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Intersectoral Terms of Trade for Pakistan's Economy: 1970-71 – 1981-82

SHAHNAZ KAZI*

The paper estimates intersectoral terms of trade for the period from 1970-71 to 1981-82. On the basis of these results the study further analyses the relationship between terms of trade and aggregate farm output over the period. The findings indicate some improvement in agriculture's terms of trade over the Seventies. However, no conclusive support is provided to the hypothesis of high supply responsiveness of aggregate farm output to shifts in the relative price ratio of sectoral output.

Changes in intersectoral terms of trade are among the most important determinants of the pace of growth and distribution in the economy. The pioneer work on the measurement of terms of trade for Pakistan was done by Lewis and Hussain [16] for the period from 1950-51 to 1964 which was later updated by Lewis [15] to 1970. Their estimates for Pakistan reveal a fall in agriculture's terms of trade till the mid-Fifties which was followed by an increasing trend that tapered off in the late Sixties. For the Seventies, Gotsch and Brown [10] further extended the series up to 1974-75 using Lewis's methodology which, as will be discussed later, does not utilize the most efficient method of estimating the terms-of-trade index, given the available data.

The main objective of this paper is to provide a new series of terms of trade between agriculture and non-agriculture for the period from 1970 to 1981-82 based on an improved methodology due to Thamarajikshi [37]. An attempt is also made to see to what extent the hypothesis of high supply responsiveness of farm output to changes in the sectoral price ratio is borne out by the experience of the agricultural sector in Pakistan.[1] The analysis that follows is divided into two sections. Estimates of intersectoral terms of trade are presented and analysed in the first section.

*The author is Senior Research Economist at the Pakistan Institute of Development Economics (PIDE), Islamabad. She is deeply indebted to Mr T. J. Byres for his invaluable advice. She is also grateful to Professor Syed Nawab Haider Naqvi, Director of PIDE, for his help in improving the exposition of the paper. Thanks are also due to Mohammad Sarwar for typing several drafts of this paper.

[1] The relationship between intersectoral terms of trade and agricultural growth has been the subject of considerable controversy in development literature [17; 18; 20; 25]. In the context of India, empirical evidence on the supply responsiveness of aggregate output to intersectoral terms of trade indicates that agricultural growth for the period from 1951 to 1975 was mainly determined by technological change with the terms-of-trade effect being marginal at best [13; 38].

The second section is concerned with tracing the implications of movements in terms of trade on the level and composition of farm output. The hypothesis of high supply response, as well as other factors influencing the terms of trade are discussed in the light of the new series we construct.

MOVEMENTS IN AGRICULTURE'S TERMS OF TRADE

It would be useful to provide a definition of the net barter terms of trade used in the present study. Net barter terms of trade is the ratio of the index of export prices of one sector to the index of prices of goods imported from the other sector.[2] This measure shows a favourable/unfavourable shift if the price level of exports has increased/decreased relative to the price level of imports. Improvement in the net barter terms of trade indicates an increase in the purchasing power of a unit of exports, which, in the absence of any dramatic change in efficiency in the two sectors or in the quantity and composition of traded goods, can be taken to imply a transfer of income from the importing to the exporting sector.

The series of net barter terms of trade between the agriculture and non-agriculture sectors, covering the period from 1970 to 1982, is presented in Table 1. The estimates are derived on the basis of a more rigorous method than that employed hitherto. Details of the methodology are presented in the Appendix.

The results reveal a mildly favourable shift in the index of agriculture's terms of trade from 103 in 1970-71 to 115.1 in 1981-82: trend growth rate of 0.5 percent is statistically significant. The composite price index of agricultural commodities increased at a rate of 12.3 percent over the period as compared to the growth rate of 11.7 percent in the case of the index of non-agricultural products (Table 2).

However, trends in growth rates hide the wide fluctuations in the terms-of-trade series which were especially marked in the early Seventies. The sharp movements in the terms of trade were due to a number of factors. The favourable shift in agriculture's terms of trade in 1972-73 was largely a result of the dramatic price increase in the export crops (rice, cotton) following the devaluation of the rupee in May 1972 and the inflation in international prices of primary commodities (see Tables A1 and A2). Prices of non-traded crops were unaffected – wheat prices increased by a mere 3 percent. Inflationary pressures in the economy reached a peak in 1973-74, prices of non-agricultural products increased by 38 percent over the previous year, while the corresponding figure for the agricultural sector was even

[2] For a discussion of various other concepts of terms of trade referred to in development and international trade literature, see Meier [19]; Kindleburger [12] and Viner [39].

