. However, again if we apply the assumption of managed float, even the real per capita income terms of trade would decline over the base year. In the year 2002-03 these terms of trade would have declined by almost 72 percent if we had a managed exchange rate scenario.

Table 4

Real Per Capita Income Terms of Trade (International Prices)

Period	Quantum Index of Agricultural Production (International)	Index of Rural Population	Terms of Trade of International Prices Received by Farmers and CPI	Real per Capita Income Terms of Trade (International Prices)
1983-84	**100.00**	**100.00**	**100.00**	**100.00**
1984-85	126.06	102.23	98.83	121.87
1985-86	141.07	104.51	88.40	119.33
1986-87	143.24	106.84	79.09	106.04
1987-88	150.50	109.22	83.98	115.72
1988-89	156.72	111.66	96.55	135.51
1989-90	157.89	114.15	115.65	159.97
1990-91	167.17	116.69	105.34	150.90
1991-92	193.61	121.35	96.37	153.75
1992-93	166.94	123.86	93.44	125.94
1993-94	163.03	126.32	91.66	118.30
1994-95	172.64	128.75	97.80	131.13
1995-96	190.51	131.25	109.78	159.34
1996-97	182.77	133.86	119.89	163.69
1997-98	189.72	136.63	101.72	141.25
1998-99	184.67	140.70	95.74	125.66
1999-00	218.84	143.73	89.59	136.40
2000-01	204.58	147.00	93.16	129.66
2001-02	194.85	150.18	100.49	130.38
2002-03	198.10	153.26	96.26	124.41

2. The Profitability in Crop Sector

(i) Ratio of the Domestic Producer Prices of Crops to the Major Agricultural Inputs Prices

These terms of trade have been computed to find whether the profitability in the crop sector has increased or decreased over the twenty years. The terms of trade have remained below the base year except for the period from 1997 to 2000. The relative prices show a mixed trend over the study period. Table 5 shows that the index of domestic prices of inputs has increased more than the index of domestic producer prices of crops. The reason of rapidly rising input prices is that the government has gradually removed the subsidies from the agricultural inputs. Producer prices did not increase substantially during these years because since 1990s the government is reluctant to increase support prices and the prices in the international market were also declining.

Table 5

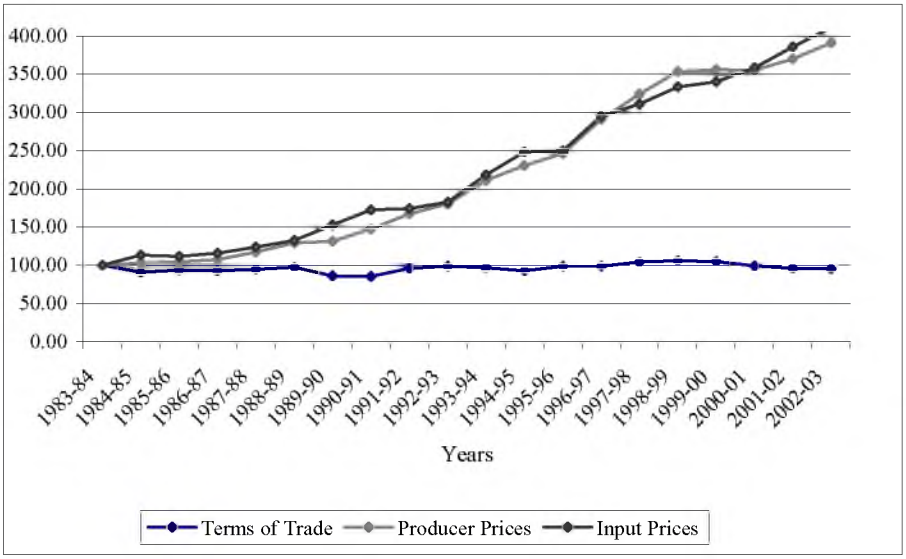
Domestic Terms of Trade (with Respect to Domestic Input Prices)

