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External Market Linkages and Instability in Indian Edible Oil Economy: Implications for Self-sufficiency Policy in Edible Oils§

Lijo Thomas[a]*, Girish Kumar Jha[b] and Suresh Pal[b]

[a]Directorate of Rapeseed Mustard Research (DRMR), Bharatpur - 321 303, Rajasthan
[b]Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi - 110 012

Abstract

The liberalization of the economy following WTO agreement paved the way for significant changes in the edible oil economy. The paper has shown that the impact of the trade liberalization has led to integration between domestic and international edible oil markets. The consequences of this integration on price stability, and production dynamics have been examined. It has been observed that India has tried to balance the interests of both producers and consumers while fixing the import tariffs. The impact of imposition of tariff analyzed in a partial equilibrium framework has revealed that the net impact will be negative, given the current demand-supply parameters of domestic edible oil economy. The implications of these finding include an increase in research investments in oilseed to reduce the need for protecting domestic sector and to create a buffer stock of edible oils to tide over the short-term international price volatilities

Key words: Oilseeds, edible oils, co-integration, imports, tariff, edible oil policy, market linkage

JEL Classification: Q11, Q13, Q18

Introduction

Oilseeds and edible oils constitute an important segment of agricultural economy of India. India is the largest producer as well the consumer of vegetable oils in the world. For the triennium ending 2009-10, India accounted for 8.5 per cent of the global oilseed production, 11 per cent of the global edible oil imports and 10.3 per cent of the global edible oil consumption. Oilseed crops were cultivated in 14.2 per cent of the gross cropped area. The livelihood security of a multitude of stakeholders (oilseed cultivators, oilseed processors, consumers and other intermediaries) depends on oilseed and edible oil value chain.

The performance of oilseed crops has shown considerable fluctuations over the years. India's oilseed and edible oil sector is being increasingly exposed to international markets and the policy interventions in production, trade and markets have not been able to provide self-sufficiency in edible oils. The growth of oilseed crops remained lack-luster for nearly two decades following the green revolution. The slow growth rate in oilseed production combined with the high expenditure elasticity for edible oils led to an increase in demand which was met through massive imports, causing a sizeable drain on foreign exchange (Gulati *et al*., 1996). The import substitution strategy for edible oils, which was adopted as a response met with early success, and the edible oil imports showed

* Author for correspondence
Email: lijo.iari@gmail.com

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a significant decline. But after the reform process initiated in the Indian economy, major changes were made in the trade policy with regard to edible oils. Beginning 1994, the edible oils were removed from the negative list of imports and tariff rates were liberalized in a phased manner. The import of 'Palmolein' was placed under Open General License (OGL) in 1994, and subsequently, import of other edible oils was also brought under this system as a part of trade liberalization in edible oils. Edible oil import dependency increased from 15.2 per cent of the total edible oil consumption in 1995-96 to 52.6 per cent in 2009-10.

This paper has highlighted some of the fundamental issues consequential to the opening up of domestic edible oil economy to the international markets. After establishing the nature of integration of domestic edible oil market with international markets, the paper has brought out the effects of the shift in degree of integration on different variables affecting the edible oil economy. The trends in oilseed and edible oil production in the country, parameters like price level, instability and import quantity as affected by the changing nature of edible oil market have been discussed. The impact of different tariff regimes on edible oil consumption and its implications for welfare of producers and consumers have been investigated. Finally, implications for edible oil policy have been outlined along with conclusions drawn from the study and specific suggestions for edible oil economy of the country.

Data and Methodology

The data on area, production and productivity of the oilseed crops in India were obtained from various issues of *Agricultural Statistics at a Glance*, published by the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India. The data on edible oil imports were collected from publications of Directorate General of Commercial Intelligence and Statistics (DGCI&S). The data on monthly prices of different edible oils in India were taken from the website of the office of the Economic Advisor, Ministry of Finance. The comparable international monthly prices of commodities, published by the World Bank, were used to study the market integration and relative movements of prices of edible oils in domestic and international markets.

Johansen's Co-integration Method

The estimation of price interdependence using time series data is subject to several considerations. One of them is the presence of non-stationarity in time series which may give misleading results regarding the degree to which the price signals are being transmitted between markets. This rules out the use of normal regression and correlation techniques. Therefore, co-integration between domestic and international markets was studied using Johansens maximum likelihood method. The presence/absence of co-integration is tested through trace test criteria and maximum eigen value test criteria. Johansen's methodology takes its starting point in the vector auto regression (VAR) of the order p. In a co-integrated system, we have,

$$\Delta y_t = \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \alpha\beta' y_{t-p} + \varepsilon_t$$

where, Matrix $\pi = \alpha\beta'$ is $n \times n$ with rank r, $0 \le r \le n$, which is the number of independent co-integration relations. The Johansen's method of co-integrated system is the restricted maximum likelihood method with rank restriction on matrix $\pi = \alpha\beta'$. The advantage of Johansen's method is that it does not impose the number of co-integration relationships beforehand; the test and estimation of the number of co-integration relationships are carried out simultaneously.

