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Price Volatility of Oilseeds under Trade Liberalization in India: Analysis of Rapeseed and Mustard

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Abstract

Trade liberalization has induced volatility in the prices of oilseeds. Oilseeds such as rapeseed and mustard, which are rich in vitamins, minerals, and the staple ingredients in many food items. This paper analyzed the international and domestic prices of rapeseed and mustard for India. The analysis showed that India was a net exporter of rapeseed and mustard oilseeds and has experienced lower price volatility for these crops. On the other hand, in terms of processed rapeseed and mustard oil, India has been a net importer. As such it is unable to influence the prices of these products and has greater price volatility in the domestic market. The present study examined these issues in-depth in post-trade liberalization and India's accession into the World Trade Organization and commitments under the Agreement in Agriculture. The statistical technique used for analysis was the run test and the nominal protection coefficients. Therefore, the present study was carried out to analyze the fluctuations in international and domestic prices of rapeseed and mustard crops after trade liberalization and its impact on the competitiveness of a crop.

Keywords: Price Volatility, Trade Liberalization, Oilseeds Crops, International Trade

JEL Classification: D40**,** F14, O53

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1. Introduction

The crop production sector plays a significant role in the Indian economy as it provides employment to almost half of the working population in India and about 70% of workers in rural India depend on the agricultural sector for their livelihood. Most of the population comprised of women and the marginalized communities. As such the crop production sector has a greater socio-economic imperative for the Indian economy.

It is observed in recent decades that the relative contribution of agriculture and allied sector in the gross domestic product (GDP) of India (17.4 %) has been on the decline while the share of its dependent population has remained more or less stagnant. Ever since the introduction of neoliberal economic policies in 1991 and subsequent signing on WTO in 1994, domestic market protection to the sector has significantly been withdrawn, exposing the large chunk of the petty commodity producers to the vagaries of the market. As part of the trade liberalization, both tariff and non-tariff measures have been axed to the extent that farmers in India have been forced to the peripheries of the world market where large farmers operating on market-based production possibility frontier with unparallel supportive mechanism from their state. Agricultural commodities, particularly cash crops, are of different types and broadly these crops can be classed under annuals and perennials. Perennials are mostly cultivated in the south and north-east (natural rubber, coffee, tea, cardamom, etc.) while in the central and northern parts of India primarily annuals are cultivated. Oilseeds are annual crops. Important oilseeds produced in India are groundnut, mustard, sesame, linseed, castor seed, and palm oil. The area under oilseeds was 26.17 million hectares with a production of 26.3 million hectares in 2015-16. The area and production of oilseeds in India have been sluggish as the annual area expansion during the last 16 years has been only 4 million hectares while production has increased by 5 million tonnes. Another characteristic feature of oilseeds production is its regional concentration as Gujarat, Rajasthan, Madhya Pradesh, Haryana, Tamil Nadu, and Karnataka accounted for a major share of area and production of oilseeds in India.

With trade liberalization and competition in the domestic sector for oilseeds, production has declined as a result of competition. As a result, India has increasingly become import-dependent on oilseeds production as the annual rate of growth in oilseeds demand is 6% as compared to its production growth of 2% over the last one and a half decade (Government of India, 2018). The demand-supply gap is met largely through imports and there also exists a huge productivity gap between India and other major oilseeds exporting countries in the world. On the introduction of trade liberalization in 1991 and the subsequent reduction in tariff rate, the import of oilseeds has substantially increased and it has worsened the production scenario of oilseeds in the country. On agriculture support, as a result of India's commitments in the Agreement on Agriculture, it has a certain threshold of direct farmer support for production. As a result, given the imbalance in terms of agriculture subsidies support between developed and developing countries, India suffers a greater imbalance and thus affecting low income and poorly resourced farmers in the oilseed sector.

In this context, it is pertinent to ask the question of whether the rate of protection has affected the domestic market of rapeseed and mustard and if so, how the price volatility is affected by trade liberalization. If the present scenario is continued, what would be the impact of trade liberalization on the production and productivity of oilseeds in India? Price volatility of agricultural commodities, particularly after the trade liberalization has given birth to voluminous literature (Lekshmi, Mohanakumar, & George, 1996; Sekhar, 2004; Fafchamps, 1992; Kim & Chavas, 2002). The research is vital as it has been sufficiently explored in the Indian context that trade liberalization (after WTO Regime) has adversely impacted crop production sector, particularly small farmers and wage labours (Acharya, Ahluwalia, Krishna, & Patnaik, 2003; Das, 2014; Lekshmi et al. 2006; Pahariya & Mukherjee, 2007). There is also evidence that the impact of policy changes has affected more the commercial crops growing farmers and that production conditions of agriculture in India do not provide space to absorb frequent and wild price fluctuations in Price as it eliminates the small capital forever.

