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Economic analysis of input output prices, their parity and income from cotton in Maharashtra

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ABSTRACT : The cost price relationship of different commodities affects the relative profitability and economic incentives to produce. In planned development, when certain objectives and targets of production of different commodities is to be achieved, one of the function of the price policy is to maintain the parity in costs, prices and income of different commodities so that the producers of various crops are not at undue advantage or disadvantageous position. The study reveals that the parity indices between FHP and input prices were not favorable to the cotton growers. This indicated relatively lower increase in farm harvest prices of cotton as compared to rise in the prices of inputs used by the farmers in its production. It implies that level of harvest prices of cotton crop not sufficient to cover the increased prices of inputs during most of the study year. The study has concluded that ,there increase of 18.86 per cent in minimum support prices of cotton during 1996-1997 to 2013-2014 is not enough to cover 136.54 per cent increase in the inputs prices at constant prices. Therefore, it is recommended that there is need to maintain the parity between minimum support prices and input prices or there is need to give adequate compensation through intensives to the producers so as to safeguard the interest of cotton grower in Maharashtra.

Key words : Cotton, input output prices, parity

The relative levels of costs, prices and income of agricultural commodities influence the allocation of production resources and ultimately the level and pattern of agricultural production. The cost price relationship of different commodities affects the relative profitability and economic incentives to produce. In planned development, when certain objectives and targets of production of different commodities is to be achieved, one of the function of the price policy is to maintain the parity in costs, prices and income of different commodities so that the producers of various crops are not at undue advantage or disadvantageous position.

India is the largest producer of cotton in the world accounting for about 26 per cent of the world cotton production. It has the distinction of having the largest area under cotton cultivation in the world ranging between 10.9 million ha to 12.8 million ha and constituting about 38 to 41 per cent of the world area under cotton cultivation (http://www.Cotton Advisory Board). Maharashtra is the largest producer and produces 29.78 per cent of the total cotton production of India. Maharashtra is a traditional producer of cotton. The lava soil of deccan plateau is world renowned for cotton production and is popularly known as the black cotton soil. The total area under cotton in the Maharashtra was 38.27 lakh ha with production of 75 lakh bales and the average productivity 333 kg/ha during the year 2015-2016 (CCI 2015-2016).

Over 80 per cent of the production comes from Khandesh, Vidarbha and Marathwada regions comprising the districts of Yavatmal, Nanded, Amravati, Parbhani, Wardha, Jalgaon, Akola, Buldhana, Nagpur, Dhule, etc.

There has been a lot of controversy about the costs and prices of agricultural commodities. Doubts have been expressed that the prices of agricultural commodities fixed by the Government are not in harmony with increase in the cost of production, which has been rising at a very high rate due to increase in the inputs prices. Among the different crops, the major producing states have often accused the price policy in favour of their major produced crops. The producers have always been alleging that the increase in the prices of their produce were not in proportion to increase in the input prices. A sound price policy is one that ensures remunerative prices to the producers and also reasonable prices to the consumers and which reduces the regional imbalances in agricultural income by maintaining parity between costs, prices and income of different agricultural commodities. Maharashtra is a state where there are no adequate marketable surpluses of food grains. But, state has large number of cash or commercial crops which enter into marketing system. Hence, their costs and prices are of vital importance to all the concerned. In view, it was decided to take up parity studies on input output prices and income from cotton in Maharashtra. Thus, the focused objectives of this study are:

- Changes in input output prices and income from cotton
- Evaluate the parity in the costs, prices and income cotton

MATERIALS AND METHODS

The study is based on the time series data on cost of production and input output prices of cotton, collected under the Comprehensive Scheme in Maharashtra (CACP Reports and Directorate of Economics and Statistics website) for the period of 18 years *i.e.* from 1996-1997 to 2013-2014. The Simple Index Numbers (SIN) of input-output prices and income were computed by considering 1996-1997 as a base year. The parity between input costs, output prices and income of cotton were judged by using the computed indices.

i) The parity indices between output prices of cotton and inputs as a whole were obtained for each crop separately by using the following formulae.

$$RPIjt = \frac{FHPIjt}{AIPit} X\ 100$$

Where,

RPIjt = Parity index between prices of inputs and output of j^{th} crop in t^{th} year