Period	Terms of Trade	Index of Producer Prices	Index of Input Prices
1983-84	**100.00**	**100.00**	**100.00**
1984-85	90.76	102.73	113.20
1985-86	93.50	104.35	111.61
1986-87	92.67	107.29	115.77
1987-88	94.69	117.17	123.74
1988-89	97.38	129.05	132.52
1989-90	85.96	131.22	152.64
1990-91	85.46	147.47	172.57
1991-92	95.94	166.99	174.06
1992-93	98.75	180.16	182.43
1993-94	96.68	210.89	218.14
1994-95	92.76	230.37	248.35
1995-96	98.52	245.90	249.59
1996-97	98.56	290.65	294.88
1997-98	104.16	323.83	310.90
1998-99	106.02	353.37	333.32
1999-00	104.62	355.74	340.02
2000-01	99.21	355.22	358.04
2001-02	95.85	369.76	385.79
2002-03	95.14	390.96	410.93

The results show that keeping productivity constant, the profitability in the crop sector has declined over the study period. The only exception is the period from 1997-98 to 1999-00 during which the profitability in the crop sector increased. The years of profitability coincide with the years of rising standard of living, which is evident from increasing domestic terms of trade with respect to consumer prices and increasing terms of trade with respect to input prices for the same period i.e. from 1997-98 to 1999-00. The terms of trade also show that the life is getting difficult for those small farmers who are depending solely on crop income.

Figure 4 further supports the argument. Gaps between the input and output indices cause the terms of trade (with respect to input prices) to fall below the base points of 100 in many years, and the terms of trade have gone above the base year for only three years (1997-00). Like the terms of trade with respect to consumer prices these terms of trade (with respect to input prices) have also not shown any significant or consistent movement away from the base year level.

Fig. 4. Domestic Terms of Trade with Respect to Input Prices.



(ii) Ratio of the International Crop Prices to the Prices of Major Agricultural Inputs they Buy Domestically

Through this index we are interested in investigating what would be the impact on farmers' profitability if the farmers buy the inputs domestically and sell their crops in the international market. The results (in Table 6) show that the terms of

trade for farmers have declined over the base year except for four years (1989-90, and 1995 to 1998). Even the exchange rate factor could not offset this decline, which means that If we assume to have a managed float the decline in the terms of trade for the year 2002-03 over the base year would be around 42 percent. Figure 5 clarifies that this is because the index of domestic prices of inputs has increased more than the index of international prices of output (see also Table 6.1).

Fig. 5. Terms of Trade Using International Prices w.r.t. Input Prices.

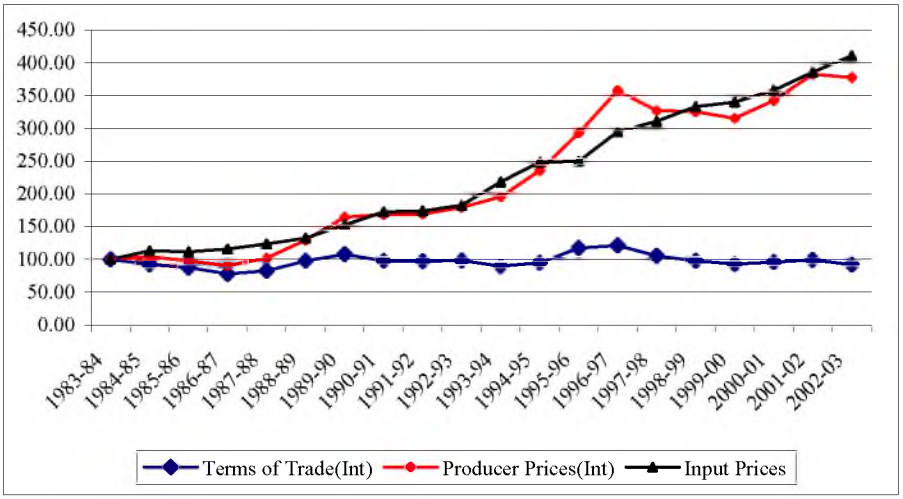


Table 6

Terms of Trade Using International Prices (w.r.t Domestic Input Prices)