In addition to this, the Agrarian crisis has been manifesting in terms of a massive spate of suicides. During the period from 1996 to 2016, more than 3 Lakh farmers have ended their life. A major part of suicides took place in areas where commercial crops are concentrated, for instance, in Iddukki, Wayanad, and Palakkad districts in Kerala. Alongside, Maharashtra, Karnataka, Andhra Pradesh, and Punjab are other states with a relatively high incidence of suicides. In this relation, Mustard is one of the prominent cash crops in Rajasthan and its trends need close scrutiny. The literature on agriculture production has convincingly proved that a stable and remunerative price is the primary incentive for agricultural production. Price volatility eliminates the small capital base of farmers and destabilizes wage labours. The price of mustard and rapeseed showed a high volatile price trend after trade liberalization. Farmers in India mostly fall under marginal to small category and they would not be able to stay back in production under a highly volatile price scenario. It is argued in the present study that the purpose of production is to earn a living from agriculture and therefore the domestic farmers need to be protected from large and cheap imports of rapeseed and mustard to promote the crop in India.

Against this background the study has been carried out with the following objectives:

1. To know the global and domestic scenario of rapeseed and mustard.
2. To analyze the area, production, and productivity of rapeseed and mustard in India and Rajasthan.
3. To measure the volatility in the domestic and international prices of rapeseed and mustard oilseeds and oil.
4. To measure the competitiveness of rapeseed and mustard in India.

The rest of the paper is as follows: Section 2 of the paper provides a brief literature review. Section 3 will discuss the methodology and provide an analysis of the global and domestic scenarios of rapeseed and mustard crops. Section 4 shows the trends in the production and productivity of rapeseed and mustard oilseeds in India and Rajasthan. Section 5 of the study deals with the international and domestic price volatility of rapeseed and mustard crops. Section 6 of the paper ends with conclusions and policy directions.

2. Literature Review

The study of Sekhar (2004) has tried to explain the possibility of transmission of agricultural price volatility of international markets to domestic markets due to the presence of liberalization. The study considered the prices of various agricultural commodities such as wheat, rice, ground-nut oil, soya bean oil, coconut oil, sugar cotton, and coffee. The movement in the price of these commodities was used as an indicator of price instability by using different statistical tools. The study concluded that output fluctuations were not significant.

Marcel Fafchamps (1992) studied the third world village to explain that larger farmers devote a larger share of their land to grow cash crops then small farmers. Through the study, it was found that rural food markets are thin and isolated. A simple model of crop portfolio decision with income and consumption price risk was used to show the conditions prevailing in rural commodities of the third world. Through it, a relationship between farm size and cash crop cultivation was observed. The study concluded that larger farmers devoted a larger share of their land to grow cash crops then small farmers due to high transportation costs and low agricultural productivity.

Another study by Kim and Chavas (2002) has tried to explain that the price support program (a feature of agriculture policy) affects price dynamics and price volatility. A dynamic Tobit model under time-varying volatility was used to show the price support program and stock holding affected both expected prices. The prices of the U.S. non-fat dry milk were used for the study. According to the study, the volatility of the U.S. non-fact dry milk price support program can significantly increase the expected price even if the price support was set below the current market prices. The model was estimated by the maximum likelihood method. It was found that the price support program was effective in reducing short-term price volatility and it disappears in the long run. Thus, market price falls below the support price then the

government purchases dairy products thereby increasing the size of the markets.

Bannor (2016), in studying the effect of futures trading on the volatility of cluster beans prices in Rajasthan, assessed the effect of future trading on cluster beans price volatility in the 3 markets of Rajasthan during the period of 2003-2015. Augmented Dickey Fuller Test (ADF) test and Phillips Person Test were used for the stationary tests whereas GARCH(1,1), EGARCH(1,1), and TGARCH(1,1) were used to model the effect of future trading on cluster bean price volatility in the study area. The results indicated future trading has a significant effect in reducing cluster bean price volatility in various selected markets in Rajasthan. Prices in Anoopgarh showed lower volatility according to the models used compared to Sri Ganganganagar. However, Hanumangarh showed the highest price volatility from shocks. The persistence of shocks was however longer in Sri Ganaganagar market compared to Anoopgarh with the lowest persistence of shocks on volatility recorded in Hanumangarh. There was no best model in modeling price volatility as TGARCH(1,1) was the best in modeling volatility in Sri Ganganagar whereas EGARCH(1,1) was the best in Anoopgarh price volatility modeling, and GARCH(1,1) was the best in modeling Hanumangarh cluster bean price volatility. According to him, every data should be approached on its own merit with regards to the selection of the model.