Table 1

Agriculture's Terms of Trade
(Base = 1969-70)

Year	Terms of Trade
1970-71	103.4
1971-72	103.2
1972-73	110.6
1973-74	114.2
1974-75	103.3
1975-76	109.1
1976-77	110.1
1977-78	108.7
1978-79	112.7
1979-80	111.5
1980-81	109.1
1981-82	111.7

Table 2

Growth Rates of Indices

Indices	Growth Rate (%)
Agricultural Sector	
Prices received for Final Goods	12.5
Prices Received for Intermediate Goods	11.7
Prices Received for Final and Intermediate Goods	12.3
Non-agricultural Sector	
Prices Received for Final Goods	11.5
Prices Received for Intermediate Goods	12.9
Prices Received for Final and Intermediate Goods	11.7
Net Barter Terms of Trade	
Goods for Final and Intermediate use	.5

Note : Estimating trend equation is $Log\ Y = a + bt$. All values are significant at the 5-percent level.

As can be seen from Table 5 the first phase from 1951-52 to 1954-55 is marked by a decline in the prices of farm goods *vis-a-vis* non-agricultural goods. This is followed by a period of continuous improvement in the terms of trade in favour of agriculture from the mid-Fifties to 1967-68, tapering off till 1970-71. The final phase till the late Seventies is characterized by wide fluctuations in the series along a sharply increasing trend.

Annual growth rates for the price indices of agricultural and non-agricultural products and for net barter terms of trade for the period from 1958 to 1969 and from 1969-70 to 1978-79 as well as for the entire period are presented in Table 6. The results reveal a much higher level of price increase in the inflationary situation in the Seventies compared with the relative price stability of the Sixties. Although agriculture's net barter terms of trade registered a positive trend in both periods, the annual growth rate of 2 percent in the latter period was more than double the trend prevailing in the years from 1958 to 1969.

IMPLICATIONS OF SHIFTS IN TERMS OF TRADE FOR OUTPUT

In the absence of time-series data on marketable surplus, a rigorous test of the response of marketed surplus to changes in the terms of trade has not been possible for Pakistan's economy. However, cross-sectional studies by Khan and Chowdhury [11] and Raquibuzzaman [35], based on National Sample Survey data for 1959 and 1960 respectively have statistically tested the response of marketed output to various economic variables. The results of both studies indicate that the principal determinant of marketed surplus is total output. In each case, the elasticity of marketed surplus with respect to output was greater than unity, reflecting a strong positive association between the two variables.

Evidence on the responsiveness of output to prices is mainly limited to single crops [6; 7]. The findings show a positive supply response to changes in relative prices, the degree of output elasticity to price being greater for cash crops. However, these results cannot be generalized to indicate the response of aggregate output to the level of intersectoral terms of trade. Given the scarcity of land resources, improvement in productivity per acre is a prerequisite for an increase in overall farm output. Thus, although price incentives may induce a shift of acreage from one crop to another, they may be ineffective in raising aggregate output where productivity per acre is constrained at low levels owing to technological and organizational bottlenecks.

Despite these considerations, a number of studies on agricultural development in Pakistan assume a strong positive association between farm prices and sectoral output [32, pp. 273–280; 8, pp. 25-26; 16, pp. 415-416; 14, pp. 10-11]. The tendency to single out price incentives as the major catalyst for the expansion of agricultural output gained popularity in the Sixties when favourable movements in agriculture's terms of trade coincided with substantial improvements in farm productivity. Lewis [16, pp. 415-416] interpreted the positive association between prices and

Table 5

Intersectoral Terms of Trade 1951–1978
(3-year Moving Average)
Base = 1959-60

Years	Terms of Trade
1951–54	97.39
1952–55	91.14
1953–56	87.36
1954–57	91.41
1955–58	96.03
1956–59	98.76
1957–60	99.43
1958–61	103.13
1959–62	106.39
1960–63	108.28
1961–64	107.17
1962–65	109.15
1963–66	110.01
1964–67	112.10
1965–68	108.46
1966–69	106.55
1967–70	103.2
1968–71	104.0
1969–72	104.9
1970–73	109.8
1971–74	118.2
1972–75	121.8
1973–76	118.6
1974–77	115.5
1975–78	118.0

Source: 1951–54 to 1960–63 from Lewis and Hussain [16].
1961–64 to 1966–69 from Lewis [15].
1969-70 to 1977-78 calculated in this paper.
Weights were taken from Lewis and Hussain [16].
Data on price indices are taken from [30 for 1978-79].