FHPIjt = Index of farm harvest prices for j^{th} crop in t^{th} year and

AIPjt = Index of average inputs prices of j^{th} crop in t^{th} year

ii)The parity indices between output prices and per quintal cost of production of cotton were worked out as under,

$$RCIjt = \frac{FHPIjt}{CPIjt} X\ 100$$

Where,

RCIjt = Parity index between output prices and per quintal cost of production of j^{th} crop in t^{th} year

FHPIjt = Index of farm harvest prices for j^{th} crop in t^{th} year and

CPIjt = Index of per quintal cost of production for j^{th} crop in t^{th} year

RESULTS AND DISCUSSION

Prices of agricultural inputs : The decision of farmers about allocation of resources are guided more by the prices of variable inputs, particularly of the inputs like human, bullock and machine labour, seeds, manures, fertilizers, irrigation and plant protection, etc. and it would be of an important to examine the changes in the prices of these inputs used in the production of cotton and these changes are judged by working out the price indices of each input and average of all inputs for the period from 1996-1997 to 2013-2014 at current as well as constant prices. Thus, the price indices have been worked out to know the fluctuations, if any during the period of 18 years. The prices of all the inputs used for cotton is presented in Table 1.

The prices of major inputs of cotton crop have increased by 136.54 per cent during the period from 1996-1997 to 2013-2014 at constant prices (Table 1). The maximum increase in index number was noticed for irrigation. This may be attributed due to increase in irrigated area under cotton. The maximum increase was noticed in seed, showing more than two times raise at constant prices, followed by bullock labour, manure and machine labour showing an increase of 259.77, 198.94, 156.78 and 149.63 per cent, respectively during the period. The input prices of all the resources used in cotton production showed a continuous rising trend with few exceptions *viz.,* 12.17 per cent during 2005-2006.Though, the indices of input prices showed it increased by 136.54 per cent at constant prices (Kumbhar and Deshmukh, 2013).

Cost of production : The per quintal cost of production of cotton during the period of 18 years *i.e.* from 1996-1997 to 2013-2014 along with their indices at constant prices revealed that the indices of /quintal cost of production at current prices for cotton had considerably increased during the period of 18 years (Table 2).The indices of /quintal cost of production of cotton had shown an increase of 6.87 per cent during the period under study. In real sense *i.e.* at constant prices, increase in indices of /quintal cost of production were noticed in cotton except the 1998-1999 and 2007-2008. It may be largely due to decline in productivity of this crop. The highest increase in the indices of /quintal cost of production of cotton was noticed during the year 2012-2013. The decline in the cost of production indices of cotton is due to introduction of *Bt* cotton cultivation in the recent years. However, no specific trend was observed in the cost of production indices.

Growth in prices of cotton : Minimum Support Price (MSP) is a form of market intervention by the Government of India to insure agricultural producers against any sharp fall in farm prices. The minimum support prices are announced by the Government of India at

Table1. Indices of input prices used in the production of cotton in Maharashtra

Item Year	Human labour (‘. /Man. h)	Animal labour (‘. /Man. h)	Machine labour (‘. /Man. h)	Seed (‘. /Man. h)	Manure (‘. /Man. h)	Fertilizer (‘. /Man. h)	Plant protection (‘. /Man. h)	Irrigation charges (‘. /Man. h)	**Average**
At Constant prices									
1996-1997	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.53	**100.00**
1997-1998	105.71	120.28	106.66	106.16	81.39	86.30	83.15	125.30	**101.07**
1998-1999	99.81	117.66	100.94	100.57	88.83	80.69	76.65	167.01	**95.48**
1999-2000	98.33	130.06	118.73	120.97	114.01	88.56	73.50	225.12	**106.51**
2000-2001	90.11	114.21	130.34	70.54	123.81	82.84	67.77	397.96	**88.02**
2001-2002	85.53	194.48	112.30	70.86	124.43	81.55	68.55	497.29	**86.71**
2002-2003	82.65	229.45	133.83	78.53	130.96	77.30	65.66	785.56	**93.49**
2003-2004	81.02	200.32	117.80	111.01	139.77	72.07	60.70	646.02	**99.94**
2004-2005	73.96	224.04	127.48	150.51	106.06	69.37	56.55	719.72	**113.45**
2005-2006	73.25	227.57	157.58	98.76	146.11	67.41	54.49	283.59	**100.54**
2006-2007	74.69	203.43	138.53	152.53	144.00	62.42	52.20	134.37	**114.94**
2007-2008	83.69	191.64	174.13	170.80	121.85	58.28	59.71	818.21	**130.85**
2008-2009	97.50	247.14	141.56	341.72	118.07	60.82	63.11	951.93	**189.93**
2009-2010	127.45	244.08	136.28	319.03	152.87	62.16	74.92	813.91	**187.02**
2010-2011	180.53	237.65	189.05	313.01	137.77	62.02	76.79	651.56	**194.81**
2011-2012	207.46	242.02	227.29	438.40	158.54	73.44	91.54	846.21	**255.45**
2012-2013	219.39	288.77	238.40	404.52	216.57	103.29	90.72	1014.09	**249.08**
2013-2014	225.95	298.94	249.63	359.77	256.78	106.08	89.75	1091.63	**236.54**

