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India
The Indian Oilseed Complex: Capturing Market Opportunities

(In Two Volumes) Volume II: Annexes

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ABBREVIATIONS & ACRONYMS

CACP	Commission on Agricultural Costs & Prices
CSIR	Council for Scientific Industrial Research
CSS	Centrally Sponsored Schemes
CV	Coefficient of Variation
DOA	Department of Agriculture
DOC	De-Oiled Cake
DRC	Domestic Resource Cost
EC Act	Essential Commodities Act
FAQ	Fair Average Quality
FC(R)	Forward Contracts (Regulation)
FFA	Free Fatty Acids
FMC	Forward Market Commission
f.o.b.	free on bord - fob
GATT	General Agreement on Trade & Tariffs
GCA	Gross Cultivated Area
GDP	Gross Domestic Product
GOI	Government of India
HVOC	Hindustan Vegetable Oils Corporation
ICAR	Indian Council of Agricultural Research
IFPRI	International Food Policy Research Institute
IPO	Integrated Policy for Oilseeds and Edible Oils
ITC	Indian Tobacco Company
MIO	Market Intervention Operation
MOA	Ministry of Agriculture
NABARD	National Bank for Agriculture and Rural Development
NAFED	National Agricultural Cooperative Marketing Federation
NCA	Net Cultivated Area
NDDB	National Dairy Development Board
NODP	National Oilseeds Development Program
NPC	Nominal Protection Coefficient
OGCP	Oilseed Growers Cooperative Project
OPP	Oilseeds Production Program
OPTP	Oilseeds Production Thrust Program
PDS	Public Distribution System
RBD	Refined, Bleached, De-odorized
RBI	Reserve Bank of India
SSI	Small Scale Industry
STC	State Trading Corporation
STE	State Trading Enterprise
TMO	Technology Mission of Oilseeds
TRIP	Trade Related Intellectual Property
UNCTAD	United Nations Conference on Trade and Development
URA	Uruguay Round Agreement
WTO	World Trade Organization

INDIA

THE INDIAN OILSEED COMPLEX: CAPTURING MARKET OPPORTUNITIES

Volume II

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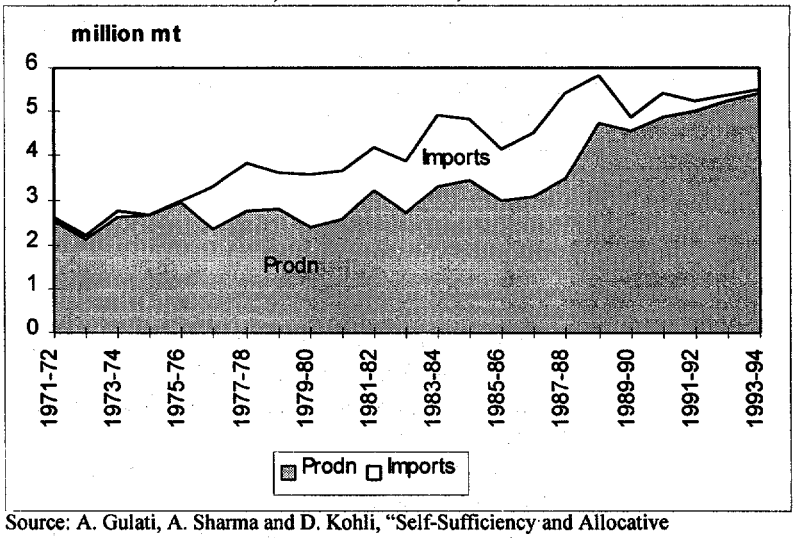
Annex 1 The Policy Environment

A. Genesis of an Import Substitution, Infant Industry Strategy

A1.1 Starting in the mid-70s, major imbalances were unfolding in the Indian oilseed complex. The growth in demand for edible oils was out-pacing domestic supply, imports were rising rapidly and foreign exchange costs escalating (Figure A1.1, Table A1.1). While annual oilseed production growth was stagnating (1% per annum between 1968 and 1981), domestic demand for edible oils was accelerating, reaching almost 16% growth per annum between 1965 and 1975. By 1979-80, edible oil imports accounted for 32% of total domestic supply (Figure A1.1). Projections made by the World Bank in 1981 estimated that "by 1990, filling the gap through imports would mean spending between US$ 3-4 billion (6-8% of total imports) and absorbing between 8-10% of total projected world exports of vegetable oils."[1]

A1.2 This widening gap between supply and demand became a major policy concern. Increasing amounts of scarce foreign exchange had to be diverted to satisfy domestic demand. By the early 1980s, the cost of edible oil imports amounted to over $650 million, nearly half of total food imports, and 4 to 5% of the value of total merchandise imports (Table A1.1). Furthermore, the increasing reliance on imports was considered undesirable from a food security and price stability perspective.

Figure A1.1
Domestic Production and Imports of Edible Oils for Human Consumption in India, 1971-72 to 1993-94, million mt.



Source: A. Gulati, A. Sharma and D. Kohli, "Self-Sufficiency and Allocative Efficiency: The Case of Oilseeds in India," draft mimeo, January 1996.

[1] World Bank, 1981, "India: Demand and Supply Prospects for Agriculture," Staff Working Paper, No. 500.

A1.3 Following the success of the green revolution in wheat and rice, GOI shifted its policy attention to the oilseed sector in the early 80s. GOI's main objective was to achieve self-sufficiency and food security in the edible oil sector. The import-substitution strategy consisted of promoting technological change in oilseed production and processing, while shielding the sector from international price competition and instability. Policies governing the oilseed complex gradually evolved from a narrow focus on production and processing technology under highly protective trade barriers (1979-80 to 1985-86), to a more comprehensive coverage of marketing and price policy considerations (1985-86 to 1993-94). Increasingly, the management of price incentives in terms of levels and stability was recognized as a major impediment to the rapid and sustained technological progress in oilseed production and processing.

Table A1.1
Edible Oil Imports in Value and Percent of Food and Total Imports

Years	Average Value of Edible Oil Imports, $ million	Edible Oil Import Value over	
		Food Imports	Total Imports
1980/81-1982/83	655	49.7%	4.6%
1983/84-1985/86	693	47.4%	3.6%
1986/87-1988/89	564	47.2%	1.3%
1990/91-1992/93	113	19.4%	0.2%
1993/94	53	9.6%	0.2%

Source: *Economic Survey*, various issues.

A1.4 Reforms implemented since 1994 have radically transformed the policy landscape of the Indian oilseed complex. Major vegetable oils can now be freely imported under modest tariffs (20%) exposing for the first time the oilseed complex to foreign competition and international price volatility. Market Intervention Operations (MIO) to stabilize domestic prices have been disbanded and domestic controls on movement of seeds and oils are progressively and selectively being relaxed by some state governments.

A1.5 The remainder of this chapter briefly describes the policy instruments governing the oilseed complex in India, and their evolution over time. The various policy instruments, and their evolution over time, are summarized in Table A1.2. In Section Two, we review external trade policies. Section Three summarizes the government programs to support technological change in oilseed production and processing. Section Four reviews domestic price and trade policies, including: price support and stabilization, food distribution, credit and taxation policies, and the legal and regulatory environment governing movement, storage, forward and futures trading practices, and the processing of oilseed commodities.

B. External Trade Policies

A1.6 **A Virtually Closed Trade Regime Prior to 1994.** Until 1994, India protected its oilseed complex by quantitative restrictions on both imports and exports (Table A1.3). In a situation of excess domestic demand for edible oils, non-tariff barriers played a crucial role in setting the domestic price level in the oilseed complex. Specifically, all edible oilseed, oil and meal imports were canalized through the State Trading Corporation (STC) and the Hindustan Vegetable Oils Corporation (HVOC). HVOC's main occupation remained limited to the packaging of oils (mainly palm olein) imported by STC. All vegetable oil imports were then

channeled to state governments for sale in the Public Distribution System (PDS) at administrative prices.[2]

Table A1.2
Government Interventions in the Oilseed Complex, April 1997

Policies	*Status*	*Remarks*	*Implementing Agency*
Trade Policies			
• Import: Seeds	Canalized	Soybean special program in 95	Min Commerce - STC
Oils	Free	Tariff: 20%	Min Commerce
Meals	Restricted	-	Min Commerce
• Export :Seeds	Restricted	Free: Groundnut HPS; rapeseed & sunflower in 1995	Min Commerce
Oils	Restricted	-	Min Commerce
Meals	Free	-	Min Commerce
Price Policies			
• Price Support	Yes	Price support well below market prices	NAFED
• Stabilization	No	MIO under IPO disbanded in 1994	MIO -NDDB
• PDS	Yes	Since IPO (1989), small vol & price differential	Min of Food & C.A. - Empowered Committee
• Storage	Lifted	Cooperatives exempted; lifted in 1997	Min of Food & C. A.
• Movement	Yes	Periodic; Cooperatives exempted	State governments
• Working Capital	Lifted	Lifted in October 96; Cooperatives exempted	RBI
• Forward Trading	Ban	Permitted up to 11 days	Min Food & C.A. - FMC
• Futures Trading	Ban	Allowed for castorseed	Min Food & C.A. - FMC
Agro-Processing Policies			
• Small Scale Reservation	Yes	Expelling of rapeseed-mustardseed and groundnut, crushing equipment. Investment ceiling raised to Rs. 30 million in 1996. Cooperatives exempted	Min Industry
• *Vanaspati* Industry	No	Price & movement controls lifted in 1989	Min Food & C.A.
Food & Health Safety			
• Veg. Oil Products Order, 1947	Yes	Used to control *vanaspati* industry	Min Food & C.A.
• PFA Act, 1954	Yes	1992: blending of 2 oils allowed	Min Health
• S.E. Oil Order, 1967	Yes	1991: Licensing req. removed	Min Food & C.A.
• Pack'd Commodities Order, 1971	Yes	15kg tins exempted	Min Food & C.A.
• Blended Edible Veg. Oils			Min Food & C.A.
• Grad'g & Mark'g Order, 1991	Yes	Define grade, marking, packaging	Min Rural Development
• Weights & Measures Act	Yes	1992: volumetric packaging of edible oils allowed	Min Food & C.A.
Technology Programs			
Crop Research & Development	Yes	Under TMO, mini-mission I	ICAR - DOR
Crop Technology Dissemination	Yes	CSS; since 85/86: NODP, OPTP, OPP	MOA - DOA
Cooperatives	Yes	OGCP since 1979/80	NDDB
Processing Technology	Yes	Under TMO, mini-mission II	CSIR

Note: PFA Act: Prevention of Food Adulteration Act; S.E. Oil Order: Solvent Extracted Oil, Deoiled Meal and Edible Flour (Control) Order. Min Food & C.A.: Ministry of Food and Consumer Affairs

[2] An issue price is fixed by the Central Ministry of Food & civil Supplies, at which canalized imports are sold by STC to State governments for distribution in the PDS. In 1988/89, canalized imports were subjected to customs duty (65% for palm oil, 45% for soybean and rapeseed oils) and STC's service charges (22% of CIF price). Actual distribution of the edible oils through the fair price shops is the responsibility of the State governments, under maximum retail prices recommendations issued by the central government.

Table A1.3
Major Agricultural Products:
Import Tariffs and Trade Policy Status, November 1996

Commodity	Existing Tariffs April 1995 (%)	Uruguay Round Binding (%)	Quantitative Restrictions	
			Exports	Imports
Oilseeds	40/50	100	Mostly restricted	Canalised
Oil cakes, meals, & flours	50	150	Free	Restricted
Soya, rapeseed, mustardseed, olive, & colza oils	20	45	Mostly restricted	Free
Other edible oils, incl. coconut & palm oils	20	300	Mostly restricted	Canalised

Notes: "Mostly restricted" means that most products or product varieties in the category are free of licensing or other non-tariff controls. "Canalised" indicates a parastatal trading monopoly; i.e., that only a designated state agency is allowed to import export.
Source: Indian Trade Policies since the 1991/92 Reforms. Garry Pursell & Anil Sharma, Mimeo, World Bank, February 1996.

A1.7 Until 1995, exports of all edible oilseeds and oils were banned, while that of oilseed cakes were permitted, but subjected to export licensing, registration requirements and other controls. In fact, exports of oilseed cakes, the production of which exceeds domestic demand, were promoted by a variety of export incentive schemes[3] established by GOI throughout the 80s and early 90s in an effort to generate foreign exchange.

A1.8 **Protection Levels Were High and Directed at the Oilseed Processing Industry, Not at the Farm Level.** In practice, only vegetable oils were imported by the STC; seeds were never imported. Until 1994, domestic vegetable oil prices were not linked to international price levels. The quantitative restrictions on the volume of canalized vegetable oil imports and their PDS price, both set by the Central Food & Civil Supplies Ministry, determined the domestic price level of vegetable oils. The volume of canalized imports was set administratively to meet some specified target for domestic demand. As a result, domestic prices of most vegetable oils were maintained at levels more than double world market prices throughout the 80s (Table A1.4).

Table A1.4: Nominal Protection Coefficients in the Oilseed Complex (Importable Hypothesis)

Commodities	1980/81-1986/87	1987/88-1989/90	1990/91-1994/95
Groundnut	1.20	1.41	0.88
Rapeseed/ Mustardseed	1.06	1.44	1.19
Soybean	0.89	0.96	0.89
Sunflower	1.25	1.27	1.13
Groundnut Oil	1.87	1.88	1.34
Mustard seed Oil	2.41 (a)	2.60	1.88
Soybean Oil		2.50	1.96
Sunflower Oil		2.47	1.96 (b)
Coconut Oil	2.97	3.07	2.36

Source: Oils - *Self-Sufficiency and Allocative Efficiency, Case of Oilseeds in India,* A. Gulati, A. Sharma & D.S. Kolki, January 1996. Oilseeds - *Trade Policies and Incentives in Indian Agriculture. Background Statistics and Protection and Incentive* Indicators, G. Pursell & A. Gupta, mimeo, World Bank.
Note:: NPC estimates are adapted and differ from the above sources as a result of different assumption regarding the reference point (see Annex 5).

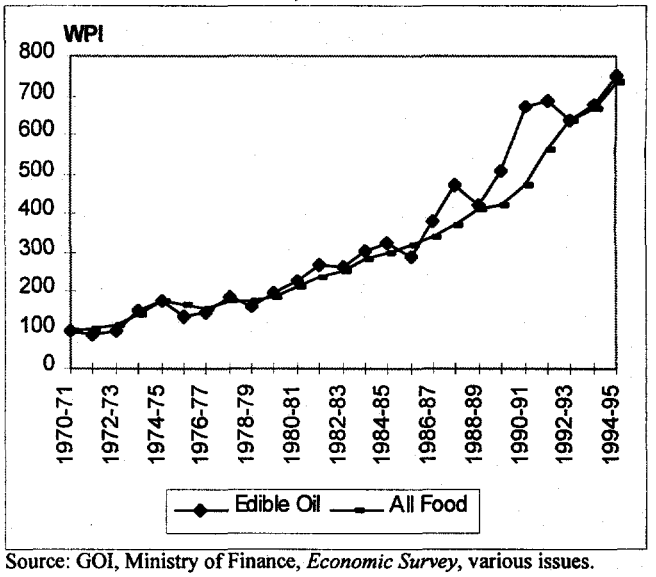
A1.9 In contrast, domestic oilseed production was much less protected. In the absence of rice oilseed imports, oilseeds derive their protection level from that granted to the Indian oilseed crushing industry through canalized imports or tariffs on edible oils. Oilseed export restrictions further provide additional protection to the local processing industry from external competition.

[3] For example, a 10% cash subsidy export incentive program which was discontinued in 1991.

The less efficient the domestic oilseed processing industry, the less oilseed growers would receive for given domestic oil and oilseed meal price levels. In practice, export restrictions were largely irrelevant until the early 90s since domestic prices remained above world prices for all oilseeds except soybean (Table A1.4).

A1.10 **Consumers Bear the Brunt of the Import-Substitution Strategy.** Consumers had to bear most of the costs from the high protection level to the oilseed commodity system which reached its highest level in 1986/87 (see oils NPCs in Table A1.4). In addition, consumer edible oil prices rose much faster than general food prices between 1986/87 and 1990/91 (Figure A1.2). This rapid increase was provoked first by poor harvests, then by a deliberate and sharp drop in the volume of edible oil imports (Figure A1.1) under the Integrated Policy on Edible Oilseeds and Oils (para A1.23) and scarce foreign exchange situation. Since 1986/87, Indian oil prices have declined sharply and consistently relative to world price levels as a result of rapid production increases and the Rupee devaluation.

Figure A1.2
Wholesale Price Indexes for Edible Oils and All Food Commodities, 1970-71 Base Year.



Source: GOI, Ministry of Finance, *Economic Survey*, various issues.

A1.11 **Dramatic and Rapid Liberalization of Vegetable Oil Imports Since 1994.** The recent global endorsement of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT),[4] the economic liberalization program, and inflationary pressures prompted GOI to reduce most import restrictions on vegetable oils. In March 1994, palm olein oils --by far the largest-- were permitted to be imported under Open General License (OGL) with a duty rate of 65 percent (Table A1.3). At the same time, STC and the National Dairy Development Board (NDDB) were allowed to import vegetable oils at the concessional rate of 20 percent. On March 1, 1995, all vegetable oils -- except for coconut oil, RBD palm oil and palm stearin which remain canalized-- were placed under OGL at import tariff rates of 30 percent; STC and NDDB continue to benefit from the 20% concessional tariff rate. In 1996, the new budget announced a further cut in import tariff to 20%, ending the preferential treatment to STC & NDDB.

A1.12 **Vegetable Oil Imports Resume Despite High World Prices.** During marketing year 1994/95 (October to September), total vegetable oil imports was expected to reach as much as 500,000 mt --about 8% of domestic consumption-- with palm olein accounting for 380,000 mt.[5] STC is reported to have imported around 90,000 mt of vegetable oils --all palm olein-- and the NDDB has imported 80,000 mt of oils --30,000 mt of soybean oil, 10,000 mt of sunflower seed oil, 10,000 mt of cottonseed oil, and 30,000 of palm olein. Due to high international prices, and

[4] See Annex 6 for a more detailed description of India's commitments to the Uruguay Round Agreement.

[5] Source: Oilseeds and Products Annual Report, 1995, USDA/FAS.

tariff differentials, the private sector delayed its purchase decisions. Private trading companies are estimated to have contracted between 100,000 and 150,000 mt of oils, mostly palm olein. The competition from imports further contributed to bringing domestic oil prices in line with the 65% import tariffs by 1994/95, except for groundnut oil whose price fell even below. The combination of higher domestic production, Rupee devaluation, and free imports contributed significantly to the remarkable drop in the protection level of edible oils, to the great benefit of Indian consumers.

A1.13 **Soybean Imports Allowed Temporarily in 1995.** In February 1995, GOI allowed, on a temporary basis, the duty-free imports of soybean by private crushers subject to meal re-export conditions; all other oilseed imports remain canalized by the STC and HVOC. This policy change was in response to industry concerns that capacity utilization and meal exports would decline following the poor 1994 soybean harvest. In response to this policy, about 30,000 mt of soybeans have been imported so far, against import licenses for approximately 970,000 mt.[6] Bureaucratic delays, high world soybean prices, and onerous phytosanitary requirements --a 45 day grow-out period imposed by the Ministry of Agriculture-- have limited actual imports under this program.

A1.14 **Exports of Sunflower and Rapeseed-Mustardseed Seeds Allowed in 1995.** In May 1995, quota restrictions on exports of sunflower seeds and rapeseed-mustardseed were lifted, but have been maintained for other oilseeds. Exports of vegetable oils, except groundnut oil, remain restricted to consumer packs of up to 5 kg; in practice, no significant exports take place due to high prices of Indian oils and the limited foreign market opportunities for packaged oil. Exports of oil meals were already allowed, and the remaining registration requirements were abolished in May 1995. Exceptions include niger seed which are canalized through three state agencies, and exports of de-oiled groundnut cakes containing more than 1% of oil.

A1.15 **India's GATT Commitments for Oilseeds, Meals and Edible Oils.** The current trade regime for oilseeds, oils and meals is consistent with India's commitments to the Uruguay Round of the GATT. India has committed to tariffy its non-tariff barriers[7] and to adhere to the tariff ceiling bindings it has submitted. India's ceiling bindings for edible oils and oilseeds are high --ranging from 45 to 150 percent-- and far above current tariff levels (Table A1.3). This leaves India with the option to raise its tariffs up to the ceiling bindings at any time. India also retained the right to register the STC and HVOC as state trading enterprises, giving GOI the option to re-introduce the import canalization of all edible oilseeds and oils at any time. If canalized imports are re-introduced, there is no GATT-related constraint on the extent to which domestic prices can rise above world prices. The URA also does not prohibit the existence of concessional tariffs to some importers.

C. Central Government Programs to Support Rapid Technological Change

A1.16 **Oilseed Growers' Cooperative Project Launched to Modernize Marketing & Processing, 1979/80 - 1996.** Progress made by NDDB in increasing domestic milk output under Operation Flood encouraged GOI to duplicate that approach to increasing oilseed production. It

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[6] Source: same as footnote 5.

[7] See Annex 6 for a detailed discussion of the implications of the GATT for Indian Agriculture.

resulted in the NDDB managed Oilseed Grower's Cooperative Project (OGCP) launched in 1979-80. Following the principle of Operation Flood, a network of oilseed growers' cooperatives was to be established to provide a market outlet for farmers' output and serve as a medium for delivering farm inputs and support services, such as credit, improved seeds, fertilizer and extension. Proceeds from the sale of edible oil donated by the Cooperative League of the United States and the Cooperative Union of Canada financed the investment costs of cooperative infrastructure.

A1.17 In addition to the above efforts, the OGCP also aimed at modernizing the oilseed marketing channel and processing industry. Presently covering the nine major oilseed producing states,[8] the project helped establish 5,513 oilseed grower's societies with about 1 million members, affiliated with 18 unions. By 1994-95, an oil crushing capacity of 3,310 mt per day, a solvent extraction capacity of 1,980 mt per day, and refining capacity of 733 mt per day have been established under cooperative management under the OGCP. Cooperative storage capacity under the project reached 170,000 mt for oilseeds and 277,000 mt for oil during the same period. According to NDDB, it was felt that, through 1986-87, the OGCP was successful in influencing market prices, farmers' investments in technology and in creating the first modern processing capacities in India. However, it did not contribute to a stable market and failed to sustain a high level of farmer loyalty to the cooperatives.

A1.18 **National Oilseed Development Project, 1984-85.** The modernization effort of the OGCP was hampered by the absence of a coherent strategy for developing and diffusing appropriate technology at the farm level. To remedy this situation, the National Oilseeds Development Project (NODP), initiated in 1984-85 and launched in 1985-86, consolidated and re-oriented the numerous and scattered centrally-sponsored schemes for oilseed development under a single scheme. The NODP and its successors are Centrally Sponsored Schemes (CSS) financed predominantly (75%) by the Ministry of Agriculture (MOA) of the GOI, and implemented by the state governments' Departments of Agriculture (DOA) under strict central guidelines (Table A1.5). Under the NODP, the four major oilseeds --groundnut, rapeseed-mustardseed, soybean, and sunflower-- were given priority in potential areas in 12 states. Another component of the NODP, the IODP was targeted at sesame, niger seed and safflower in areas not covered by special projects of the four major oilseeds referred to above. The NODP was later extended to 180 districts in 17 oilseed growing states. The two main objectives of the NODP --and its successors-- were to: (i) ameliorate oilseed crop technology by developing improved cropping practices, and improved or

Table A1.5
Central Financing of Central Sector and Centrally Sponsored Plan Schemes for Oilseeds
(Rs. Million at current prices)

Year	Central Sector	CSS	Total
1985-86 [a]	2.50	322.31	324.81
1986-87 [a]	0.00	140.44	140.44
1987-88 [a]	0.00	326.85	326.85
1988-89 [a]	0.00	512.71	512.71
1989-90 [a]	0.16	490.66	490.82
1990-91 [a]	4.21	546.58	550.79
1991-92 [a]	235.25	582.41	817.66
1992-93 [a]	157.18	729.30	886.48
1993-94 [a]	203.07	946.52	1149.59
1994-95 [b]	310.31	1004.00	1314.31
1995-96 [b]	406.00	1040.00	1446.00

Note: a - actual expenditures; re - estimated.
Source: Central Government Budget Documents

[8] The states include: Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, and Uttar Pradesh (National Dairy Development Board, 28th Annual Report, 1993-94).

hybrid seed varieties with higher yields, shorter crop duration, better tolerance to drought, pests and diseases, adaptable to a greater variety of agro-climatic situations; and (ii) accelerate the diffusion of the new crop technology among farmers by subsidizing packages of inputs (mini-kits which included improved seeds varieties, rhizobium cultures, fertilizers, plant protection chemicals, and irrigation equipment) along with providing extension activities.

A1.19 **Technology Mission on Oilseeds, 1986.** The Technology Mission on Oilseeds (TMO) launched in 1986, and established in the Ministry of Agriculture, represented a decisive step by GOI towards the consolidation of government programs designed to support rapid technological change in oilseed production and agro-processing. It was also the first attempt at addressing domestic price volatility with the introduction of producer price support operations. To achieve its stated self-sufficiency objective in edible oils by 1990, GOI initiated four mini-missions (Table A1.6). The first mini-mission focused on the coordination and acceleration of varietal and agronomic research on oilseed crops, with the Directorate of Oilseed Research, Hyderabad as the nodal agency. The second mini-mission centered on technological improvements in oilseed processing, with the Council for Scientific and Industrial Research as the nodal agency, and the promotion of both cooperative and private sector involvement in oilseed processing activities. The third mini-mission sought to improve the delivery of inputs and support services, particularly extension services for improved production technologies, to farmers. The fourth mini-mission focused on oilseed market development and price support operations. The National Agricultural Marketing Federation (NAFED) was given the implementation responsibility of the price support operations.