Note: Further extension of the series up to 1981-82 was not possible as the CSO wholesale price index series with base 1959-60, used in the calculations, was discontinued after 1978-79. The new CSO wholesale price index with base 1969-70 was not comparable with the earlier series.

Table 6

Growth Rates of Indices Based on Lewis's Weights, 1958–1978 (3-year Moving Average) 1959-60 = 100

(Percentages)

Indices	1958–61 to 1975–78	1958–61 to 1966–69	1969-70 to 1975–78
Prices Received by Agriculture	12.0	2.4	14.6
Prices Received by Non-agriculture	8.04	1.7	12.3
Terms of Trade	4.19	0.9	2.0

Note: Estimating trend equation is $Log\ Y = a + bt$. All trend values presented in table are significant at the 5-percent level.

output during the period as an evidence of a causal link with higher prices leading to increased output. However, no mechanism was specified as to how price incentives led to a major breakthrough in aggregate output.

The results of the only attempt to estimate the relationship between terms-of-trade changes and aggregate farm-output for Pakistan's economy during the Sixties show that the effect of relative prices on output was statistically insignificant. However, the regression of output on the time variable, a proxy for technological change, was highly significant. On the basis of these results, the authors concluded that in Pakistan's case "the productivity of improved technology was sufficient to provide the incentive necessary for a respectable rate of growth" [10, p. 39].

Growth in tubewell irrigation has been found in many studies to have been the crucial precondition for the productivity gains realized in the Sixties.[4] Regular availability and seasonal flexibility of water supply made possible by tubewell irrigation set the stage for adoption of the HYV seed and fertilizer technology. The productive potential of tubewell technology was so great that the incentive effect of prices was marginal by comparison. Nulty [26] has estimated that a 20-percent fall in the prices of rice, maize, sugar-cane and wheat would reduce the advantage of a tubewell farm as compared with a non-tubewell farm from a 60 percent – 80 percent increase to a 50–70 percent increase.

[4] The importance of tubewell irrigation as a catalyst in the agricultural breakthrough in the Sixties was first pointed out in the empirical work by Ghulam Mohammad [21] on the spread and productivity potential of tubewells. Other economists who have emphasized the crucial role of tubewell as the leading input in the agricultural growth of the Sixties include Alavi [1], Burki [5] and Nulty [26], Bose and Clark [4].

To assess the relative roles of price and non-price factors, the following equation was estimated for the years from 1952-53 to 1978-79.

$$Q_t = \text{constant} + \underset{(0.04)}{0.46}\ P_{t-1} + \underset{(14.23)}{289.85}\ T^* + \underset{(5.075)}{14554.69}\ Z_t^*$$

$$R^2 = .98 \qquad [.005] \qquad [.92]$$

where

Q = Gross domestic product in agriculture at constant factor cost of 1959-60;

P_{t-1} = Terms of trade lagged by one year (Table 5);

T = Time trend; and

Z_t = Percent of cultivated area irrigated.

(Figures in parentheses are t-values of regression coefficients, figures in square brackets are elasticities at the means of variables and * marks coefficients significant at the 1-percent level).

The estimated function shows that whereas both the trend variable and the irrigation ratio have a significant positive effect or farm output, the coefficient of the price variable is statistically insignificant. The findings conform to the results of a similar empirical study by Gotsch and Brown [10] for the Sixties, whereby the growth in farm output was primarily determined by non-price factors.

However, there was a major change in the sources of increase in output for the period from 1970 to 1982 as compared with the preceding decade from 1959-60 to 1969-70. In the Sixties, especially in their latter half, technological progress in the form of seed, fertilizer and tubewell irrigation led to production growth through higher yields.[5] In the later period improvements in the level of farm production, which were concentrated in the years from 1978 to 1982 (Table 7), were mainly due to increases in cropped acreage (Table 8) made possible by greater water availability due to favourable weather conditions and did not represent any significant upward movement in yields. With the exception of wheat and a mildly rising trend in rice and maize, output per acre for the rest of the foodgrains, pulses, oilseeds and other cash crops such as cotton and sugar-cane, etc., was stagnant or declining (Table 9).