Evolution of Pre-reforms Edible Oil Policy in India

Historically, India has been a net importer of edible oils (Reddy, 2009). The growth rates in oilseed production in the two decades immediately following the green revolution (1967-68 to 1986-87) were not only much lower than cereals like wheat and rice, but were also lower than their own performance during the pre-green revolution years (Gulati *et al.,* 1996). The stagnation in growth and rise in edible oil demand due to high expenditure elasticity for edible oils resulted in heavy dependence on imported edible oils to meet domestic requirements. The imports of edible oils averaged about Rupees 1000 crore per annum during the mid-1980s which ranked the highest in import bill after petroleum and fertilizers (Ninan, 1995). This put a constant strain on foreign exchange resources. It was in response to the chronic shortage in foreign exchange under the administered exchange rate system that India

decided to adopt an import substitution strategy in edible oils.

In response, the National Oilseeds Development Project (NODP) was launched in 1985-86 by integrating all the centrally sponsored schemes for oilseed development. However, a concerted effort with coordination of technology delivery for crops and oilseed processing, price support and support services was made under mission mode with the launch of Technology Mission on Oilseeds (TMO) in 1986 with the goal of achieving complete self- sufficiency in edible oils by 1990. A special time limited scheme for three years targeting four major oilseed crops was also launched in 1987-88, named as the Oilseed Production Thrust Programme (OPTP), which ran concurrently with TMO. The assurance of fair and stable prices for oilseeds was the key to achieving desirable shift in cropping area in favour of oilseed crops and for inducing private investments in oilseed crops. Price support operations in oilseeds were undertaken as a part of this strategy. The National Agricultural Cooperative Marketing Federation (NAFED) was designated as the nodal agency for undertaking price support operations in oilseeds during 1985-86. Subsequent to the announcement of the Government integrated policy on oilseeds in 1989, the OPTP and NODP were merged in 1990-91 into a single programme, Oilseed Production Programme (OPP) to avoid duplicity and bring in better coordination.

The National Dairy Development Board (NDDB), which, along with TMO, was assigned an important role in restructuring of oilseeds and edible oil sector, was also involved in stabilization of supplies and prices of edible oils through its Market Intervention Operations (MIO). The market intervention operations by NDDB between 1989 and 1994 were the first major attempt by the government to stabilize oilseed/edible oil prices with a pre-determined price-band. The NDDB did this through buffer stocks and imports of both oilseeds and oil (Srinivasan, 2004 a,b). However, the NDDB met only with limited success in MIO (Ninan, 1995).

All these developments happened in an environment where the imports of edible oils were kept under the negative list and only the State Trading Corporations (STCs) and designated public sector agencies like NAFED were allowed to import edible oils. Beginning 1994, by placing palmolein imports under Open General Licence, the imports and tariff rates on imports of edible oils and oilseeds were liberalized in a phased manner. The import of all edible oils (except coconut oil, palm kernel oil, RBD palm oil, RBD palm stearin) was placed on OGL with 30 per cent import duty from March, 1995. The declining trend of import dependency in edible oils during the preceding years played a part in the decision to liberalize edible oil imports as much as the commitments under WTO agreement.

External Market Linkages and Trends in Domestic Edible Oil Economy

The impact of liberalization of the edible oils trade and the opening up and realignment of the domestic economy with international markets, as a part of WTO commitments, can be examined by knowing the nature of integration of domestic edible oil markets with international markets in two different periods. Johansen's co-integration method was employed to test the presence of co-movement of prices in domestic and international markets for three major edible oils and oilseeds[1]. The two periods selected (Period 1: 1981-82 to 1994-95 and Period 2: 1995-96 to 2009-10) reflect the structural break in the nature of the economy effected through the trade liberalization of edible oils which was initiated in March 1994. The monthly price series of all the selected commodities were integrated of the order one which was tested through Augmented Dickey Fuller Test (ADF test). The results of Johansen's co-integration test for the selected commodities between the domestic and international prices for the two periods have been presented in Table 1.

The significant values for both trace test and maximum eigen value test statistic indicate the presence of co-integrating equation only during period 2. During period 1, none of the selected edible oils and oilseeds showed co-integration wih their corresponding international reference prices. But in period 2 after the liberalization of edible oil economy, evidence for co-integration was detected in all the selected commodities. The domestic prices which were determined independent of the international prices in the protected environment started moving together with the international reference price after liberalization. The parameters of the co-integrating equations for period 2 have been given in Table 2.