the beginning of the sowing season for certain crops on the basis of the recommendations of the Commission for Agricultural Costs and Prices (CACP).The major objectives are to support the farmers from distress sales and to procure food grains for public distribution. The Minimum Support Prices of cotton announced by the Government and Farm Harvest Prices (FHP) along with their indices from 1996-1997 to 2013-2014 are given in Table 3. The constant price indices of the procurement prices of cotton had shown an increase of 18.86 per cent only during the above mentioned period.

The farm harvest prices of cotton have increased by 7.79 per cent at constant prices during 1996-1997 to 2013-2014. While comparing, the increase in prices of cotton both at MSP and FHP in the light of an increase in average prices of major agricultural inputs shows that the increase in prices of inputs are much higher than the increase in output prices of cotton during the period of 18 years. Index number of cotton at constant farm harvest prices did not show any specific trend. The index number of cotton at constant farm harvest prices was maximum in 2010-2011.

Parity in prices and income : These changes do not give true picture of the level of relative profitability. Thus, in order to examine the impact of changes in input prices on profitability, parity indices between farm harvest prices to average input prices, farm harvest prices to cost of production and income to cost of

Table 2. Cost of production and indices of cotton

Year	Cost of production (‘./ q)	Indices of cost of production at constant prices
1996-1997	1703.69	100.00
1997-1998	1852.00	101.91
1998-1999	1765.00	89.01
1999-2000	2093.82	100.67
2000-2001	2495.71	108.93
2001-2002	2425.07	100.84
2002-2003	2630.96	104.54
2003-2004	2367.7	87.64
2004-2005	2360.24	80.47
2005-2006	2365.13	76.31
2006-2007	2257.13	68.09
2007-2008	2211.55	63.08
2008-2009	2793.42	78.76
2009-2010	2938.83	81.38
2010-2011	3975.88	105.33
2011-2012	4383.56	111.64
2012-2013	4532.3	111.84
2013-2014	4440.13	106.87

Source: Directorate of economics and statistics

production of cotton are presented in Table 4.

The parity indices between FHP’s and average input prices of cotton were less than 100 in cotton during 18 years of study period. This indicated relatively lower increase in farm harvest prices of cotton as compared to rise in the prices of inputs used by the farmers in its production. It implies that level of harvest prices of cotton crop not sufficient to cover the increased prices of inputs during most of study year (Murthy *etal.*2015).

The parity ratio of FHP to cost of production of cotton crop was favorable during 2009-2010 and 2010-2011. In the remaining years, ratio was not favorable *i.e.* it was less than 100. It is inferred from the parity ratio that increase in farm harvest price is less than its cost of production.

The parity indices of gross income at MSP to /q cost of production for cotton (2006-2007 to

Table 3. Minimum support prices and farm harvest prices and indices of MSP and FHP of cotton

Year	Minimum support price (‘./q)	Indices at constant prices	Farm harvest prices (‘./q)	Indices at constant prices
1996-1997	1380	100	1742.21	100
1997-1998	1530	103.94	1080.5	58.14
1998-1999	1650	102.73	1511	74.52
1999-2000	1775	105.36	2018.31	94.9
2000-2001	1825	98.34	1998.05	85.28
2001-2002	1875	96.25	1807.73	73.51
2002-2003	1875	91.98	2032.79	78.99
2003-2004	1925	87.97	2420.01	87.6
2004-005	1960	82.5	1919.29	63.99
2005-2006	1980	78.86	1900.55	59.96
2006-2007	1990	74.11	1940.46	57.24
2007-2008	2030	71.48	2178.63	60.77
2008-2009	3000	104.43	2730.45	75.29
2009-2010	3000	102.56	3013.99	81.61
2010-2011	3000	98.11	4353.12	112.77
2011-2012	3300	103.76	3993.09	99.45
2012-2013	3900	118.81	4056.44	97.88
2013-2014	4000	118.86	4579.58	107.79