Brain Wright's (2011) study showed that the storability of grains caused the price response to change with the level of available supply. The study also showed that when aggregate supply was high, a moderate reduction can be tolerated with a moderate increase in price by drawing on discretionary stocks. But when stocks decreased to a minimum feasible level, a similarly modest supply reduction can cause a price spike.

Jin and Frechette's (2004) study tested whether the volatility of agricultural futures prices exhibited fractional integration. Volatility series were constructed for fourteen agricultural future price series with over 5300 observations per series. It exhibited a strong long-term dependence which was an indicator of fractional integration. A fractional model, FIGARCH(1,d,1) and traditionally volatility model, GARCH(1,1) were used for the study. The major finding of the study showed the importance of modeling both short and long-term memory in the conditional volatilities of agricultural future prices. The results suggested the validity of FIGARCH(1,d,1) model for agricultural prices which may lead to an improvement in option pricing and risk management through a better understanding of future price volatility.

3. Methodology and Data Source

The study was based on Secondary data. The secondary data on area, production, and yield were taken from the publications of the Ministry of Agriculture, and international statistics was culled out from the official sites of FAO. The statistical technique that adopted for the study was the run test[1] and NPC's[2] (Nominal Protection Coefficients). The study used a run test to find the fluctuation in the domestic and international prices of rapeseed and mustard crops, in other words, volatility was calculated through a random test. NPC is used to know the competitiveness of rapeseed and mustard crop.

3.1 Global and Domestic Scenario of Rapeseed & Mustard Crop

3.1.1 Global Scenario

The global output of rapeseed and mustard production has been increasing in the last 15 years. The output has increased from 5083 tons in 2001-02 to 7917 tons in 2016-17. Production from Canada and China has increased steadily and reached 26.76% and 22.19%, respectively, of total world production (Appendices, Table1). On the other hand, the output from India has remained 6797000 tons in 2016-17 and consequently its share has increased a little to 9.87% from 8.83% in 2015-16(FAOSTAT). There may however be some fluctuations in production as a result of COVID-19 pandemic and lockdown measures of countries across the globe.

[1] A runs test is a statistical procedure that examines whether a string of data is occurring randomly from a specific distribution. The runs test analyzes the occurrence of similar events that are separated by events that are different.

[2] NPC is the ration between the domestic price and the world price.

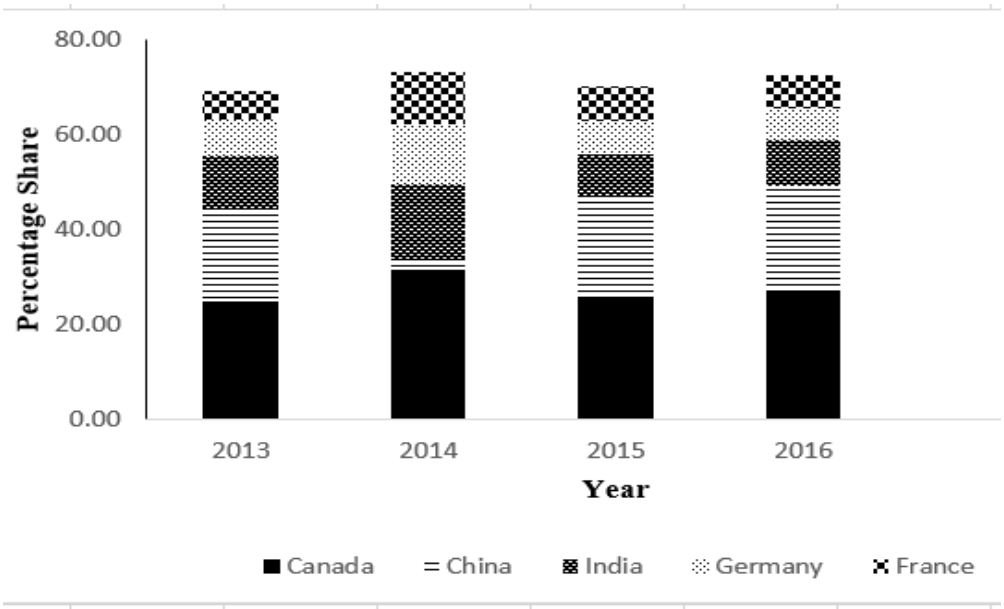

Figure 1: Relative Share in Rapeseed and Mustard Production by Major Producing Countries from 2013 to 2016