Table 1. Johansen co- integration test results for major oilseeds and edible oil prices

Price series	Maximum Eigen value test		Trace test	
	H_0: r=0	H_0:r=1	H_0: r=0	H_0:r=1
Period 1: April 1982 to March 1994				
Soybean oil	-	-	-	-
Groundnut oil	6.16	0.64	6.81	0.64
Mustard oil	6.75	1.62	8.38	1.62
Groundnut	12.17	0.11	12.29	0.11
Soybeans	8.01	0.25	8.26	0.24
Period 2: April 1994 to March 2010				
Soybean oil	15.66*	0.03	15.69*	0.03
Groundnut oil	16.38*	0.03	16.40*	0.03
Mustard oil	16.33*	0.63	16.97*	0.63
Groundnut	15.95*	3.19	19.15*	3.19
Soybeans	15.53*	0.20	15.73*	0.20

Notes: * Significant at 5 per cent level of significance
Critical values of Trace test statistic at 5 per cent level of significance are: Ho: r=0 is 15.49 and Ho r=1 is 3.84
Critical values of Maximum Eigen test at 5 per cent level of significance are: Ho: r=0 is 14.26 and Ho r=1 is 3.84

The normalized beta coefficients indicated the effect of a change in international prices on the domestic prices. It could be seen that the coefficients were significant for all the selected commodities based on standard-error values. The adjustment coefficients indicated the time taken for prices to return to long-run equilibrium in the case of price fluctuations. The results of co-integration test on domestic and international prices have concluded that the domestic prices started moving together with the international prices after the opening up of domestic edible oil economy through trade liberalization. The concurrent changes that occurred in other determinants of edible oil availability in India should be viewed in this backdrop. The effects of this alignment with international markets hold significance for domestic oilseed producers directly and indirectly. The domestic prices and instability of edible oils could also be affected through the linkages with international markets. Domestic prices and instability are also influenced by other factors affecting domestic edible oil availability, growth and instability in area, production and productivity of oilseed crops, shift in domestic demand for edible oils and fluctuations in imports of edible oils. In the following section, the trends in these variables across the two periods have been analyzed.

Trends in Area, Production and Yield in Oilseed Crops

The technological impetus provided to oilseed crops through TMO and other oilseed development programmes along with the market support and favourable price policy for edible oils led to a strong performance of oilseeds, especially after 1986. The domestic producers of oilseeds were strongly protected against international competition by insulating the oilseed economy from international markets through protective structures. The import of edible oils could be done only through STCs and public agencies during this period and import of oilseeds was not allowed. The domestic price parity between oilseed crops and cereals were adjusted many times in favour of oilseed crops during 1980s. Between 1978-79 and 1985-86, while the price support for paddy was increased by 67 per cent, it was increased by 100 per cent for groundnut. Similarly, the price support for wheat during this period

Table 2. Co-integration parameters during Period 2 (April 1994 to March 2010)

Commodity	Normalized β coefficient (International prices)	Adjustment coefficients	
		β_1 (Domestic prices)	β_2 (International prices)
Soybean oil	0.51 (0.06)	-0.04 (0.01)	0.10 (0.04)
Groundnut oil	0.82 (0.12)	0.01 (0.01)	0.09 (0.02)
Mustard oil	0.52 (0.08)	-0.04 (0.01)	0.05 (0.03)
Groundnut	1.07 (0.14)	-0.01 (0.01)	0.07 (0.02)
Soybeans	1.28 (0.18)	-0.04 (0.02)	0.05 (0.02)
Oilseeds	0.52 (0.06)	-0.01 (0.01)	1.66 (0.22)

Note:* Figures within the parentheses indicate the standard-error of the coefficients

Table 3. Trends in growth rates of area , production and yield of major oilseeds in India

Crop	Area		Production		Yield	
	1980-81 to 1994-95	1995-96 to 2009-10	1980-81 to 1994-95	1995-96 to 2009-10	1980-81 to 1994-95	1995-96 to 2009-10
Soybean	16.8 (785.1)	4.4 (125.5)	19.9 (1082.4)	4.8 (146.5)	2.6 (27.3)	0.4 (14.1)
Groundnut	1.4 (13.7)	-1.9 (-26.3)	2.9 (44.0)	-1.2 (-10.9)	1.5 (27.0)	0.7 (19.7)
Rapeseed-mustard	4.1 (66.0)	-0.2 (-4.1)	7.9 (184.9)	2.1 (23.6)	3.7 (72.5)	2.3 (28.8)
Total oilseeds	3.1 (48.2)	0.5 (3.6)	6.0 (123.2)	1.75 (30.8)	2.8 (50.8)	1.3 (26.3)

Note: The figures within the parentheses are percentage change in respective variables over the period calculated on triennium ending values

was increased by 41 per cent, whereas it was 63 per cent for rapeseed and mustard (Acharya, 1993). The high level of protection achieved through a managed edible oil and oilseed market and the favourable price policy which saw the price parity shifting in favour of oilseeds, resulted in robust growth rates in area, production and productivity of oilseed crops during 1980-81-1994-95 (Table 3).