A1.20 As part of Mini-Mission III, a three-year CSS scheme called the Oilseed Production Thrust Project (OPTP) was initiated in 1987-88 covering 246 districts in 17 states. In 1990-91, the NODP and OPTP were eventually merged under a single program called the Oilseed Production Program (OPP). In 1992/93, the OPP covered 324 oilseed-growing districts spread over 21 states.

Table A1.6
Technology Mission on Oilseeds, 1986

Mini-Mission I Crop Production Technology Development	Mini-Mission II Post Harvest Technology Development	Mini-Mission III Improved Input and Support Service Delivery	Mini-Mission IV Price Support and Market Development
Develop improved varieties with higher yields, higher oil content, shorter growing duration, improved resistance to disease, pest and moisture stress Produce and multiply of nucleus and breeding seeds Implementing Agency: Directorate of Oilseeds Research	Improve efficiency of processing through the use of modern integrated technologies and improving efficiency of *ghanis* and oil expeller units in private and cooperative sector Develop technology for minor and unconventional oil-bearing materials Implementing Agency: Council for Scientific & Industrial Research Promotion private sector processing	Strengthen extension system Streamline production and distribution of seeds Streamline supply and distribution of inputs Improve credit delivery Implementing Agencies: Ministry of Agriculture & states' Department of Agriculture	Create and expand integrated processing facilities in the cooperative sector Increase efficiency of procurement operations Improve price dissemination and ensure fair prices to consumers Modernize marketing facilities (storage, packaging) Implementing Agency: NDDB

D. Domestic Price & Trade Policies

A1.21 Domestic policies governing the oilseed commodity system cover a wide range of instruments, including price support and stabilization, food distribution, industrial and trade regulatory, taxation, and forward and futures trade policies.

Price Support & Stabilization Policies

A1.22 **Except for a Short Spell under the MIO (1989-1994), Price Support and Stabilization Policies Have Been Largely Non-Existent.** The Agricultural Prices Commission and later the Commission for Agricultural Costs and Prices (CACP) have announced support prices for major oilseeds since the early seventies. The National Agricultural (Cooperative) Marketing Federation (NAFED) was designated as the nodal agency for undertaking price support operations for five years starting in 1985-86 under the TMO. Price support operations covered six major oilseeds --groundnut, rapeseed-mustardseed, soybean, sunflower, and safflower-- on the basis of the support price recommendations issued by the Commission on Agricultural Costs and Prices (CACP). However, these announcements did not have any direct impact, since market prices were always higher than the announced support prices.

A1.23 **The Integrated Policy for Oilseeds, 1989-1994.** The volatility of domestic prices in the oilseed complex, and the management of oil imports under increasingly scarce foreign exchange conditions, prompted GOI to adopt an Integrated Policy on Oilseeds and Edible Oils (IPO) in January 1989. The IPO completed the coverage of GOI interventions in the oilseed complex. It was perceived that while developmental activities pertaining to oilseed crop and processing technology were well integrated under the TMO, the commercial operations in the oilseed complex remained un-coordinated. The fast deteriorating foreign exchange situation also demanded a coordinated approach to the management of imports and distribution of edible oils. The IPO recognized the need for an improved management of price incentives in terms of both level and stability. It did so by:

- Introducing Market Intervention Operation (MIO);
- Reducing the differential between the open market price and the Public Distribution System (PDS) price of edible oils, and sharply curtailing the volume of oil imports;
- Transferring the administrative control of the TMO to the Empowered Committee on Oilseed Policy, chaired by Cabinet Secretary.

A1.24 **Market Intervention Operations, 1989-1994.** The MIO, implemented by NDDB from April 1989 to April 1994, was the first major attempt of the GOI to directly stabilize oilseed and edible oil prices within a pre-determined price band. The price band policy sought to fix the procurement prices of groundnut and rapeseed-mustardseed "at least 40% above the present levels recommended by the CACP".[9] The NDDB was to achieve this by means of buffer

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[9] Shenoi, P.V. (1989); *Oilseeds Situation in India*, Department of Agricultural Research and Education, Ministry of Agriculture, Government of India, New Delhi.

stocking operations of seeds and edible oils from both domestic and imports sources "when the prices of groundnut and rapeseed-mustardseed went outside their prescribed price bands."[10]

A1.25 The Empowered Committee on Oilseed Policy set the wholesale price bands for groundnut oil and rapeseed-mustardseed oil in 1989-90, and for groundnut oil in 1990-91.[11] In the subsequent years, no price bands were set by the Empowered Committee. Instead, the NDDB aimed at stabilizing wholesale groundnut and rapeseed-mustardseed oil prices within a 30% and 45% price band, respectively. Groundnut oil prices in Bombay and rapeseed-mustardseed oil prices in Delhi were used as indicators for judging the performance of the MIO. To maintain the price band, NDDB bought, stocked and sold oilseeds, groundnut and mustardseed-rapeseed oils for achieving the intended stabilization.

A1.26 The NDDB was allocated an initial market intervention fund of Rs. 3 million to operate the MIO. A special line of credit at concessional rates from the Reserve Bank of India and NABARD was provided to finance the MIO. NDDB also relied on canalized imports at pre-determined prices to maintain the ceiling price during the lean months and offset possible losses on account of the MIO.

A1.27 NDDB also created the National Oil Grid and its own edible oil brand, *Dhara*, to assist in achieving the MIO objectives. Modern oil tank farms with a capacity of 40,000 mt at Kandla and 100,000 mt in Delhi were set up, in addition to storage facilities in both producing and consuming centers to backstop the oil grid. NDDB marketed its own brand of edible oil, *Dhara*, through a network covering 24 states and three Union Territories. *Dhara* sales reached a peak of about 132,000 mt in 1992, but the volumes have almost halved since the closure of MIO in 1994.

A1.28 **NDDB's MIO Ended In 1994 in Considerable Operating Losses and Controversy.** During the period 1991-93, NDDB reported accumulated losses of about Rs. 2.72 billion.[12] The Empowered Committee on Oilseed Policy directed NDDB to cease its procurement operation in June 1993 and to liquidate its existing stocks by March 1995. Government funding of MIO ended in April 1994. Two successive committees appointed by GOI reviewed the workings of the MIO. No decisions arose out of the first committee appointed in 1990 by the Deputy Prime Minister. In 1993, a second committee was appointed under the chairmanship of P.V. Desai. Its mission was to look into the differences between NDDB and GOI about the magnitude of the operating losses under the MIO and the admissibility of NDDB's claim for reimbursement, notably under its Dhara operations. An agreement on compensation was eventually reached between GOI and NDDB. In 1994, GOI announced that NDDB would be allowed to import 150,000 tons of edible oils at a concessional tariff rate of 30%.

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[10] Ninan, K.N. (1995); "Oilseeds Development & Policy: A Review," *Economic & Political Weekly*, pp. A.14- A.20, March 25, 1995.

[11] Meeting with NDDB; May 1995. For 1989-90, the wholesale price bands for groundnut and rapeseed-mustard seed oils were set at Rs. 17,000 - 23,000 per mt, respectively; and in 1990-91 at for groundnut oil. NDDB procured rapeseed-mustard seed seeds at Rs 5,800 per mt in 1989-90. See also P.V. Shenoi, "Oilseed Development: Role of Market Intervention and Policy Support," *National Seminar on Oilseeds Research and Development in India: Status and Strategies*, Indian Council of Agricultural Research, Hyderabad, August 2-5, 1993, pp. 27-33.

[12] Rachna Burman, "Ministry favors 4 lakh tonnes duty-free oil import by NDDB," *Economic Times*, August 5, 1995.

Public Distribution of Edible Oils

A1.29 **Edible Oils Introduced on the PDS List in 1974.** The Public Distribution System (PDS) is a safety net program of the GOI designed to improve food security for consumers in India by subsidizing rations of essential items such as rice, wheat, sugar, edible oils, kerosene, soft coke, and standard cloth through about 430,000 retail outlets spread all over the country.[13] Edible oils became part of the basket of items included in the PDS in 1974 following the 1972-74 drought and its attendant shortages and politically costly price spikes. Prior to 1974, only soybean oil received under PL 480 from the United States were occasionally distributed.

A1.30 **Until 1988/89, PDS Edible Oils Accounted for a Quarter of Domestic Supplies.** The PDS operates as a general entitlement scheme providing equal access to all segments of the population For edible oils, a level of availability of 6.5 kg per capita per year has been fixed.[14] The supply of edible oils through PDS, however, never actually reached this target; even at their peak (Table A1.7), total per capita PDS supply of edible oils was only 1.8 kg in 1988. In spite of low absolute levels, the share of total domestic availability of edible oils handled by the PDS until 1988/89 was high --ranging between 20 and 35%.

A1.31 Unlike foodgrains and sugar, the PDS distribution of edible oils is entirely supported by imports, exclusively undertaken by the STC. The STC arranged for the further refining of the imported crude oils and the subsequent packaging and distribution of the refined oils to the states, as directed by the Department of Civil Supplies. Packaging of the oils into 1 kg packages or into 15 kg tins is undertaken by the HVOC or other State-owned companies. The HVOC, a GOI-owned enterprise, is mainly a manufacturer of refined edible oils and hydrogenated oils. PDS products, including edible oils, are "sold" to the States at a uniform "issue price." The States in turn cover transportation and handling costs and sell to the consumers through a network of fair price shops.

Table A1.7: Public Distribution of Edible Oil in Selected States, 1986/87 (percentages)

State	Share in All-India PDS Distr'n, July 86 - June 87	Leakage as a Proportion of PDS Distr'n
North		
Haryana	1.1	97.2
Himachal Pradesh	1.1	21.7
Jammu & Kashmir	0.5	84.9
Punjab	1.5	60.1
Uttar Pradesh	1.5	95.7
East		
Assam	0.2	81.7
Bihar	1.0	95.9
Orissa	0.8	36.3
West Bengal	13.4	77.9
Center		
Madhya Pradesh	2.7	61.9
Rajasthan	0.6	69.6
West		
Gujarat	16.1	33.9
Maharashtra	20.9	45.8
South		
Andhra Pradesh	13.1	32.4
Karnataka	6.9	53.7
Kerala	2.5	59.6
Tamil Nadu	8.3	56.2
All India	100	54.6

Note: All-India distribution through PDS = 0.817 million mt.
Leakage column is calculated as quantity distributed minus quantity actually purchased.
Source: D. Ahluwalia, 1993, "Public Distribution of Food in India," *Food Policy*

A1.32 **Subsidized PDS Consumer Prices.** Until 1989, PDS edible oil prices remained well below market levels --

[13] Coarse grains, such as sorghum and millet are also distributed in some states, by their volumes are negligible.

[14] The prescribed level of 6.5 kg per capita per year was derived from the recommendation that between 10 to 15 percent of total caloric intake (equivalent to a minimum of 2000 Kcal) should come from fats, with allowance made for invisible fats received from milk and other foods.

between 40% to 80%. The implementation of the IPO in 1989 reduced the difference between market and PDS prices to a much smaller level (between 15 to 20%).

A1.33 In addition to the PDS of edible oils, between 1978 and 1988, the *vanaspati* industry was also allotted imported oils at concessional or commercial rates well below market price levels. Price Control Orders, first statutory under the Essential Commodities Act, and then on a voluntary basis with the consensus of the industry, were imposed upon the *vanaspati* industry to ensure that the benefits of cheap imports reach the *vanaspati* consumers. The supply of cheap imported oils to the *vanaspati* industry was stopped in 1989 as part of the IPO.

A1.34 **Depressing and Destabilizing Price Effects of PDS Oil Supplies.** Numerous evidence accumulated point at the perverse side-effects of the management of PDS oil supplies on the performance of the oilseed complex. The large differential between PDS and free market prices encouraged massive diversions of PDS edible oils to the free market. It has been estimated that during 1986-87, as much as 55 percent of the edible oils channeled through the PDS were illegally diverted to the free market where it was used for blending with other oils (Table A1.7). The large PDS allocations to the surplus oilseed producing states (e.g., Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu) further promoted the incentives for leakages and adulteration. Another concern was that the poor timing of imports and distribution --concentrated around market arrival of the kharif[15] oils-- which further depressed and destabilized producer prices.

A1.35 **Since 1988/89, PDS Supplies Have Dwindled to Insignificant Levels.** The above concerns, combined with the fast deteriorating foreign exchange situation, motivated GOI to curtail and improve the management of its edible oil imports under its Integrated Policy on Oilseeds and Edible Oil (IPO) in January 1989. Since 1989, PDS oil supplies have dwindled to insignificant levels, letting domestic supply and demand conditions set the price level (Figure A1.3). Between 1988-89 and 1991-92, domestic prices initially rose much faster than food prices, but declined afterwards as domestic production increased rapidly (Figure A1.2).

Industrial and Domestic Trade Regulatory Policies

A1.36 The Essential Commodities Act, 1955, the Small-Scale Industrial Reservation Policy, the Reserve Bank of India's (RBI) credit guidelines, taxation policies, and forward trade regulations are the main regulatory instruments of the domestic trade and processing policy regime which help shape the marketing and processing structure and performance of the oilseed industry.

A1.37 **Essential Commodities Act, 1955.** The Essential Commodities Act, 1955 (EC Act) aims at ensuring the availability at reasonable prices of essential mass consumption items, including oilseeds and edible oils[16], by providing GOI with considerable powers to control and regulate the production, supply and distribution of these commodities. The EC Act provides GOI with considerable powers including:

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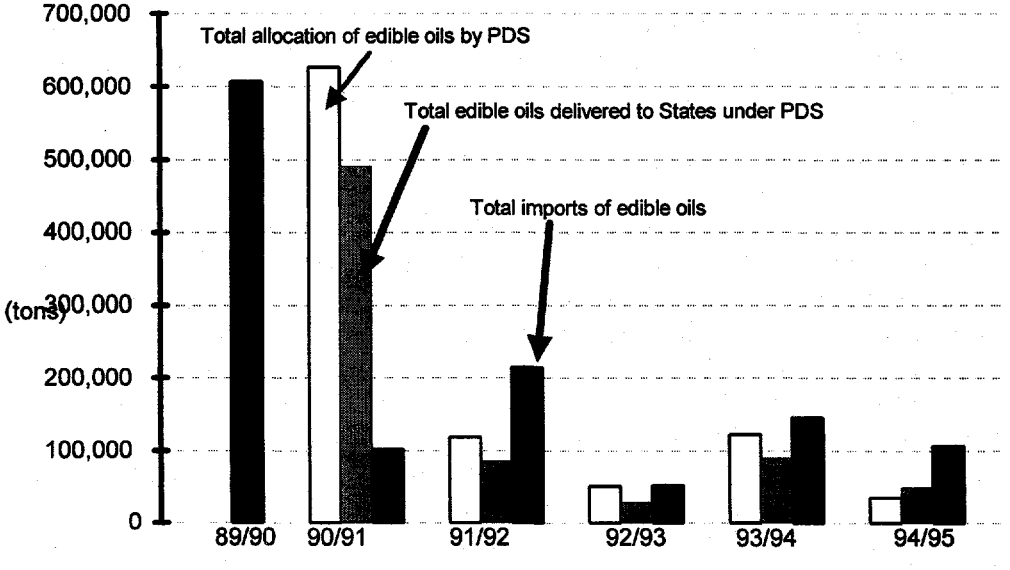
[15] The kharif season covers the monsoon months which lasts from about May to October, depending on the state. The rabi season covers the "winter" months, from November to April.

[16] Other items covered by the EC Act include wheat, paddy, cereals, pulses, sugar, cotton, tea, milk and milk products, and meat and meat products.

- issuance of licenses and permits for the production, trading and processing of specific crops;
- setting of buying and selling prices;
- regulation of storage, transport, and distribution of commodities within and across states;
- prohibition of withholding from sale;
- regulation or prohibition of any commercial or financial transactions considered detrimental to the public interest;
- forced sale of inventories to the government, its agents or representatives.

A1.38 The EC Act authorizes the central government impose duties on state governments, and also to delegate the powers of central government to the state governments. As a result, *Control orders* and *Notifications* may be issued by both central and state governments, or by officers authorized by the central and state governments. All authorities/licensing officers empowered by the central or state governments have large inspectorates to implement these Orders and Notifications. In general, the actual monitoring and enforcement of the EC Act and the Control Orders are performed by the state governments, usually by their Civil Supplies Departments. The intensity of enforcement of the EC Act, however, remains at the initiative of state governments. The states cannot formally relax any provision of the Control orders, although state governments can, with the concurrence of the central government, make them more stringent if the situation warrants it.

Figure A1.3
Edible Oil Imports and Total and State PDS Allocations



A1.39 The central government has the supervening power, i.e. the delegation of power to the state governments is at the discretion of the central government. The delegation could be specific to a commodity or all commodities, or to a particular geographical area. The delegation may also be given under satisfaction of certain conditions --conditional delegation-- by the central government. The principal power rests with the central government even though they have been delegated to state governments. Accordingly, the central government can rescind or modify any control order passed by the state governments which it has used in the past.

Table A1.8
Stock Limits under the Pulses, Edible Oil Seeds Etc. (Storage Control) Order, 1977

Commodity	Category of Cities	Stock limit in quintals in case of:		Remarks
		Wholesaler	Retailer	
Edible Oilseeds including groundnut in shell but excluding mustard seed seed/rapeseed.	Category 'A' Cities Category 'B' Cities Other Areas	1500 1000 500	100 75 50	All Edible oilseeds other than mustard seed seed/rapeseed For groundnut kernel or seeds 75% limits specified shall apply
Mustardseed/Rapeseed.	Category 'A' Cities Category 'B' Cities Other Areas	4500 3000 1500	300 225 150	
Edible Oils including hydrogenated vegetable oils.	Category 'A' Cities Category 'B' Cities Other Areas	600 400 250	20 12 8	All edible oils including hydrogenated vegetable oils.
Edible Oils including hydrogenated vegetable oils.	Category 'A' Cities Category 'B' Cities Other Areas	800 600 350	25 15 10	All edible oils including hydrogenated vegetable oils.

Source: "Essential Commodities Act, 1955," Law Publishers (India) Pvt. Ltd., 1994

A1.40 Three central Control orders under the EC Act are of particular relevance to the oilseed sector; these include the Pulse, Edible Oilseeds, and Edible Oils (Storage Control) Order, 1977; the Solvent Extracted Oil, De-Oiled Meal and Edible Flour (Control) Order, 1967; and the Vegetable Oil Products Control Order, 1947.

A1.41 **The Pulse, Edible Oilseeds, and Edible Oils (Storage Control) Order, 1977** was introduced by GOI to prevent the speculative hoarding of pulses, edible oilseeds and oils. It extends to the whole country. The Order defines:

- *Licensing requirements*. All firms engaged in oilseeds and edible oil trade holding stocks exceeding a small, specified level are required to obtain a license.

- *Stocking Limits*. Stock limits for pulses, edible oils and oilseeds by wholesalers and retailers are specified, based on the category of the city. Limits have been specified for producers, wholesalers dealers and retailers, separately (Table A1.8). Stocking limits are changed occasionally, as recently as 1993 under the Pulses, Edible Oilseeds and Edible Oils (Storage Control) (Second Amendment) Order, 1993. Individual state governments have been empowered by the central government to fix more stringent limits for these commodities by a notification in the Official Gazette (e.g., 2.5 mt for retailers in Punjab). Stocks held by oilseed processors (crushers and refiners) are also limited; oilseed stocks should be no greater than one-eighth of maximum past annual oil production (or annual installed capacity for new plants); edible oils --including refined oils-- stocks should be no greater than one-twelfth of maximum past production (or annual installed capacity for new plants).

A1.42 State owned enterprises, such as the STC, HVOC, and cooperatives are exempted from stocking limits.[17] Solvent-extracted oils, de-oiled cake for export, imports of vegetable oils and

[17] The exemption of the NDDB and other cooperative oilseed federations was confirmed in 1995 by the Central Government, following the litigation between NDDB and the state government of Gujarat.

oilseeds are also exempted from storage restrictions. GOI does not restrict stockholding of solvent extracted oils, on the premise that such oils require further refining for human consumption. The 1997/98 Budget Speech announced that the lifting of the implementation of the Order would be invoked only in well-defined emergency situations.

A1.43 **The Vegetable Oil Products (Control) Order, 1947.** This GOI Order regulates trade in vegetable oils. According to this Order, vegetable oil products mean any hydrogenated vegetable oils, or mixed with any other substance for edible purposes. The Order empowers the state-level Vegetable Oil Products Controller to:

- Specify packaging and labeling requirements of vegetable oil products;
- Specify the types of permits required for the transport of vegetable oil products by road, rail or water;
- Prescribe maximum or minimum limits of usage of vegetable oils in the manufacture of vegetable oil products or to halt processing;
- Set maximum prices that manufacturers could charge and allot quotas for different classes of transactions; and
- Prohibit or restrict the manufacture, storage, or sale of vegetable oil products, taking into account availability of vegetable oils.

A1.44 Until 1989, this Order was used primarily to regulate the price, storage and movement of hydrogenated oil by the *vanaspati* industry, since the *vanaspati* industry was then benefiting from access to imported oils at concessional or commercial rates well-below market prices. The Order was designed to ensure that these benefits were passed on to consumers.

A1.45 **Solvent Extracted Oil, De-Oiled Meal and Edible Flour (Control) Order, 1967.** This GOI Control Order was designed to regulate the oilseed solvent extraction and refining industry to ensure consumer health and safety. Key features of the Order are:

- Licensing of all firms engaged in oilseed solvent extraction[18] or subcontracting of oilseed processing with solvent extraction firms;
- Regulation of the manufacture, storage and sale of solvent extracted oils and edible flours;[19]
- Specification of quality standards of solvent extraction products and by-products;
- Monthly reporting to the Controller of production, stocks, sales and returns and government authority to search the plants and seize stocks if warranted.

A1.46 **Controls on the Movement of Edible Oilseeds and Oils Implemented by State Orders.** Movement controls are imposed by state governments through Orders or Notifications under the power conferred by the ECA. These movements controls can be imposed at any time, for any length of time, in an ad-hoc, opportunistic fashion with limited advance warning to traders and processors by the state governments whenever concerns about price increases arise. In Gujarat, for example, the inter-state movement of groundnut oil was banned seven times

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[18] The type of license issued varies according to the type of operation, for example, pure solvent extraction, solvent plants with pre-cleaning and expelling, solvent plants with refineries, etc.

[19] According to the Third Schedule of the Order, the manufacture, sale and storage is permitted it the oils of standard or refined grade; these activities are prohibited for sub-standard solvent extracted oils.

between 1990 and 1995. Andhra Pradesh exercised the same powers in 1992. The central government has, so far, never intervened to prevent the restrictions imposed on inter-state trade and commerce, by using its supervening power under the ECA.

A1.47 **The New Industrial Policy, 1991 Maintains the Small-Scale Reservation in the Oilseed complex.** The Small-Scale Industry (SSI) reservation policy was formulated in 1977, in conjunction with the Industrial Licensing Policy, 1977. It exclusively reserved the manufacturing of over 3,500 commodities to small-scale and cottage industries. In the oilseed complex, the SSI policy applies to oilseed crushing equipment manufacturing, and to groundnut, rapeseed/mustardseed and sesame oil expelling, except solvent extraction. Safflower crushing was already reserved for cottage industries or *ghanis*. Small-scale enterprises, as defined by the Policy, are enterprises with investments of Rs. 500,000 to Rs. 7.5 million. Industrial units operating prior to 1977 were permitted to continue operations, but barred from expanding their processing capacity. The only exceptions to the SSI Policy are the cooperative processing units. This SSI policy has been a major force in shaping the structure and composition of the oilseed processing industry.

A1.48 The New Industrial Policy, announced in 1991, maintained the small-scale reservation for the commodities listed above. The New Industrial Policy removed the registration --with the DGTD-- and licensing requirements in the solvent extraction and refining industry. In 1996, the investment ceiling for plant and mercenaries of SSIs was raised to Rs. 30 million.

Credit Policies

A1.49 **Additional Private Storage Restrictions through Selective Credit Control Policy, 1977.** The Selective Credit Control Policy does not fall under the EC Act, but represents an additional policy instrument for GOI to regulate storage activities by the private sector. It is implemented by the Reserve Bank of India (RBI) which issues, at least twice a year, new guidelines to the banks, and more often if the situation warrants it. The Selective Credit Control Policy limits the access to trade credit for the storage of essential agricultural commodities, including oilseeds and their vegetable oils. Specifically, the Selective Credit Control sets:

- the rate of interest (up to 1994);
- the level of credit ceilings;
- the minimum margins against stocks which the borrower has to self-finance; and
- the exemption from level of credit, minimum margins and rate of interest.

A1.50 The Selective Credit Control Policy applies to most oilseeds (groundnuts, rapeseed-mustardseed, linseed, castorseed, cottonseed, and all imported oilseeds) and vegetable oils (groundnut, rapeseed-mustardseed, linseed, castor, *vanaspati* and all imported oils), but not to soybean, sunflower and safflower. It applies to all stocks, including stocks secured against warehouse receipts, held by both processing units and any other economic agents. Minimum margins are generally lower for processing units than for others. It is worth noting that stocks secured against warehouse receipts cannot attract more favorable terms --rates of interest, credit ceilings, and/or minimum margins-- than unsecured stocks. On October 18, 1994, minimum margin requirements for oilseeds and vegetable oils were set at 60, 75 and 60% for mills/processing units, others, and warehouse receipts, respectively. The level of credit ceiling was based at 85% of stock held in the three years ending November 1992 - October 1993. The

RBI announced the lifting of the Selective Credit Control Policy for oilseeds and vegetable oils in October 1996.