Source: Authors' Compilation from data from FAOSTAT

Figure 1 shows the relative share of rapeseed and mustard production by major producing countries during the period from 2013 to 2016. The figure shows that the largest producer of rapeseed and mustard oilseeds is Canada during the 4 years from 2013 to 2016. The share of China in total production during the year 2014 declined to around 2% out of world production of rapeseed and mustard. In the same year, a significant change in its share in the world production is seen in all major rapeseed and mustard producing countries of the world. The share of India has increased to 15.86% in 2014 as compared to 2013 which was 10.76%. In 2015, its share has decreased to 8.83% while in 2015 it shows a slight increase of 9.87%.

3.2. Domestic Scenario

India is the third largest producer of rapeseed and mustard oilseeds in the world with 8.5% of the global production in 2017 grown domestically (USDA). Rapeseed and mustard seeds produced in India are mainly used for domestic consumption. After extracting oil from the seed, the remaining part of the seed is used to produce rapeseed and mustard meal. Rapeseed and Mustard meal is an important source of cattle and poultry feed. India is the exporter of rapeseed and mustard seed. (Ministry of Agriculture & Farmers Welfare, GOI).There was an increase in production quantity from 5083 thousand tons to 7917 thousand tons during the period from 2001-02 to 2016-17 (Appendix, Table 4). The increase in production is primarily due to a sharp rise in the area by 1.13% rather than yield (i.e. 0.78%).

State-wise Production: In India, Rajasthan occupies the first place both in terms of cultivated area and production accounting for over 45% followed by Madhya Pradesh with 13%. The third place is occupied by Haryana and Uttar Pradesh with 11% of the total production each. West Bengal and Gujarat occupy the 5th and 6th positions with 6% and 5%, respectively (Commodities Control). During the period from 2001-02 to 2016-17, the annual growth rate in area and production is 4.01% while the annual growth rate is just 1.88%.

4. Trends in Area, Production, and Productivity of Rapeseed and Mustard Oilseeds in India and Rajasthan

Figures 2 and 3 depict the trend in the area and production of a crop and productivity. Here, trends in the area and production of rapeseed and mustard oilseeds are analyzed to see the impact of its change in productivity.

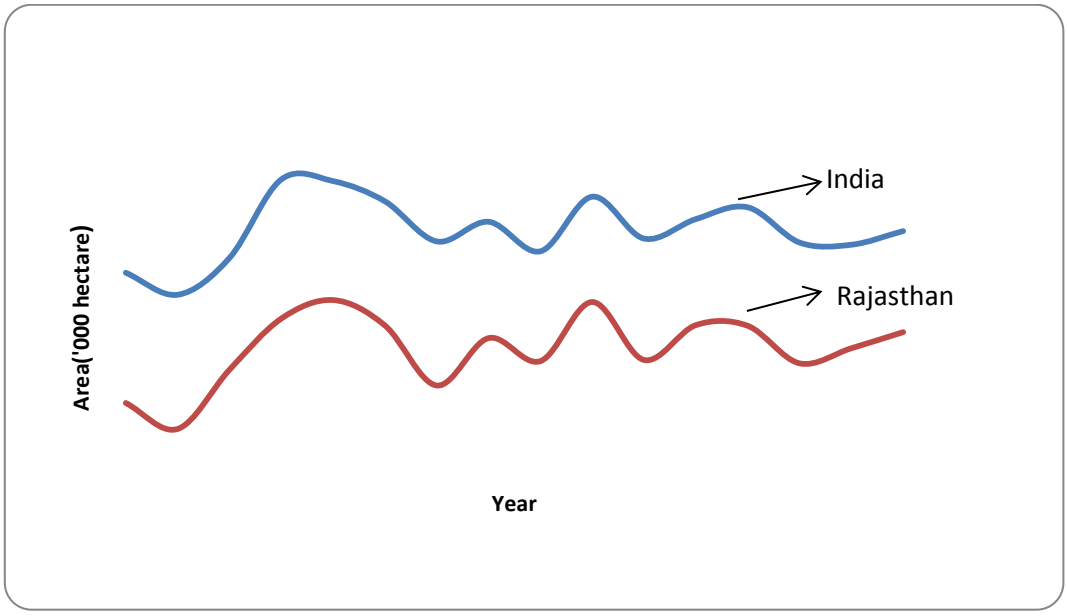

Figure 2: Area ('000 Hectare) of Rapeseed and Mustard Oilseeds in India and Rajasthan during 2001-02 to 2016-17