A decline in growth rates of area and production of oilseed crops after trade liberalization was predicted (Gulati *et al*., 1996) on the ground that these crops were over-protected prior to trade liberalization and the chief mechanism for maintaining higher prices for oilseed producers was by severely restricting import of cheaper edible oils. The nominal protection coefficients NPC for three major edible oils consumed in India showed that the level of protection has declined in the post-liberalization phase signalling a better alignment of domestic and international prices (Table 4). With trade liberalization adversely affecting the mechanism of protection, the distortionary shift in area in favour of oilseeds would be reduced or even reversed. With tapering-off of the thrust provided by the TMO and other similar programmes and the decision to allow edible oil imports with gradual and incremental reduction in import tariffs, the growth rates in area, production and productivity showed a considerable decline during 1995-96 to 2009-10. The groundnut and rapeseed-mustard showed an absolute decline in area during this period, the decline being 26.3 per cent and 4.1 per cent, respectively. For oilseeds as a whole, the decline in growth rate of area (from 3.13% to 0.45%) was much sharper than the decline in yield (from 2.78 per cent to 1.29 per cent).

Table 4. Decrease in protection of major edible oils after trade liberalization

Commodity	Nominal protection coefficients		
	Average		
	1990-91 to 1994-95	1980-81 to 1994-95	2005-06 to 2009-10
Groundnut oil	1.51	1.91	1.14
Mustard oil	2.35	2.95	1.09
Soybean oil	2.32	2.68	1.37

Note: * The NPC values have been calculated under importable hypothesis

Instability in Area, Production and Yield of Oilseed Crops and Edible Oils

The instability measured using the coefficient of variation of trend adjusted values of area, production and yield of oilseed crops in the two periods has shown a general decline in instability, except in groundnut where it has increased (Table 5). The technology and input delivery services initiated through the TMO and later continued under the ISOPOM were instrumental in bringing down the variability in these parameters. The spread of irrigation, distribution of certified seeds of oilseed crops and improvement in varietal technology have also contributed to the reduction in instability. A similar trend has been seen in the case of instability in edible oil production also. Except for groundnut oil, the instability in oil production declined during the second period of analysis (1995-96 to 2009-10). The decline in instability was found to be significant for soybean oil, rapeseed-mustard oil and for the total domestic edible oils production (Table 6). With the growth rates for area, production and

Table 5. Instability in area, production and yield of major oilseed crops in India

Crop	Area		Production		Yield	
	1980-81 to 1994-95	1995-96 to 2009-10	1980-81 to 1994-95	1995-96 to 2009-10	1980-81 to 1994-95	1995-96 to 2009-10
	Coefficient of variation in percentage					
Soybean	66.7	22.7	80.9	29.1	18.6	12.5
Groundnut	8.7	10.9	18.9	21.3	13.1	18.5
Rapeseed-mustard	21.5	14.6	36.1	20.0	17.7	13.4
All oilseeds	15.6	7.8	28.9	16.4	15.0	12.0

Table 6. Growth rate and instability in edible oil production

Commodity	Growth rate		Instability		Direction of instability	Significance*
	1980-81 to 1994-95	1995-96 to 2009-10	1980-81 to 1994-95	1995-96 to 2009-10		
	CAGR (%)		CV (%)			
Soybean oil	19.9	4.8	79.6	26.7	Decreasing	Significant
Groundnut oil	3.1	-1.2	19.9	21.9	Increasing	Not significant
Mustard oil	7.9	2.1	35.5	20.6	Decreasing	Significant
Total edible oils	5.6	1.7	26.1	14.4	Decreasing	Significant

Note: * Significance based on F test on the ratio of variance between two periods

productivity remaining positive and the instability in production of both oilseeds and edible oils declining significantly, it was expected that the prices in the domestic market for oilseeds and edible oils would remain stable, with only a moderate rise in prices due to the effect of increasing demand. The instability in prices was expected to decline in line with the reduction in instability of domestic edible oil and oilseed production.

Instability in Prices of Edible Oils

The expected decline in price instability of edible oils in the domestic market failed to materialize after the trade liberalization (Table 7). The domestic instability in edible oil prices has shown an increase in the second period compared to the first period for all the three major edible oils consumed in the country. This increase reflects the instability in the international prices for these commodities. Before 1994, the domestic edible oil prices were not exposed to the international market price fluctuations, as they were highly protected from imports through tariff and non-tariff barriers. The instability measurement has shown that the international markets exhibited a high degree of price instability during both the periods. The instability in international markets was more than the instability in domestic markets in absolute terms in both the periods for all the major edible oils of domestic origin. The impact of market integration with respect to price instability was the transfer of a higher magnitude of price instability from the international markets to the domestic edible oil market in India. Apart from the integration of domestic and international markets, another factor contributing to the transfer of price instability from international markets to domestic markets was the rise in quantum of edible oil imports consequential to the rise in domestic demand for edible oils.

