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Assessment of Domestic Terms of Trade on Oilseed Crops Supply and Demand by Parity Index in Rajasthan: An Analysis

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

In this paper, the terms of trade between the input and output prices of selected major oilseeds i.e. groundnut, rapeseed & mustard and soybean have been estimated for selected districts of Rajasthan for the period 1996-97 to 2015-16. The indices of terms of trade for groundnut has shown mixed trend whereas for rapeseed & mustard trend remained favourable from 1996-97 to 2010-11. The ratio of index of procurement prices to index of input prices for rapeseed & mustard was more than one during this period reached to as high as of 165 in 2003-04 over the base of 100 in 1996-97. Like rapeseed & mustard, terms of trade for soybean cultivation in Baran was found favourable for about a decade (1996-97 to 2008-09) and afterward had shown mixed trend of ups and downs. The decline in indices can be attributed to relatively higher rate of increase in prices of inputs than of output prices. Based on the study it was suggested to conduct regular studies for better understanding the trend in prices of farm inputs and outputs that will help in revising the existing policies with confidence. To remove the disparity between 'prices received and paid', concerted efforts should be made to maintain the parity, which will help farmers in buying inputs and other items of household consumption.

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1. INTRODUCTION

The state price support schemes have tremendous effects on the allocation of resources and distribution of income within agriculture sector as well as in other non-agriculture sectors [1]. There has been uncertain trend in prices of agricultural commodities in India. The role of price support system is very important in bringing desired change in production of agricultural commodities in the economies which required planned development (Koshta et al. 1990). The price support system also needed in time and space despite transformation of complete restructured form of planned economic development into action-oriented agenda framework. In the reform process, infrastructure of villages markets is getting improved along with their integration with national markets. Government of India is planning of linking national markets with major international markets as well. Initially, agriculture was considered as a way of life rather than a commercial venture. With the increasing adoption of new technology, uses of purchased inputs increased substantially. Now the agricultural production in country has become market oriented and marketable gluts of some agricultural commodities are very common in the country, and agriculture in Rajasthan is also not an exception to this change [2]. Changes in relative prices of different commodities influence the farmers' decision to allocate area under a particular crop which in turn would affect the level of production of different crop enterprises. The farmers' decision to grow crop in a season too is influenced by a number of complex group of factors such as family consumption needs, weather condition, level of technology and resources requirement of crop to be grow. Further, agricultural production decision of an average farmer is influenced by many factors like weather, irrigation facilities and availability of chemical fertilizers and quality seeds, particularly when he produces in part or in whole for getting better price of his produce. Any agricultural policy analysis needs to be done around the factors or the problems influencing the agricultural production. The important decisions usually taken by farmers in agricultural production include: what to produce? How much to produce? The policy instruments and other factors that influence farmer decisions in acreage allocation for various crops to be grown must be understood properly to devise a sound successful agricultural policy. The decisions of supply in agriculture are made based on the knowledge of technical coefficients, price of inputs and outputs. Among the major policies for farm sector, agriculture price policy is one of the instruments that has helped farmers and brought a noticeable change in production and productivity of agriculture sector. In the distorted and unregulated market conditions prevailing for agricultural commodities in India, support prices are very crucial for farmers to get assured income from their crop cultivation.

Agricultural price policy is aimed at intervening in agricultural produce markets to influence the level of fluctuations in prices which spread from farm gate to the retail level. The price support scheme linked to procurement has served the country well in the past decades [3]. In the price support system analysis of Parity Index (Terms of trade) are very important to arrive at a judicial market oriented policy for a particular agricultural commodity. In Rajasthan, oilseeds play an important role in the economy of farmers. The state produced around 5.71 million ton oilseeds and is ranked second next to Madhya Pradesh during 2017-18.Two main issues have been widely discussed about domestic terms of trade which affect supply and demand of agriculture sector [4]. Both the issues (i) whether the terms of trade have moved against or in favour of agricultural sector? and (ii) whether changes in terms of trade have affected the rate of growth of Indian agriculture have been debated at length? Hence, in the present study the terms of trade between the input and output prices of selected major oilseeds, i.e. groundnut, rapeseed & mustard and soybean have been estimated for selected districts of Rajasthan for the period 1996-97 to 2015-16.

2. RESEARCH METHODOLOGY

2.1 Selection of Crops

The major oilseed crops like groundnut, rapeseed & mustard and soybean were selected for the study because price policy revolves around these crops in Rajasthan. These crops are covered under the minimum support price (MSP) scheme and floor prices are announced regularly by the Government of India before sowing of crops. Further, these crops are major crops in terms of area under cultivation. In the state, one Tehsil each from Bikaner, Alwar and

Baran were selected for the present study in which groundnut, rapeseed & mustard and soybean are the principal crops of these districts, respectively. Two villages from each *Tehsil* were chosen randomly, using chit method. Fifteen farmers from each village were selected randomly, making a total of thirty farmers from each selected Tehsil of a district, making a total of 90 cultivators. Thus, 90 cultivators were personally contacted with the help of pre-tested survey schedule to collect the required field data. The present study has employed both primary and secondary data to achieve the stated objectives of the study.