Period	Terms of Trade	Period	Terms of Trade
1983-84	**100.00**	**1993-94**	**89.59**
1984-85	92.26	1994-95	94.81
1985-86	87.34	1995-96	117.33
1986-87	78.04	1996-97	121.25
1987-88	82.41	1997-98	105.20
1988-89	97.66	1998-99	97.65
1989-90	107.69	1999-00	92.79
1990-91	97.75	2000-01	95.67
1991-92	97.18	2001-02	99.16
1992-93	98.23	2002-03	91.94

Table 6.1

Indices of International Prices of Output and Domestic Input Prices

Period	Index of Producer Prices	Index of Input Prices	Period	Index of Producer Prices	Index of Input Prices
1983-84	**100.00**	**100.00**	**1993-94**	**195.42**	**218.14**
1984-85	104.43	113.20	1994-95	235.46	248.35
1985-86	97.48	111.61	1995-96	292.85	249.59
1986-87	90.35	115.77	1996-97	357.54	294.88
1987-88	101.97	123.74	1997-98	327.07	310.90
1988-89	129.42	132.52	1998-99	325.48	333.32
1989-90	164.38	152.64	1999-00	315.50	340.02
1990-91	168.68	172.57	2000-01	342.54	358.04
1991-92	169.15	174.06	2001-02	382.56	385.79
1992-93	179.20	182.43	2002-03	377.81	410.93

3. The Trends in Real Per Capita Rural Income

In order to confirm our results and to see the changes in the real income and standard of living of the farmers we have computed index of real per capita rural income based on all major and minor crops. To calculate this index, first of all we calculated real per capita crop income by dividing value added of all major and minor crops at constant prices by the rural population in each year. Then we calculated a simple index of the real per capita crop income, using the un-weighted average. The fact that this index is not weighted is a deficiency in this index. As this index was calculated just to have a basic idea about the direction of the real per capita rural incomes hence our results are not affected by this deficiency.

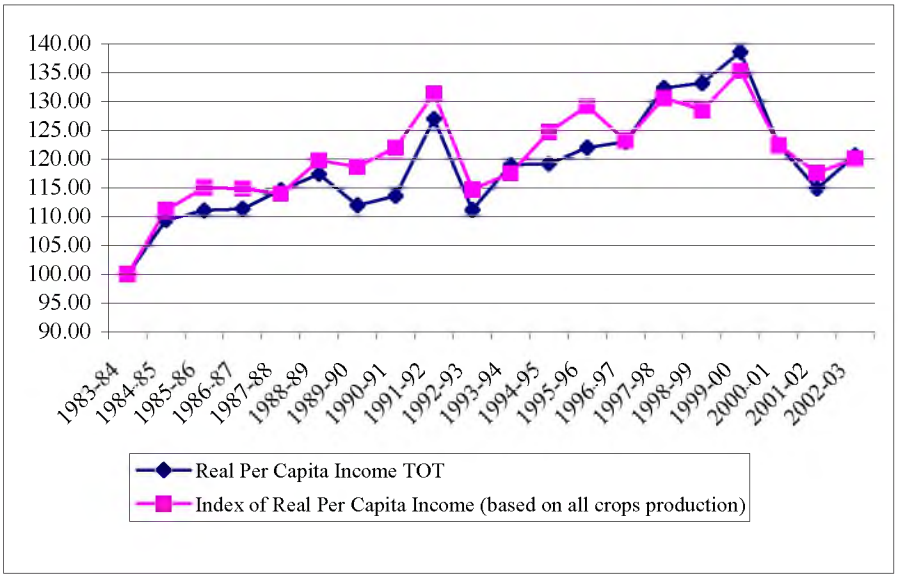
The results shown in Table 7 depict that rural per capita income has been increasing slowly over the years. There is a very high correlation between the real per capita income based on all major and minor crops and the real per capita income terms of trade based on domestic prices of the twenty commodities we have included in our analysis. This is shown by a comparison of Column 2 and 3 of Table 7, depicted in Figure 6.