A1.51 Cooperatives are exempted from minimum margins requirements as well as credit ceilings for both oilseeds and vegetable oils. Some state governments, all public procurement, storage and distribution agencies, and commodities meant for exports --under additional conditions-- are exempted from minimum margins and credit ceilings.

Taxation Policies

A1.52 **Central and State Taxation Policies.** GOI is empowered to impose a central sales tax on inter-state trade and consignment of goods. Similarly, state governments are empowered to charge state sales (or purchase) tax on trade within states (Table A1.9).[20] Value-added taxes have not yet been introduced in India. Local governments also levy entry taxes or Octroi and *Pathkar* on goods entering a local area for consumption, use or sale. Local and state governments also levy Toll Duty for the maintenance of roads, bridges, ferries. The Octroi, *Pathkar* and Toll Duty are collected at entry points. Finally, agricultural commodities sold in the regulated markets are subjected to a market cess levied by the Regulated Market Committee whose level varies across states; in some states (e.g., Punjab) an additional rural development tax is levied together with the market cess.

A1.53 **Oilseed Products are Subjected to a Multi-point, and Non-Unitary Taxation Regime.** Oilseeds and their derivatives are subjected to multiple taxation. For oilseeds, these include a market cess and a purchase tax. Edible oils, oil meals and de-oiled cakes are subject to sales tax and a surcharge on the sales tax. For inter-state trade, traders and dealers of oilseeds and their derived products are subject to a turnover tax, entry tax or octroi, and central sales tax. For items transported over long distances, octroi fees can range from 0.5 to 1 percent of the product value. The frequency of collection of octroi indirectly increases marketing costs. For products transported over long distances, truckers often assume the added financial cost of arranging credit with specialized local agents to pay octroi fees, to avoid the security risk of drivers carrying large amounts of cash for making payment at each octroi post.

A1.54 Tax rates vary across states (Table A1.9), but also from one oilseed to another with no apparent justification. The multiplicity of taxes, and the non-unitary nature of the taxation regime is inimical to an efficient allocation of resources in the Indian oilseed complex, and the development of truly common domestic market. It also encourages large-scale tax evasion. Industry sources estimate that as much as 70 percent of edible oil trade occur without payment of taxes. It is reported that the cost of tax evasion in the form of bribes amount to 1.5 to 2 percent of the product value. In some states with high taxes, the problem of "phantom" inter-state trade has arisen. Companies, in order to avoid paying the high taxes in one state, create subsidiaries in neighboring state who "purchases" the products and "transports" them out of the high tax state and thus generates savings by only paying the Central Sales Tax.

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[20] Under the Sales Tax Act, Administrators are empowered to prescribe the points where products may be taxed. The Sales Tax and Excise Inspectors also have the authority to undertake physical verification.

Table A1.9: Sales Tax Rates on Oilseeds, Oilcakes, Deoiled Cakes, Extraction, Vegetable Oils, and *Vanaspati* Applicable in Different States of India as of June 1995

States	Tax	Oilseeds	Oilcake	Deoiled Cake	Vegetable Oils		Refined	*Vanaspati*
					Edible Expeller Oils	Edible S.E. Oils		
Andhra Pradesh	Sales Tax	2%	4%	3%	4%	4%	4%	2%
Assam	Sales Tax	8%	8%	Nil	8%	8%	8%	8%
Bihar	Sales Tax	4%	5%	5%	--	--	GN-9%, Ms-2%	--
	Add'l Tax	--	1%	1%	--	--	GN-1%, Ms-Nil	--
	Surcharge on ST	--	5-10%	5-10%	--	--	5-10%	--
Delhi	Sales Tax	3%	Nil	Nil	5%	5%	5%	5%
Gujarat	Sales Tax	GN -1%	2%	5%	2%	--	3%	8%
	Rapeseed	2%	2%	all DOC				
	Soybean	2%	2%					
Haryana	Sales Tax	Nil	2%(Pur.)	Nil	6%	6%	--	1%
	Surcharge on ST	--	--	10%	10%	10%	--	10%
Karnataka	Sales Tax	2%	2%	Nil	2%	2%	2%	3%
	Surcharge on ST	--	15%	15%	15%	15%	15%	NA
Kerala	Sales Tax	4%	5% GNOM-2% oth-3%	3%	GN-5% oth-8%	3%	8%	8%
	Surcharge on ST	5-10%	5-10%	5-10%	5-10%	5-10%	5-10%	5-10%
Madhya Pradesh	Sales Tax	4%	4%	4%	2%	2%	2%	4%
	Purchase Tax	SB-1%	--	SBM-2%	--	--	--	--
Maharashtra	Sales Tax	2%	2%	Nil	1.5%	1.5%	1.5%	1.5%
	Turnover Tax	--	--	--	--	1.5%	--	1.25%
Orissa	Sales Tax	4%	4%	Nil	4%	4%	4%	8%
Punjab	Sales Tax	Nil	2%	Nil	8%	8%	6%	4%
	Purchase Tax	2%	--	--	--	--	--	--
	Surcharge on ST	--	10%	--	10%	10%	10%	10%
Rajasthan	Sales Tax	4%	2%	Nil	6%	6%	6%	--
Tamil Nadu	Sales Tax	3%	3%	3%	3%	3%	3%	5%
	Surcharge on Sales Tax	Nil	15% in Mofussil 20% in Madras city	15% - Mofussil 20% - Madras city	15% - Mofussil 20% - Madras city	15% - Mofussil 20% - Madras city	15% - Mofussil 20% - Madras city	15% - Mofussil 20% - Madras city
Uttar Pradesh	Sales Tax	2%	1%	Nil	2%	2%	6%	6%
	Surcharge on ST	Nil	25%	Nil	25%	25%	25%	25%
	Purchase Tax	1%	1%	--	--	--	--	--
West Bengal	Sales Tax	4%	Nil	Nil	3%	3%	7%	15%
	Surcharge on ST	10%	--	--	10%	10%	10%	10%
GOI	Central Sales Tax	na	na	2%	3%	4%	3%	na

NOTE: 1. ST - sales tax; Ms - mustard seed, GNOM -ground nut oil millers, SB - soybean, SBM - soybean meal, DOC -De-oiled cake, na - not available

2. Information published in this statement is based on the information received from SEA members and various Associations. Though all efforts have been made to ensure corrections, the Association shall not be responsible for any omission, deficiency or error. As the current information on the Sales Tax in Kerala, Haryana, Orissa, Delhi and Bihar has not been received, hence last year information is repeated.

Source: Solvent Extractors' Association of India

A1.55 **Numerous Tax Incentives Further Distort the Allocation of Resources.** State governments offer a number of attractive tax incentives to encourage investments, including in oilseed processing. -- in industrially backward areas. It has encouraged the establishment of plants where efficient operations are not likely to be sustainable. State governments have offered deferments or complete exemptions from these taxes to encourage private investments.

Forward Trading Policies

A1.56 **The Forward Contracts (Regulation) Act, 1952 Bans Futures Trading in the Oilseed Complex.** Futures trade in oilseeds, oils and meals was introduced in India in 1926, and were actively traded until the early 1960s. All futures contracts were banned gradually during the 1960s, and the last two remaining futures contracts -- castorseed and linseed-- were disallowed in 1977. The ban on futures trading of oilseeds, oils and oilseed meals stems from the Forward Contracts (Regulation) Act (FC(R) Act), which was introduced in 1952 to regulate forward and futures trading in India. It is only in the case of castorseed --a non-edible oilseeds-- that futures (hedge) contracts have been allowed to be traded since 1982 in four recognized associations (Delhi, Ahmedabad, Bombay and Rajkot). [21]

A1.57 In addition to the ban on futures trading, the FC(R) Act also restricts "forward" trade to "ready" or spot contract which provide for the delivery of goods and full payment within 11 days after signature of the contract. Forward trade contracts involving the delivery of a commodity of a specific grade, at a specified future date and place, and at a pre-determined price between two parties --defined as Non-Transferable Specific Delivery contract (NTSD) by the FC(R) Act-- are either prohibited or suspended for all oilseeds, oils and oilseed meals.

A1.58 **An Active, Illegal Forward Trading in Oilseed Products.** Despite the burden imposed by government interventions, there is a large interest for risk management tools by the oilseed community in India. The risk management needs has spawned an active, illegal trading in oilseed futures contracts, notably for groundnut oil --in Rajkot, Dhoraji and other centers-- and mustard seed oil --in Delhi, Hapur, and Agra. According to a 1986 study,[22] it was found that some 60 operators actively traded in oil futures in Rajkot, closely resembling formal exchange operations, with standardized trading rules and open outcry. Most of the business served the risk management needs of genuine groundnut oil traders, millers and wholesalers; speculation was relatively unimportant. This illegal trade worked quite efficiently, with rules for cash-settlement, weekly margin payments, and significant investment in tele-communications. Most offices in the market were linked through internal telephones, with each office having at least six telephones. The market also had 30 telex machines. About 70,000 calls were reportedly made each working day between this exchange and other main cities.

A1.59 **The 1994 Kabra Committee Report Recommends the Re-introduction of Futures Contracts.** The September 1994 report of the Committee on Forward Markets,[23] chaired by Professor Kabra, recommends the introduction of futures contracts in a number of commodities, including a number of oilseeds --groundnuts, rapeseed/mustardseed, cottonseed, sesame seed, sunflower, safflower, coconut, soybean, linseed and rice bran-- and their oils, and major oilseed cakes.

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[21] For a detailed exposition and analysis futures trading in India, see World Bank, 1996, "Managing Price Risks in India's Liberalized Agriculture: Can Futures Markets Help?", Report No. 15453 IN.

[22] Reported in V.P. Gulati and S.J. Phansalkar, *Oilseeds and edible oil economy of India*, Delhi 1994.

[23] Ministry of Civil Supplies, Consumer Affairs & Public Distribution, 1994, "Report of the Committee on Forward Markets," (Kabra Committee Report).

Health Safety & Standards Regulations

A1.60 **Numerous Legislation Govern Edible Oil Quality and Safety Standards.** More encompassing GOI legislation complement the Solvent Extracted Oil, De-Oiled Meal and Edible Flour (Control) Order, 1967 and the Vegetable Oil Products (Control) Order, 1947. These include the Prevention of Food Adulteration Act, 1954; the Weights and Measures Act; the Packaged Commodities Order, 1971; and the Blended Edible Vegetable Oils Grading and Marking Rules, 1991 under the Agricultural Produce (Grading and Marking) Act, 1937.

A1.61 **Prevention of Food Adulteration Act, 1954.** The Prevention of Food Adulteration (PFA) Act, governs quality control in the manufacture and packaging of edible oils and other food products. This legislation was enacted by the GOI in 1954 to ensure consumer health safety; its implementation rests with the GOI Ministry of Health & Family Welfare, and is enforced by the central and state-level food inspectors. The PFA Act defines the standards for each category of edible oils. Under the PFA Act, all types of edible oils can be sold unrefined, with the exception of cottonseed oil. In some ways, the PFA Act is more stringent than the Vegetable Oil Products Control Order, 1947. The blending of oils finally allowed 1992, but limited to the blending of two oils --one conventional and one refined oil. Amendments to the Act in 1992 require the specification of the composition --including the percentages-- of blended edible oils.[24]

A1.62 **Blended Edible Vegetable Oils Grading and Marking Rules, 1991.** The Agricultural Produce (Grading and Marking) Act, 1937, also known as AGMARK, establishes the rules and regulations for the grading and marking of agricultural commodities for the purpose of making available quality agricultural produce to consumers. In 1991, the GOI passed the Blended Edible Vegetable Oils Grading and Marking Rules which defines the grade designations and marking, method of packaging and marking.

A1.63 **Packaged Commodities Order, 1971.** In 1971, the GOI passed the Defense and Internal Security of India Rules designed to ensure standardization and the availability of packaged products to protect consumer interests. From this arose the Packaged Commodities Order, which defines how commodities are packed and the accompanying information to be provided, such as contents, manufacturing and expiration dates, name of manufacturer, etc. The sale of 15 kg tins of vegetable oils are exempted from this order.

A1.64 **Weights and Measures Act.** The Weights and Measures (WM) Act establishes the standards of weights and measures in India. It provides the guidelines for verification and stamping of weights, Prior to 1992, the WM Act prohibited the volumetric packaging of edible oils. The enforcement responsibility of the WM Act falls with the Ministry of Civil Supplies, Consumer Affairs & Public Distribution.

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[24] Under the PFA Act, other characteristics, such as the acid value and moisture and volatile matter in the oils also have to be specified.

Annex 2

Production & Consumption: Recent Performance & Prospects

A. Production of Oilseeds

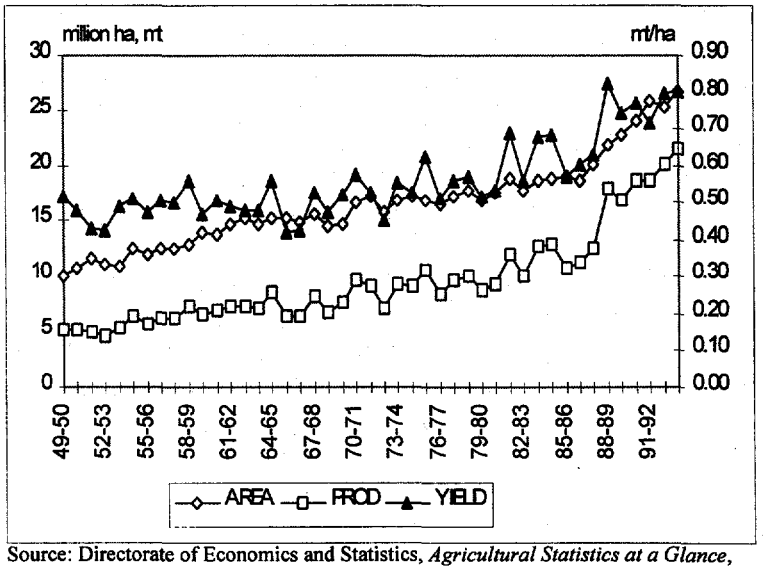
A2.1 The oilseed complex has registered dramatic changes over the last 15 years. The most striking and well-known development has been the doubling of oilseed production since 1980. Much less known, but as vital from a food security policy perspective, is the 75% drop in production instability which has accompanied this formidable production performance. The doubling of oilseed production has not come without concerns. There is an active debate about the appropriateness of India's past import substitution strategy in oilseeds until 1994, its implications about the capacity of the sector to compete under an open and less protected foreign trade regime.

A2.2 In this section, we first review the recent production performance of oilseed crops, and identify the sources of that growth. We then review some of the available evidence about India's comparative advantage and allocative efficiency in oilseed production. Finally, we will provide the evidence about the increased stability in oilseed production instability, and identify its causes.

Recent Production Trends and Performance

A2.3 **Oilseed Production More Than Doubles Since 1980.** The production of the nine oilseeds[1] jumped from less than 10 million mt in 1980 to more than 21 million mt in 1993/94 (Figure A2.1). At 5.8% per annum, oilseed crops registered the fastest annual growth rate of all major crops in India between 1981/82 and 1993/94 (Table A2.1 in Appendix), contributing for 22% to all-India crop growth during the same period. The average annual rate of growth in oilseed production was more than double the annual rate of growth of foodgrains (2.8%) and far exceeded the annual rate of growth of all cereals (3.0%), fibers (3.4%), sugarcane

Figure A2.1
Total Oilseed Production, Area Cultivated, and Average Yield 1949-50 to 1993-94.



Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues and Ministry of Finance, *Economic Survey*, various issues.

[1] Nine oilseed include the five major oilseed (groundnut, rapeseed-mustardseed, castorseed, sesamum, and linseed), soybean, sunflower, safflower and nigerseed.

(2.9%) and fruit and vegetables (4%). This recent production performance contrasts sharply with the virtual stagnation (1% per annum) in production of the initial post-green revolution period (1968-1981). Rapid growth in oilseeds has also meant a more balanced agricultural growth across regions, particularly favorable to the rainfed regions. This stems from the fact that oilseeds remain predominantly grown under rainfed conditions.

A2.4 **Technological Change as the Major Source of Growth in Oilseed Production.** An examination of the growth in oilseed production indicates a typical adoption pattern of new technology. An initial phase, between 1979/80 and 1986/87, corresponds to the introduction of new oilseed crop technologies and its up-take by early adopters. The following period, from 1986/87 until 1993/94, corresponds to the rapid adoption of the new, improved technology by an increasing number of growers across regions and seasons. The decomposition of sources of growth in total oilseed output into pure yield and pure area expansion effects clearly illustrates these two distinct phases (Table A2.1). Between 1979/80 and 1986/87, the growth in yields accounts for almost two-thirds of the then modest total output growth (30%), while area expansion under oilseed accounts for only a third of that growth. Since 1986/87, oilseed growth accelerates and its sources reverse dramatically. The new technology quickly spreads to new areas as suggested by the rapid area expansion which now explains more than half of total output growth; pure improvements in yields play a more modest role in explaining total output growth (34%). This adoption pattern of the new technology -- up-take by early adopters followed by a rapid spread across growers-- is also consistent with the output growth of individual oilseeds to which we now turn.

Table A2.1
Sources of Oilseed Production Growth

Period	Area Effect (%)	Yield Effect (%)	Interaction of Yield & Area (%)	Increase in Oilseed Production (%)
TE 1979/80 to TE 1985/86	33.24	61.59	5.73	27.96
TE 1986/87 to TE1993/94	52.68	34.37	12.98	88.21

Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues

A2.5 **New Crops, Soybean and Sunflower, Explain 40% of the Growth in Total Oilseed Production.** In the 1970s, oilseed production was dominated by groundnut (61%) and rapeseed-mustardseed (21%), with sunflower and soybean almost non existent (1.4% and 0.3%, respectively). Technological change in oilseed production assumed two forms: new crops -- soybean and sunflower-- were introduced, and improved technology was introduced in the traditional oilseeds --rapeseed-mustardseed and groundnut. The output of new crops, soybean and sunflower, increased rapidly between 1979/80 and 1993/94: 19.5% and 16.6% per annum, respectively. Together, soybean and sunflower contributed for more than 40% of the total output growth in oilseeds (Table A2.2). The production of rapeseed-mustardseed, a traditional oilseed, also accelerated significantly -- 8.2% per annum-- contributing for another third of the total oilseed production increase between 1979/80 and 1993/94 (Table A2.2). This rapid production increase in rapeseed-mustardseed, soybean and sunflower changed dramatically the performance and composition

Table A2.2
Contribution to Growth of Individual Oilseeds

Period	Groundnut effect (%)	Rape/mustard effect (%)	Sunflower effect (%)	Soybean effect (%)	Other Oilseeds (%)
TE 1979-80 to TE 1985-86	7.3	42.8	9.3	22.9	17.8
TE 1986-87 to TE 1993-94	24.9	28.8	9.7	30.1	7.69
TE 1979-80 to TE 1993-94	18.6	33.1	10.4	30.5	7.5

Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues

of oilseed output in India. Annual growth in groundnut production was much more modest over the entire period (2.6%), and its contribution to total oilseed growth concentrated after 1986/87.

A2.6 **For the Newly Introduced Oilseed Crops, Area Expansion Contributed Most of the Increase in Production.** Technological change in oilseed production took place through the introduction of new oilseed crops --soybean in Madhya Pradesh and Maharashtra, sunflower in Karnataka and Andhra Pradesh. The introduction of this new technology (soybean, shorter duration varieties of sunflower: Morden, SS 56, and Co2) accounted for 40% of the total oilseed output growth. As should be expected, most of that technological change took the form of area expansion throughout the period (Table A2.3). Initially (1979/80 to 1986/87), area expansion in soybean and sunflower remained fairly modest (1.5 million ha or 30% of the total area expansion in these two crops) and limited to the early adopters; 70% of the total area expansion in soybean and sunflower took place after 1986/87, once these two crops became adopted by an ever increasing number of growers.

Table A2.3
Sources of Growth in Soybean Production

Period	Yield Effect (%)	Area Effect (%)	Interaction of Yield & Area (%)	Increase in Production (%)
TE 1979/80 to TE 1985/86	-3.6	101.5	-8.8	239.4
TE 1986/87 to TE1993/94	10.8	60.1	18.7	999.4
TE 1979/80 to TE1993/94	0.9	80.4	9.1	1275.0

Sources of Growth in Sunflower Production

Period	Area Effect (%)	Yield Effect (%)	Interaction of Yield & Area (%)	Increase in Production (%)
TE 1979/80 to TE 1985/86	-5.8	125.2	-20.0	275.1
TE 1986/87 to TE1993/94	11.3	71.2	14.5	968.3
TE 1979/80 to TE1993/94	0.3	96.3	4.1	1287.7

Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues

For these new crops, yield improvements played a minor role in output growth, as should be expected. In spite of their relatively minor role in output growth, soybean yields grew quite fast throughout the 70s, 80s and early 90s, and at a faster pace than rice and wheat yields since the onset of the green revolution (Appendix Table A2.1). Growth in sunflower yields also accelerated significantly since the early 80s.

A2.7 **Yield Improvements Among Early Adopters Followed by Rapid Diffusion of the New Technology Characterizes Technological Change in Rapeseed-Mustardseed.** The process of technological change among the already well-established rapeseed-mustardseed followed a similar pattern. First, a process of adoption of new improved varieties by the early adopters already growing rapeseed-mustardseed. Until 1986/87, yield improvements played the dominant role in output growth, while area expansion contributed little (Table A2.4). After 1986/87, area expansion contributed the most as the new varieties spread to an increasing number of growers, and yields contributed less (Table A2.4). The growth in yields improved significantly from 0.2% per annum (1968 to 1981) to 3.6% (1982 to 1994), also surpassing that of rice and wheat (Appendix Table A2.1). Area expansion took place largely in Rajasthan, Madhya Pradesh and portions of Gujarat.

A2.8 In groundnuts, the extent of technological change has been much more limited. Growth in groundnut yields remained slow over the entire period (Appendix Table A2.1). Output growth performance has been the lowest of all oilseeds, contributing little to overall oilseed output performance. Most of the groundnut output growth took place in the late 80s, mostly as a

result of area expansion. Here, the process of technological innovation was that of an expansion into new areas or seasons, such as *rabi* groundnut in Andhra Pradesh (Table A2.4).

Table A2.4
Sources of Growth in Rapeseed-Mustardseed Production

Period	Yield Effect (%)	Area Effect (%)	Interaction of Yield & Area (%)	Increase in Production (%)
TE 1979/80 to TE 1985/86	74.5	16.9	8.7	69.3
TE 1986/87 to TE1993/94	19.3	68.4	12.2	155.8
TE 1979/80 to TE1993/94	36.0	35.4	28.6	225.1

Sources of Growth in Groundnut Production

Period	Yield Effect (%)	Area Effect (%)	Interaction of Yield & Area (%)	Increase in Production (%)
TE 1979/80 to TE 1985/86	62.3	29.7	0.6	3.2
TE 1986/87 to TE1993/94	39.8	54.0	7.4	33.1
TE 1979/80 to TE1993/94	38.7	56.1	6.4	29.6

Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues

A2.9 New, improved seed varieties released during the 1970s and 1980s were adapted to a larger variety of agro-ecological conditions, with higher yields but also improved resistance to various diseases and moisture stress, shorter duration cycles (rapeseed: Bhavani, PT-303, TL15; and mustardseed: RH-819) which facilitated their inclusion into existing cropping systems, as an additional crop. These included over 65 groundnut, 54 rapeseed-mustardseed, 39 sesame, 23 linseed, 14 safflower, 11 sunflower, 10 castor and 10 nigerseed varieties.[2] The varieties developed upto 1975, for example, have been shown to have a 15-30% yield advantage over the traditional or local varieties.[3]

A2.10 In addition to the adoption of improved varieties, increased oilseed cultivation in irrigated areas have also contributed to the significant yield increases and thus overall growth. Between 1979/80 and 1991/92, the share of irrigated oilseed cultivated area increased from 12.6% to 23.9%, mostly concentrated in rapeseed-mustardseed (e.g., Rajasthan, Gujarat) and groundnut (Maharashtra, Rajasthan, Andhra Pradesh) (Appendix Table A2.4). Gulati, Sharma and Kohli (1996)[4] estimated that groundnut and rapeseed-mustardseed yields during the TE 1986-87 were about 80 percent higher in irrigated than in un-irrigated areas.

A2.11 **This Process of Rapid Technological Change in Oilseeds Has Caused Major Changes in Cropping Patterns.** The rapid area expansion of oilseeds has caused significant changes in cropping patterns, in particular since 1986/87. Between 1979/80 and 1993/94, the area devoted to oilseed crops increased by 50%, or close to 9 million hectares, against a decline of 20% for coarse cereals (8.2 million hectares), 6.5% for cotton (0.5 million hectares) and 3% for pulses (0.7 million hectares). Using crop shares of Gross Cultivated Area (GCA) to identify cropping patterns clearly indicates the extent to which increased oilseed production has contributed to changes in cropping patterns over time (Appendix Table A2.3).

A2.12 Not all area expansion in oilseeds, however, took place at the expense of --i.e. substituted for-- these crops. A significant share of the area expansion in oilseeds, in particular

[2] For more details about the different new varieties of oilseed, see M.V.R. Prasad, 1993, "Improved Agro-Economic and Management Practices for Annual Oilseed Crops in India," in R.S. Paroda and M. Rai (eds), *Oilseeds in the Asia-Pacific Region*, Bangkok, Thailand: Regional Office for Asia and the Pacific, FAO, pp. 44-58.