2.2 Terms of Trade Between Input and Output Prices

To study the terms of trades between input and output prices of major oilseeds for the selected districts of Rajasthan, the composite input price index was constructed by giving the weights to the individual selected inputs in the total cost structure calculated under the cost of cultivation scheme and the index of farm harvest prices / procurement prices received by the farmers by taking 2005-06 as base year.

(a) Index of input prices

To work out the indices of input prices, actual prices paid by the farmers for all important agricultural inputs *viz.,* preparatory tillage, sowing, seed, fertilizer, irrigation, weeding, harvesting, threshing, interest on working capital, transportation charges, management charges, risk factor and rental value of land as used in the production of selected crops were considered. The input price indices were estimated for oilseeds crops by using weighted average of price relatives as given below [5]:

$$Itj = \frac{\sum_{i=1}^{n} \frac{P_{ti}}{P_{0i}} \times w_i}{\sum_{u=1}^{n} w_i}$$

$$Itj = \frac{\frac{P_{ti}}{P_{01}} \times W_1 + \frac{P_{t2}}{P_{02}} \times W_2 + \ldots\ldots\ldots\ldots \frac{P_{tn}}{P_{0n}} \times W_n}{W_1 + W_2 + \ldots\ldots\ldots\ldots\ldots + W_n}$$

Where,

I_{tj} = Price index of j_{th} crop (groundnut, rapeseed & mustard and soybean)

P_{ti} = Price of i_{th} item of input in year 't'

n = Number of inputs used

P_{oi} = Price of i_{th} item of input in the base year

W_i = Weight of i_{th} item of output in the base year

Weights are used as the percentage contribution of individual input to the total cost of that in the base year.

(b) Index of output prices

For working out indices of output prices (farm harvest prices/ procurement prices) actually received by the farmers, simple method of price index [5] was used as given below for the period 2005-06- 2016-17 as base year price.

$$O_{tj} = \frac{P_{tj}}{P_{oj}} \times 100$$

Where,

O_{tj} = Output price index of j_{th} crop in period 't'

P_{oj} = Price of j_{th} crop in the base year

P_{tj} = Price of j_{th} crop in the year 't'

(c) Terms of Trade (Parity Index)

Finally, to study the terms of trade (parity) between input and output prices, the indices of output prices received by farmers were divided by the indices of input prices paid by them [5]. It is expressed as below:

Terms of Trade (Parity Index) =

$$(\text{Parity Index}) = \frac{\text{Output Price Index}}{\text{Input Price Index}} \text{ X } 100$$

$$= \frac{O_{tj}}{I_{tj}} \times 100$$

Where,

O_{tj} = Output price index of j_{th} crop in period 't'

I_{tj} = Price index of j_{th} crop in period 't'

3. RESULTS AND DISCUSSION

An analysis of procurement / farm harvest prices and input prices paid by the farmers for major

oilseed crops of groundnut, rapeseed & mustard and soybean in Alwar, Bikaner and Baran, respectively have been estimated in order to study the terms of trade between the input and output prices (Table 1-3). A comparison of increase in procurement / farm harvest prices of selected crops with that of their input prices index were made to examine their impact on the selected districts, farmers in particular and farmers of selected district, in general. To examine the terms of trade, an index of the ratio of index of procurement/ farm harvest prices to composite input price index of the input prices use by the farmers in production of groundnut, rapeseed & mustard and soybean was used. Analysis shows mixed trend in terms of trade for these crops, except rapeseed & mustard, in selected district of Rajasthan during the period 1996-97 to 2015-16. The terms of trade for groundnut were positive in recent years, it may be attributed to price and farmers having assured irrigation in Bikaner started growing groundnut in past few years. Thus, over time the cultivation of selected crops is becoming less and less profitable.

The indices of terms of trade for groundnut has shown mixed trend. However, in majority of years of study period, input price indexes were higher than that of output price index. The terms of trade for rapeseed & mustard were favourable till 2010-11 from 1996-97, as the ratio of index of procurement prices to index of input prices were more than one, and the index reached to as high as of 165 in 2003-04 over the base of 100 in 1996-97. From 2011-12 afterwards, the terms of trade for the crop remained unfavourable in the state. Like rapeseed & mustard, terms of trade for soybean cultivation in Baran was found favourable for about a decade (1996-97 to 2008-09) and afterward had shown mixed trend of ups and downs. The decline in indices can be attributed to relatively higher rate of increase in prices of inputs than of output prices.

To improve the terms of trade in favour of agricultural crops in selected districts in particular and Rajasthan state in general, along with adoption of improved technology efforts should be made to provide quality inputs to farmers at affordable price and right time.