Source: Authors' compilation based on data from MAFW, GOI

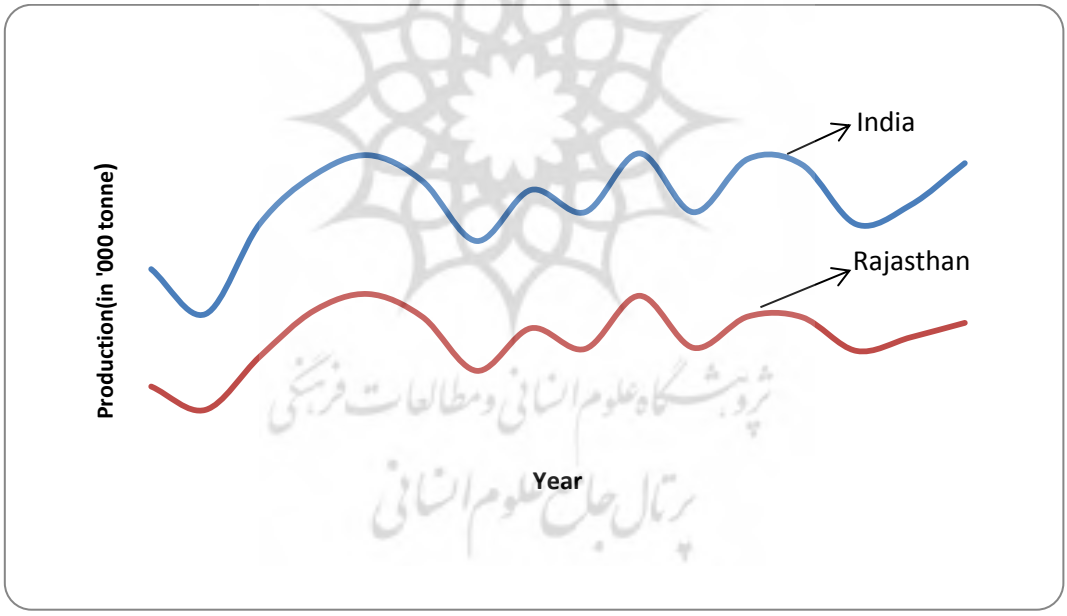

Figure 3: Production ('000 Tonne) of Rapeseed and Mustard Oilseeds in India and Rajsthan during 2001-02 to 2016-17

Source: Authors' compilation based on data from MAFW, GOI

Figures 2 and 3 depict that a pattern of change in area and production in Rajasthan reflects the same pattern of change in area and production in India. This is because the state of Rajasthan is the largest producer of rapeseed and mustard oilseeds in India. The above charts also show that with an increase in its production under rapeseed and mustard oilseeds, the area under cultivation of it also increases in both Rajasthan and India. The chart shows that the total area of rapeseed and mustard in India has increased from 2073 to 6074 thousand hectares in 2001-02 to 2016-17, while production has increased from 5083 to 7917 thousand tons in the same year (details in Appendix, Table 4). In Rajasthan, the area under rapeseed and mustard oilseeds increased from 1840.8 to 2563.6 hundred hectares, while

production has increased from 1943 to 3645.44 thousand tons. However, there is a slight increase in productivity of rapeseed and mustard (i.e.366kg/hectare) with 1056kg/hectare in 2001-02 to 1422 kg/hectare in 2016-17 (details in Appendix, Table 4).

5.0 Volatility in International and Domestic Prices of Rapeseed and Mustard Crops

The price volatility in the international and domestic prices of rapeseed and mustard crops is also a major factor determining the over-cultivation and production of the crops. Indian rapeseed/mustard seed and oil prices have witnessed high volatility in its prices. This has not only affected the revenues of the government and farm sector but also the farmers producing these crops. The random test is employed for calculating the price volatility. The run test is used to analyze the number of times the prices fluctuate in a given period (Lekshmi et al., 1996). The test statistic employed to check the randomness in the prices is as follows:

$$Z = \frac{R - E(R)}{SE(R)}$$

Where, $E(R)=N/2+1$, $SE(R) = \sqrt{N-1/2}$,
R=number of runs , N=number of observations