The deceleration in productivity growth was mainly due to the fact that the momentum of the technological breakthrough in the Sixties could not be sustained. Under the initial impetus of the tubwell-HYV-fertilizer technology, quick and easy gains in productivity were possible without any modification of the institutional

[5]Gotsch has estimated that as much as 74 percent of the increase in output in the Third Plan period (1965–1970) was due to the yield effect as compared with only 7 percent attributed to the area effect [9, p. 360].

Table 7

Indices of Agricultural Production, 1971-72 – 1981-82[a]
(1959-60 = 100)

Crops	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Food Crops	*170*	*181*	*190*	*183*	*207*	*212*	*208*	*238*	*245*	*254*	*260*
Rice	221	233	246	230	262	275	296	328	323	314	335
Wheat	176	190	195	196	224	229	212	254	275	294	281
Barley	74	78	101	99	93	88	86	93	85	126	–
Jowar (Sorghum)	134	130	162	114	121	112	121	108	107	99	–
Bajra (Millet)	109	92	107	82	93	94	97	97	84	65	–
Maize	142	143	155	151	162	154	166	161	177	191	–
Gram	84	91	101	88	97	105	100	100	51	63	–
Non-food Crops	*169*	*163*	*188*	*171*	*193*	*224*	*223*	*212*	*210*	*236*	*250*
Sugar-cane	189	189	226	201	240	277	282	261	258	303	343
Rape and Mustard	113	119	121	103	112	124	98	117	104	106	–
Sesamum	175	125	150	100	150	150	163	238	238	225	–
Tobacco	143	103	108	126	95	120	121	111	128	110	–
Cotton	243	241	226	218	176	149	197	162	250	245	257
All Crops	**183**	**188**	**196**	**187**	**199**	**203**	**209**	**219**	**239**	**249**	**258**

Source: Ministry of Planning and Development.

[a]Fiscal year ending June 30, 1982. Data are provisional.

Table 8

Indices of Acreage under Cultivation, 1971-72 – 1981-82
(1971-72 = 100)

Crops	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Food Crops										
Rice	102	104	110	117	120	130	139	140	133	135
Wheat	103	105	100	105	110	110	115	119	120	120
Barley	105	131	124	119	111	106	113	102	166	114
Jowar (Sorghum)	99	116	88	94	88	102	92	83	78	83
Bajra (Millet)	81	97	72	82	85	84	87	74	53	84
Maize	102	100	97	98	99	104	103	111	118	113
Gram	105	115	103	111	114	114	130	117	87	96
Non-food Crops										
Sugar-cane	97	117	122	127	143	149	136	130	149	167
Rape and Mustard	94	95	80	83	92	73	76	72	74	75
Sesamum	71	79	54	68	73	76	110	111	106	105
Tobacco	87	92	107	89	100	105	94	98	85	–
Cotton	103	94	104	95	95	94	97	106	108	110
Total Cropped Acreage	**102**	**110**	**105**	**109**	**110**	**111**	**115**	**116**	**116**	**119**
Total Irrigated Acreage	101	105	103	105	106	110	111	113	115	118

Source: Ministry of Food, Agriculture and Cooperatives.

Table 9

Yield per acre of Agricultural Crops, 1971-72 – 1981-82[a]

(maunds per acre)