Import of Edible Oils

Edible oil imports declined after the launch of TMO and had become negligible at 0.19 million tonnes for the TE 1994-95, but started rising thereafter in line with the higher edible oil imports as the growth rate of domestic edible oil production was slower than of edible oil import growth. The need for increased imports of edible oils was necessitated by the increase in domestic demand for edible oils which increased

Table 7. Instability in edible oil prices

Commodity	Coefficient of variation adjusted for trend (%)	
	1980-81 to 1994-95	1995-96 to 2009-10
	India	
Soybean oil	13.6	19.8
Groundnut oil	13.8	27.8
Mustard oil	12.9	16.4
	World	
Soybean oil	24.8	31.8
Groundnut oil	26.0	27.8
Mustard oil	24.4	29.6

rapidly with a sharp rise in per capita consumption of edible oils. The per capita edible oil consumption increased by 105 per cent during TE 1994-95 and TE 2009-10 compared to a rise of 60 per cent during the previous 15-year period (Table 8). This rise in per-capita edible oil consumption came in the wake of significant increase in the growth rate of economy as a whole. The growth rates of both the GNP and per capita edible oil consumption followed similar trends. An expenditure elasticity of 0.55 has been estimated for edible oils by Kumar (1998), which is much higher than expenditure elasticity for foodgrains. The increasing trend in per capita consumption, the projected growth rate in population and the expected performance of the economy over the next decade indicate that the requirement for edible oils will further rise in the coming years. The per capita demand for edible oils is projected to increase to 15.0 kg/annum and the demand for edible oils is expected to rise to 20.36 Million tonnes by 2020-21[2] (Jha *et al.*, 2011).

The increase in per capita income and imports to meet the rise in demand meant that the prices for edible oils hardened. Prior to the liberalization of edible oil trade, the quantum of edible oils import was more or less policy determined and the consumption was adjusted according to the supply conditions. Market instruments like price band operations and non-market instruments like rationing, stock control, etc. were used to regulate consumption and manage the upward pressure on prices. This meant that the prices prevailing in the international market played a major role in determining the quantum of imports. But, with the removal of trade restrictions in edible oils, it can be seen that the rise in prices of edible oils in the international markets have negligible effect on the quantum of imports. Demand is the dominant factor determining the requirement of edible oils and the supply required to meet this demand is being met through a combination of domestic production and imports. This could be seen from the correlation coefficients between the deviations in imports with that of the deviations in international prices of edible oils (Table 9). There was a significant correlation between these variable during the first period which turned insignificant during the second period. This shows the relative price insensitivity of imports during the liberalized phase due to persistent demand for edible oils arising from increasing incomes and high expenditure elasticity.

Table 8. Trends in production and import of edible oils in India

Year	Domestic production (Mt)	Imports (Mt)	Total availability (Mt)	Per capita edible oil consumption (kg)	GNP growth rate (%)	Import dependency (%)
TE 1980-81	2.75	1.63	4.38	3.8	2.6	30.8
TE 1984-85	3.43	1.22	4.65	5.3	4.7	26.3
TE 1989-90	4.51	1.12	5.63	5.5	4.2	19.9
TE 1994-95	5.73	0.19	5.92	6.1	6.2	3.2
TE 1999-00	7.28	2.61	9.89	7.9	6.3	26.4
TE 2004-05	7.21	4.74	11.95	9.4	6.5	39.7
TE 2009-10	9.05	6.55	15.60	12.5	8.2	42.0

Table 9. Correlation between variations in import quantity and international edible oil prices

Period	Correlation coefficient	t-value
Using current year international edible oil price variations		
1980-81- 1994-95	0.70	17.74*
1995-96 - 2009-10	0.09	1.23^{NS}
Using one year lagged international edible oil price variations		
1980-81- 1994-95	0.65	14.69*
1995-96 - 2009-10	0.09	1.24^{NS}

*Note:** Significant at 1 per cent level of significance and NS = Non-significant [Table value for t (.01,13) = 3.01]

Tariffs, Price Wedge and Growth Rate of Prices for Edible Oils

When the trade in edible oils was liberalized by the gradual removal of all non-tariff barriers, including import quotas and quantitative restrictions in line with WTO agreements, the government sought to accord protection to the domestic edible oil industry by applying import duties on edible oils within the levels permissible under the agreement. In practice, the import tariffs are fixed at varying levels for different edible oils not exceeding the bound rate committed under the trade agreement. The final bound rates of tariffs under WTO agreement range from 34 per cent to 228 per cent (Table 10). But, India has seldom used the upper limits of admissible tariff rates since signing of the agreement.

The concept of price wedge (the difference in domestic prices and international prices expressed as a percentage of international prices) is used to study the divergence between domestic and international prices and the adequacy of the bound and applied rates of tariffs. The calculations exclude the transportation cost to capture the maximum possible difference between the domestic and international prices. The price wedge has shown a significant decline after the trade liberalization in edible oils. On comparing the maximum observed price wedge values against the bound rates, it was observed that the bound rates were adequate for groundnut oil, and inadequate for soybean

Table 10. Bound and applied tariff rates on import of edible oils

(in per cent)

