

Are the Terms of Trade in Cotton Production Favourable to the Indian Farmers?

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Abstract

This study analyses the changes in Terms of Trade (TOT) in cotton production in major cotton growing states of India during the period 1996-97 to 2010-11. The results revealed that during the initial years of analysis TOT was in favour of the cotton producers, but during the later period it turned against them due to unfavourable price terms. Though the quantity terms were favourable, they showed declining trend during last three years. TOT should be made favourable through improving price received by the cotton farmers and controlling the input prices. Similarly cotton productivity should be improved through proper technological as well as policy interventions to make the terms favourable to the cotton producers.

Keywords: cotton production, Price terms of trade, Quantity terms of trade, Net terms of trade, Laspeyres indices.

In India there is a feeling among the cotton farmers that the cotton prices have not maintained its parity with input prices over time and the prices received does not cover production costs. It was argued that the strong inflationary pressures have resulted in rapid increase in the prices paid by the cotton farmers for purchasing inputs in cotton production.

The concept of terms of trade (TOT) has been developed as an analytical tool to study the international trade between two countries in the comparative cost theory. Over a period of time, several researchers have evolved different concepts and used the analysis for different purposes. The relationship between agriculture and industry has been a long debated issue in India. Indian economy has undergone a structural change in its sectoral composition over the years which generated interest in studying the inter-relationship between agriculture and industry. Most of the studies conducted in India followed “two-sector” framework and considered agriculture as one sector (Thamarajakshi, (1969, 1977, 1994, 2000); Kahlon and Tyagi 1980; Tyagi 1987; Mungekar 1993; Deb 2006). attempts were made in India

to workout parity indices between prices received and prices paid at the level of individual crops during 1950s and 1960s (Poduval and Sen 1958; Mathur 1958; Randhawa 1959; Thingalaya 1966). We won't find any study concentrating on single crop in the recent past. As the cotton is one of the important commercial crop and has strong linkage with industrial sector, prices related to cotton production would influence overall employment and economic development of the country. The standard of living of lakhs of cotton farmers will also be influenced by these changes.

The aim of this paper is to present an evidence of changes in inter sectoral terms of trade in cotton production for the period 1996-97 to 2010-11. The analysis of output input prices in cotton production provide evidence whether cotton farmers are at an advantageous position or not.

Methodology

Source of the data is cost of cultivation / production estimates of Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Government of India. State wise data on cost of cultivation / production of cotton in nine cotton growing states for the period 1996-97 to 2010-11 were obtained from the official website of the Directorate (http://eands.dacnet.nic.in/Cost_of_Cultivation.htm). The data of Madhya Pradesh for the year 1996-97 was not available hence 1997-98 was considered as base for this state. Weighted average of these indices was worked out across the states for getting the country level indices by taking the cotton area in each state as its weight. Three types of terms of trade indices were calculated using Laspeyres formula taking as 1996-97 as a base year.

Price Terms of Trade (Price TOT): This is basically an index of prices received and price paid by the cotton farmers in the production of cotton. As there is only one produce i.e seed cotton , prices of seed cotton were consider as prices received by the farmers. For calculating the prices paid, nine inputs viz. Hired human labour, Hired machine Labour, Hired animal labour, Fertilizer, Manure, Seed, Insecticides, Irrigation and Land rent were considered. Share of each input in total cost (of these nine inputs) was used as the weight for calculating the index. Price TOT was worked out as given below

$$TOT(P) = PI_Y / PI_X$$

$$PI_Y = P_{yt} / P_{yo}$$

$$PI_X = \sum W_{io} \times (P_{it} / P_{io}) \times 100$$

Where,

TOT(P) = Price terms of trade index

PI_Y = Index of output Price

PI_X = Index of input prices

P_{yt} = Price of output in the year t

P_{yo} = Price of output in the base year

W_{io} = Share of input i in total cost in base year

P_{it} = Price of input i in the year t

P_{io} = Price of input i in the base year

Quantity Terms of Trade (Quantity TOT): Price TOT mentioned above reflects the changes in the profitability only based on the prices. The changes in profitability will also be affected by the changes in the productivity that is input-output relation. To account for these changes Quantity TOT was worked out by using the quantities of the above mentioned nine inputs and one output. As the quantities of insecticides and irrigation were not available in the data, an index of quantities was obtained by using price indices of insecticides and electricity for Agriculture. Quantity for the land was considered as 1 ha as all other inputs were per ha basis. Quantity TOT was worked out as below.