[3] M.V.R. Prasad, 1993, *op.cit.*

[4] A. Gulati, A. Sharma, and D.S. Kohli, 1996, op. cit.

in the case of soybean, sunflower, and to a lesser extent rapeseed-mustardseed, resulted in higher cropping intensity. Using changes in crop shares of GCA instead of Net Cultivated Area (NCA) to identify changes in cropping patterns over-estimates the substitution effect across crops by not accounting for improvements in cropping intensity (Appendix Table A2.3). Higher cropping intensity was made possible by the introduction of new crops (e.g., soybean in Madhya Pradesh), and varieties with shorter duration, improved tolerance to moisture stress, pest and diseases (sunflower, rapeseed and mustardseed) which facilitated their inclusion into existing cropping systems, as an additional crop. Being less water intensive, oilseeds can either survive on residual moisture, and be planted over a larger area relative to other, more water intensive crops (wheat, cotton and sugarcane) for the same amount of available (rainfall or irrigated) water. Sixty percent of the total oilseed area expansion is accounted by area expansion in sunflower and soybean, most of which taking place in Karnataka and Madhya Pradesh, respectively (Appendix Table A2.3). Simple statistical analysis indicates that soybean and sunflower area expansion in Madhya Pradesh and Karnataka have been strongly --and statistically significant-- associated with higher cropping intensity. Similarly, the area expansion of rapeseed-mustardseed in Gujarat between 1978 and 1990 has been strongly and significantly associated with higher cropping intensity.[5]

A2.13 **Available Evidence Suggests that Price Incentives Were Favorable to the Rapid Adoption of Technology in Oilseed Complex.** Non-tariff barriers raised producer prices above world prices for all oilseeds except soybean throughout most of the 80s, in particular during the second half of the 80s and early 90s.[6] The estimated nominal protection coefficients (NPCs) for the four major oilseeds indicate an unstable protection level to oilseed growers throughout most of the period (Figure A2.2).[7]

A2.14 The protection levels indicated by the NPCs, however, do not provide a useful representation of the production incentives faced by Indian farmers. Absolute oilseed price levels and relative to other crops play a greater role in influencing planting decisions by growers. The available evidence indicates that, throughout the 80s, farmgate prices of oilseeds improved relative to competing crops such as coarse cereals and cotton; farmgate oilseed prices improved even more relative to wheat prices during the same period (Figure A2.3). Oilseed prices, however, declined relative to pulses, another competing crop. Starting in 1988/89 with the reduction in edible oil imports initiated by GOI, oilseed prices improved sharply relative to wheat until 1992/93, and to a lesser extent relative to coarse cereals. By contrast, between 1988/89 and 1992/93, oilseed prices continued to decline relative to pulses and also relative to cotton. Since 1992/93, oilseed prices have declined relative to all competing crops, largely as a result of rapidly increasing domestic supplies and, since 1994/95, the liberalization of edible oil imports.

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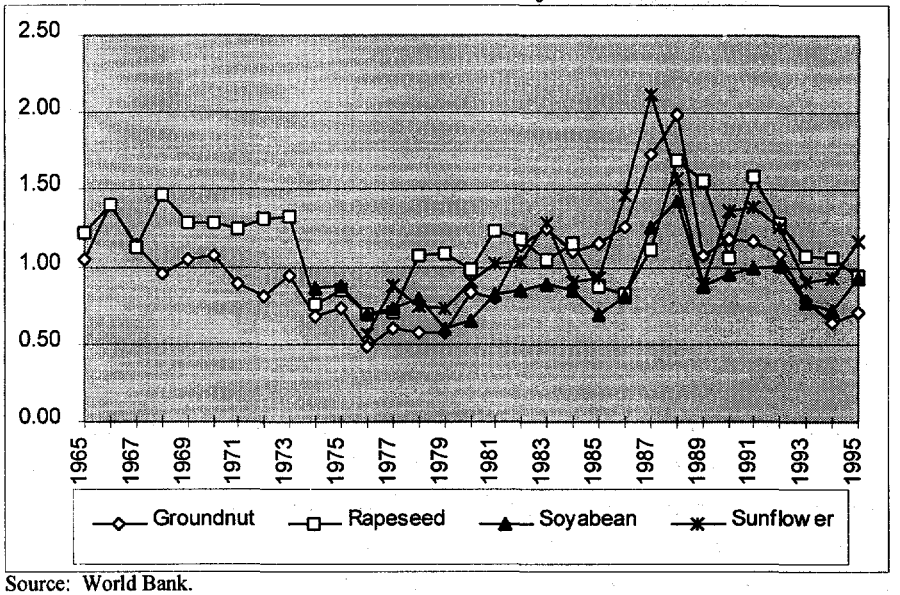
[5] Using district level data, changes in cultivated area devoted to individual oilseed crops were regressed against changes in cultivated area devoted to other, individual crops as well as cropping intensity.

[6] See Annex 1 for a detailed discussion of the evolution of price and trade policy in the oilseed complex.

[7] The nominal protection coefficient is the ratio of domestic market prices over world prices at the same physical location, taking into account transport costs and quality differentials. Values greater than 1 indicate protection of domestic producers, while values less than 1 indicate taxation of domestic producers. See Annex 5 for a more detailed discussion of the NPCs.

A2.15 The above evidence indicates that oilseed growers faced favorable price incentives throughout the 80s, and more so between 1988/89 and 1992/93 as GOI cut edible oil imports. The introduction and dissemination of a new and profitable oilseed technology, was therefore made even more profitable by the favorable price environment which the import substitution policies helped create. Higher oilseed prices therefore played an important role in the observed oilseed supply response by accelerating the process of technological adoption in oilseed production. It is unlikely, however, that prices alone -- i.e., without the benefit a new technology-- would have triggered the oilseed supply response of the magnitude witnessed during the 80s and early 90s. The stagnation in the production of pulses during the 80s despite increasingly favorable prices relative to other crops, including oilseeds, underscores the importance of a profitable technology in triggering a sustained supply response.

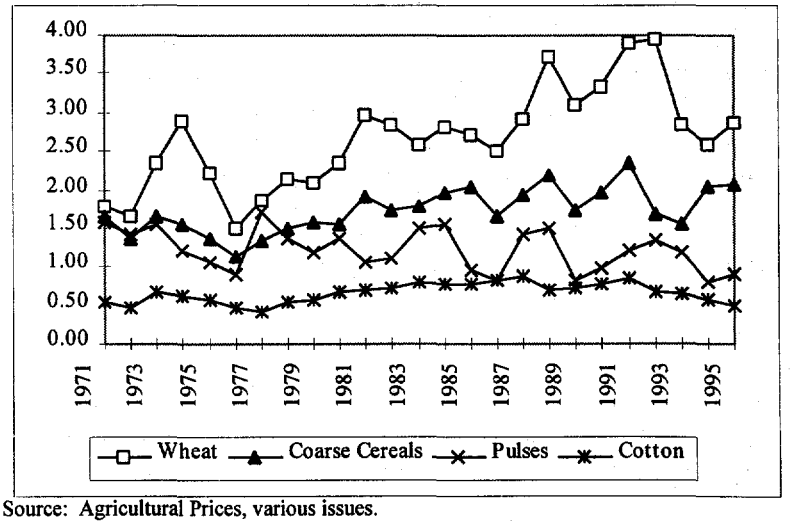
Figure A2.2
Nominal Protection Coefficients for Major Oilseeds 1965-1995



Source: World Bank.

A2.16 It is likely, however, that the high oilseed prices by contributing to the rapid area expansion, also caused the expansion of oilseed production into areas where oilseeds are likely to have a more limited comparative advantage. This is particularly true between 1988/89 and 1992/93 when oilseed prices increased rapidly, in particular with respect to wheat and a lesser extent coarse cereals. The rapid area expansion in oilseed production observed between 1986/87 and 1993/94 reflects in part the substitution of land away from competing and more efficient crops in areas where oilseeds have less of a comparative advantage.

Figure A2.3
Producer Prices of Oilseeds Relative to Competing Crops
1970/71 to 1995-/6



Source: Agricultural Prices, various issues.

These areas with a marginal comparative advantage in oilseed production are likely to revert back to other competing crops as oilseed prices decline after 1992/93.

A2.17 **New Technology Improved Oilseed Profitability Relative to other Crops.** A key factor driving the oilseed supply response has been the government and private sector efforts at developing, introducing and disseminating new and/or improved varieties of oilseeds that would fit into the cropping systems of a wide range of agro-ecological situations. The higher profitability and convenience provided by the new oilseed technology has been critical in its rapid adoption and diffusion among farmers. Technological features of the new and improved oilseed cultivars introduced over the last two decades helped improve farmers' returns to scarce factors of production over other crops. As noted earlier, oilseeds are significantly less water-intensive than other crops such as sugarcane and wheat. Evidence suggests that improved oilseed varieties substituted for more water-intensive crops: sugarcane (rapeseed in Rajasthan, soybean in Madhya Pradesh), wheat (rapeseed in Madhya Pradesh); because larger areas could be planted to oilseeds for the same amount of available water, oilseed area expansion contributed to higher cropping intensity as well. In rainfed areas, evidence also reveals that improved oilseed varieties substituted for crops with lower returns to labor, the binding constraint: coarse cereals (soybean and rapeseed in Madhya Pradesh; groundnut in Gujarat), pulses (sunflower in Karnataka), cotton (sunflower in Andhra Pradesh); in some instances, larger areas could be planted to oilseeds for the same amount of available labor, contributing to higher cropping intensity (sunflower in Karnataka, soybean in Madhya Pradesh).

A2.18 The additional contribution of the oilseeds Centrally Sponsored Schemes (CSS) launched in 1985/86 in accelerating the diffusion of the new technology, however, is not as clear. As noted earlier, by 1985/86, the new technology had already been taken-up by early adopters, and would have naturally continued to spread exponentially among farmers by simple demonstration effect. There is no evidence to indicate whether the large financial outlays and input subsidies involved with the oilseeds CSS have been critical in accelerating the normal diffusion process of the new technology. Even if they had played a critical role, it is a moot point that over the last 10 years, they have outlived their usefulness.

A2.19 **Better Access to Market Outlets Has Played a Critical Role in the Adoption of New Technology.** This is most readily apparent in the case of soybean and sunflower whose rapid growth accounted for 40% of the increase in total oilseed output. For these two new oilseed crops, GOI offered a policy environment extremely favorable to the establishment of large-scale and modern processing facilities in the private and cooperative sectors. Unlike groundnut and rapeseed-mustardseed, soybean and sunflower are exempt from the Small-Scale Reservation policy. This policy encouraged the private (e.g., ITC, Unilever) and cooperative enterprises to offer new market outlets and services to growers in an effort to raise their processing capacity utilization, lower their processing costs, and improve their competitiveness.

A2.20 To summarize, the development of a profitable oilseed technology well-suited to the cropping systems in a wide range of agro-ecological zones, together with the better access to new market outlets, made oilseed production much more responsive to the highly favorable price incentives it was facing. The improved profitability of oilseeds relative to other crops brought about by the new crop technology, encouraged the rapid adoption and diffusion of the new oilseed technology, resulting in important changes in cropping patterns. Favorable oilseed prices facilitated and accelerated the rapid adoption of the new technology and corresponding changes in cropping patterns. Between 1988/89 and 1992/93, oilseed prices became even more favorable relative to wheat and coarse cereals, and probably contributed to further expansion of oilseed

production in areas where oilseeds have a limited comparative advantage. These marginal areas are likely to revert back to other crops as oilseed prices decline.

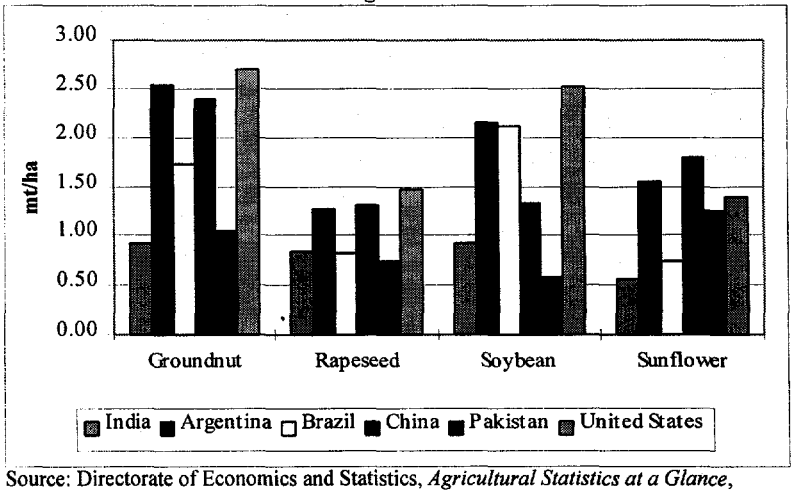
India's Comparative Advantage in Oilseed Production

A2.21 **Why Does it Matter?** There is an on-going debate about India's comparative advantage in oilseed production and the sustainability of the past production gains in the face of the 1994 liberalization of oil imports. The presence or absence of a comparative advantage will dictate how oilseed production will react to the more open trade environment it now faces, and how oilseed policies are likely to evolve. In the absence of a comparative advantage, the open trade environment may threaten the large gains in production and food security achieved so far. This may compel GOI to reverse its liberalization stance, imposing high costs to consumers as well as large inefficiency losses to the economy. In the presence of comparative advantage, current policies could be easily sustained to the benefit of consumers, oilseed growers and the economy in general.

A2.22 **The Concerns About Lack of Comparative Advantage: What is the Evidence?** To a large extent, the concern about the absence or lack of comparative advantage in oilseed production has been motivated by two pieces of empirical evidence. Foremost is the evidence that NPCs for three of the major oilseeds (groundnut, rapeseed/mustardseed, and sunflower), except in the case of soybean, have been consistently maintained well above unity, causing major price distortions in the agricultural sector (Figure A2.2). Such price distortions have distorted the allocation of resources in agriculture: resources have been shifted away from less protected crops into the highly protected oilseeds, imposing large efficiency losses to the economy. The supporting evidence, using changes in individual crop shares of GCA, is that most of the oilseed production increase has come from area expansion into oilseeds at the expense of other, less protected crops --cereals, cotton, pulses.

A2.23 An additional piece of evidence of limited comparative advantage in oilseed production has to do with the low Indian yield levels compared to the rest of the world (Figure A2.4). The average yields of most oilseeds in India are increasing, but remain at less than half the level of other major oilseed producers in the world. Groundnut yield for the triennium ending (TE) 1994 was 0.93 mt/ha compared to 2.71 mt/ha in the United States and 2.55 mt/ha in Argentina --but 0.3 mt/ha in Cameroon. Average soybean yield during the same period was 0.92 in India in contrast to 2.51 mt/ha in the United States and 2.16 mt/ha in Argentina. It is only in rapeseed, although yields are still low, that India is slowly approaching international levels (1.2 mt/ha in Canada).

Figure A2.4:
Yields of Different Oilseeds in Selected Countries, mt per hectare, Average for 1992-94



Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues and FAO.

A2.24 **How Strong is That Evidence?** It is argued, however, that India's lack or presence of comparative advantage has not yet been clearly established either way. While NPCs are a good measure of India's international price competitiveness, they do not offer any indication about comparative advantage. Domestic resource cost (DRC)[8] measured in the different growing regions would be a more appropriate indicator of comparative advantage. No DRC estimates, however, are available for oilseeds to answer this question. DRC estimates will be critical for India, especially since water is becoming an increasingly scarce resource, and oilseeds have the advantage over other crops of being less water intensive. In view of the increasing water scarcity in some states/areas, oilseed production may well represent an efficient use of scarce resources relative to alternative crops, in which case a comparative advantage would prevail.

A2.25 Similarly, the evidence about the extent to which changes in cropping patterns represent a pure land substitution in favor of oilseeds at the expense of more efficient, competing crops does not seem well-established for two reasons. First, equating changes in crop shares of GCA -- as opposed to NCA-- with substitution among crops ignores the improvements in cropping intensity that have been associated with area expansion in oilseeds such as soybean, sunflower and to a lesser extent rapeseed-mustardseed. Therefore, it does not appropriately reflect the extent to which area expansion in oilseeds may have contributed to a more efficient use of scarce resources in agricultural production. In those areas where oilseeds have led to higher cropping intensity, oilseed production is likely to represent an efficient use of existing resources, suggesting the presence of a comparative advantage in production. This conclusion applies in spite of low Indian yields by international standards.

A2.26 Second, and more importantly, it simply ignores the role of technological change. Technological change causes changes in cropping patterns. By making oilseed production more profitable, farmers have strong incentives to devote more resources --including land-- into the production of oilseeds, even in the absence of higher prices. The evidence presented earlier about the critical importance of technological change in the growth of oilseed production, and improvements in cropping intensity suggests that India's comparative advantage in oilseed production may be quite strong. Over the last two decades, deliberate technological advancements such as the development of shorter duration, improved resistance to pests and moisture stress, higher yielding seeds varieties have enabled the better integration of oilseeds into existing cropping patterns and the increased efficiency in the use of scarce, non-tradable resources --water, labor, and land.[9] This is not to deny that, at the margin, oilseed production may have substituted for more efficient crops in some areas, notably during the short period of fast rising oilseed prices in the late 80s and early 90s. In those areas, farmers are indeed likely to shift out of oilseed production as their prices decline.

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[8] Domestic Resource Cost coefficient is defined as the ratio of the economic value (i.e. opportunity cost in terms of its next best alternative) of nontradable factors of production (e.g., labor, land, water) to the value-added of the product (economic value of production less the cost of tradable inputs) measured at world prices.

[9] The results of simple, district-level regression over the period 1980-1990 suggests that the area expansion of the fastest expanding oilseed --soybean in Madhya Pradesh, sunflower in Karnataka, rapeseed-mustardseed in Gujarat-- has been strongly associated with higher cropping intensity. In the case of Andhra Pradesh, the results of the analysis suggest no significant improvement in cropping intensity associated with (*rabi*) groundnut area expansion, but indicate a strong and significant complementarity with area planted under pulses.

Oilseed Production Has Become Much More Stable.

A2.27 **Increased Production Stability.** Oilseed production has become remarkably more stable as it expanded. One indicator of production instability is the coefficient of variation (CV).[10] The CV of total oilseed production has steadily declined from a high of 20% in 1971-77, to 18% in 1981-87, and 5% in 1989-95 (Table A2.5).[11] Increased diversification in the sourcing of seeds across regions, seasons and oilseeds brought about this dramatic drop in production instability.

A2.28 **Increased Regional Diversification of the Production Base.** Regional supply patterns underwent two marked changes over the last 25 years (Figure A2.5). First, oilseed production shifted to the more stable producing regions --those with low or declining CVs. The increasingly stable oilseed production regions either increased (Center) or maintained (West and South) their share of national total oilseed production, while the increasingly unstable regions (North and East) diminished in relative importance (Figure A2.5 & Table A2.5).

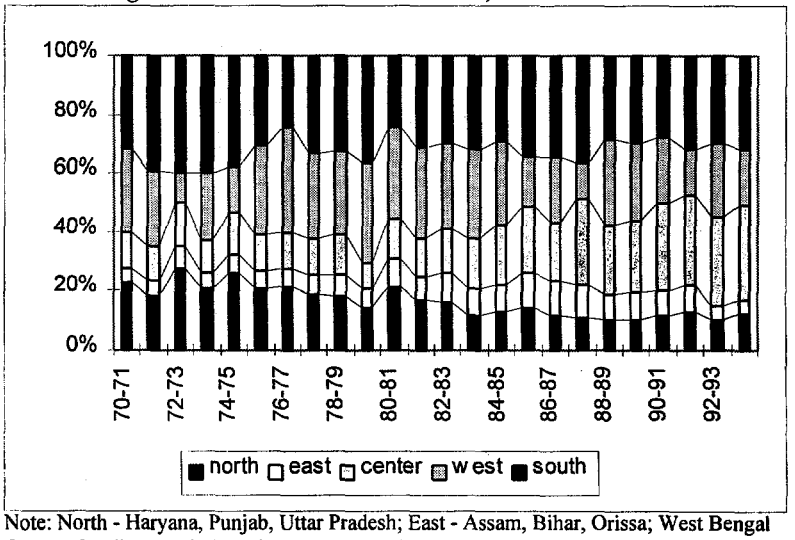
Table A2.5
Indicator of Production Instability
(Coefficient of Variation)

Regional Production			
Region	1971-77	1981-87	1988-94
North	0.053	0.267	1.301
Center	0.214	0.259	0.105
East	0.127	0.457	0.432
West	2.450	0.369	0.468
South	0.301	0.242	0.082
Seasonal Production			
Season	1976-82		1989-95
Kharif	0.224		0.116
Rabi	0.227		0.100
Oilseed Production			
Oilseeds	1971-77	1981-87	1989-95
Groundnut	0.269	0.267	0.144
Rape/must	0.285	0.259	0.116
Soybean	0.396	0.457	0.233
Sunflower	0.953	0.369	0.219
Others	0.183	0.242	0.121
Total	0.203	0.185	0.049

Source: computed.

A2.29 Second, oilseed production across regions increasingly compensated for each other production booms and busts. This increasing compensatory effect across regional production is indicated by the larger number of low or negative correlations coefficients of regional production over time (Appendix Table A2.5). Further evidence of this increasing compensatory effect across regions is provided by the ever increasing contribution of production variance of the individual regions --from

Figure A2.5
Regional Share in Oilseed Production, 1970-71 to 1993-94



Note: North - Haryana, Punjab, Uttar Pradesh; East - Assam, Bihar, Orissa; West Bengal
Center - Madhya Pradesh, Rajasthan; West - Gujarat, Maharashtra; South - Andhra Pradesh, Karnataka, Kerala, Tamil Nadu.
Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues

[10] The coefficient of variation was calculated by dividing standard deviation of the residuals of the detrended output series by the most recent **fitted** value of the series.

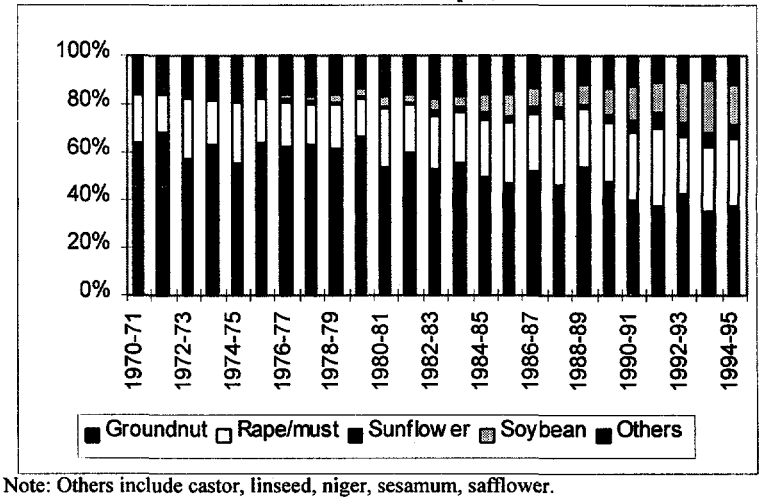
[11] By way of comparison, CV of Indian cereal production is 5% over the period 1971/72 to 1982/83; Peter B.R. Hazell, "Changing Patterns of Variability in World Cereal Production", in Variability in Grain Yields, ed. J.R. Anderson & P.B.R. Hazell, The John Hopkins University Press, 1989.

82% in 1971-77 to 165% in 1988-94--in the total oilseed production variance.[12]

A2.30 **Diversification Across Oilseeds.** Output growth was also accompanied by increasing diversification in the types of oilseeds produced in the country (Figure A2.6). The share of groundnuts in total output declined from 62% to 40%, while rapeseed-mustardseed, soybean and sunflower together assumed a much larger share (from 22% to 52%).

A2.31 The increased diversity in the sourcing of oilseeds contributed to increased domestic supply stability in two ways. First, there was increased stability in the production of each of the oilseeds as indicated by the significant decline in CVs for all oilseeds (Table A2.5). Second, different oilseeds increasingly compensated for shortfalls and booms in the production of other oilseeds, as indicated by their negative correlations in the 1990s (Appendix Table A2.6).

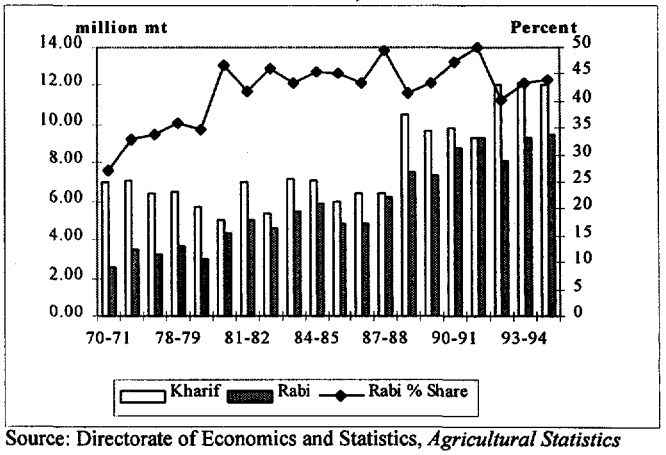
Figure A2.6
Individual Oilseed Share in Total Output, 1970-71 to 1994-95



Note: Others include castor, linseed, niger, sesamum, safflower.
Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues.

A2.32 **Increased Seasonal Balance in Production.** *Rabi* production increased dramatically over the period, raising its total output share from a third in the early 70s to 40-45% in the early 90s (Figure A2.7). The increased production of oilseeds during the *rabi* season (November to March) also contributed to greater stability in domestic output. The increased share of *rabi* output can be partly traced to the expansion of production of sunflower, rapeseed-mustardseed, and groundnut in Andhra Pradesh which are all grown during the *rabi* season.

Figure 2.7
Rabi and Kharif Production (million mt) and Share of Rabi Production, 1970-71 to 1993-94



Source: Directorate of Economics and Statistics, *Agricultural Statistics at a Glance*, various issues and Ministry of Finance, *Economic Survey*, various issues.