Oil category	Uruguay round bound duty		Applied basic duty		
	Base	Final 2004	2001	2005	2010
		Crude oil			
Soybean oil	45	34	45	45	Free
Palm oil	300	228	100	80	Free
Groundnut oil	300	228	100	85	Free
Sunflower oil	300	228	100	75	Free
Coconut oil	300	228	100	85/100	Free
Rapeseed-mustard oil	75	57	75	75	Free
Castor oil	100	76	100	85/100	Free
		Refined oil			
Soybean	45	34	45	45	7.5
RBD palmolein	300	228	100	90	7.5
Palm oil	300	228	100	90	7.5
Groundnut oil	300	228	100	85	7.5
Sunflower oil	300	228	100	85	7.5
Coconut oil	300	228	100	85	7.5
Rapeseed-mustard oil	75	57	75	75	7.5
Castor oil	100	76	100	100	7.5

Source: Agricultural Statistics at a Glance , Ministry of Agriculture, Government of India, New Delhi

Table 11. Maximum observed price wedge for selected edible oils: 1990-2011

(in per cent)

Edible oil	1990-1995	1996- 2000	2001-2005	2009	2010	2011
Groundnut oil	120	40	50	41	42	16
Soybean oil	140	100	73	45	22	25
Palm oil	-	-	84	38	33	29

Source: Price wedge values for the first two periods are from Sekhar (2004)

oil, even after the decline in price wedge after liberalization (Table 11). The bound rates under WTO for soybean were only 45 per cent, whereas the price wedge, which gives the upper limit for a potentially import restricting tariff, was above that level till 2005. This led to the rise in imports of soybean oil after trade liberalization. The share of soybean oil in imports increased from less than 10 per cent of edible oil imports in 1995-96 to nearly 40 per cent in 2004-05, a period where the price wedge was much higher than the bound rates under WTO. But, the price wedge calculated for the recent years has shown a decline due to the rise in international prices of edible oils and the resultant increase in alignment of domestic prices with the international prices. A gradual alignment of the domestic prices and international prices has made the bound rates much higher than the potential requirement to counter dumping of edible oils and protection of domestic edible oil industry. It is true for the three major edible oils produced in India. India being a large country (small country assumption does not hold good), large imports by India raise edible oil prices in the world market, which over time, may reduce the benefits supposed to accrue to the domestic consumers.

The price wedge had to be examined against the actual applied rates of basic duty to know the real restrictive nature of tariff rates. It was seen that the applied tariff values had progressively declined and the current applied basic duty was well below the maximum price wedge values. The fact that tariff values have been kept below the restrictive rates, has played a major role in the integration of domestic edible oil markets with international markets and the rise in imports of edible oils commensurate with the increase in domestic demand. The comparison of applied and bound tariff rates has shown that India has considerable flexibility to reduce imports by raising tariffs. Given the current level of price wedges, raising tariff up to the bound rate would raise the cost of most of the imported edible oil above the domestic prices and would reduce imports to zero. The country has chosen to levy lesser than the bound tariff in the larger interests of the consumers and to maintain a balance between the interests of consumer and producer (Chand *et al*., 2004).

The comparison of growth rate of prices between the two periods (Table 12), as expected, shows that integration with world markets, where the edible oil prices were lower than the domestic markets, had resulted in a decline in growth rate of edible oil prices in the domestic market after 1995. For edible oils as a whole, the growth rate in prices declined from 9.6 per cent during 1980-1994 to 3.7 per cent during 1995-2010. Without trade liberalization, the domestic prices would have risen much faster. Thus, the domestic consumers of edible oils were benefited from trade liberalization of edible oils and domestic producers of oilseeds and edible oils were adversely affected by reduced protection and competition from cheaper imports. Compared to the domestic market prices of edible oils, the world markets exhibited a reverse trend with the growth rate of price increase in the second period. The increased demand for edible oils and the opening up of export markets explain this rise in prices. This price rise also holds a significant message for countries like India, where the choice for edible oil policy is between import substitution and import dependence.

The argument that India is better off by importing edible oils and oilseeds based on the current market price differentials between domestic and world markets and production efficiency, runs the risk of being proven wrong by rising edible oil prices in the world markets due to increased demand or supply disruptions. Also,

Table 12. Growth rates of prices in edible oils (CAGR)

Commodity	1980-1994	1995- 2010
	India	
Soybean oil	-	3.7
Groundnut oil	11.8	4.8
Mustard oil	9.9	3.9
Total edible oils	9.6	3.7
	World	
Soybean oil	1.1	4.7
Groundnut oil	2.6	4.0
Mustard oil	1.8	5.7
Edible oils and fats	0.4	3.8

as Ninan (1995) has pointed out, the gains from exports through concentration of production efforts on rice and cotton where India has comparative advantage may not be significant, as was the case for many African countries. The real international prices of oilseeds are expected to go up by 15.1 per cent following complete trade liberalization which is the second highest rise in prices after cotton (World Bank, 2008).