Table 7

Real per Capita Income, Terms of Trade, and Real per Capita Rural Income

Period	Real per Capita Income Terms of Trade (Based on 20 Selected Commodities)	Index of Real per Capita Income (Based on all Crops Production)	Period	Real Per Capita Income Terms of Trade (Based on 20 Selected Commodities)	Index of Real per Capita Income (Based on all Crops Production)
1983-84	**100.00**	**100.00**	**1993-94**	**118.96**	**117.55**
1984-85	109.40	111.12	1994-95	119.22	124.72
1985-86	111.10	115.01	1995-96	121.99	129.24
1986-87	111.34	114.87	1996-97	123.00	123.23
1987-88	114.59	113.98	1997-98	132.38	130.66
1988-89	117.38	119.77	1998-99	133.21	128.54
1989-90	111.96	118.65	1999-00	138.61	135.36
1990-91	113.61	121.99	2000-01	122.46	122.38
1991-92	127.01	131.38	2001-02	114.85	117.60
1992-93	111.18	114.75	2002-03	120.64	120.10

Fig. 6. Real per Capita Income, Terms of Trade, and Index of Real per Capita Income.



5. CONCLUSION

In the wake of the WTO regime, the government of Pakistan is changing its policies regarding the agricultural subsidies and prices. Profitability in the crop sector and standards of living of the farmers have been affected by these policies.

Consumer prices over the twenty years period have increased more than the producer prices but there was not a very significant difference in these indices. The purchasing power of the farmers has relatively decreased and so they can buy fewer goods for their personal consumption. This shows that the standard of living of farmers who solely depend on crop/farm income has worsened. Although the terms of trade with respect to producer prices and consumer prices were not in favour of the farmers, the rise in production and larger sales volumes due to increase in productivity have let the farmers maintain their farm incomes. The real per capita farm incomes have shown a modest rise. There were some years during which real per capita rural income did not increase and even decreased.

If the farmers sell their products in the international market under unrestricted trade scenario (and assuming that the developed countries continue to provide agricultural subsidies to their farmers) then the farmers would face a further decline in their purchasing power and a deterioration in their living standards due to falling producer prices. The fall, however, would not be very significant if the Pakistan Rupee continues to depreciate. It is worth mentioning that, if the developed countries remove the agricultural subsidies they provide to their farmers, the prices in the international market would rise giving greater margins to Pakistani farmers. The consumer prices of agricultural commodities would then increase. The subsidies provided by the developed countries to their farmers have distorted the international prices and there is a continuous decline in international prices. The declining producer prices in the international market have also affected the profitability of the farmers. In the domestic market also the input prices have increased more than the output prices. Except for three years from 1997 to 2000, the domestic terms of trade with respect to input prices have remained below the base year. One of the main reasons of rising input prices is that the government has gradually removed the subsidies on the inputs. The profitability for the farmers has declined in the crop sector. This establishes a very strong argument that because of the declining profitability in the crop sector the farmers are now looking for other means of income, for instance livestock, to meet their consumption requirements. The rising domestic demand for livestock and the trend among farmers to adopt it as a second means of income has resulted in a significant increase in livestock value added.

Since, there is not any significant increase in real per capita rural income over the last two decades because of sluggish growth in crop prices, and the profitability in the sector has also not improved, the farmers depending only on crop income must have become victims of rising poverty. Although we have not established any direct link of terms of trade with poverty but it seems that the worsening terms of trade are

contributing to rising poverty. However, this must be kept in mind that these analysis cover only the crop sector and for a comprehensive analysis other sources of income shall also be considered.

If developed countries cut down their subsidies on agricultural products, the competitiveness of Pakistani agricultural products would improve and Pakistani farmers can fetch better prices for their products in the international market.

As far as the government policies regarding agricultural subsidies and prices are concerned it can be suggested that if the government reduces or removes the input subsidies it must increase the support prices or explore new avenues so that the farmers are not further marginalised.

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