A2.33 The increased seasonal balance in oilseed production also contributed to domestic supply stability in two ways. First, production in each season became more stable, as indicated by the halving of the CVs over time (Table A2.5). Second, *kharif* and *rabi* production increasingly compensated for each other's instability in production. While *kharif* and *rabi* output were positively correlated during 1976-82, their production became negatively

[12] Assuming total production is the sum of two regions A and B, the variance of total production (Var (P)) is equal to: Var (P) = Var (A) + Var (B) +2 Cov (A,B), where Cov (A,B) is the covariance of A and B.

correlated in 1989-95, indicating that one season tended to compensate for possible shortfalls or booms in the other season, thus providing for increased overall supply stability (Appendix Table A2.7).

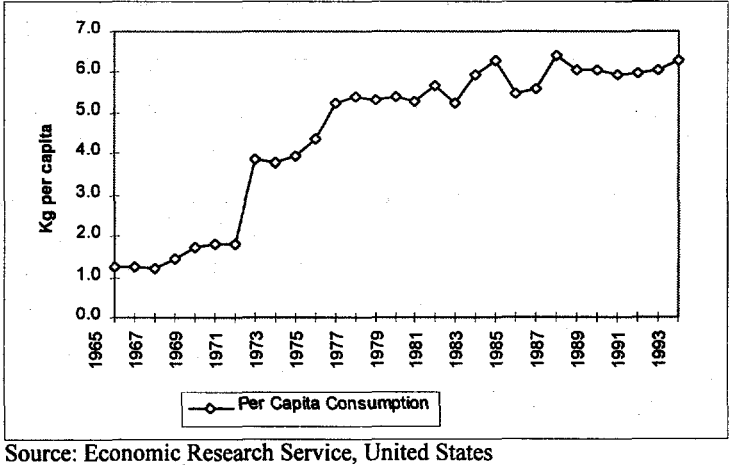
A2.34 **Increased Irrigated Production Also Contributes to Greater Stability in Oilseed Production.** The expansion of oilseed production was also accompanied by increased share of irrigated oilseed production, which would have a favorable effect on production stability. In the four states where oilseed area increased significantly--Madhya Pradesh, Rajasthan, Andhra Pradesh and Karnataka, the irrigated area planted to oilseeds increased by 80 to 160 percent between 1986-87 and 1991-92 (Appendix Table A2.4). The expansion into irrigated area planted of oilseeds in the central regions (Rajasthan and Madhya Pradesh) by 1.27 million ha was accompanied a drastic reduction in production instability (Table A2.5).

B. Demand Patterns: Recent Trends & Future Prospects

Vegetable Oil Consumption Trends & Patterns

A2.35 **Per Capita Vegetable Oil Consumption Grew Rapidly during the 60s-70s, But Has Stagnated Thereafter.** Per capita vegetable oil consumption in India grew extremely rapidly until the mid-70s, but slowed dramatically afterwards. Per capita consumption of vegetable oils in India almost quadrupled from less than 1.5 kg per capita in the late 1960s to about 5 kg in the mid-70s (Figure A2.8). Between 1965 and 1975, it grew at an average annual rate of 15%. Thereafter, annual per capita consumption growth ground to a halt: 1.2% during 1976-85, to 0.5% between 1986 and 1993. Per-capita consumption has remained unchanged at about 6 kg per capita since the mid-80s.

Figure A2.8
Per Capita Vegetable Oil Consumption in India, 1965-93, Kg per capita



Source: Economic Research Service, United States Department of Agriculture.

A2.36 **Indian Consumption Levels Are in the Range of Developing Countries Standards.** Current per capita consumption levels in India are slightly below average consumption levels of less developing economies (Table A2.6). They are slightly higher than China and Bangladesh, but only half consumption levels in Pakistan, Indonesia, and Brazil.

A2.37 **Price & Expenditure Elasticities Are Much Higher Among the Population Where the Bulk of Edible Oils is Consumed.** Radhakrishna and Ravi (1994) found that price and expenditure elasticities of demand for oilseeds is higher in the heavily populated rural areas than in urban areas, and higher among poor than among richer consumers groups. Phansalkar and Gulati (1994) report that per capita consumption of edible oil increases significantly across income groups (Table A2.7). Individuals earning over Rs 42,001 per year consumed more than double (14.4 kg per capita per year) the edible oil consumed by individuals earning less than Rs 9,000 per year (5.6 kg per capita per year). In terms of consumption shares, over 80 percent of

edible oil is consumed by individuals earning Rs 18,000 or less; those earning Rs. 9,000 or less (65% of the population) consumed about 50% of total oil consumption.

A2.38 **Sources of Growth in Consumption.** Changes in income, consumer preferences and prices have been the major contributing factors to changes in per-capita consumption between 1972-73 and 1987-88.[13] In rural areas, growth in incomes and changes in preferences each contributed about 75% of the observed increase in rural per capita consumption over the period, while price effects lowered that growth by a third. In urban areas, per-capita consumption of edible oils grew at a much lower pace, although per-capita consumption levels remain much higher in urban than in rural areas. In urban areas, higher oil price played a larger dampening

Table A2.6
Average Quinquennial Per Capita Consumption of Edible Oils in Selected Countries and Regions, kg per capita, 1965-1993

Period	India	Bangladesh	China	Indonesia	Pakistan	Sri Lanka	LDCs	SSA	Brazil
1965-70	1.5	3.0	0.8	3.0	3.3	3.8	1.7	3.4	2.2
1971-75	3.5	1.8	1.3	4.2	5.2	3.5	3.2	5.4	7.6
1976-80	5.3	1.5	1.6	6.6	7.2	4.2	4.4	6.6	12.4
1981-85	5.7	2.6	3.0	8.5	9.7	3.9	5.2	6.4	13.8
1986-90	6.0	3.8	4.8	10.2	11.6	4.3	5.7	5.8	15.2
1991-93	6.1	4.7	5.4	13.4	12.3	4.6	6.4	5.9	15.7
Ave Annual Percentage Growth Rate									
1965-93	6.05	2.25	8.79	6.26	6.14	0.75	5.72	2.17	9.02
1965-75	15.76	-7.12	10.31	6.10	10.60	-2.00	12.43	8.52	28.44
1976-85	1.20	11.98	12.86	5.04	6.43	-0.18	3.32	-0.51	3.10
1986-93	0.51	5.13	3.92	7.52	0.79	2.09	2.68	0.08	1.09

Source: Economic Research Service, United States Department of Agriculture.

role (37%) on the growth in per-capita consumption, while changes in preferences contributed little (32%).

A2.39 **The Bulk of Domestic Demand is Consumed in Loose, Unrefined Form.** Of the approximately 6 million mt of edible oils currently consumed in India, about 85% is sold in liquid form, with the remaining 15% (1 million mt) being accounted for by hydrogenated oils, including *vanaspati*. Of the liquid oil, at least 85% is estimated to be consumed directly by consumers in loose and raw (unrefined) form. Since most consumers buy oil in small quantities, retailers simply ladle out the desired quantities for the consumer. The sale of edible oils in branded, small consumer packs of refined oils (of 1, 2 or 5 litres or kgs) is of recent origin, and is estimated to account for a small share (5 to 6%) of the total liquid oil consumed in India.

Table A2.7
Edible Oil Consumption in India, 1988/89

Income per annum Rupees	Estimated Population million	Consumption Total estimated million mt	Consumption Annual per capita kg
up to 9,000	515	2.89	5.6
9,001-18,000	199	1.72	8.61
18,001-30,000	55	0.64	11.54
30,001-42,000	12	0.14	11.91
ABOVE 42,001	8	0.12	14.37
ALL	789	5.51	6.97

Source: NCAER household consumption surveys reported in Phasalkar and Gulati, 1994.

A2.40 **Consumer Preferences Differ Markedly Across Regions.** There are distinct preferences for oils in different parts of the country. Unrefined groundnut oil is preferred in the Western, Southern and Central states, whereas the Northern states prefer refined oils. The Eastern states prefer raw mustard oil, which has a strong pungent flavor. The organization and

[13] R. Radhakrishna and C. Ravi, *Food Demand in India: Emerging Trends and Perspectives*, Mimeo, 1994

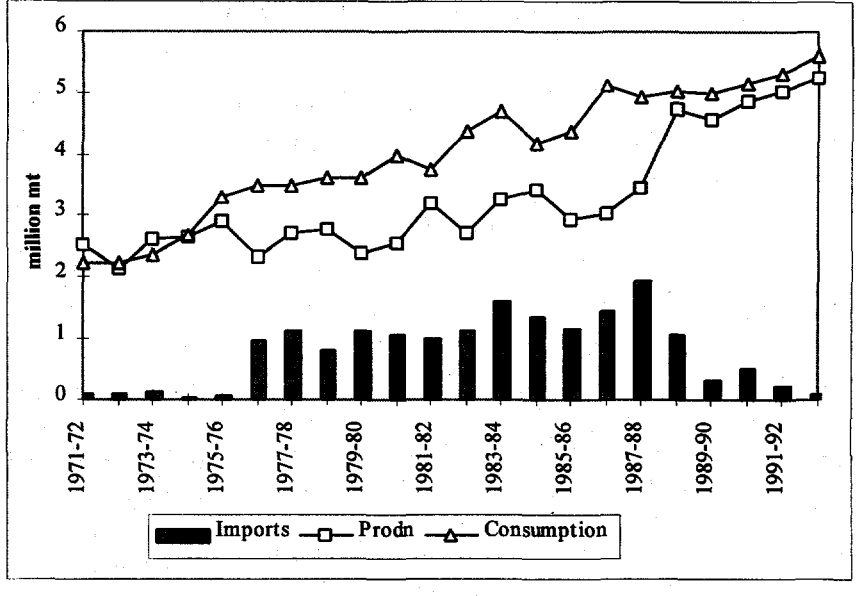
modus operandi of the edible oil trade and industry have emerged from these geographically distinct preferences.

A2.41 **Consumer Preferences Shift towards Packaged Oils.** Consumer preferences are shifting rapidly towards branded packaged edible oils, and away from bulk purchases of loose oils as a result of rising incomes and increasing health concerns about adulteration. Prior to 1988, very few brands of vegetable oils were sold in packs, because the Weights and Measures Act[14] discouraged their use. The Act requires that fluids, including edible oils must be packed by weight, found not practical by most suppliers. Dhara, a product of the NDDB, was the first brand of oil to be packed volumetrically. Following its introduction in 1989-90, several other edible oils have been marketed in small consumer packs. The total volume of oils sold in consumer packs is currently estimated to amount at 250,000 mt per year. It is also the fastest growing segment of the market expanding at 20% to 25% a year. This trend is expected to induce greater emphasis on value addition through the refining of vegetable oils in the future, and will also lead to greater transparency in the oil trade.

Demand and Supply Balance Prospects in Edible Oils

A2.42 **Self-Sufficiency Achieved at Great Costs to Consumers.** The gap between domestic production and consumption has narrowed considerably in the early 1990s, and self-sufficiency has been virtually achieved (Figure A2.9). The achievement in self-sufficiency in edible oils can be attributed to two main factors: a large increase in domestic production, and a virtual stop in the growth of per-capita consumption. The economic slow-down of the early 90s together with higher oil prices induced by the sharp reduction in imports, explain the dramatic slow-down in edible oil consumption. The achievement in self-sufficiency has therefore come at great costs to consumers already burdened by edible oil prices at least twice world price levels.

Figure A2.9
Production, Consumption and Imports of Edible Oil in India, million mt.



Source: USDA and Gulati, et al. 1996.

A2.43 **Import Liberalization Will End Stagnation in Consumption.** Free edible oils imports at 30% tariffs will drive down domestic oil prices relative to other goods. As evidenced by price elasticities and composition of demand for edible oils, the decline in oil prices will spur domestic consumption, in particular in rural areas and among the poorest segments of the population which account for the bulk of domestic consumption.

[14] See Policy Annex for a more detailed description of the Weights and Measures Act.

A2.44 **Continued Rise in Incomes May Spur Greater Supply Imbalance.** The overall economic reform program is accelerating economic growth, boosting incomes. As evidenced by expenditure elasticities across income groups and significant jump in per-capita consumption across income groups, rising domestic per capita incomes will boost even further demand for edible oils in the future.

A2.45 **Edible Oil Demand Projections to Year 2020.** IFPRI (1996) recently estimated demand food balances for India to the year 2020, including for edible oils. Ultimately, food balances critically depend on several factors: changes in population growth, growth in per-capita income, rate of urbanization, changes in livestock feeding practices, and the pattern of future growth on poverty reduction. The results for edible oils under contrasting assumptions are reported in Table A2.8. These projections do not take into account the consumption effects of the relative decline in price of edible oils. With 3% per annum per capita income growth, demand for edible oils will more than double by the year 2020, and more than treble if per capita income growth accelerates further to 5.5% per annum. If poverty is removed, demand for edible oils would grow even faster.

Table A2.8
Consumer Demand Projections, 1990 to 2020
Under Alternative Scenarios
(million mt)

Commodity	1990 Actual	2020 Baseline		Poverty Removed	
		3% per Capita Income Growth	5.5% per Capita Income Growth	3% per Capita Income Growth	5.5% per Capita Income Growth
Edible Oils	4.15	12.46	20.23	13.61	22.13

Source: G.S. Bhalla, P.B.R. Hazell, 1996 "Prospects for Balancing Food Needs with Sustainable Resource Management in Indian To 2020", draft mimeo, International Food Policy Research Institute

Demand Patterns for Oil Cakes & Meals

A2.46 **Domestic Demand for Oil Meals & Cakes is Poorly Valorized and Maintained Artificially Below Potential.** About 70% of oil cake production is consumed domestically. Its valorization on the domestic market is poor however. Oil cakes are primarily used in India for two purposes: animal feed and fertilizers/soil improvers. A substantial amount of oil cakes are used as fertilizers for plantation crops, such as rubber and banana, in Southern India. Oil cakes are consumed as animal feed directly or through compound feeds using de-oiled cakes (DOC). The compound feed industry increased its output from only 39,000 tons in 1964 to over 2.2 million tons in 1990. The capacity for the manufacture of compound feeds is estimated at around 4 million tons. Domestic demand for compound feed by the livestock industry, however, has remained much smaller than one would expect, given the

Table A2.9
Financial Incentives for Intensification in the Indian Livestock Industry are Poor.
(Price of Livestock Feed Relative to Livestock Product - 1990-93)

Relative Price		1990	1991	1992	1993
Feed Milk	India	0.41	0.26	0.26	-
	US	0.32	0.30	0.34	-
Feed-Broiler	India	0.21	0.19	0.21	0.20
	US	0.18	0.13	0.16	0.14
Feed-Egg	India	0.39	0.39	0.39	0.36
	US	0.38	0.32	0.31	0.38
Corn-Beef	India	0.40	0.34	0.29	-
	US	0.05	0.04	0.03	-

Source: World Bank, India - Livestock Sector Review: Key Issues for Enhancing Growth & Development, Report No. 14522-IN.

extremely large size of the cattle, buffalo and poultry population in the country.[15]

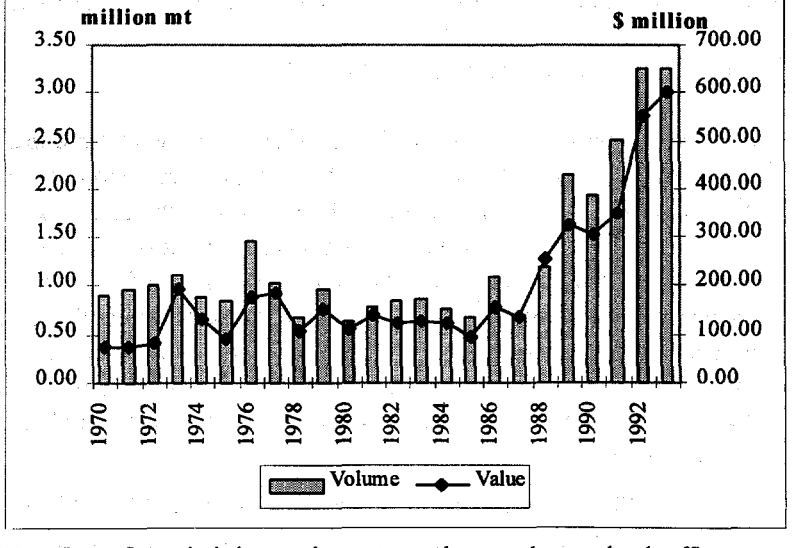
A2.47 **Limited Financial Incentives for Domestic Use of Oil Cakes by the Livestock Industry**. In large part, this low effective demand for oil meals and cakes by the livestock industry reflects the poor financial incentives in using them. These poor financial incentives are the result of low livestock product prices and/or low average productivity of the Indian livestock population. Indeed, prices of livestock feed relative to livestock product prices tend to be higher in India than internationally, in particular in the poultry industry where demand has been rising fast (Table A2.9). In the case of dairy, milk producer prices in India are kept below world prices as a result of foreign trade restrictions and domestic processing inefficiencies. In the case of beef, cultural factors help explain the low domestic demand and therefore low prices.

A2.48 **Growth in the Fast Growing Poultry Feed Industry Hampered by Small-Scale Reservation Policy**. The Small-Scale Reservation Policy of the poultry feed industry is hampering its technological development, keeping poultry feed prices higher than otherwise necessary. The Small-Scale Reservation policy prevents the poultry feed industry from taking advantage of the sizable economies of scale which prevail elsewhere in this type of industry, and from adopting the sophisticated technology to meet the demanding quality standards of the poultry industry.

A2.49 **Limited Domestic Demand Encourages Exports**. Limited domestic demand for oil cakes and meals has made export markets much more financially attractive. Special export incentives of the 1980s and 1990s, and the 1991 devaluation of the Rupee have improved further the financial attractiveness of the export markets. The international competitiveness of Indian meal exporters has been supported even further by India's policy of supporting high domestic vegetable oil prices.

A2.50 **Significant Export Development in the Late 1980s.** Oilcake exports have increased significantly from 71,000 mt in 1987 to 3 million mt in 1993, accounting for 3 percent of the value of total exports (Figure A2.10). The rapid diversification of oil meal exports away from groundnuts meals, and towards soybean and rapeseed-mustardseed, has played a critical role in this export performance. Most of the recent growth has been driven by soybean and rapeseed oil cake exports and to a smaller extent by sunflower exports, commodities where there is less quality problems. Soybean exports increased from about half a million mt in 1986 to 1.9 million in 1993, while rapeseed/mustardseed cake exports increased from

Figure A2.10
Oil cake exports, Volume (million mt) and Value ($ million), 1970-93

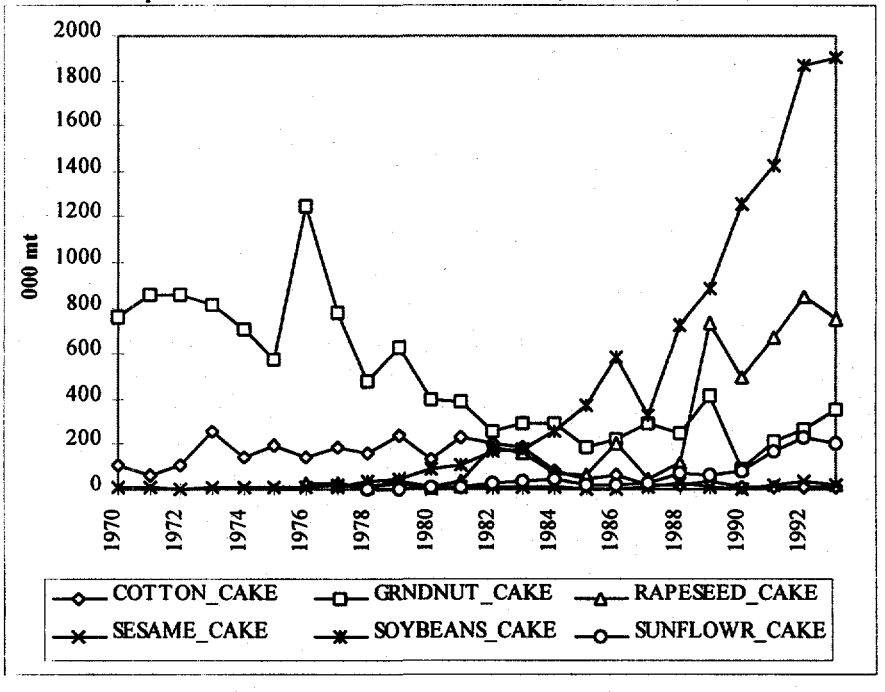


Note: Export figures include groundnut, cottonseed, rapeseed-mustardseed, safflower, sesame, soybean and sunflower oil cake exports.
Source: FAO.

[15] 280 million cattle and buffaloes, 110 million goats, 47 million sheep, 11 million pigs and around 300 million poultry birds.

207,000 mt to about 750,000 mt during the same period. The EU ban on imports of oil cakes contaminated with aflatoxin seriously hurt India's groundnut meal exports --where aflatoxin

Figure A2.11
Export Volumes of Different Oilseed Cakes, 1970-1993, 000 mt.



Source: FAO Trade Yearbook.

contamination has been and continues to be a major problem-- which used to dominate Indian meal exports until the early 80s (Figure A2.11).

A2.51 This remarkable export performance has transformed the oilseed complex from a net user of foreign exchange until the mid-80s to a net earner of foreign exchange in the early 90s.

Future Demand Prospects for Oilseed Meals

A2.52 **Livestock Sector Will Be A Major Force Determining Future Oil Cake Demand.** Growth in the livestock industry will be a major force driving future demand for oil cakes. With highly income elastic demand for milk and milk products, meat, eggs, and fish, the accelerating growth in income will be a major factor that will boost domestic demand for livestock products in the future. It is expected that the increased demand for livestock products will promote a large scale shift towards improved animals or crossbreeds, and improved management and feeding practices (e.g., feed stalling for dairy, etc.). Intensification in the livestock industry will require a larger proportion of concentrate feed in their diet. This will raise the demand for feeds, in particular on cereal feeds, but also on oilseed meals which are an important component for livestock feeds.

A2.53 **Oil Meal Demand Projections to Year 2020.** IFPRI (1996)[16] recently estimated the range of possible additional demand for livestock feed, including meals, which would arise from population growth, income growth, and technological change in the domestic livestock industry -

[16] G.S. Bhalla, P.B.R. Hazell, 1996, "Prospects for Balancing Food Needs with Sustainable Resource Management in India To 2020", draft mimeo, International Food Policy Research Institute.

-reflected by changes in Indian feed coefficients which are low by international standards. The demand for oil meals was estimated under (i) two different assumptions on the annual rate of per capita income growth --3% and 5.5%, and (ii) three different scenarios of feed demand: Indian, Chinese and Indonesian feed coefficients. The results of these simulations are summarized in Table A2.10.

A2.54 Maintaining Indian feed coefficients, meal demand would increase significantly from the base year (1990) level of 1.97 million mt to 7.4 million mt if per capita income grows at 3% per annum, and even higher to 16 million mt if income grows at 5.5% per year. While using Chinese feed coefficients produce a modest increase in meal demand over time, Indonesian feed coefficients result in a near doubling of meal requirements by 2020 compared to current Indian feed coefficients. Future meal requirements will eventually fall somewhere within this extremely wide range. The policy implications are clear: rising incomes will be a major force that will drive the increased domestic demand for meals.

Table A2.10
Meal Demand Projections under Different Feed Coefficient Scenarios and Income Growth Assumptions

Feed Coefficient Scenario	1990	2020 per Capita Income Growth of	
		3%	5.50%
	million mt	million mt	million mt
Indian	1.97	7.99	16.81
Chinese	0.36	1.30	2.40
Indonesian	3.49	15.64	37.03

Source: IFPRI, 1996.

A2.55 **Summary.** Rising incomes and liberal trade policies in the oilseed complex will have large repercussions on the consumption levels of both edible oils and oil meals. This creates formidable opportunities for a market-led growth of the Indian oilseed complex industry. Recent performance on the production front suggests that the industry has the capacity to capture and benefit from these opportunities. Capturing them will require GOI to establish a policy environment that is conducive to an efficient and sustainable growth in the oilseed complex industry.

Appendix Table A2.1:
Trend Growth Rates of Production of Major Crop Groups,
Pre- and Post-Green Revolution, percent per year

Item	Weight in Index of Agricultural Production	Pre-Green Revolution 1951-67	Post-Green Revolution Period I 1968-81	Post Green Revolution Period II 1982-94	Significant Change between Period I & II at 5% Level	Percent Contribution to All Crop Growth in Period II
All Crops Index	**100.00**	**2.40**	**2.20**	**3.30**	**Yes***	**100.00**
Food grains	**62.29**	**2.00**	**2.10**	**2.80**	**No**	**53.40**
Total Cereals	54.98	2.50	2.60	3.00	No	50.00
Rice:	29.74					
Prod		2.8	2.2	3.6	No	
Area		0.6	0.8	0.5	No	
Yield		2.3	1.4	3.1	Yes	
Wheat:	14.45					
Prod		4.7	5.3	3.3	Yes	
Area		1.6	2.9	0.5	Yes	
Yield		3.0	2.4	2.8	No	
Coarse Cereals	10.79	1.70	0.70	0.70	No	2.30
Pulses	7.94	0.20	-0.40	0.90	No	2.20
Non-Foodgrains	**37.08**	**3.20**	**22.00**	**4.20**	**Yes**	**47.20**
Oilseeds	12.64	2.50	1.00	5.80	Yes	22.20
Groundnut	5.60					
Prod		1.6	0.6	2.6	No	
Area		0.6	-0.3	1.6	Yes	
Yield		1.1	0.9	1.0	No	
Rapeseed Mustardseed	2.41	5.2	1.5	8.2	Yes	
Prod		2.6	1.3	4.7	Yes	
Area		2.6	0.2	3.6	Yes	
Yield						
Soybean	0.25					
Prod		23.8	36.7	19.5	Yes	
Area		22.6	32.5	16.4	Yes	
Yield		1.3	4.4	3.1	No	
Seasamum	0.65					
Prod		2.0	-0.3	2.7	Yes	
Area		-0.2	-0.3	0.2	No	
Yield		2.2	0.0	2.7	No	
Sunflower	0.10					
Prod		12.1	-3.8	16.6	Yes	
Area		13.8	-1.1	15.7	Yes	
Yield		-1.7	-2.8	1.0	Yes	
Fibers	5.09	3.30	2.50	3.40	No	5.20
Sugarcane	8.11	4.00	2.60	2.90	No	7.10
Plantation Crops	2.29	2.90	4.10	3.80	No	2.60
Condiments & Spices	2.59	0.80	2.00	3.40	No	2.70
Fruits & Veg.	4.90	7.60	4.10	4.00	No	5.90
GDP Agriculture (including forestry and fishing)		2.00	2.00	3.00	Yes*	

*At 10% level of significance
Source: D. Ahluwalia, 1996, "Agricultural Growth in India: Trends, Sources and Challenges," Draft Mimeo, World Bank New Delhi.