Impact of Trade Liberalization on Domestic Edible Oil Economy

With the alignment of domestic edible oil markets with international markets, the changes in trade policy or variables affecting international demand and supply of edible oils will be transmitted to the domestic economy. Using the data on price movements in the domestic and international prices for the past three years, the coefficient of elasticity of price transmission was estimated to be 0.56 for groundnut oil and 0.37 for soybean oil. The tariff price elasticity estimates for edible oil economy have been found to be significant for most of the key parameters affecting the edible oil economy. The elasticities of edible oil prices (tariff) for various parameters are given in Table 13. This indicates that the trade policy can have an impact on all the key parameters of edible oil economy. Given these elasticities, an increase in tariffs will reduce domestic consumption of edible oils and their imports and will have a positive effect on area , production and productivity of oilseed crops.

Table 13. Elasticities of edible oil prices (tariff)

Variable	Tariff elasticity
Consumption of edible oils	-0.51
Production of edible oils	0.39
Import of edible oils	-1.71
Oilseed prices	1.38
Area under oilseeds	0.23
Yield of oilseeds	0.22
Production of oilseeds	0.46

Source: Ghosh (2009)

The magnitude of impact of changes in international markets and tariffs on domestic edible oil production, imports of edible oils, benefits to producers and consumers, total economic benefits, etc. depend on the factors like share of imports, income, own price and expenditure elasticities. A simultaneous equation system developed by the International Food Policy Research Institute (IFPRI, 2012) was adopted for modelling these parameters to analyze the impact of change in tariffs on domestic producers and consumers[3]. The results are presented in Table 14.

The results show that the economic gains through increase in producer surplus (higher producer prices for oilseeds) and increased tariff revenue are more than offset by the economic value of loss in consumer surplus due to increase in domestic prices of edible oils resulting from the increase in tariffs on edible oil imports. The net economic loss due to imposition of 10 per cent and 25 per cent of tariff was calculated to be INR 304 crore and INR 1805 crore, respectively. The impact of such a change in tariff will also affect the domestic consumption and production of edible oils. The domestic consumption will decrease from 16.76 Mt in the base scenario to 14.71 Mt if the effective tariff is set at 25 per cent. If the per capita income increases by 6 per cent and the tariff level and international prices of edible oils increase by 10 per cent, then the domestic production has been projected to increase by 15 per cent and the domestic edible oil consumption will fall by 8 per cent. A sharp decline in imports by 28 per cent is also expected in this scenario.

India had reduced its tariff rates for crude and refined oils to zero and 7.5 per cent, respectively to address the sharp rise in international prices of edible oil. Although the net welfare impact will be negative for higher import tariffs, the income transfer effect of the import tariffs has also to be considered. A higher

Table 14. Impact of alternative tariff levels on domestic edible oil economy

Variable	Increase in tariff on import of edible oils (%)		
	0	10	25
Imports (million tonnes)	8.82	7.34(-13.0)*	5.31(-40.0)
Change in domestic prices (%)	-	7.0	18.0
Domestic consumption (million tonnes)	16.76	15.8	14.71
Change in consumer surplus (in crore INR)	-	-6691.3	-16132.0
Change in producer surplus (in crore INR)	-	3377.7	8892.4
Change in tariff revenue (in crore INR)	-	3009.4	5434.7
Net impact (in crore INR)	-	-304.2	-1804.9

Note: * The figures within parentheses denote per cent change in imports
INR = Indian rupees

tariff means a higher income for oilseed producers and a lower income (consumer surplus) for consumers. The oilseed producers are generally dryland resource-poor farmers whereas major part of edible oils is consumed by high-income and medium-income consumers. Thus, the lower import tariffs transfer considerable income from the pockets of poor farmers to the pockets of better-off consumers. The higher tariffs certainly benefit the poor farmers. The modelled response of domestic edible oil economy assumes significance since the tariffs may be imposed on edible oil imports, both as a safety measure for domestic oilseed cultivators and a source of revenue.

Conclusions and Policy Implications

The edible oil and oilseed economy in India has undergone several changes, both by design and through economic compulsions. The availability of edible oils in the country is linked to a variety of factors like performance of edible oilseeds, trade policies and domestic edible oil availability and import scenario. The policy of import substitution of edible oils adopted in the mid-1980 led the way for operationalization of several developmental schemes for oilseed crops and this resulted in an impressive performance of oilseed crops and edible oil production till 1994-95. Thereafter, the opening up of the edible oil economy through trade liberalization reduced the protection available to oilseed cultivators by exposing the domestic economy to edible oil imports from abroad. The trade liberalization resulted in the integration of domestic edible oil prices with international markets and its impact was felt through the increased instability in domestic prices and the reduction in growth rate of edible oil prices in the domestic markets, reduction in growth rate of area under oilseed crops and increase in edible oil imports.