Source: Directorate of economics and statistics

Table 4. Parity indices between farm harvest prices to input prices, farm harvest price to cost of production and income to cost of production of cotton in Maharashtra (At constant prices)

Year	Parity index between		
	FHP and input prices	FHP and cost	Gross income and cost
1996-1997	100.00	100.00	100.00
1997-1998	56.70	57.05	32.79
1998-1999	74.27	83.72	68.24
1999-2000	83.14	94.26	97.00
2000-2001	77.40	78.29	63.14
200120-02	63.19	72.90	73.17
2002-2003	55.14	75.56	85.53
2003-2004	63.26	99.95	125.2
2004-2005	41.14	79.52	102.31
2005-2006	53.45	78.58	98.17
2006-2007	50.41	84.07	114.15
2007-2008	34.83	96.33	150.22
2008-2009	31.76	95.58	160.06
2009-2010	36.66	100.29	172.69
2010-2011	51.84	107.07	200.66
2011-2012	35.53	89.08	177.64
2012-2013	34.14	87.52	193.88
2013-2014	38.26	100.86	234.94

2013-2014) were greater than 100, this indicates, over the period of time, the gross income of cotton increased at a higher rate as compared to /q cost of production. In the remaining years, ratio was not favorable *i.e.* it was less than 100, this indicates that over the period of time, the /q cost of production increased at a higher rate as compared to the gross returns of cotton and thereby adversely affecting the level of profitability.

Growth rates of input and output prices : The rates of compound growth in average input prices, cost of production, output prices and income (both at MSP and FHP) for cotton were computed and depicted in Table 5.

Table 5 Compound growth rates of input and output prices

(1996-1997 to 2013-2014)	
Particulars	Cotton (CGR%)
Average input cost	12.79***
Cost of production	5.30***
Minimum support prices MSP)	5.86***
Farm harvest prices (FHP)	6.79***
Gross income at MSP	13.25***
Gross income at FHP	14.20***

*** - indicates significance at 1 per cent level.

It is observed that, for the entire period (1996-1997 to 2013-2014) the average input costs of cotton, has significantly increased at the rate of 12.79 per cent/annum and thereby the costs of production of cotton have significantly increased at the rate of 5.30 per cent/annum.

The output prices of cotton at MSP and FHP were also increased significantly at the rate of 5.86 per cent and 6.79 per cent/annum, respectively (Murthy *et al.,* 2015). The gross income at MSP of cotton have increased at the rate of 13.25 per cent/annum significantly, while at FHP it increased significantly by 14.20 per cent/annum (Singh and Kumar, 2002).The rates of compound growth of prices of output at MSP and FHP were higher than input prices.

Above results have clearly indicated that, compound growth rates of average input cost, minimum support prices, farm harvest prices, cost of production, gross income at MSP and gross income at FHP of all crops were positive and highly significant .

SUMMERY AND CONCLUSIONS

The indices at constant prices of major inputs for cotton had shown tremendous increase during the period under consideration. The parity

indices between FHP and input prices were not favourable to the cotton growers. This indicated relatively lower increase in farm harvest prices of cotton as compared to rise in the prices of inputs used by the farmers in its production. It implies that level of harvest prices of cotton crop not sufficient to cover the increased prices of inputs during most of the study year. Compound growth rates (CGR) of input prices were more than the prices of output at MSP and FHP. However, the rate of growth in FHP is higher than MSP.

The study has concluded that ,there increase of 18.86 per cent in minimum support prices of cotton during 1996-1997 to 2013-2014 is not enough to cover 181.71 per cent increase in the inputs prices at constant prices. Therefore, it is recommended that there is need to maintain the parity between minimum support prices and input prices or there is need to give adequate compensation through intensives to the producers so as to safeguard the interest of cotton grower in Maharashtra.

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