Table 1. Volatility in Rapeseed and Mustard Prices

Price	Value of Z	
	Rapeseed & Mustard Oilseed	Rapeseed & Mustard Oil
Domestic Price	(-0.28)	(-0.28)
International Price	(-0.49)	(-0.18)

Source: Authors

The null hypothesis is that there is no randomness in the price movement or there exists a discernable trend. The run test indicates that there is no long-run discernable trend in the overall movement of the price for seeds and oils. In other words, the null hypothesis was rejected at 5% level of significance (the value of Z lies within the range $-1.96 \leq Z \geq 1.96$). It means that the fluctuation in price is randomly-distributed and it is a characteristic feature of agricultural commodities, particularly annuals.

5.1 Price Volatility of Rapeseed and Mustard Oilseeds

The domestic prices of rapeseed and mustard seeds fluctuate more than the international prices. During the period from 2012 to 2016, the domestic prices fluctuated 4 times while the fluctuations in the international prices were just 2 times. This is due to the fact that India is the net exporter of these seeds and a global player in the international market. During the period from 2012 to 2016, the domestic prices fluctuated 4 times while the fluctuations in the international prices were 5 times due to its imports.

5.2 Competitiveness in Production of Rapeseed and Mustard Crops in India

The competitiveness of a crop depends on its domestic and international prices, cost of cultivation, subsidy, etc. Given that India is a member of the World Trade Organization, it also has to adhere to global commitments in relation to domestic support measures as the Agreement on Agriculture. We have further analyzed both domestic and international prices to find the competitiveness of rapeseed and mustard crops. The statistical method used for measuring the competitiveness of rapeseed and mustard in the world market is NPC (Nominal Protection Coefficient). NPC is the ratio of the domestic price to the international price of rapeseed and mustard under consideration. NPC helps in measuring the divergence of the domestic price from the international price and thus determines the degree of domestic protection/non-protection of the commodity in question (Rakotoarisoa & Gulati 2006). It is defined as:

$$NPC_j = \frac{P_j^d}{P_j^i}$$

where:

NPC – Nominal Protection Coefficient

P_j^d - Domestic Price of Rapeseed & Mustard Oilseeds or Oil

P_j^i – International Price of Rapeseed & Mustard Oilseeds or Oil

Table 2. Competitiveness of Rapeseed and Mustard Oilseeds in India

Year	NPC(Rapeseed & Mustard oilseed)	NPC(Rapeseed & Mustard oil)
2012	1.08	1.26
2013	0.90	1.11
2014	1.03	1.23
2015	1.16	1.66
2016	1.18	1.51

Source: Authors

Table 2 shows the competitiveness of rapeseed and mustard oilseeds in India from the years 2012 to 2016. The value of NPC is greater than 1 for rapeseed and mustard oilseeds during the period of 2012 to 2016 except in the year 2013, while the NPC for rapeseed and mustard oilseeds is also greater than 1. This shows that rapeseed and mustard oilseeds are competitive in the international market as the domestic market is protected with government support. That is, due to government intervention, domestic producers are receiving a higher price and having a producer surplus, and at the same time, consumers pay a high price given the government intervention and facing a consumer loss. As such, there would be some deadweight loss as a result of the producer surplus and consumer loss.

6. **Conclusion**

Trade liberalization has been characterized by its huge impact on agriculture. Volatility in the prices of oilseeds is one such result of trade liberalization. India is a member of the World Trade Organization and has to adhere to multilateral commitments on domestic support in the Agreement on Agriculture. This has to an extent constrained India's ability to provide adequate support to low-income and poorly resourced farmers and also exposed small businesses to global competition.

The present study is restricted to one agricultural crop group of rapeseed and mustard oilseeds. India is a major exporter of rapeseed and mustard oilseeds and a major importer of rapeseed and mustard oils (Ministry of Agriculture and Farmers Welfare, GOI). The study also showed that imports and exports of the crop affected the fluctuation in its prices as the international prices of rapeseed and mustard oils fluctuate more than the domestic prices as India is the importer of these oilseeds, while the fluctuation in international prices of rapeseed and mustard oilseeds was less than its wholesale prices as India is the exporter of these oilseeds. In other words, India is an importer of the final product which is the oil and exporter of raw material the oilseed. Such variations, therefore, reflect results in which for oilseed as India is an exporter, it is able to influence the global prices and thus greater price certainty and fewer fluctuations. On the other hand, since it is an importer of processed product oil and is unable to influence global prices, there are price fluctuations at the domestic level. As such, India should consider further value addition and diversification of rapeseed and mustard oils as a policy imperative to reduce importing and generating employment in the domestic market. This will be important for sustaining India's food security too.