The price of edible oilseeds produced domestically being higher than the international prices, the allocative efficiency will be reduced if more area is devoted for oilseed crops. Therefore, the decline in growth rates of area under oilseeds is on expected lines. It has been argued that the import of edible oils could be a viable option under these circumstances and India should concentrate more of its resources on production of cereals where it has a comparative advantage. This argument, however, fails to take into consideration the instability in international prices of edible oils and the possible disruptions in supply. The prices of edible oils have shown a significant increase during the recent past in response to the increased demand from the developing countries like India and diversion of edible oils for energy purpose. India being a large country (small country assumption does not hold good), large imports by India raise edible oil prices in the world market, which over time, may reduce the benefits supposed to accrue to the domestic consumers. Moreover, the landed cost of imported edible oils is comparable with the domestic cost of production of various edible oils (Acharya, 1997). These aspects have clearly brought out the dangers of undue dependence on edible oil imports to meet the edible oil requirements of the country.

The permissible limits of tariff protection that can be provided to the domestic producers of oilseeds and edible oils are sufficient in view of the difference in domestic and international prices, but the need for tariff protection arises only when imports are likely to reduce the share of domestic producers in a limited market. With the rising consumer incomes leading to a rapid growth in edible oil demand, there is no reason for discouraging imports so long as the equilibrium prices are high giving reasonable profits to the oilseed cultivators and oilseed processing units. The applied tariff levels reflect this thinking and have been kept low to make available imported edible oils at affordable prices to the domestic consumers. But an easing of international prices of edible oils could see India setting tariffs at rates higher than the current levels. The net cost of this imposition of tariffs and the welfare tradeoff between producers of oilseeds and consumers of edible oil, which has to be balanced, has been brought out by the partial equilibrium model. An option available to the domestic oilseed producers in the scenario of decreasing protection is to become more competitive to increase the efficiency in production.

With the option for area expansion being ruled out, the domestic oilseed producers have to improve the productivity and thereby reduce the cost of production of oilseeds and edible oils. Technology delivery and input supply in oilseed cultivation should be strengthened so that the need for protecting domestic producers of oilseeds could be gradually brought down commensurate with the increase in efficiency in oilseed production. This will have the effect of equalizing domestic cost of production of edible oils with that of international prices. It will simultaneously increase the domestic edible oil availability and profitability of oilseed cultivation. Some of the specific policy measures to address the present edible oil scenario are:

- Increase allocation for oilseed research to improve efficiency of oilseed production and to reduce the need for protection to domestic primary producers and processors of oilseeds.
- In the medium-term, the farm income safety net for oilseed producers needs continuation. Incentives for increasing productivity could be provided by linking Minimum Support Prices to production efficiency measured through internationally competitive cost of production[4].
- In view of the heavy import dependency expected to continue in the medium-term, maintenance of an effective buffer stock of edible oils is required to manage international volatility in supply and prices of edible oils.
- Measures to expand edible oil base by promoting non-traditional sources of edible oils like palm oil (highest per hectare productivity across edible oils) and rice bran oil need to be implemented

Oilseed and edible oil economy in India supports the livelihood of a significant part of the population and is also crucial for achieving nutritional security. The concerted efforts through integration of technology, policy and trade could transform the oilseed economy into a vibrant sector and contribute significantly to the achievement of inclusive agricultural growth.

End-notes

1. The data from domestic wholesale price indices with base 2004-05= 100 published by the Office of the Economic Advisor , Ministry of Finance, were used for co-integration analysis . The international reference prices for the selected commodities were : Groundnut oil (any origin), c.i.f. Rotterdam; Soybean oil (Any origin)- crude, f.o.b. ex-mill Netherlands; Rapeseed Oil- Crude, fob Rotterdam; Palm oil- (Malaysia), 5% bulk, c.i.f. N. W. Europe; Soybeans- c.i.f. Rotterdam; and Groundnuts (peanuts)- cif Argentina.
2. In the same study, the optimistic scenario for supply projection of edible oils was constructed by taking into account the potential yield of oilseed crop with adequate level of technology and was calculated as 14.92 Mt in 2020-21. Given the projected demand of 20.36 Mt of edible oils, even under optimistic scenario of supply projection, there will be a gap of 5.44 Mt by the end of 13th Plan, which will have to be met through imports.
3. For the purpose of the model it was assumed that the supply curve has a constant elasticity of supply and the demand curve has a constant price elasticity of demand. The model employed was a partial equilibrium model which ignores the interaction between edible oils and other substitutes. The value of elasticity of supply was

assumed to be 1, which is a close approximation for oilseed crops which are commercially cultivated in India with limited purchased inputs. The demand elasticity for edible oil calculated by Mittal (2006) on an all India basis (-0.78) was used in the model. The expenditure elasticity of demand was used as a proxy for income elasticity for edible oils and an expenditure elasticity of 0.55 calculated by Kumar (1998) was used in the model.

4. Measurement of relative production efficiency and levels of protection based on international reference prices and domestic prices has some disadvantages. The producers of foreign countries also receive production support which is not usually reflected in the international reference prices (e.g., export subsidies). Expressed as a percentage of gross value of farm receipts, the Producer Support Estimate was 30 per cent ,34 per cent and 16 per cent for OECD countries, USA and EU, respectively during 2003-05. This calls for a realistic re-assessment of production efficiency of oilseeds in India and efforts to reduce the producer support provided in the developed economies.

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