Item	1969-70	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Foodgrains Cereals	*16.5*	*16.8*	*17.1*	*17.6*	*15.6*	*16.6*	*17.0*	*16.8*	*17.5*	*17.1*	*17.5*	*18.4*
Rice	16.5	16.8	17.1	17.6	15.6	16.6	17.0	16.8	17.5	17.1	17.5	18.4
Wheat	–	12.9	13.5	13.5	14.3	15.4	15.5	14.3	16.1	17.0	17.8	18.1
Bajra (Millet)	5.2	5.1	5.4	5.2	5.3	5.4	5.2	5.4	5.2	5.4	5.7	–
Jowar (Sorghum)	6.3	6.7	6.5	7.0	6.5	6.4	6.3	5.9	5.8	6.4	6.3	–
Maize	11.1	12.1	11.9	13.1	13.2	14.0	13.3	13.6	13.3	13.5	13.8	13.8
Barley	6.7	7.1	7.2	7.4	7.7	7.6	7.7	7.9	7.9	8.0	7.4	–
Pulses												
Gram	6.0	5.7	5.9	6.0	6.0	6.1	6.4	6.1	4.8	3.0	4.3	3.2
Mash	5.3	5.0	5.2	5.4	5.4	5.6	5.5	5.5	5.6	5.6	5.4	–
Masoor	3.6	3.8	3.7	3.8	3.9	4.2	4.2	4.1	4.0	4.7	4.8	–
Mung	5.0	5.4	5.2	5.1	5.0	5.2	5.0	5.1	4.9	5.2	5.2	–
Other Pulses	–	4.8	5.0	4.8	4.8	4.8	4.8	4.9	4.9	5.1	5.0	–
Oilseeds												
Rape and Mustard	5.8	5.8	5.8	5.9	6.0	6.2	6.2	6.2	6.2	6.5	6.6	–
Sesamum	3.2	3.6	3.7	4.0	3.8	4.2	4.3	4.5	4.5	4.5	4.4	–
Cottonseed	6.7	7.8	7.6	7.7	6.8	6.0	5.1	6.8	5.4	7.6	7.3	–
Groundnuts	15.4	15.0	15.7	15.4	15.3	15.4	15.4	15.4	13.7	13.3	13.3	–
Cash Crops												
Cotton (Lint)	3.3	3.9	3.8	3.9	3.4	3.0	2.5	3.4	2.7	3.8	3.5	3.8
Sugar-cane	461.1	391.8	405.5	401.7	342.2	395.9	406.3	396.4	393.6	415.1	425.4	428.7
Tobacco	20.5	18.6	15.5	15.4	15.4	14.0	16.1	15.1	15.4	17.0	16.9	–

Source: Ministry of Food, Agriculture and Cooperatives.

[a]Fiscal year ending June 30.

environment. However, while making rapid gains possible in the short run, the "green revolution" of the Sixties did not set the foundation of sustained growth in the farm sector owing to its limited impact. Firstly, the use of new high-yielding seed variety was confined to the major crops of wheat and rice. A similar technological breakthough had not materialized for other major crops or inferior cereals. Furthermore, in the case of rice, there was little progress in the spread of area under new varieties in the Seventies because of the demand for traditional varieties of the crop. Secondly, since supplementary irrigation was a prerequisite of the adoption of the new seed-technology, its benefits were limited to farms with access to tubewells. In Pakistan, where tubewells are concentrated on large farms of 25 acres or more, this meant that the benefits of the technological development of the Sixties were limited to a small proportion of the farming population.[6] Finally, the irrigation infrastructure was badly in need of rehabilitation. Public investment had been mainly concentrated on large water-projects while maintenance of the existing irrigation system had been neglected. Due to the deterioration of canals and water-course commands, more than half of the gross inflow of water into the irrigation system was lost through seepages with negative repercussions on crop yields [10; 34].

Instead of directly tackling these techno-organizational constraints on production through investment in qualitative improvements in irrigation and the agricultural research infrastructure, government policy in the Seventies continued to place primary reliance on price incentives, in the form of higher procurement prices and input subsidies, to raise the level of farm productivity [33].

Statistics on fertilizer subsidies and expenditure on agricultural research for Pakistan and some other Asian countries (Table 10) leave little doubt about the importance assigned to price incentives as a means of encouraging fertilizer use and thereby raising farm productivity. However, fertilizer use is a function not only of its price but also of technological developments. Long-term strategies, such as investment in agricultural research, can lead to technological innovations, which, as in the case of high-yielding seed, greatly increase productivity and make complementary increases in fertilizer use very profitable. Table 10 clearly illustrates the fact that in Pakistan public policy, instead of seeking a balance between price incentives and non-price measures for promoting growth in agriculture, has tended to rely disproportionately on price incentives.

[6]The *Farm Mechanization Survey* of 1968 shows that nearly 70 percent of the tubewells were owned by farmers with farms of 25 acres or more [28].

Table 10

Fertilizer Subsidy, Agricultural Research Expenditure in Selected Countries: 1969–1975

Countries	Subsidy on Fertilizer (Million $)	Agricultural Research Expenditure (Million $)	Subsidy as % of Agricultural Research Expenditure
Afghanistan	15.10	0.63	2397
Bangladesh	14.63	1.40	1045
Indonesia	71.90	3.42	2102
Iran	36.08	16.66	217
South Korea	27.26	2.44	1117
Pakistan	20.97	1.26	1664
Philippines	36.77	7.96	462
Sri Lanka	5.25	2.44	215

Source: M. S. Mudahar [22].