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Appendices

Table 1: Relative Share in Rapeseed and Mustard Oilseeds Production by Major Producing Countries during 2013-2016.

Country	Year			
	2013	**2014**	**2015**	**2016**
Canada	24.67	31.32	25.82	26.76
China	19.89	2.34	20.98	22.19
India	**10.76**	**15.86**	**8.83**	**9.87**
Germany	7.96	12.58	7.05	6.65
France	6.01	11.12	7.50	6.87
Australia	5.70	7.72	4.88	4.28
Poland	3.68	6.60	3.79	3.22
U.K	2.93	4.95	3.57	2.58
USA	0.00	0.00	0.18	2.04
Ukraine	3.23	4.43	2.44	0.00
Czech Republic	1.99	3.10	0.00	1.97
Other Countries	13.19	0.00	0.00	0.00
World	100.00	100.00	100.00	100.00

Source: Authors

Table 2: Relative Position of Rapeseed and Mustard Oilseeds by Major Producing Countries during the period from 2013 to 2016

Country	Year			
	2013	2014	2015	2016
Canada	1	1	1	1
China	2	10	2	2
India	**3**	**2**	**3**	**3**
Germany	4	3	5	5
France	5	4	4	1
Australia	6	5	6	6
Poland	7	6	7	7
U.K	9	7	8	8
USA			10	9
Ukraine	8	8	9	
Czech Republic	10	9		10

Source: Food and Agricultural Organization (FAO)

Table 3: Production (in Ton) of Rapeseed and Mustard in the World

Country	2013	2014	2015	2016
Canada	17935000	15555100	18376500	18423600
China	14458029	1160015	14930677	15281624
India	7820000	7877000	6282000	6797000
Germany	5784300	6247400	5016800	4579600
France	4370075	5522980	5334404	4727961
Australia	4141731	3832000	3470000	2944000
Poland	2677665	3275806	2700776	2219270
U.K	2128000	2460000	2542000	1775000
USA	NA	NA	130600	1403650
Ukraine	2351730	2198020	1737600	NA
Czech Republic	1443210	1537320	NA	1359125
Other Countries	9589868	NA	NA	NA
World	72699608	49665641	71171010	68855446

Note: NA*-Not Available
Source: Food and Agricultural Organization (FAO)

Table 4: Area, Production and Production of Rapeseed and Mustard Oilseeds during 2001-02 to 2016-17

Year	Area(in '000 Hectare)		Production(in '000 Tonne)		Productivity(in Kg/Hectare)	
	India	Rajasthan	India	Rajasthan	India	Rajasthan
2001-02	5073	1943	5083	1943	1002	1056
2002-03	4544	1318.2	3880	1318.2	854	868
2003-04	5428	2740.2	6291	2740.2	1159	1279
2004-05	7316	3970.7	7593	3970.7	1038	1078
2005-06	7276	4416.9	8131	4416.9	1117	1205
2006-07	6790	3805.6	7438	3805.6	1095	1185
2007-08	5826	2362.2	5834	2362.2	1001	946
2008-09	6298	3502.5	7201	3502.5	1143	1234
2009-10	5588	2948.2	6608	2948.2	1183	1276
2010-11	6901	4369.7	8179	4369.7	1185	1188
2011-12	5894	2976.3	6604	2976.3	1121	1189
2012-13	6363	3814.6	8029	3814.6	1262	1346
2013-14	6646	3797.1	7877	3797.1	1185	1233
2014-15	5799	2895.7	6282	2895.7	1083	1170
2015-16	5746	3258	6797	3258	1183	1287
2016-17	6074	3645.44	7917	3645.44	1134	1422

Source: Ministry of Agriculture and Farmers Welfare, Government of India

Table 5: Relative Share of Rajasthan in Area, Production, and Productivity of Rapeseed and Mustard in

India during 2001-02 to 2016-17

Year	Area(in '000 Hectare)	Production (in '000 Tonne)	Productivity(in Kg/Hectare)
2001-02	38.30	38.23	105.39
2002-03	29.01	33.97	101.64
2003-04	50.48	43.56	110.35
2004-05	54.27	52.29	103.85
2005-06	60.71	54.32	107.88
2006-07	56.05	51.16	108.22
2007-08	40.55	40.49	94.51
2008-09	55.61	48.64	107.96
2009-10	52.76	44.62	107.86
2010-11	63.32	53.43	100.25
2011-12	50.50	45.07	106.07
2012-13	59.95	47.51	106.66
2013-14	57.13	48.20	104.05
2014-15	49.93	46.10	108.03
2015-16	56.70	47.93	108.79
2016-17	60.02	46.05	125.40