Appendix Table A2.2:

Change in area devoted to oilseeds (1991-92 over 1986-87)

Major oilseed producing states	TE 1986-87 (m. ha.) (A)	As % of state NCA (B)	TE 1993-94 (m. ha.) (C)	As % of State NCA (D)	Absolute change (m. ha.) (C-A)	Percentage change (C-A/A)	Change in Percentage Share of state NCA (D-B)
Central Region							
Madhya Pradesh	2.72	14.12	4.73	24.76	2.01	73.74	10.64
Rajasthan	1.78	12.58	3.50	21.94	1.72	96.47	9.36
Western Region							
Gujarat	2.46	25.78	2.94	31.44	0.47	19.17	5.66
Maharashtra	2.19	12.15	2.54	14.35	0.35	15.94	2.20
Southern Region							
Andhra Pradesh	2.20	21.27	3.25	30.43	1.05	47.73	9.16
Karnataka	1.87	17.85	2.93	28.46	1.06	56.57	10.61
Tamil Nadu	1.07	18.86	1.36	23.95	0.29	27.33	5.09
Other states	4.33	8.55	4.72	9.31	0.39	9.06	0.76
All- India	18.63	13.48	25.97	18.62	7.12	39.40	5.14

Note: Due to the non-availability of NCA for the latest years, the ratio of average net cultivated area in each state to the total NCA for the TE 1991-92 and the total NCAs for 1992-93 and 1993-94 were used to project the state NCA for 1992-93 and 1993-94.

Source: Gulati et al. 1996, B. Ozler, G. Datt, and M. Ravallion, 1996, "A Database on Poverty and Growth in India," World Bank.

Appendix Table A2.3a:

Changes in Cropping Patterns All-India - Net Cropped Area (TE 79-80 to TE 1993-94)

Items	Area under various crops						Absolute Change		% Change in Crop Area		% Change in Crop Share of NCA	
	TE 1979-80		TE 1986-87		TE 1993-94		TE80-TE94	TE87/ TE94	TE80-TE94	TE87/ TE94	TE80-TE94	TE87/ TE94
	(m. ha.) (A)	% of NCA (B)	(m. ha.) (C)	% of NCA (D)	(m. ha.) (E)	% of NCA (F)	(m. ha.) (E-A)	(m. ha.) (E-C)	(%) (E-A)/A	(%) (E-C)/C	(%) (F-B)/B	(%) (F-D)/D
Net Cropped Area (NCA)	141.28		140.46		139.49							
Foodgrains	127.25	90.07	127.30	90.63	122.49	87.81	-4.76	-4.81	-3.74	-3.78	-2.51	-3.11
Rice	39.99	28.31	41.15	29.30	42.15	30.22	2.16	1.00	5.40	2.43	6.75	3.14
Wheat	22.09	15.64	23.23	16.54	24.26	17.39	2.17	1.02	9.80	4.41	11.21	5.14
Coarse Cereals	41.96	29.70	39.47	28.10	33.63	24.11	-8.32	-5.84	-19.84	-14.80	-18.81	-14.20
Pulses	23.14	16.38	23.44	16.69	22.45	16.09	-0.69	-0.99	-3.00	-4.23	-1.76	-3.56
Oilseeds	17.27	12.23	18.86	13.43	25.97	18.62	8.70	7.12	50.38	37.75	52.31	38.71
Groundnut	7.21	5.10	7.09	5.05	8.40	6.03	1.19	1.13	16.57	18.51	18.06	19.34
Rapeseed-mustardseed	3.53	2.50	3.90	2.77	6.35	4.55	2.82	2.45	79.80	62.96	82.11	64.09
Soybean	0.34	0.24	1.37	0.98	3.74	2.68	3.40	2.37	1011.01	173.02	1025.28	174.92
Sunflower	0.35	0.25	0.87	0.62	2.29	1.64	1.94	1.42	547.48	163.46	555.79	165.29
Cotton	8.04	5.69	7.29	5.19	7.51	5.39	-0.53	0.23	-6.55	3.10	-5.35	3.82
Sugarcane	2.95	2.09	2.96	2.11	3.62	2.59	0.67	0.66	22.57	22.15	24.15	23.00
Cropping Intensity		1.22		1.26		1.31						

Note: Due to the non-availability of NCA for the latest years, we have used the ratio of average area under principal crops to NCA for the TE 1991-92 (this ratio is approximately 1.14) and the area under principal crops for the years 1992-93 and 1993-94 are used to project the NCAs for these yeas.

Source : Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi

Appendix Table A2.3b:

Changes in Cropping Patterns All-India - Gross Cropped Area (TE 79-80 to TE 1993-94).

Items	Area under various crops						Absolute Change		% Change in Crop Area		% Change in Crop Share of NCA	
	TE 1979-80		TE 1986-87		TE 1993-94		TE80-TE94	TE87/ TE94	TE80-TE94	TE87/ TE94	TE80-TE94	TE87/ TE94
	(m. ha.) (A)	% of GCA (B)	(m. ha.) (C)	% of GCA (D)	(m. ha.) (E)	% of GCA (F)	(m. ha.) (E-A)	(m. ha.) (E-C)	(%) (E-A)/A	(%) (E-C)/C	(%) (F-B)/B	(%) (F-D)/D
Gross cropped area (GCA)	172.21		177.27		182.47							
Foodgrains	127.25	73.89	127.30	71.81	122.49	67.13	-4.76	-4.81	-3.74	-3.78	-9.15	-6.52
Rice	120.18	69.79	41.15	23.22	42.15	23.10	-78.03	1.00	-64.93	2.43	-66.90	-0.49
Wheat	22.09	12.83	23.23	13.10	24.26	13.29	2.17	1.02	9.80	4.41	3.63	1.44
Coarse Cereals	41.96	24.36	39.47	22.27	33.63	18.43	-8.32	-5.84	-19.84	-14.80	-24.35	-17.22
Pulses	23.14	13.44	23.44	13.22	22.45	12.30	-0.69	-0.99	-3.00	-4.23	-8.46	-6.96
Oilseeds	17.27	10.03	18.86	10.64	25.97	14.24	8.70	7.12	50.40	37.75	41.95	33.83
Groundnut	7.21	4.19	7.09	4.00	8.40	4.61	1.19	1.13	16.57	18.51	10.11	15.14
Rapeseed-mustardseed	3.53	2.05	3.90	2.20	6.35	3.48	2.82	2.45	79.80	62.96	69.69	58.32
Soybean	0.34	0.20	1.37	0.77	3.74	2.05	3.40	2.37	1000.02	173.02	938.26	165.25
Sunflower	0.35	0.20	0.87	0.49	2.29	1.26	1.94	1.42	554.88	163.46	518.05	155.96
Cotton	8.04	4.67	7.29	4.11	7.51	4.12	-0.53	0.23	-6.55	3.10	-11.80	0.17
Sugarcane	2.95	1.71	2.96	1.67	3.62	1.98	0.67	0.66	22.57	22.15	15.68	18.67

Note: Due to the non-availability of NCA for the latest years, the ratio of average area under principal crops to GCA for the TE 1991-92 (this ratio is approximately 0.9) and the area under principal crops for the years 1992-93 and 1993-94 are used to project the GCAs for these yeas.

Source : Gulati, et al. 1996 and World Bank.

Appendix Table A2.4

Change in irrigated area under oilseeds (1991-92 over 1986-87)

Major oilseeds producing states	1986-87 (m. ha.) (A)	As % of state GIA (B)	1991-92 (m. ha.) (C)	As % of State GIA (D)	Absolute change, m. ha (D-B)	Percentage change, % (C-A/A)	Change in % Share over State GIIA (D-B)
Central Region							
• Madhya Pradesh	0.13	3.86	0.34	7.11	0.20	153.56	3.25
• Rajasthan	0.64	14.73	1.71	32.43	1.07	166.34	17.70
Western Region							
• Gujarat	0.41	17.89	0.69	23.85	0.28	66.91	5.96
• Maharashtra	0.13	5.14	0.34	12.22	0.22	168.75	7.08
Southern Region							
• Andhra Pradesh	0.33	7.62	0.62	11.51	0.29	86.39	3.89
• Karnataka	0.38	16.99	0.69	24.29	0.31	80.25	7.30
• Tamil Nadu	0.35	12.27	0.51	15.69	0.16	46.38	3.42
Other states	0.92	2.74	1.61	4.36	0.68	73.94	1.62
All- India	3.30	5.92	6.50	10.16	3.20	96.97	4.24

Note: Due to the non-availability of GIA for the latest years, we have used the figures for 1986-97 and 1991-92.

Source: Gulati et al. 1996.

Appendix Table A2.5
Correlation Coefficients in Regional Oilseed Production
(1971-77 and 1988-94)

1971-77	Center	East	North	South	West
Center	1.000	0.567	0.465	0.342	0.056
East		1.000	-0.236	0.890	-0.159
North			1.000	-0.130	0.525
South				1.000	-0.106
West					1.000
1988-94	Center	East	North	South	West
Center	1.000	-0.426	-0.453	0.374	-0.214
East		1.000	-0.095	-0.315	-0.034
North			1.000	0.465	0.342
South				1.000	-0.343
West					1.000

Source: computed.

Appendix Table A2.6
Correlation Coefficient in Crop-wise Oilseed Production (1971-77 and 1989-95)

1971-77	Groundnut	Rapeseed-Mustardseed	Soybean	Sunflower	Others
Groundnut	1.000	-0.116	0.155	0.190	0.805
Rapeseed/Mustardseed		1.000	-0.306	0.638	0.361
Soybean			1.000	-0.831	-0.208
Sunflower				1.000	0.648
Others					1.000
1989-95	**Groundnut**	**Rapeseed/-mustard**	**Soybean**	**Sunflower**	**Others**
Groundnut	1.000	-0.494	-0.029	-0.442	0.200
Rapeseed/Mustardseed		1.000	-0.074	0.229	-0.160
Soybean			1.000	0.617	-0.049
Sunflower				1.000	-0.260
Others					1.000

Source: computed.

Appendix Table A2.7
Correlation Coefficient in Seasonal Oilseed Production, (1976-1982, 1989-95)

1976-82	*Kharif*	*Rabi*
Kharif	1	0.657
Rabi		1

1989-95	*Kharif*	*Rabi*
Kharif	1	-0.484
Rabi		1

Source: computed.

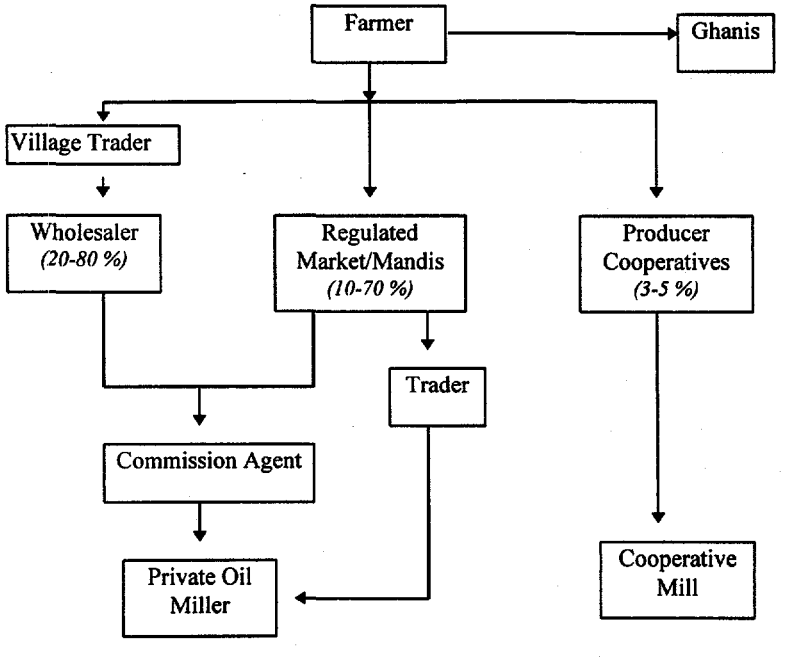
Annex 3

Marketing Structure & Organization of the Oilseed Complex

A. Marketing of Oilseeds

A3.1 **Three Main Marketing Channels.** Farmers generally have four alternatives in selling their marketed surplus; the oilseeds may be (i) sold to a cooperative society for eventual processing by the cooperative mills; (ii) sold to private traders for eventual sale to private mills; and (iii) sold to private traders through *mandis* or regulated markets operated by the state governments (Figure A3.1). Of the approximately 22 million mt of oilseeds produced in India, about 90 % is sold through these channels, the remainder is kept by farm households as seeds or direct use. The percentage of oilseeds flowing into each channel varies depending on: i) the size of the land holdings in the region, ii) the type of oilseeds; and iii) the State. In the State of Andhra Pradesh, it is estimated that about 40 % of marketed surplus is sold through regulated *mandis*, with the remaining 60% is sold directly to local traders or cooperatives. In Madhya Pradesh approximately 45% of marketed surplus is sold to through the *mandis*, in contrast to about 75% in Rajasthan. Direct sales outside *mandis* are usually made using the price observed at the local *mandis* as reference. The *mandi* prices are generally accessible through the newspapers. Therefore, the pricing system at the *mandis* is of great importance for both traders and farmers as well as for processors.

Figure A3.1
Marketing Channels for Oilseeds in India



Source: Gulati and Phansalkar, 1994.

A3.2 **Crushing by Ghanis, Traditional Channel But of Diminishing Importance.** The traditional, but now only rarely used channel, is job-order processing by ghanis. Farmers transport the oilseeds usually set aside for home consumption to the local ghani, where it is crushed for a fee. The farmer retains ownership of the oil and the oil meal. This system is still common in the eastern and northern parts of the country.

A3.3 **Cooperative Procurement Remains Negligible.** The cooperative share of total oilseed procurement remains very modest both in terms of state level production and total production in India. Presently, there are about 5,513 village growers cooperatives, associated with 18 cooperative unions in 8 states. In seven states, the unions have been organized into seven cooperative federations. Total farmer membership in the cooperative sector is about 1.02 million; these members cultivate about 3 million ha to oilseeds. In view of its limited participation in the oilseed sector as a whole, as a percentage of total production, cooperative procurement had remained negligible (Table A3.1). Moreover, cooperative procurement dropped drastically in absolute terms over the last five years from 489,000 mt in 1990-91 to 63,000 in 1994-95. In percentage terms, its share declined from about 3 % of total production during the 1990-91 to 192-93, less than 1 % by 1993-94 to 1994-95. The large bulk of procurement was concentrated in two states, namely Gujarat and Madhya Pradesh (until 1992-93).

Table A3.1
Cooperative Procurement of Edible Oils, 000 mt.

State	Procurement, 000 mt					Procurement as % of Total Production
	1990-91	1991-92	1992-93	1993-94	1994-95	90-91 to 92-93
Gujarat	181.2	131.2	182.2	73.1	32.5	7.13%
Madhya Pradesh	168.2	355.5	263.9	na	na	8.28%
Tamil Nadu	40.7	25.8	5.6	0.7	na	1.61%
Karnataka	40.4	32.8	22.1	22.5	8.1	1.95%
Orissa	7.4	24	26.8	8.6	3	2.73%
Maharashtra	13	34.5	13.6	10.4	9.1	1.28%
Andhra Pradesh	38.3	13.1	8.4	14.6	8	0.80%
Rajasthan	na	16.4	na	3.3	1.9	0.65%
Uttar Pradesh	na	na	na	0.7		-
Total	489.1	633.4	522.7	133.7	62.6	-
As % of Production	2.73%	3.55%	2.70%	0.65%	0.29%	2.99%

Source: NDDB.

A3.4 ***Mandis* Serve As a Major Market Outlet.** The *Mandis,* established under State Agricultural Product Markets Acts (Text Box 1), consist of a dense network of delivery points all over the country and is an important market outlet for farmers. As of 1993, there were about 6,792, consisting of principal and sub-markets, accounting for over 90 % of wholesale markets in India. In 1991-92, the most recent period for which disaggregated data are available, there were 2,198 principal markets and 4,024 sub-markets. *Mandis* can be further classified into two types: producer markets in net surplus areas, where only a small number of commercial crops are usually traded exchanged[1] and consumer markets in net deficit areas, where a large range of agricultural products is traded. The *mandis* usually operate six days a week, except for holidays, for a few hours in the morning. The average area served by the *mandis* vary from state to state.

[1] In Kurnool, Andhra Pradesh, in the center of an important production region, only three products are traded on the local mandi: groundnuts, sunflower seeds and onions; as opposed to the city of Jaipur, Rajasthan — an urban area — where about 150 categories of products are exchanged.

Text Box 1: Agricultural Product Markets Act and *Mandi* Operations

The Agricultural Product Markets Act (APMA) was legislated by the states for the purpose of regulating the marketing of agricultural produce, including oilseeds and oilseed products, for the purpose of improving their efficiency and in the process ensure a more equitable distribution of gains from agricultural trade between consumers, traders and producers. The Uttar Pradesh *Krishi Utpadan Mandi Samitis Adhiniyam* (1972) and the Punjab Agricultural Produce Markets Act (1961) are examples of this legislation. The act prescribes the setting up of *mandis* or regulated markets for agricultural produce and the establishment of Marketing Committees in each market area. The Marketing Committees are responsible for implementing and enforcing the provisions of the act and are empowered to control and regulate admissions to the markets, charge fees (market and license fees), issue or renew license and suspend or cancel them. The Marketing Committees are supervised by the State Agricultural Produce Market Board, which is entrusted with the responsibility for state-wide market development.

Revenues generated under the Act were to be allocated for the operation and development of the respective markets, particularly (i) the operation and maintenance of the market yards and related facilities (Market Committee Funds) and (ii) the development and improvement of market facilities and related development works and activities (Market Committee Development Fund).

In Rajasthan, it is 900 sq. km, Madhya Pradesh 700 sq. km, Gujarat 620 sq. km, Karnataka 530 sq. km, Andhra Pradesh 480 sq. km, Uttar Pradesh 470 sq. km, Haryana 175 sq km and Punjab 75 sq. km.[2] The average transport distance for oilseed farmers and local small traders to the local *mandi* ranges from 20 to 39 km.

A3.5 **Generally Active Trading in *Mandis*, But Exchange Practices Remain Rudimentary.** Relatively high volumes of oilseeds are traded in the *mandis*, especially during the harvest periods. In the major oilseed growing states and major markets within the state, market arrivals could average from 2,000 mt to 5,000 mt per day (Table A3.2). Trading in the *mandis* is mediated by the large number of commission agents[3] operating in the markets. Oilseeds are transported to the *mandis* via a wide range of vehicles, from animal-drawn carriages filled with oilseeds packed in bags (80 kgs for rapeseed and soybean; 40 kgs for groundnuts), to tractor trailers transporting oilseeds in bulk.[4] A producer then engages a commission agent, who displays it in a heap in the yard. Buyers move from heap to heap, picking samples and making their calculation of the appropriate price for the produce. The produce is then auctioned, with auctioning methods being adapted to local practices in each state, such as the open auction by the commission agent (e.g., Rajasthan) or written tenders for each pile of seeds (e.g., Andhra Pradesh). Buyers from local processing plants also participate in trading in the *mandis*, either directly or through agents. After the deal is agreed upon, seeds are sifted manually on sieves of a standard mesh, bagged, weighed and loaded on the buyer's vehicle. Payments are made in cash, for immediate delivery through the commission agent who retains the *mandi* fee (paid by the buyer) and other fees as authorized by the market committee. Due to restrictions imposed by the Forward Markets Regulations Acts (see Policy Annex for detailed discussion of this Act), forward contracts are only permitted for up to 11 days. These contracts are usually negotiated directly, outside the *mandi* proper.

A3.6 **Lack of Standardized Product Grading.** There is no standardized grading of products in the markets. Visual grading is generally practiced; formal testing for oil content is not performed. The only testing instrument used widely is the moisture meter. Health safety criteria of importance

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[2] D.S. Sidhu, 1996, "Rice and Wheat Marketing System in India," draft mimeo.

[3] There are two types of commission agents or *adatiyas* operating in the markets. The *kachcha adatiya* is a pure commission agent who does not conduct business on its own account, while the *pucca adatiya* usually finances the trade on behalf of a distant buyer and may also engage in business on his/her own account.

[4] In some cases, seeds are placed in the bottom of the trailer and covered with bagged seeds to minimize losses during transport.

in other countries, such as erucic acid and glucosinolate content in rapeseed-mustardseed, or aflatoxin levels in groundnuts, are almost universally ignored. Scientific testing facilities for independent quality checks of oilseeds do not yet exist at the *mandis*.

A3.7 **Most *Mandis* have Limited Facilities and Infrastructure.** There are limited facilities and infrastructure to handle oilseed trading efficiently in most *mandis*. Trading is often done in the open air, and covered storage facilities which could be leased as needed by farmers or traders are limited. As noted above, oilseed cleaning in the market despite the bulk nature of the transactions is still done manually. Bulk handling equipment are non-existent. Although in some places, products are being delivered in bulk (e.g., Kota, Rajasthan), the oilseeds have to be bagged for subsequent transport to a warehouse or to the processing facilities. The lack of bulk equipment contributes to the high transport costs. Trucks which deliver products to the market for sale are typically hired to transport the same goods from the market after the auction has been completed. In practice, the lorry delivers the product to the *mandi* in the morning for unloading and presentation for sale. The sales transactions takes the whole day, consequently, it is rare for the vehicle to be

Table A3.2:

Size Of Operations At Selected Leading *Mandis*

State	Main oilseeds	Town	Number of commission agents	Average arrivals per day at the seasonal peak (mt)
Rajasthan	Rapeseed and mustardseed	Bharatpur	250	3,000
		Alwar	200	2,500
		S. Madhopur	175	2,000
		Kota	165	1,500
Madhya Pradesh	Soybean	Indore	200	5,000
		Ujjain	150	4,000
		Jaora	100	3,000
		Sehore	50	2,000
Andhra Pradesh	Groundnut and sunflower seed	Adoni	200	2,000
		Anantpur	200	1,500
		Kurnool	65	300

Note: Indicative numbers
Source: World Bank.

able to leave for the customer's premises until after 4 p.m. This restricts the lorry to just one round trip per day, whereas bulk handling would permit three round trips per day. It has been estimated that this would permit the saving of at least one third of the road transport costs, which would represent the equivalent of Rs 200 per ton of recovered oil.

A3.8 **According to Law, Market Cess Collected for the Purpose of Improving/Maintaining *Mandi* Facilities.** As per the State Agricultural Product Markets Act, the *mandi* committees are permitted to charge an *ad valorem* market cess for the purpose of generating revenues for market improvement and development activities (See Text Box 1). The market fees charged vary from state to state, but generally range from 1 to 2 % of the value of the commodity. For example, the cess is 1.75 % in Rajasthan, 1 % in Madhya Pradesh and 1.6 % in Andhra Pradesh. Although the fees are supposed to be charged only at a single point, in many states, the fee is applied at several points, to both primary and processed products, which tend to increase transaction costs of traders. Cooperatives and State agencies, however, are exempt from such fees when they buy oilseeds at the *mandi*. *Mandi* fees represent a relatively important source of revenues for the State. In 1994, the State of Rajasthan collected about Rs 900 million in market charges, while Andhra Pradesh collect about Rs 1 billion.

Text Box 2. Expenditures Financed By Market Cess Levied On Market Yards In The State Of Andhra Pradesh

A 1% market cess is levied on products purchased on the 821 *mandis* in operation in the State of Andhra Pradesh. A total of around Rs 1 billion , (US$32.2 million) was collected during 1994, of which:

- 30% (US$9.6 million) was used to cover market and central administration operating costs;
- 10% (US$3.2 million) went into a "Central Market Fund" which makes loans and grants to the *mandis*;
- 25% (US$8.0 million) was used for short-term credit for a maximum of three months and 50,000 Rs. (US$1,600) to farmers at a low interest rate;
- 15% (US$4.8 million) was used to improve market infrastructure; and
- 20% (US$6.4 million) went towards the maintenance and improvement of rural roads.

Note: Percentages are best estimates of order of magnitude.

Source: Field Estimates.