$$TOT(Q) = QI_Y / QI_X$$

$$QI_Y = Q_{yt} / Q_{y0}$$

$$QI_X = \sum W_{io} \times (Q_{it} / Q_{io}) \times 100$$

Where,

$TOT(Q)$ = Quantity terms of trade index

QI_Y = Index of output quantity

QI_X = Index of input quantities

Q_{yt} = Quantity of output in the year t

Q_{y0} = Quantity of output in the base year

w_{io} = Share of input i in total cost in base year

Q_{it} = Quantity of input i in the year t

Q_{io} = Quantity of input i in the base year

Net Terms of Trade (Net TOT): To incorporate both the effects of changes in prices as well as quantities Net TOT was worked out by multiplying price TOT index with quantity TOT index. This will give the net effect on the produce of cotton. This was worked out with the following formula.

$$\text{Net TOT} = \text{Price TOT} \times \text{Quantity TOT}$$

Results and Discussion

Price TOT: The results clearly indicated that the price terms showed a mixed trend (Table 1). At national level Price TOT was in favour of cotton producers up to 2000-2001 as it was above 100 in these 5 years. From 2001-2002 it remained below 100 and showed a declining trend indicating that the price terms are against the cotton producers. This shows that cotton prices failed to maintain pace at which input prices increased.

If we examine the Price TOT in individual states, it is clear that from 2004-05 in all the states it was

below the base year and showed decreasing trend except in Rajasthan. In Punjab and Karnataka price terms remained favourable to the cotton farmers during 1996-97 to 2003-04. During these entire years price TOT index remained above base year level. After 2003-04 it started declining in both the stated

Table 1. Price terms of trade in cotton production in India during 1996-97 to 2010-11

Year	Punjab	Haryana	Rajasthan	Maharashtra	Gujarat	Madhya Pradesh	Andhra Pradesh	Karnataka	Tamil Nadu	India
1996-97	100	100	100	100	100	NA	100	100	100	100
1997-98	147	130	222	NA	103	100	110	149	103	130
1998-99	151	131	174	NA	99	104	121	113	104	122
1999-00	106	86	141	94	99	107	130	112	78	104
2000-01	108	97	58	101	129	184	115	142	99	113
2001-02	104	154	61	83	92	109	100	100	83	95
2002-03	105	112	165	83	98	46	84	147	79	94
2003-04	107	103	94	87	83	78	77	143	77	89
2004-05	64	73	159	69	58	33	77	88	66	71
2005-06	45	81	122	68	52	25	87	93	67	67
2006-07	42	70	113	63	61	32	68	80	66	62
2007-08	38	57	91	62	63	31	65	67	80	60
2008-09	40	50	128	59	50	28	73	65	41	57
2009-10	36	42	81	58	52	34	77	72	70	57
2010-11	49	57	57	64	60	41	89	72	76	65

and remained below the base year during the entire remaining period. In Madhya Pradesh and Andhra Pradesh, price TOT remained above the base year up to the year 2001-02 only. During this period output prices maintained its pace with the input prices in these states. But after 2001-02 output prices failed to maintain acceleration with the input prices and the TOT index fall below the base year and remained below 100 during the entire remaining period. The decline in Andhra Pradesh was more when compared with the other states. In Maharashtra, Gujarat and Tamil Nadu price TOT started declining much earlier when compared with other states. In these states decline began after the year 2001-02 and remained below the base level in the entire remaining period. The only state which showed some better performance in favour of cotton farmers regarding the price TOT was Rajasthan. In this state, price TOT showed mixed trend and remained fluctuating from year to year. During the period of analysis TOT remained above the base year for 9 times and below the base year for 6 times. If we observe the price TOT index during the last two years, in no state it was above the base level. From this analysis it is clear that the price terms are against the cotton farmers in all the states of India.