CONCLUSIONS

The results of the study show that agriculture's terms of trade for the period from 1970-71 to 1981-82 were characterized by fluctuations around a trend of .5 percent. The findings further indicate that non-price factors were the major determinants of growth in farm output for the period from 1951-52 to 1978-79 with the terms-of-trade effect being relatively insignificant.

However, the sources of increases in output for the earlier period from 1959-60 to 1969-70 were quite different from those for the later period from 1970-71 to 1981-82. In the Sixties, especially in the latter half, the combination of HYV seeds, fertilizers and tubewell irrigation led to production growth through intensive cultivation rather than through an increase in crop acreage. This is in contrast with the later period when the gains in output were largely a result of increased acreage due to favourable weather conditions rather than to higher yields.

The failure to sustain productivity growth in the farm sector cannot be attributed to an unfavourable change in the price environment. The terms-of-trade index, although marked by fluctuations, did not shift to the disadvantage of the farm sector. In this context, the inability to raise the level of productivity underlines the importance of structural impediments to expansion of agricultural production. A

firm foundation to the process of sustained growth in the farm sector requires investment in qualitative improvement in input use (especially water supply), an effective research and extension programme, and a thorough reform of the agrarian structure. The latter is essential to ensure a broad based participation in the productive potential of technological change. These non-price factors have been largely neglected by policy-makers in Pakistan who have preferred the easier option of relying on increased quantities of inputs and price incentives for achieving the objective of development of the agricultural sector.

APPENDIX

The main problem in the construction of a terms-of-trade index is related to the choice of appropriate prices and weights. Ideally, all major items traded between sectors should be included in the index. Prices used should reflect the prices received and prices paid by the agriculturist for the sale of his products and the purchase of non-agricultural commodities, respectively. Furthermore, the price of each commodity should be weighted by the quantities bought from or sold to the non-agricultural sector.

Data on intersectoral transactions are not available for Pakistan's economy. Therefore, weights have to be computed by some indirect method Lewis derived the value of intersectoral sales and purchases by estimating the total availability of various commodities and then apportioning it between the agricultural and non-agricultural sectors on the basis of certain assumptions about the consumption pattern of the two sectors. The net availability of each commodity was calculated by adding the value of imports to the value of domestic supply less than the value of exports. Alternative sets of weights were derived on the basis of different assumptions about consumption behaviour of the population of the two sectors (these include equal per capita expenditure in the sector; 10 percent, 25 percent and 40 percent less per capita expenditure on non-agricultural consumption goods in the rural sector). Similarly, for manufactured intermediate and investment goods a smaller per capita share was assigned to the agricultural sector but the exact proportions were not specified.

Apart from the fact that the value of intersectoral sales and purchases was based on arbitrary assumptions, the accuracy of Lewis's weighting scheme was further reduced by the inclusion of commodities in the index which did not enter in the trade between sectors. All commodities produced in the large-scale manufacturing sector were incorporated in the composite index of non-agricultural items. Weights were assigned to items like basic metals, non-metallic minerals which were hardly likely to feature in the purchases of farmers from the non-agricultural sector. The weight of machinery except electrical was greater than the combined share of tea, sugar and edible oils, while the share of basic metals in the weighting scheme was larger than that of sugar (see Table A3). Furthermore, commodities purchased from the non-agricultural sector but not produced by large-scale industry, such as expenditure on electricity and gas, were excluded.

Information available on per capita consumption expenditure in the rural and urban sectors makes it possible to estimate more accurate weights by employing an alternative methodology used by Thamarajikshi [37] in her study on sectoral prices in India. Using this method, an attempt is made to generate a time-series of net barter terms of trade for the period from 1969-70 to 1981-82.

Construction of weights for consumption goods by this method entails the following steps:

1. The *Household Income and Expenditure Survey* [29] published by Central Statistical Office (CSO) gives the pattern of monthly consumption expenditure per household for both urban and rural areas classified by major items of food, clothing, footwear, fuel and lighting and other miscellaneous expenditure. The sub-division of these items into agricultural and non-agricultural commodities is as follows:

Agricultural[1] *Products*	*Non-Agricultural Products*
1. Foodgrains	1. Edible Oils
2. Pulses	2. Condiments and spices
3. Milk and milk products	3. Sugar and sugar products
4. Meat and fish	4. Tobacco and chewing products
5. Poultry	5. Tea
6. Vegetables	6. Clothing and footwear
7. Firewood	7. Gas and electricity

2. The next step is to derive total expenditure on purchases and sales of various commodities by the agricultural and non-agricultural sectors by using sectoral population data to blow up per capita expenditure on individual items.