A3.9 **Problems of Diversion of Large Share of *Mandi* Revenues.** Although intended primarily for financing market operations and improvements under the guidance of the market committees, the market cess has become a major source of revenue for the state treasury. For example, Market Committees in Uttar Pradesh (UP) were required, according the UP Agricultural Marketing Act, to remit a maximum of 10 % of their total receipts to the State Marketing Board. In practice, however, the UP Agricultural Marketing Board has been appropriating a greater share of total revenues, leaving only minimal resources under the authority of the Market Committees.[5] These market revenues in turn have been spent on non-market related activities such as rural roads outside the operation of the market, agricultural scholarships or transferred to the District Magistrate as general tax revenue, instead of being reinvested in upgrading of market facilities or services (e.g. sanitation, cold storage, grading and weighing equipment, or market information). For example in Andhra Pradesh, only about 45 % of the approximately Rs 1 billion market tax collection was re-invested in the markets--30 % of operating and administrative costs and 15 % for infrastructure improvement (Text Box 2). In Rajasthan, about 7,000 km of roads have been built using revenues from the *mandis*. Limited financial authority of the respective marketing committees constrains access to the necessary capital to properly operate or upgrade the facilities of the agricultural markets. Weal financial authority, coupled with deficient accounting systems, have further contributed to rent-seeking activities.

A3.10 **Need for Increased Decentralization of Financial and Management Authority to Market Committees.** The market committees should be given more authority and accountability over the revenue generation and mobilization activities. The frequency at which fees are to be collected needs to be clarified and made more transparent. In order to increase the efficiency and promote the development of individual agricultural markets, the financial rules need to be reformed to allow the marketing committees to retain a greater proportion of the revenue collected and greater authority in fund allocation. To improve the effectiveness and transparency of the fund allocation, the composition of the marketing committees should be improved to increase the representations of users--traders, farmers, and consumers and regular elections should be held. The Marketing Board should focus on monitoring and enforcement of the rules and regulations, while retaining financial control over state-wide market development initiatives

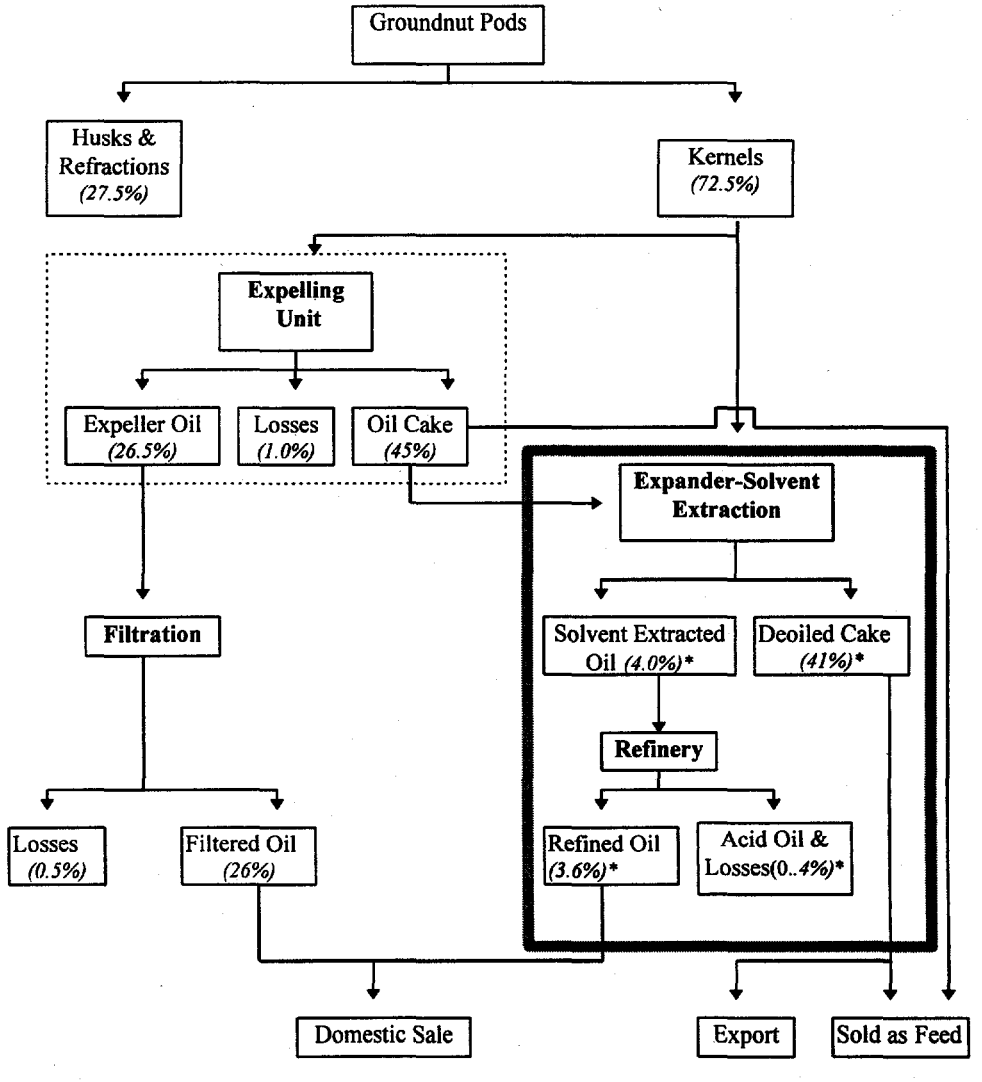
[5] In UP, for example, the market committees were only expected to contribute 10 % of their total receipts to the marketing board. In practice, however, the market committee contributes to the market development fund controlled by the marketing board no more than 50 % of the first Rs 5 million it collects and all receipts over and above the Rs 5 million.

B. The Oil Processing Industry

Structure of the Vegetable Oil Processing Industry

A3.11 **Three Major Technological Processes for Crushing Oilseeds in India.** Government regulations on oilseed processing technology have shaped the structure of the oilseed processing industry. There are three major technological processes for crushing oilseeds in India: (i) mechanical expulsion[6], (ii) solvent extraction for non soft seeds (e.g., soybean, cottonseeds) and

Figure A3.2
Groundnut Expeller and Expander-Solvent Extraction Process



Note: * - percentages apply only to solvent extraction of oil cakes.
Source: Gulati and Phansalkar, 1994; Mission estimates

[6] Oil is extracted out of the oilseeds by mechanical pressure using different types of equipment (also called expellers). A popular method is by means of screw pressing (V.P. Gulati and S. J.Phansalkar, 1994, Oilseeds and

other low oil bearing material (e.g., expeller cake), and (iii) expander-solvent extraction for soft seeds --groundnut, rapeseed-mustardseed, sunflower.[7] Figure A3.2 provides an illustration of the three processes at is applies to softseeds such as groundnut. The oilseed crushing industry is divided into the following four distinct segments. Two additional segments follow the crushing industry: the oil refining, and the *vanaspati* industry.

A3.12 **The Oilseed processing Industry is Fragmented, and Dominated in Number by Micro-Scale, Private *Ghanis*.** The most numerous of all are the very small scale, traditional crushers, the *ghanis*, which rely on animal or electric power to undertake very simple mechanical expulsion of oil from oilseeds at a rate of kilos, rather than tons, per day. By virtue of Small Scale Industry (SSI) Reservation, the *ghanis* process primarily groundnuts and mustardseed, whose processing is reserved for small scale units (Table A3.3).

Table A3.3: Structure of the Industry in Oilseed Processing

Segment	No. of Units	Total Capacity (million tons)	Average Capacity	Capacity Utilization	Output (million tons)
Mechanical Crushing					
A. Cottage Industry	131,600	2	18 (60kg/Day)	10%	0.2
B. Expellers	20,000	53	2,650 (9 T/Day)	30%	16.0
Solvent Extraction	761	28	36,800 (123 T/Day)	34%	9.5
Oil Refining	130	1.2	7,692 (26 T/Day)	50%	0.6
Hydrogenation (*Vanaspati*)	145	2.45	16,900 (56 T/Day)	37%	0.9

Notes:
a) Reliable data for cottage industry units are available only for 1977. It is expected that this number has since shrunk.
b) The figures for expellers are not precisely known. The numbers here are based on estimates in Gulati and Phansalkar (1994) and on the Minister of Civil Supplies' May 1995 statement that the utilization rate is 30%.
c) According to industry sources, of the given number of solvent extraction units, 100 are closed; of the given number of *vanaspati* plants, 31 are closed. All hydrogenation plants have refining facilities integrated in the plant. In 1993-4, the *vanaspati* factories produced about 50,000 tons of refined oils. The exact use of refinery capacities (whether stand-alone or otherwise independent of *vanaspati* plants) is not known, but may be judged from industry estimates that about 400,000 tons of soybean oil and 100,000 tons of safflower, cottonseed and sunflower oils are refined.
d) Capacities are expressed as tons/year (of seed for expellers, of cake and seed for solvent extraction units, and of oil for refining and *vanaspati* units, respectively), and are given on a 24 hours/day, 300 working days per year, basis.

A3.13 **The Small-Scale, Private Expellers in the Unorganized Sector Account For the Bulk of India's Oilseed Processing.** The next most numerous group of processors, whose throughput is far larger than that of the *ghanis*, is the small-scale expellers, whose scale is restricted to no more than tens of tons per day by the limits established under SSI Reservation (Table A3.3). Like the *ghanis*, they crush oilseeds, using metal screws, which press ("expel") oil from seeds, and leave the cake behind. They also put the resulting cake a few times through the same expeller, to maximize the output of oil. They sell only expeller oil and expeller cake with a high residual oil content, which often exceeds 10% of the weight of the cake.

A3.14 **The Large-Scale, Modern Solvent Extraction Segment.** The next most significant sector, which is second only to the small scale expellers in their total production, consists of

[7] The solvent extraction method involves the extraction of the oil using a chemical solvent, usually hexane. It involves a pre-treatment of oilseeds, for example breaking soybeans into flakes and heating them ("expanding them") to facilitate subsequent extraction of the oil. The non-fat components remain undissolved, while the mixture of oil and hexane is filtered and distilled to separate the two. But a small fraction of the hexane remains in the solvent extracted oil, which requires further refining to be fit for human consumption. Solvent extraction is ideally suitable for oilseeds containing not more than 15-20 % oil by weight (e.g. soybean and cottonseed). Those containing more oil need to be crushed first and their cakes used for solvent extraction.

factories which process low oil content raw materials with solvent extraction technology. These solvent extraction plants, like their counterparts in other countries, tend to process low oil/high meal seeds, such as soybeans or cottonseed, or low oil by-product materials, such as expeller cake or rice bran. They undertake a certain amount of pre-treatment of oilseeds, for example breaking soybeans into flakes and heating them ("expanding" them) to facilitate the subsequent extraction of oil. The actual extraction is performed using solvents, notably hexane, which dissolve the oil from the raw material, and ultimately leave only a very low oil content de-oiled cake, which can be used either for high protein animal feed or for edible protein for human consumers. They tend to have capacities which range from 50 to 1,500 tons per day, with an average daily processing capacity of the order of 125 - 150 tons, which is barely 10% of the norm in North America, South America or Western Europe (more precise estimates are presented in Table A3.4).

Table A3.4
Capacity Utilization
Indian Solvent Extraction Processing Sector

Year	No. of Units	Average Capacity per Unit (tons)	Average Processing per Unit (tons)	Utilization Rate (%)
1987	305	34,815	10,449	30%
1990	395	39,381	15,020	38%
1991	396	41,574	15,718	38%
1992	494	43,608	15,298	35%
1993	516	47,562	15,226	32%
1994	550	48,890	14,691	30%
1995	553	53,885		

Source: Indian Solvent Extractors' Association, mission estimates

A3.15 **A Solvent-Extraction Industry for Soft Seeds Emerges to Circumvent the Small-Scale Industry Reservation.** The fourth segment of the Indian processing industry is uniquely Indian. The usual form of solvent extraction plant is the one just described, where low oil content bearing materials (soybean, expeller cakes) are treated in such a way as to remove their oil. In other countries, it is usual for high oil content bearing seeds --soft seeds-- such as groundnuts, rapeseed-mustardseed and sunflowerseed, to be crushed in medium to large-scale factories with an expeller, and then for the expeller cake to undergo through the solvent extraction plant, integrated in the same factory. This internationally standard technological process is virtually impossible in India for groundnuts and rapeseed, as a result of the SSI Reservation. Therefore, a few factories have recently been established with expanders-cum-solvent technology --which lies outside the scope of SSI Reservation Policy-- to pre-process groundnuts and rapeseed in a technologically inefficient manner, much as they would process soybeans. In India, softseed processors have to resort to the ingenious use of expander-cum-solvent extraction technology to by-pass the effect of the law (their numbers are combined with the other segment of the solvent-extraction industry in Table A3.4). In 1994-95, of the 1.5 million mt of rapeseed processed, 25 % by processed by means of an expander. During the same period, 14 % of the 661,000 mt of sunflower were processed using expanders.

A3.16 **The Oil Refining Industry.** The fifth segment of the processing industry is the classical oil refining sector. Outside India, it is very often linked to a solvent extraction plant, and refines both expeller oils and solvent extraction oils. India is, once again, distinctive in one special respect in its regulation of the refining industry. Under the PFA, the labeling of refined oil has to indicate whether it originates from expeller or solvent extraction oil, and the latter attracts lower selling prices. No other countries insist upon this distinction, which has little rationale in terms of quality.

A3.17 **The *Vanaspati* Industry.** The final segment of the industry is the *vanaspati* sector, which hydrogenates refined oil to produce a vegetable shortening or spread, somewhat similar to *ghee*, which is produced from milk, and to margarine. This sector, too, has a uniquely Indian aspect. In order to provide indirect assistance to products classified as non-traditional oil-containing products, such as expeller cake, rice bran, mango seed, neem seed, etc., which are processed by solvent extraction means, special tax drawbacks are permitted for these products, to reduce the incidence of excise tax on sales of *vanaspati*. Also, there are strict limits as to which oils can be used, and in what proportions, in the manufacture of *vanaspati*. These limits (which are often known to be flouted) have no logic in terms of the manufacture of the end-product, but are designed, instead, to stimulate demand for particular crude oils.

A3.18 **The *Vanaspati* sector has a Long Tradition in India but Remains Small.** *Vanaspati* or hydrogenated oil production has been a traditional mainstay in the oil processing industry. Presently, it absorbs about 10 % of total oil supply in India. After refining, oils may be further, processed into hydrogenated form. Presently, there are about 145 units with an average capacity of 56 mt/day and a total of 2.45 million mt per year.

A3.19 *Supply of Subsidized Oil to Vanaspati Industry Ended in the 1990s.* Closely allied with the PDS for edible oils has been the policy of supplying imported edible oils to the *vanaspati* industry, a policy followed between 1978 and 1988. The *vanaspati* units were allotted oils at both concessionary and commercial rates (though both remained substantially below the prevailing market prices of domestic oils). Price control orders, under the Vegetable Oil Products Control Order(1947) and then voluntary, were imposed on the *vanaspati* industry to ensure that the benefit of cheap imports reached the *vanaspati* consumers. The supply of cheap imported oils to *vanaspati* and price controls ceased in the 1990s.

A3.20 **Cooperatives Account for Small Share of Processing Capacity.** Cooperative processing units account for only a small share of total crushing capacity and a slightly larger share in refining capacity. They account for 1.8 % of expelling capacity, 2.1 % of solvent extraction capacity and 18 % of refining. Co-operatives were given preferential treatment --such as exemption from SSI reservation, controls under the EC Act, and the RBI's Selective Credit Control Policy) over their private sector competitors. As such, it would have been expected that they would perform in a superior manner relative to private processors. However, in spite of their exemption from the Selective Credit Control Policy, oilseed processing cooperatives suffered from lack of access to working capital. With the exception of co-operatives in Madhya Pradesh, which received working capital finance as a result of state government intervention, other cooperatives simply lacked the working capital to buy seeds with which to utilize their capacities. As a result, the impact of cooperatives on the oilseed marketing and processing has been correspondingly limited.

A3.21 **GOI-Owned Enterprise Engaged in Refining and Packaging of Oils Incurring Significant Losses.** The Hindustan Vegetable Oil Corporation (HVOC) is the only GOI-owned enterprise (it was taken over by the government in 1984) involved in vegetable oil refining. The HVOC is mainly a manufacturer of refined edible oils and of hydrogenated oils. It has three *vanaspati* production and packing units, five refining and packing units, and eight units making consumer packs. The HVOC is also one of the principal agencies involved in packaging vegetable oils distributed through the Public Distribution System (PDS) (See Policy Annex for more detailed discussion of the PDS). However, it is suffering from extremely low capacity utilization, resulting in significant financial losses. Between the 1991 and 1993 financial years, the HVOC consistently operated at less than 1 % of its refining capacity, while the utilization of its *vanaspati* units slipped from 24 to 16 %. Capacity utilization in its packing installations dropped from 12 to 3 %. As a

result, the net losses suffered by HVOC jumped from Rs 36.4 million in 1992/93 to Rs 102.5 million (US$3.3 million) in 1993/94.

A3.22 **Continuing Expansion of Oil Processing Industry Has Resulted in Over-Capacity in Industry**. Continued investments in the oil processing industry has resulted in substantial over capacity. The continued expansion of the processing industry has in part been supported by incentives from state governments for the establishment of units in industrially backward areas. Consequently, capacity utilization has declined overall, and average 10 to 30 % for expelling units and 30 to 50 % in the solvent extraction and refining units (Tables A3.3 and A3.4). In addition, while this capacity is well distributed geographically, it does not necessarily match up with the availability of raw materials in each individual region leading to substantial movement of oilseeds within India (Table A3.5). Underutilization of capacity as well as poor location of plants, in turn, have had a major impact on the efficiency and international competitiveness of India's crushing industry (See Annex 5 for a detailed discussion of the efficiency of the Indian oilseed crushing industry).

Marketing of Vegetable Oils

A3.23 **Composition of Consumer Sales of Edible Oils.** The majority of edible oils in India is sold in liquid form. About 90 % is sold in this manner, with the remainder sold in hydrogenated form (Figure A3.3). Branded products remain a small fraction of this small refined oil segment of the market for liquid oils. Although *vanaspati* sales remain stagnant, refined oils represent a fast growing market (increasing at 17 to 18% per year), with the most rapid growth occurring in the area of refined oils sold in small consumer packages (a segment expanding at 20 to 25% per year).

Table A3.5
Comparison of Processing Capacity
& Availability Of Raw Materials (million tons)

Segment	West	North	East	South	Center
Mechanical Expulsion	11.1	13.8	6.2	13.0	9.0
Oilseeds Available for Crushing	4.85	1.72	1.33	4.91	1.5
Observed Imbalance	+56%	-25%	-115%	+62%	+83%
Solvent Extraction	7.0	5.2	0.5	6.5	9.3
Oil Cakes and Seeds for Extraction	2.9	10..3	0.7	2.9	4.3
Observed Imbalance	+59%	-50%	-40%	+55%	+54%

Notes:
1. The quantity of oilseeds available for crushing is assumed to be 85% of production, after allowing for sowing, wastage and direct consumption.
2. In these estimates, only soybean and oilseed cakes from conventional oilseeds (assumed to equal 60% of the quantity of oilseeds) are assumed to be processed in these solvent extraction plants;
thus materials such as cottonseed cake and rice bran are excluded.

A3.24 **Vegetable Oil Marketing is a Largely Private Sector Activity**. Vegetable oil is distributed to consumers mainly through private wholesale and retail networks. Although it is also distributed under the Public Distribution System (PDS), the PDS share of the market has declined considerably in recent year (See Policy Annex for more detailed discussion of the PDS vegetable oil operations). Edible oils and *vanaspati* are marketed by the processing industry through a large network of wholesalers.[8] The size of operations of wholesalers is mostly limited by their ability to supply retail shops and stores. Several large processing companies rely upon a network of more than 1,000 wholesalers. The largest individual supplier of edible oils operates through a network of about 2,000 wholesalers located in both urban and rural areas. Some large companies selling under major brand names operate under exclusive contracts with wholesalers.

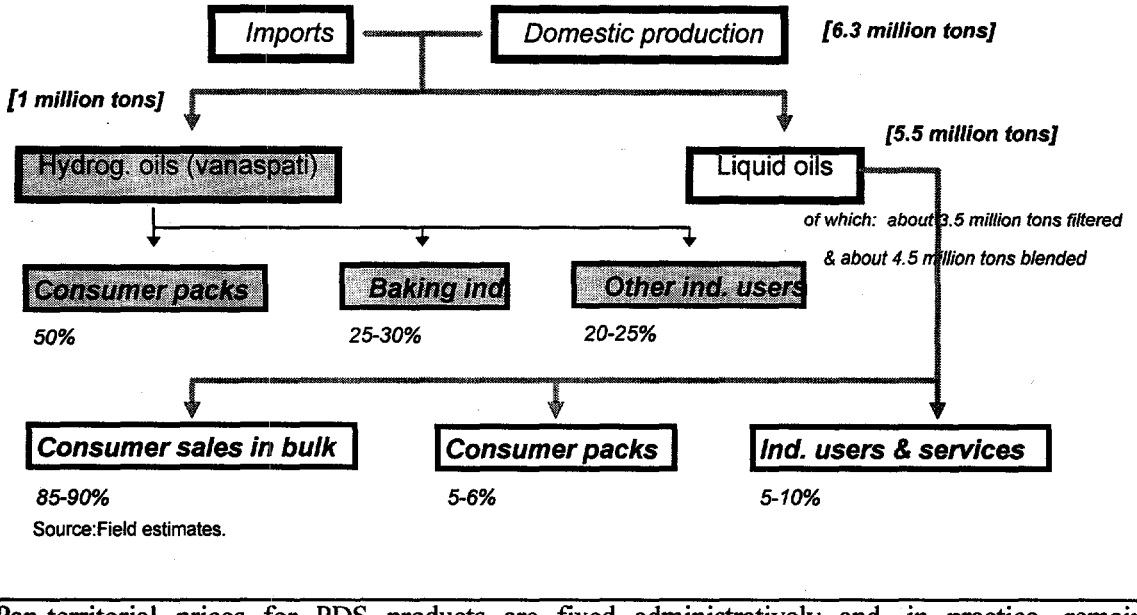
A3.25 The PDS is a safety net program of the GOI which includes the subsidized, but rationed sale of edible oils (See Policy Annex for detailed discussion of the PDS operations). Edible oil

[8] No official data were found by the mission, but trade sources indicate that, throughout India, there are 10,000 to 12,000 wholesalers in all.

distributed under PDS have been primarily supported by edible oil imports, undertaken by the State Trading Corporation (STC). These imports are channeled through six ports--Calcutta, Vizag, Madras, Kandla, Bombay and Bangalore, where they can be stored in bulk. These purchases have been made regularly from Malaysia, under competitive bidding for 6,000 mt per batch to be delivered to the Indian ports. Imported products under the PDS are delivered to States either in bulk, in 15 kg tins or in 1 kg. consumer packages. State Civil Supplies administrations take delivery.

A3.26 **Significant Leakage of PDS Oils to Free Market.** Price differentials between PDS oils and free market oils have encouraged the large scale diversion from the PDS to the free market.

Figure A3.3
Composition of Vegetable Oil Sales in India



Source:Field estimates.

Pan-territorial prices for PDS products are fixed administratively and, in practice, remain unchanged for long periods of time. The difference between the prevailing market price and the PDS price of edible oils was between 40 % and 80 % of the PDS price till 1989. Since then the differences had been reduced to 15 to 20 %. Imported Refined Bleached and De-odorized (RBD) palm oil, RBD palm olein and refined rapeseed oil have been the most commonly distributed oils. Since PDS vegetable oils tend be made available at lower prices than those prevailing in the free market, problems of large scale leakages into informal trading channels occur, especially for the oils packed in drums. These can be repackaged easily, before being sold at higher free market prices and may also partly explain the sharp divergence between the percentage lifting of PDS supplies of oils in retail packs (said to be approximately 30%) compared to oils in drums (reported to be 99%). An added incentive is that fact that palm olein can be blended with other more expensive oils, notably groundnut oil, without the final customer necessarily being able to detect the difference.[9]

[9] The practice of selling blends (often illegal ones, including castor and solvent extraction oils) in unbranded tins is well-known. The *telia rajas* who sell such blends in re-used tins are so important in the North West oil sector that separate quotations are published in Rajkot for *telia* tins and branded tins. Likewise, daily newspaper reports on the edible oil market often refer to the distortions caused by the sale of "smuggled" products, such as *vanaspati*, presumably an allusion to supplies which avoid inter-State tax and quality controls.

A3.27 Sales under the PDS in the form of the 1 kg unit pouch remain very small. The HVOC ex-factory price[10] is decided by a governmental committee, as are the fees to be charged by the HVOC to the State Trading Corporation for loading 15 kg tins[11]. The final allocation of the products to retailers is supervised by State administrations. The entitlement of a ration card holder differs from State to State, but is generally around 3 kg per capita per month.

A3.28 **National Dairy Development Board and the Marketing of Vegetable Oils**. In April 1989, the Government of India appointed the NDDB as its implementing agency for its market intervention operations (MIO). The NDDB's strategy included intervention in both oilseed and edible oil marketing (See Policy Annex for detailed discussion of the MIO and NDDB's role). In line with its new role, NDDB created large storage facilities for oil in bulk: 40,000 tons in the port of Kandla, 100,000 tons in Delhi and 18,000 tons in Calcutta. The Board has also financed the creation of cooperative processing (crushing and refining) and storage facilities in the states of Gujarat, Tamil Nadu, Andhra Pradesh, Maharashtra, Karnataka, Madhya Pradesh and Rajasthan. These places are equipped with large storage facilities for both oilseeds and oil. In addition, a network of packaging stations has been established at nine locations and the NDDB launched a new retail brand: Dhara, emphasizing the reliability of its product in terms of its composition and size. Since the blending of oils has been permitted since early 1992, the Board has also introduced blends of groundnut oil and palm olein under the brand name Lok Dhara. The NDDB has the largest network of wholesale distributors in the country and, in contrast to its large private competitors, also distributes its products in rural areas. NDDB, however, incurred significant losses in its market intervention operations. During the period 1991-93, NDDB's accumulated losses were estimated at Rs. 2.72 billion.