Quantity TOT: Quantity terms were certainly in favour of cotton farmers through there was a setback in the initial years (Table 2). At country level quantity terms index remained below the base year till 2001-02. From 2002-03 it started increasing and remained above base year level throughout the remaining period. It is clear that due to the technological advancement cotton output increased more rapidly than

Table 2. Quantity terms of trade in cotton production in India during 1996-97 to 2010-11

Year	Punjab	Haryana	Rajasthan	Maharashtra	Gujarat	Madhya Pradesh	Andhra Pradesh	Karnataka	Tamil Nadu	India
1996-97	100	100	100	100	100	0	100	100	100	100
1997-98	51	61	73	0	111	100	98	71	99	86
1998-99	48	69	74	0	112	94	90	76	97	87
1999-00	77	64	75	102	81	87	81	58	114	87
2000-01	98	115	150	79	48	69	103	60	105	82
2001-02	70	26	83	96	75	78	111	75	143	85
2002-03	80	101	53	107	94	96	147	90	131	103
2003-04	101	101	91	128	145	101	159	77	130	126
2004-05	165	137	102	128	152	105	141	109	122	134
2005-06	189	96	115	129	163	188	108	80	109	136
2006-07	204	119	138	148	148	138	162	107	159	149
2007-08	196	149	132	156	148	179	182	152	141	160
2008-09	209	146	102	156	144	224	146	118	199	156
2009-10	187	138	148	153	145	215	152	133	162	154
2010-11	155	124	172	138	154	241	123	148	166	148

the increase in the quantity of inputs after 2002-03. Though it remained above base year level, during the last three years it showed a declining trend which causes much concern. But this increase was not sustained after 2007-08. This decreasing trend at national level is caused due to the decline in quantity TOT in the states of Punjab, Haryana, Maharashtra, Andhra Pradesh and Tamil Nadu. If this declining trend continues with in four years this may come below the base year level. Hence proper measures need to be taken to boost the cotton productivity in these states.

If we examine the state level quantity TOT indices, after 2003-04 in most of the states quantity TOT were in favour of the cotton farmers. Farmers of Tamil Nadu faced positive quantity TOT during most of the years (13 out of 15 years) followed by the cotton farmers of Andhra Pradesh (12 out of 15 years), Gujarat (11 out of 15 years) and Maharashtra (11 out of 13 years). Farmers of Karnataka state faced a minimum number of favourable quantity terms (7 out of 15 years) during the period of analysis.

Net TOT: Net TOT depicts the combined effect of changes in both prices as well as quantities. During the period of analysis, most of the period cotton farmers of India faced unfavourable net TOT (Table 1). The net TOT index was below the base year level in 11 years out of 15 years. Though there was a slight decreasing trend in the net TOT, it remained fluctuating from year to year. This was mainly due to favourable quantity terms which succeeded to contain unfavourable price terms to some extent. Not only for cotton, entire agriculture as a sector also characterized by periodical shifts in intersectoral terms of trade in favour and against agriculture (Rajesh 2012). Commission for Agricultural Costs and Prices (CACP) also observed that the Index of Terms of Trade of agriculture sector (ITT) deteriorated steadily from 1997-98 to 2000-01 and recovering thereafter (CACP). Cotton farmers of AP faced favourable Net TOT during the entire period except in 2005-06. Cotton farmers of Rajasthan experienced favourable net terms in 10 years out of 15 years, while Tamil Nadu farmers experienced favourable terms for 9 years. Cotton farmers of Maharashtra were worst affected by unfavourable terms of trade. Out of 13 years they experience favourable terms only in two years, while in remaining 11 years the terms were against them. In the terminal year TOT index in three states, Andhra Pradesh, Karnataka and Tamil Nadu was above the base year level due to improved price TOT as well as quantity TOT. This analysis clearly indicates that cotton production is not in better terms when compared to 1996-97. Hence there is a felt need to address this issue to make the cotton production terms in favour of the producers. All the three terms of trade at country level are depicted in figure 1. From the figure it is clear that price terms and quantity terms tries to balance each other. Whenever price terms are against, quantity terms