Table 1. Terms of trade (Parity index) of groundnut in Bikaner district of Rajasthan

Year	Procurement price index	Farm harvest price index	Composite input price index	Index of the ratio of procurement price to the composite input price index	Index of the ratio of farm harvest price to the composite input price index
1996-97	100.00	100.00	100.00	100.00	100.00
1997-98	102.00	102.10	105.91	96.30	96.40
1998-99	104.00	103.50	108.68	95.70	95.23
1999-00	115.50	94.76	186.86	61.81	50.71
2000-01	122.00	90.91	265.05	46.03	34.30
2001-02	134.00	88.67	89.34	150.00	99.26
2002-03	135.50	101.33	182.38	74.30	55.56
2003-04	140.00	110.21	99.29	141.00	111.00
2004-05	150.00	112.24	182.75	82.08	61.42
2005-06	152.00	108.74	143.37	106.02	75.85
2006-07	152.00	140.70	158.12	96.13	88.98
2007-08	155.00	167.41	172.89	89.65	96.83
2008-09	210.00	145.03	226.22	92.83	64.11
2009-10	210.00	194.41	314.79	66.71	61.76
2010-11	230.00	168.81	229.37	100.28	73.60
2011-12	270.00	209.72	362.64	74.45	57.83
2012-13	370.00	339.79	606.81	60.97	56.00
2013-14	400.00	183.43	344.48	116.12	53.25
2014-15	400.00	251.68	402.89	99.28	62.47
2015-16	403.00	269.16	209.12	192.71	128.71

Table 2. Terms of trade (Parity index) of rapeseed and mustard in Alwar district of Rajasthan

Year	Procurement price index	Farm harvest price index	Composite input price index	Index of the ratio of procurement price to the composite input price index	Index of the ratio of farm harvest price to the composite input price index
1996-97	100.00	100.00	100.00	100.00	100.00
1997-98	105.56	103.33	146.91	71.85	70.34
1998-99	111.11	104.58	104.39	106.44	100.18
1999-00	122.22	99.50	118.65	103.01	83.86
2000-01	133.33	94.42	126.32	105.55	74.74
2001-02	144.44	102.42	115.80	124.73	88.44
2002-03	147.78	141.92	138.58	106.64	102.41
2003-04	177.78	146.75	107.92	164.72	135.97
2004-05	188.89	129.58	126.80	148.97	102.19
2005-06	190.56	121.50	135.23	140.92	89.85
2006-07	190.56	144.33	154.32	123.48	93.53
2007-08	200.00	216.08	174.54	114.59	123.80
2008-09	230.33	184.75	186.79	108.85	98.91
2009-10	230.33	186.75	182.97	111.13	102.06
2010-11	205.56	196.58	162.05	126.85	121.31
2011-12	277.78	290.17	318.75	87.15	91.03
2012-13	333.33	273.67	351.64	94.79	77.83
2013-14	338.89	271.25	365.77	92.65	74.16
2014-15	344.44	284.17	432.35	79.67	65.73
2015-16	372.22	316.83	487.16	76.41	65.04

Table 3. Terms of trade (Parity index) of soybean in Baran district of Rajasthan

Year	Procurement price index	Farm harvest price index	Composite input price index	Index of the ratio of procurement price to the composite input price index	Index of the ratio of farm harvest price to the composite input price index
1996-97	100.00	100.00	100.00	100.00	100.00
1997-98	102.67	102.82	61.28	167.52	167.77
1998-99	106.00	105.63	68.87	153.90	153.37
1999-00	112.67	112.68	73.74	152.79	152.80
2000-01	115.33	115.49	103.20	111.75	111.91
2001-02	118.00	118.31	105.25	112.12	112.41
2002-03	118.00	118.31	176.59	66.82	67.00
2003-04	124.00	124.65	93.91	132.05	132.74
2004-05	133.33	133.80	73.01	182.62	183.26
2005-06	134.67	134.51	94.77	142.09	141.92
2006-07	136.00	135.21	99.80	136.27	135.48
2007-08	140.00	138.03	104.23	134.32	132.43
2008-09	185.33	192.96	174.87	105.98	110.34
2009-10	185.33	192.96	223.56	82.90	86.31
2010-11	192.00	200.00	208.42	92.12	95.96
2011-12	225.33	235.21	117.81	191.27	199.65
2012-13	298.67	312.68	182.57	163.59	171.27
2013-14	341.33	356.34	403.34	84.63	88.35
2014-15	341.33	235.34	455.11	75.00	78.30
2015-16	346.67	366.20	521.39	66.49	70.23

4. CONCLUSION

Based on the survey of farmers and results of the study following policy measures are suggested. Regular studies must be conducted to understand the trend in prices of farm inputs and outputs in a better way in revising the existing policies with confidence. To remove the disparity between 'prices received and paid', concerted efforts should be made to maintain the parity, which will help farmers in buying inputs and other items of household consumption.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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