Source: Authors' Calculation

Table 6: Domestic & International Prices of Rapeseed & Mustard Oilseeds, 2012-2016 (Rs/Qtl)

Year	Quarter	Wholesale Price	International Price
2012	Q1	3285	3083
2012	Q2	3435	3379
2012	Q3	3918	3489
2012	Q4	3792	3364
2013	Q1	3444	3408
2013	Q2	3131	3202
2013	Q3	3157	3050
2013	Q4	3348	3173
2014	Q1	3207	3332
2014	Q2	3121	3242
2014	Q3	3367	2575
2014	Q4	3572	2597
2015	Q1	3493	2529
2015	Q2	3854	2713
2015	Q3	4137	2692
2015	Q4	4492	2735
2016	Q1	3875	2669
2016	Q2	4032	2798
2016	Q3	4208	2761
2016	Q4	4072	2924

Source: DES, Ministry of Agriculture & Farmers Welfare for Domestic Prices and World Bank for International Prices.

Table7: Domestic and International Prices of Rapeseed and Mustard Oils (2012-2017) (Rs/Qtl)

Year	Quarter	Wholesale Price	International Price
2012	Q1	7687	6442
2012	Q2	7822	6718
2012	Q3	8423	6838
2012	Q4	7990	5489
2013	Q1	7369	6502
2013	Q2	6654	6208
2013	Q3	6756	6231
2013	Q4	7152	6305
2014	Q1	6833	6069
2014	Q2	6546	5776
2014	Q3	6872	5276
2014	Q4	7089	5023
2015	Q1	7090	4716
2015	Q2	7873	4897
2015	Q3	8493	4996
2015	Q4	9577	5296
2016	Q1	7902	5234
2016	Q2	8355	5391
2016	Q3	8884	5432
2016	Q4	8377	6098

Source: Solvent Extractors Association of India (SEAI) for Domestic Prices and World Bank for International Prices.

Table 8: Trend in International and Domestic Prices of Rapeseed and Mustard Oilseeds

Year	Quarter	Wholesale Price		Runs	International Price		Runs
2012	Q1	3285	0		3083	1	
2012	Q2	3435	0	1	3379	1	
2012	Q3	3918	1		3489	1	
2012	Q4	3792	1	2	3364	1	
2013	Q1	3444	0		3408	1	
2013	Q2	3131	0		3202	1	
2013	Q3	3157	0		3050	1	
2013	Q4	3348	0		3173	1	
2014	Q1	3207	0		3332	1	
2014	Q2	3121	0		3242	1	1
2014	Q3	3367	0		2575	0	
2014	Q4	3572	0		2597	0	
2015	Q1	3493	0	3	2529	0	
2015	Q2	3854	1		2713	0	
2015	Q3	4137	1		2692	0	
2015	Q4	4492	1		2735	0	
2016	Q1	3875	1		2669	0	
2016	Q2	4032	1		2798	0	
2016	Q3	4208	1		2761	0	
2016	Q4	4072	1	4	2924	0	2

Source: Authors' Calculation

Table 9: Trend in International and Domestic Prices of Rapeseed and Mustard Oils

Year	Quarter	Wholesale Price		Runs	International Price		Runs
2012	Q1	7687	0	1	6442	1	
2012	Q2	7822	1		6718	1	
2012	Q3	8423	1		6838	1	1
2012	Q4	7990	1	2	5489	0	2
2013	Q1	7369	0		6502	1	
2013	Q2	6654	0		6208	1	
2013	Q3	6756	0		6231	1	
2013	Q4	7152	0		6305	1	
2014	Q1	6833	0		6069	1	
2014	Q2	6546	0		5776	1	3
2014	Q3	6872	0		5276	0	
2014	Q4	7089	0		5023	0	
2015	Q1	7090	0		4716	0	
2015	Q2	7873	0	3	4897	0	
2015	Q3	8493	1		4996	0	
2015	Q4	9577	1		5296	0	
2016	Q1	7902	1		5234	0	
2016	Q2	8355	1		5391	0	
2016	Q3	8884	1		5432	0	4
2016	Q4	8377	1	4	6098	1	5

Source: Authors' Calculation