Table 3. Net terms of trade in cotton production in India during 1996-97 to 2010-11

Year	Punjab	Haryana	Rajasthan	Maharashtra	Gujarat	Madhya Pradesh	Andhra Pradesh	Karnataka	Tamil Nadu	India
1996-97	100	100	100	100	100	NA	100	100	100	100
1997-98	75	80	161	NA	114	100	107	106	102	107
1998-99	73	91	129	NA	110	97	108	86	101	103
1999-00	82	55	106	96	80	93	105	65	89	89
2000-01	106	111	87	80	62	126	119	86	104	89
2001-02	73	41	51	80	69	85	111	75	119	78
2002-03	83	113	88	90	92	45	123	132	103	94
2003-04	109	104	85	112	120	79	123	111	100	110
2004-05	105	101	162	88	87	34	109	96	81	93
2005-06	84	77	139	88	85	47	94	75	73	86
2006-07	85	83	156	92	91	44	110	85	106	92

2007-08	75	85	121	97	93	55	117	102	112	95
2008-09	84	73	130	91	72	63	106	77	82	86
2009-10	68	58	119	88	75	74	117	96	113	87
2010-11	75	71	99	89	92	99	110	106	126	94

remain in favour of cotton farmers vice versa. This is one of the reasons for the sustainability of cotton production in India. Still unfavourable effect of price terms is more predominant making net terms to remain unfavourable most of the period.

Table 4. Required yield and price level to bring the TOT to base year level

State	Punjab	Haryana	Rajasthan	Maharashtra	Gujarat	Madhya Pradesh	Andhra Pradesh	Karnataka	Tamil Nadu	Country Average
Current yield (2010-11) (kg/ha)	19.3	16.3	21.6	14.4	22	14.4	14.9	12.1	19.9	16.8
Required yield (kg/ha)	25.6	23.1	21.8	16.2	23.8	14.5	TOT above the base year level			18.2
Current price (2010-11) received by the farmers (Rs./q)										4342
Required price (Rs./q)										4696



Figure 1. Terms of trade in cotton production in India

What is to be done?

Various price and non price factors influence TOT to shift in favour and against agriculture. It is necessary to maintain the TOT favourable to the cotton producers to sustain the cotton production of the country as well as to improve the welfare of the cotton producers. As the price terms are against the cotton farmers, the rise in input prices should be brought under control or output prices may be supported to bring parity. Similarly productivity should be improved and sustained by widespread adoption of improved technologies or devising new technologies to boost the productivity to offset the negative price terms. The level of output at current input and price levels as well as level of output price at current productivity level which brings the TOT to the base year level in different states were worked out and presented in table 4. The current productivity at national level should be increased to 18.2 q/ha from the current level of 16.8 q/ha to bring the TOT to the level of base year. Similarly output price should be increased to ₹ 4696 per q. The issues limiting the productivity in the states of Punjab, Haryana, Maharashtra, Andhra Pradesh and Tamil Nadu should be addressed as the quantity terms in these states are showing declining trend.

Conclusion

From the above analysis it is clear that price terms are against the cotton producers and quantity terms are in favour of them when compared with the base year 1996-97. Favourable quantity terms failed to offset the negative price terms and net terms became unfavourable. Though the quantity terms are above the base year level, they showed a declining trend during the terminal period. This trend needs to be reversed through proper technological as well as policy interventions.

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