Thamarajikshi in her study assumed that the rural pattern of consumption applied to the agricultural population and the less organized sub-sectors of the non-agricultural sector (viz. forestry, fishery, small enterprises and construction), whereas the urban pattern applied to the rest of the non-agricultural sector. Mundle [23] has derived a simple method which does away with the need to rely on assumption about consumption patterns to estimate expenditure on agricultural and non-agricultural goods by the agricultural and non-agricultural populations. He simply decomposes the rural and urban populations into their agricultural and non-agricultural components. Hence, the value of sales of individual agricultural products to the non-agricultural population is obtained by multiplying the per capita expenditure on each item in the rural and urban areas by the rural non-agricultural population and urban non-agricultural population respectively and summing the totals. A similar procedure is applied to derive the value of purchases of non-agricultural products by the agricultural sector.

For Pakistan, although information is not available on the division of population by different economic categories, the *Labour Force*

[1] The agricultural sector is defined to include crop rearing, fishing, livestock and forestry.

Survey published by the CSO provides data on self-supporting persons in various economic categories as a proportion of the rural and urban totals. This information can be used to estimate agricultural and non-agricultural populations in the two sectors on the assumption that population is distributed in different economic categories in the same ratio as self-supporting persons. Estimates of urban and rural populations for 1969-70 have been taken from [40].

3. Usually household-survey totals, when blown up, are less than the national accounts total of private consumption expenditure [27, p. 16]. The estimate of total private consumption expenditure, based on survey data, is 82 percent of the national income estimates of the corresponding figure. The lower value of consumption estimates may be partly due to the inadequate representation of the higher income groups in the sample.[2] Furthermore, the national accounts consumption figure also includes consumptions of various non-profit organizations, such as religious institutions, private schools, private hospitals, co-operatives, etc.

   To adjust the discrepancy in the two estimates, the ratio of expenditure on individual items to the total consumer expenditure based on survey data is applied to the consumption expenditure given by the National Income statistics.[3]

4. Imports are deducted from the adjusted estimates to derive final values to be used as weights. Following the approach adopted by Thamarajikshi, imports of non-agricultural commodities are assumed to be divided between the two sectors in proportion to their share in total consumption whereas agricultural commodities for final use are assumed to be imported only for the consumption of the non-agricultural sector. Detailed data on imports by commodities were available from the *Monthly Statistical Bulletin* published by the CSO [30].

With respect to agricultural commodities for intermediate use it is assumed that the entire value of production is purchased by non-agricultural sector. No allowance has been made for seeds and wastage. Exports are not deducted on the assumption that agricultural raw material exported goes to the non-agricultural sector. Data on

[2] This inadequacy of the survey data has been pointed out by Azfar [2, p. 47] and Naseem [24, p. 120].

[3] Here it should be mentioned that in the national accounts figures private consumption expenditure is not an independent estimate but is derived as a residual of NNP at factor cost after making adjustment for all other flows and hence includes an indeterminate statistical discrepancy.

the value of production of agricultural intermediate products are provided in the *National Income Accounts* published by the CSO [31]. This publication also provides information on the value of non-agricultural intermediate inputs used by agriculture, such as fertilizers, pesticides, water, etc. Data on electricity and diesel oil used for farm production is given in the *Energy Year Book 1979* [32].

The index was assigned base-year weights in accordance with the Laspeyres formula. Base-year weights were considered appropriate as the period of time was short enough to rule out the likelihood of any major shifts in the composition of sectoral trade. The choice of 1969-70 as base year was guided by several considerations. Firstly, it was a relatively normal year in a period characterized by wide fluctuations in prices. Prices had stabilized after sharp increases in the drought years of 1966-67 and 1967-68, while 1970-71 was characterized by somewhat lower prices owing to the record-breaking harvest of the preceding year. Finally, a new series of wholesale price index numbers was provided by the CSO with 1969-70 as base period which had a wider coverage and a more detailed classification of commodities.

Wholesale prices were used in the construction of terms-of-trade indices. More appropriate prices would have been harvest prices at which the farmer sells his product and retail prices which he pays for purchases from the non-agricultural sector. However, in the case of Pakistan, the harvest prices used by the Central Statistical Office are a fixed proportion of wholesale prices and are not an independent measure. Wholesale prices are also believed to be more reliable than retail prices, since fewer outlets are involved.

Table A1

Annual Percentage Change in the Price Indices of Various Agricultural Commodities 1971-72 – 1981-82

(Percentages)

Year	Wheat	Rice	Cotton	Sugar-cane	Tobacco
1971-72	14	5	9.2	1	9.3
1972-73	3	50	21	32	1
1973-74	24	25	45	15	16.4
1974-75	54	15	−12	12	89
1975-76	−2.6	10	20	21	2
1976-77	−1.7	13	28	−2	8.8
1977-78	14.7	14	14.8	.1	9.4
1978-79	10	9	21	–	11.7
1979-80	4	6	−11	16	12
1980-81	1	12	8	25	4
1981-82	18	13	6	8	−3

	Milk	Meat	Vegetable	Jowar (Sorghum)	Bajra (Millet)
1971-72	4	2	−24	24	23
1972-73	20	11	2	22	44
1973-74	41	40	221	9	12
1974-75	29	37	−51	81	118
1975-76	13	13	13	12	.4
1976-77	17	10	52	−1	−19
1977-78	1	7.4	−7	−5.4	20
1978-79	−4	2.8	5	7	53
1979-80	4	12	10	29	38
1980-81	5	16	3	20	21
1981-82	15	5	40	7	−15

Source: [30].

Table A2

Annual Percentage Change in the Price Indices of various Non-agricultural Commodities 1971-72 – 1981-82

(Percentages)

	Vegetable Ghee	Salt and Spices	Sugar	Cigarettes	Tea
1971-72	1	8	–3	13.5	2
1972-73	–.4	–1	32	3	25
1973-74	25	30	40	11	3
1974-75	31	113	24	58	8
1975-76	14	–21	11	17	–.8
1976-77	1	32	–	9	2
1977-78	–.7	7	–	14	75
1978-79	3	2	–	12	–
1979-80	7	–14	8	13	–
1980-81	–	2	30	15	–
1981-82	–	41	17	5	–

	Cotton Textiles	Foot-wear	Kerosene Oil	Fertilizer
1971-72	4	4 5	19	–12
1972-73	7.7	8	–1	–22
1973-74	64	16	27	34
1974-75	16	40	35	41
1975-76	5	8	12	5
1976-77	17	8	5	–10
1977-78	9	17	1	–1
1978-79	–1	4	17	–5
1979-80	5	30	56	12
1980-81	2	9	42	25
1981-82	9	3	4	2

Source: [30].
Note: – Means no change in price index.

Table A3

Weights: Non-agricultural and Agricultural Commodities

Commodities	Lewis's Weights	Alternative Weights Derived in this Study
Non-agricultural Commodities		
Sugar	.018	.13
Edible Oil	.014	.005
Vegetable Ghee	–	.07
Tea	.05	.052
Salts and Spices	.012	.083
Beverages	.006	–
Tobacco	.038	.04
Cotton textiles	.25	.36
Silk and Art silk	.034	–
Footwear	.017	.115
Wood and Furniture	.003	–
Printing and Publishing	.017	–
Soap and Perfume	.024	–
Matches	.009	.01
Jute Textile	.023	–
Paper Manufacturing	.08	–
Leather	.001	–
Rubber Products	.01	–
Fertilizers	.146	.04
Medicine	.038	–
Petrol and Coal	.045	.034
Non Metallic Minerals	.012	–
Basic Metal	.02	–
Metal Products	.01	–
Machinery except Electrical	.08	–
Electrical Machinery	.014	–
Transport Equipment	.02	–
Charcoal	–	.0004
Gas	–	.0003
Electricity (Final use)	–	.008
Electricity (Intermediate use)	–	.023
Diesel Oil (Intermediate use)	–	.03
Agricultural Commodities		
Wheat	.228	.22
Rice	.083	.04
Other Cereals	.021	.01
Gram	.04	.01
Other Pulses	–	.02
Milk	.137	.12
Ghee	.07	.056
Meat	.02	.056
Fish	–	.005
Chicken	–	.005
Eggs	–	.005
Vegetables	.011	.055
Oilseeds	.03	.027
Cotton	.16	.153
Sugar-cane	.13	.13
Tobacco	.04	.04
Wool	.014	–
Hide and Skin	.014	–
Firewood	–	.048

Source: Lewis's weights are taken from Lewis [15] and Lewis and Hussain [16].

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