Marketing of Oilseed Meals

A3.29 **Processing Sector in Other Countries Are Usually Vertically Integrated.**. Typically, soft seed processing (e.g. mustardseed, groundnuts or sunflower seed, with oil contents ranging from 30% to 50%) in other oilseed producing countries is vertically integrated. The expellers are integrated with the solvent extraction of oil in one location. This permits the processor to maximize the benefits from sharing factory infrastructure, while minimizing the scope for the deterioration of cake quality during handling between the two processes. It also encourages the factory to achieve the optimal balance between the degree of oil extraction at the expeller and the extractor.

A3.30 **Indian Processing Industry is Highly Fragmented, Contributing to Significant Losses in Oil Meal Processing.** In contrast to international experience, the Small Scale Reservation applied to groundnut and rapeseed expellers in India has contributed to the separation of expelling units both geographically and by ownership from the subsequent solvent extraction units. This separation has three main consequences. First, it has resulted in the direct sale of expeller meal, often with an oil content of over 10 % for livestock feed, even though most of the oil is not digested by the animals and is wasted. It has been estimated that 700,000 tons of recoverable oil is lost in cake sold in this manner. Second, it contributes to costly oil cake losses during handling. In between the processes, the meal has to be bagged, loaded, transported, and eventually unloaded for the next stage of processing. Third, it has encouraged the introduction of expander technology, in conjunction with solvent extraction, into oilseed processing, even in circumstances where other countries continue to favor expellers. This is because expanders are exempted from SSI restrictions.

[10] In May 1995, 32 Rs/pouch (US$1,000/ton).

[11] In May 1995: 3,700 Rs/ton (US$119/ton).

Oil Cake Exports

A3.31 **De-Oiled Cakes Largely Cater to the Export Market.** Due to the relatively small demand for DOC in India, most of the locally produced meal is exported in the form of DOCs. (See Production and Consumption Annex for more additional discussion of export performance). East Asian countries continue to be the major markets for Indian oil meals. During FY 1994-95, Iran emerged as a major buyer of Indian soybean meal. Rapeseed meal exports were mostly to South Korea and Germany. Competitive prices, improving quality especially of soybean meals, lower freight rates, shorter shipping times, and the ability to provide small cargoes or an assortment of meals have enabled Indian meal exports to expand in east Asian and Middle Eastern markets.[12] The quality of soybean meal has improved considerably in recent years due to the adoption of modern processing technologies, increased production of yellow soybeans, and financial incentives resulting from protein premiums received in the world market. Processors claim that Indian soybean meal typically has a higher protein content--48 %--compared to the 44 % in most other countries. However, concerns about aflatoxin levels in groundnut meal and glucosinolates in rapeseed meal limit export opportunities of these meals. The marketing of DOC is undertaken mainly by solvent extractors, who sell their output either to local compounders or to exporters. Shipments of DOC from the factory are always made in bags. Exports are typically shipped to the exporting ports by the extractors, and at the ports, the DOC is either sold on an FOB basis directly to the foreign buyer, or is sold to another Indian company who will pay a premium (in the form of "export performance") for the right to sell the DOC to a foreign buyer, and gain official recognition for the associated foreign exchange earnings.

A3.32 **Poor Quality of India's De-Oiled Groundnut and Rapeseed Cakes is Hurting Export Competitiveness.** Indian DOC exports, however, are poorly regarded by overseas buyers, on the grounds of unacceptably high levels of aflatoxin (in groundnuts due to poor post harvest handling) and glucosinolates (in rapeseeds due to variety cultivated)[13] and the inability to standardize the quality of export cargoes, since these are aggregated from many small shipments from different factories. Rice bran extractions are also poorly received by many foreign buyers, since Indian shipments tend to have a high silica and sand content. Because the average Indian solvent plant is small in scale, it is necessary to combine the export sales of a number of extractors in order to obtain a cargo large enough to fill a vessel. This makes it difficult to standardize the quality of export cargoes from India.

C. Storage of Oilseeds and Oilseed Products

A3.33 **Government Regulations Limit Private Trader and Processor Storage of Oilseeds and Oilseed Products.** Due to government regulations of storage volume and credit under the Pulse, Edible Oilseeds, and Edible Oils (Storage Control) Order, 1977 and Selective Credit Control Policy (See Annex 1 for figures and detailed discussion of this policy), private traders and processors' storage of oilseeds and oils is restricted.

A3.34 **Unofficial Forward Trading Pursued to Get Around Storage Restrictions.** Legally, forward trading for more than 11 days is prohibited by the Forward Markets Regulation Act (See

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[12] USDA, 1995, "Oilseeds and Products Annual," AGR No. IN5042.

[13] The glucosinolate content is a vital feature of the pungent taste which makes mustard oil attractive to many Indian consumers, especially in the North East of the country. This increases the difficulty of encouraging farmers to adopt "double zero" varieties of rapeseed (zero in both glucosinolates and erucic acid), which would yield low free fatty acid vegetable oil and DOC which are permitted for use in Europe or North America.

Annex 1 for more detailed discussion of this Act). However, forward contracts for one month and up to three months are reportedly common practice, although defaults are a common problem. The limitation on trader and processor stockholding acts as a strong incentive to secure large quantities of product at harvest time through forward contracting. As a result, in contrast to the Government's expectations when the Essential Commodities Act was passed, the costs and risk of storage in many cases fall on farmers. Farmers unofficially price their products just after harvest, and receive a first payment as credit from traders. They hold the stocks until delivery. On-farm storage, in the absence of specialized equipment, induces large and costly losses. For this reason, some traders and processors are reluctant to undertake on-farm storage of their own purchases. This tendency is reinforced by the extreme practical difficulty of verifying storage losses when oilseeds are held on-farm. It would have been expected that village cooperative societies would play an important role in reducing the scope of on-farm storage. However, their impact in many States remains minimal.

D. Domestic Transportation and Shipping

Domestic Transportation and Handling

A3.35 **Product Flows.** Throughout the country, there is a clear preference for processing seeds near the point of production and then transporting both edible oils and DOC to the main consuming centers. Therefore, shipments of oilseeds remain small in comparison to shipments of oils.

A3.36 **Transportation of Oilseeds and Edible Oils Mainly done by Trucks, But Oilmeals and DOCs are Transported by Truck and Rail.** With the exception of the transport of produce from the farm to the assembly market, the transportation of oilseeds and oils (in bulk or packaged form) is almost entirely done by road in trucks with a load of 10 to 12 tons (there is a legal limit of 16 tons throughout India), while the transport of oil meals or DOC are undertaken both by trucks and rail. Non-specialized trucks are used for the seeds and packaged oils; and tankers for the delivery of oil in bulk. In the case of DOC for export, for example from Madhya Pradesh, they will likely be shipped through the Gujarat port of Bedi. The DOCs may be loaded onto train railcars or onto road trucks. Rail freight rates are generally cheaper than road freight rates: the nominal rail freight from Indore to Bedi is Rs 350 per mt compared to Rs 550 - 600 per mt for road freight. Despite the fact that truck transport is more costly, it is the preferred mode of transport by about one-third of exporters. This stem from uncertainties about the reliability/availability of rail wagons supplied by the authorities. Moreover the traveling time by rail is also substantially longer and less predictable than that for road cargoes.

A3.37 **Freight Rates Account for 1 to 3 % of Product Value.** Freight rates generally range from one to three % of the value of the oilseeds or oilseed product. Freight rates for seeds currently average Rs 65-75 per mt per 100 kms (US$2.10-2.40) for trucks and Rs 100 per mt per 100 kms (US$3.25) for tankers. Oilseeds are generally transported in bags, and only in rare instances are they transported in bulk. The transportation cost from the farm (via a *mandi*) to the crushing plant represents 2 to 3 % of the seed price. Additional costs, which vary according to the manner in which the seeds were packed for transport, are incurred in unloading the seeds when they arrive at the processing plant. The costs are less if the seeds are transported in bulk since it only requires three to four minutes to complete the task. In contrast, it normally takes 15 - 20 minutes to unload the same volume of cargo in bags. For edible oils, freight costs represent 1 % to 2 % of the oil price. Transportation by rail is of limited importance for both seeds and oils. On certain routes, where the railroad tracks of the same gauge are available all the way to the products destination, rail transportation is commonly used. In general, railways carry slightly over half of DOC exports.

A3.38 **Oilseeds and Oilseed Products Transport Subject to Central Sales Tax and Octroi.** Oilseeds and oilseed products can be subject to multiple octroi upon crossing of municipal, district, or state lines as well as the central sales tax when crossing state borders. For long hauls, octroi fees typically represent 0.5 - 1 % of the product value. To avoid the security risk inherent in drivers having to carry large amounts of cash to make payments at each octroi post, truckers often assume the added financial cost of arranging credit with specialized local agents, who undertake the payment on the spot. Furthermore, for products crossing state borders, special permission is required on a case-by-case basis from the State Governments (through the District Controller) and the central sales tax, applicable to inter-state trade, is levied instead of the individual State sales taxes. This leads frequently to significant biases for or against inter-state trade, where the central sales tax and State sales tax rates differ appreciably. It also creates phantom inter-state trade where companies can save taxes by creating subsidiaries in one state, which "buy" products from another state with a high state sales tax, and then "transport" them to the first state, thereby avoiding its sales taxes. All these charges including the transport costs, spillage during handling, *mandi* cesses, commissions paid to agents at *mandis* and octroi fees, total the equivalent of about 12 to 13 % of the farmgate value of seeds, when they are transported a distance of 300 to 400 kms to the processor.

Handling and Shipping of DOC Exports

A3.39 **Inefficient Port Infrastructure and Domestic Transport Systems Unnecessarily Increase Shipping Costs.** The inefficiencies in domestic transport and poor port infrastructure impose a high cost on DOC exports. The cost of land and sea transportation and port operations, and of wastage en route to the importing country are extremely high that on occasion they exceed 40 to 50% of the ex-factory price of the DOC. The high transportation costs can be traced to two major factors:

- *Transport Losses*: DOC transport losses from Madhya Pradesh to the two main Gujarat ports of Bedi and Kandla are three times greater than those incurred between Illinois and New Orleans, in the US;
- *Delays in Loading Export Cargoes*: The unreliability in the timing of exports and uncertainties regarding fulfillment of export contracts are blamed by overseas traders for the emergence of a *de facto* US$10 - US$15 per mt discount in the prices offered for Indian DOC cargoes, over and above any discounts associated with objective quality differences;

A3.40 **Poor Infrastructure Increases Handling Costs.** The lack of proper facilities to handle large scale exports significantly increase export costs. For example if DOCs are shipped to the port of Bedi by rail, the railway platform is only long enough to handle half of a full railcar rake (approximately 1,500 tons). In addition, the practice of shipping DOC exports in bags, rather than in bulk, increases handling costs, because loading and unloading of bagged products takes five times longer than those of bulk cargoes. The ports also have limited storage facilities such that bagged cargoes often have to be placed on the ground, because of inadequate storage capacity. Many shipments are handled repeatedly: from open storage to godown, from godown to wharf, from the jetty onto the barges, and from barge to the export vessel. From the barge, the bags are carried by hand onto the export vessel at its anchorage, several kilometers offshore, where it is finally slit open to disburse its contents onto the ship's hold (the empty bags returned to the exporter). This allows the cargo to be handled in bulk at the importing port. The need to use barges stems from the fact that ports in the East Cost are anchorage ports, which adds additional handling and costs to the export process.

A3.41 Due to the repeated handling, weight losses can exceed 3 % of the ex-factory shipments. This includes moisture loss of up to 1 % caused by the gradual drying of the DOC during its transportation. Moisture loss is greater for rail shipments, by virtue of the longer time needed to reach the export port. Surveyors at the port tend to deduct a standard 0.6% of the gross weight of a cargo on the jetty to reflect the loading losses and spillage between the godown and the ship's hold for new bags. This allowance is doubled to 1.2% where old bags are used because of the increased possibility of spillage. The 0.6 % difference between new and old bags at the port should probably be doubled, at the very least, to take account of other losses through spillage en route to the port. If the extra losses suffered as a result of the use of old bags are equivalent to only 1.2%, this corresponds to a loss of Rs 50 - 70 per mt in export revenues.

A3.42 **Low Labor Productivity is Another Factor Increasing Costs.** The low productivity of workers at the ports increase the handling time and costs. Wage workers at the ports generally averages less than one mt per day, even in the peak exporting season. Indian ports are exceptionally labor-intensive. Some local estimates put the employment at Bedi port in excess of 10,000, who handles a total of 1.91 million tons of products in 1994. This translates to a maximum of slightly under 250,000 tons in the peak month. Official data reveal that the Kakinada port has 8,600 employees, who handled 1.31 million tons of cargo in 1994. Bedi port is a tidal one, in which 500 ton barges have to be loaded at high tide (which means that loading has to be concentrated during six hours of the day), and taken to the anchorage several kilometers offshore. Manual handling is very cumbersome and slow, and increases the difficulty in attaining a loading rate of even 1,000 tons per day for each export ship (exporters seem to take 500 tons per day as a more representative loading rate[14]).

A3.43 **Delays in loading Significantly Increases Costs.** Delays in loading can increase transport cost by as much as Rs 1,100 to Rs 1,300 per mt. . The port charges levied at Bedi, for example, amount to Rs 125 per mt for road shipments if they are delivered directly to the jetty and loaded within two days. The corresponding charge for rail cargoes, which have to be transshipped first from the rail head is Rs 154 per mt. However, if the shipment waits for more than two days at the port, a full month's godown fee of Rs 25 per mt is levied, in addition to the Rs 25 per mt charged for loading and unloading. The cumbersome procedures for exporting from Bedi increases handling time for a 10,000 mt cargo to 15 days, in contrast to one day in efficient ports elsewhere in the world. At a daily charter rate of $6,000 - $7,000, the extra time taken in Bedi adds the equivalent of $10 per ton to the freight costs of exporting. Due to past experience by exporters, the slow loading rates are already reflected in the export freight contracts. In doing so, they can avoid the penalties which would otherwise have to be paid on account of demurrage. But Indian exporters typically fail to benefit if they achieve faster rates of loading, since minimal allowance is made for dispatch in Indian charter terms (which would be payable when the vessel is loaded more rapidly than the rate stated in the contract).

[14] The other main export port in Gujarat is Kandla, which also relies upon barges to ferry exports to the ships at their anchorage. Unlike Bedi, Kandla is not a tidal port, and can therefore comfortably load up to 1,500 tons per day onto a vessel.

A3.44 The export costs incur when shipping from Bedi are summarized in Table A3.6.

Table A3.6

Costs Of Exporting De-Oiled Soybean Cakes Through Bedi Port

	Cost Item	By rail, Rs/mt	By road,Rs/mt
A.	Freight from Indore, Madhya Pradesh to Bedi port	350	600
B.	Port and handling charges from the godown in Bedi to loading into the hold	154	125
C.	Godown charges for one month	50	50
D.	Losses in handling and from moisture reduction between the factory and the ship	<175	<150
E.	Losses in the value of bags, after slitting	60	60
F.	Increases in freight costs as a result of the slow loading rate in the port	320	320
G.	Total Transport and Handling Cost to and Within Port	<1,109	<1,305

A3.45 When compared with soybean ex-factory gate DOC prices Rs 2,500 - 3,000 per mt in 1995, the total transport and handling costs from the factory to the port represent 40 - 50 % of ex-factory receipts. When normal sea freight rates of Rs 500 per mt (taking freight rates to Thailand as a basis) are included in the costs of delivering DOC to over seas customers, one arrives at full exporting costs of as much as 70% of the ex-factory price.

A3.46 **Bulk Transport and Handling Facilities Could Generate Cost Savings of Up to 50% in DOC Export Costs.** Investments in bulk transportation and handling facilities for DOCs destined for exports could generate savings of as much as Rs 570 per mt on DOC exports shipped from Bedi port. This amounts to about 23 % of factory gate price of the DOC. These savings could be achieved through: (i) the investments in bulk transportation and handling facilities for DOCs in **palletized** form to the ports; (ii) investments in full bulk handling facilities at the port; and (iii) round-the-clock direct loading of DOC into the hold of the vessel at the jetty. These changes would translate to savings of about Rs 25 per mt in freight and handling costs to the port (Category A); Rs 40 per mt in port and handling charges (Category B); eliminate the Rs 50 per mt godown charge (Category C); reduce costs of moisture losses by Rs 75 per mt (Category D); eliminate additional costs of bags of Rs 60 per mt (Category E); and eliminate additional costs due to loading delays of about Rs 320 per mt (Category F). If passed on in full to growers, this would enable processors to increase the prices paid for oilseeds by around Rs 300 per mt, from about Rs 900 (in 1995) to about Rs 1,200 per mt.

Handling and Transport of Edible Oil Imports

A3.47 **Inadequate Port Handling Facilities Increase Handling Costs of Imported Edible Oils.** Losses during handling and penalties due to delays in unloading from sea tankers unnecessarily increases handling costs of imported edible oils. With the exception of the few cases (including the STC) where importers have tanks available alongside the quay, transshipment from sea vessels (which are usually of 6,000 tons capacity) to ground storage facilities are generally made with 10 ton tanker trucks. Since their rate of unloading per hour averages 60 tons, it usually takes four to five days to unload such small sea vessels. In other ports, such cargoes can be unloaded directly into tanks within one day. Consequently, Indian importers have to bear an additional cost of four days of chartering, which adds over $4 per ton to the import cost. Long delays are also often experienced during berthing: 10 to 12 hours are normal in Bombay; even more in Kandla. Inefficient handling also results in higher losses (stealing, spillage, errors in measurement at delivery). Estimates from trade sources place these losses at 1.5 % on average, in contrast to 0.25% in many other countries. Because the exporting companies are aware that it is standard for Indian importers to allow for 1.5 % import losses, and the weighing of cargoes destined for India (even those delivered CIF) is done at the point of delivery, it is believed that

exporters take advantage of this by under-loading. Likewise, domestic transporters of edible oils take full advantage of the large leeway allowed for losses in handling, even when shipments are made in the form of tins or drums, for which losses should be very low. The private sector experiences an additional difficulty when importing (even though edible oil imports receive high priority from port authorities), in that State Corporations, such as the STC and the NDDB, receive priority for the unloading of their vessels, without any kind of prior warning.

A3.48 **Private sector and state government initiatives are being undertaken to overcome transport constraints.** The extreme congestion being experienced at Indian ports as a result of the competition between exporters of wheat, rice and DOC has brought to the forefront the issue of port facilities. Delays at Indian ports are causing demurrage penalties to rise, at a cost estimated to reach hundreds of millions of Rupees for the DOC exporting sector. In response to these difficulties, exporters have started to export DOC through small ports, formerly by-passed for such shipments, because of their high costs and absence of facilities. A development which should eventually help to ease the port constraint is the Government initiative to promote Build, Operate, Lease and Transfer (BOLT) contracts with the private sector, under which the private exporter will be granted a 30 year lease for its own private jetty. A variant of this strategy has been the leasing of existing jetties on an exclusive basis. Among the first of these contracts has been one granting a trading company a 12 year lease on a jetty, capable of handling 750,000 tons per annum of cargo at Kandla port. Inland, too, DOC exporters are examining ways of reducing export costs. In Madhya Pradesh, for example, the State Government is evaluating the scope for inland container depots and warehouses, which could be used to simplify the exportation of products such as DOC. Some oilseed processors have investigated the feasibility of building their own rail sidings for DOC sales. The sidings would cost Rs 60 million to handle a full rake of approximately 1,500 ton of rail haulage capacity, but would enable the firm to ease the handling of DOC, by palletizing it and loading it in bulk onto 60 ton rail cars, for handling in bulk at the export port.

Annex 4

Marketing Performance: Assessment & Key Determinants

A. Physical Exchange: Performance and Key Determinants

Principles of Commodity Trading

A4.1 Commodity trading involves two major activities: the actual physical movement and storage of commodities, and arbitrage trading. Both activities contribute to the efficiency of commodity trading.

A4.2 **Physical Exchange**. Commodity trading takes the form of physical movement of commodities over space and time. The decision to trade commodities between two spatially separated markets is determined largely by the transportation costs between markets. If markets are competitive, price differences between the two markets will just equal the transportation costs.[1] The decision to store commodities over time is determined largely by storage costs. If markets are competitive, the difference in prices between two points in time will equal the storage costs.[2] Table A4.1, Case A illustrates the typical activities involved in trading rapeseeds between the Hapur market in Uttar Pradesh and the Delhi market.

A4.3 **Arbitrage Trading**. Using their understanding of markets and price behavior, entrepreneurs also arbitrage across markets, in the hope of earning a profit through the relative changes in price differences across markets. Arbitrage trading is undertaken based on the anticipation of the change in price difference that the commodity trader expects at the time of delivery of the product. Table 1, illustrates the basic principle behind arbitrage trading, assuming prices decline in both the Hapur and Delhi markets. As a theoretical example (Case B.3), the scenario assumes the price difference between Delhi and Hapur markets also decreases. A trader on September 1 could (i) go "long" in the Hapur market by buying 10 mt of rapeseed at a price of Rs 10,400/mt for delivery on September 15 and (ii) go "short" in the Delhi market by selling 10 mt of rapeseed at a price of Rs 10,900/mt for delivery on September 30.[3] Two weeks later, on

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[1] The spatial price differences between markets cannot exceed transportation costs, because any time they exceed transportation costs, buyers will purchase commodities from the low-priced market and ship them to the latter, raising prices in the former and reducing them in the latter. This form of arbitrage will continue until it is no longer profitable to ship commodities between markets, that is when the price difference equals the transportation costs. Transportation costs include handling, insurance and shipping charges, etc.

[2] The inter-temporal price difference cannot exceed storage costs, because traders will purchase commodities during the low-priced period, and store and sell them during the high price period raising prices during the earlier period and lowering them in the latter period. This form of trading will continue until it is no longer profitable to store commodities, that is when the price difference equals the storage costs. Storage costs include the direct costs of warehouse space, fire insurance, interest on investment in facilities and inventory, and others.

[3] If an increase in the absolute value of the price difference is expected, the trader would not go "long" in Hapur and "short" in Delhi, since this would result in a loss. It would instead sell in Hapur and, simultaneously, buy in Delhi, and the increase of the price difference would result in a profit.

September 15, the trader will take reverse positions and will sell the 10 mt of rapeseed in the Hapur market at the current price--Rs 10,300/mt delivered the same day, while buying 10 mt of rapeseed in the Delhi market at Rs 10,760/mt to be delivered September 30. Although the arbitrageur lost Rs 100 in the transaction in Hapur, he/she gained Rs 140 in the transaction in the Delhi market. The net profit overall is therefore Rs 40 less any associated transactions cost.

A4.4 Globally, on both markets the arbitrage trader has a zero net position since the tonnage purchased in Hapur offsets in its books the tonnage sold in Delhi. By arbitraging between the two markets, the arbitrageur faces a risk limited to the changes in the price differences. In the pure trading case, risks are much higher since the trader faces uncertainty in the full price. Arbitrage traders therefore reduce their speculative risks, and as result, their net gain or loss is also reduced. Under purely competitive markets, an equilibrium will occur when i) the quantity of trade originating from traders estimating that price differentials will increase equals the volume traded by those estimating that price differentials will decrease; and ii) storage and transportation is no longer attractive for the marginal trader.

Table A4.1: Illustrative Example of Pure and Arbitrage Trading

Type of Trading	Date	Hapur, UP		Delhi		Price Difference Rs/mt	Profit/Loss Rs/mt
		Activity	Price, Rs/mt	Activity	Price, Rs/mt		
Case A: Pure Trading							
	Sept. 1	Buy 10 mt, delivered Sept 15	10,400	Sell 10 mt, delivered Sept 30	10,900	500	500 - transport & 2 wk storage costs
Case B: Pure Arbitrage, Prices are Dropping							
Case B.1: Delhi Price Difference Stable							
	Sept. 1	Buy 10 mt, delivered Sept 15	10,400	Sell 10 mt, delivered Sept 30	10,900	500	
	Sept. 15	Sell 10 mt, delivered Sept 15	10,300	Buy 10 mt, delivered Sept 30	10,800	500	
	Sept 30	Net loss	-100	Net gain	100		0
Case B.2: Delhi Price Difference Increases							
	Sept. 1	Buy 10 mt, delivered Sept 15	10,400	Sell 10 mt, delivered Sept 30	10,900	500	
	Sept. 15	Sell 10 mt, delivered Sept 15	10,300	Buy 10 mt, delivered Sept 30	10,850	550	
	Sept 30	Net loss	-100	Net gain	50		-50
Case B.3:Delhi Price Difference Decreases							
	Sept. 1	Buy 10 mt, delivered Sept 15	10,400	Sell 10 mt, delivered Sept 30	10,900	500	
	Sept. 15	Sell 10 mt, delivered Sept 15	10,300	Buy 10 mt, delivered Sept 30	10,760	460	
	Sept 30	Net loss	-100	Net gain	140		40

Source: Mission

A4.5 **Both Physical and Arbitrage Trading Contribute to Improved Market Performance.** Arbitrage traders, by buying in the Hapur market for example, increase competition in that market and thus exert an upward pressure on prices in Hapur. By selling in Delhi, they exert a downward pressure on prices in Delhi. The resulting price difference in each market therefore tends to decrease as the volumes traded increase in both markets. Commodity trading therefore exerts a positive influence on markets, by improving the allocation of products over space and time, increasing competition in markets, and preventing dominant positions from building up in individual markets.

A4.6 **Physical and Arbitrage Trading Requires Full Flexibility in trading Practices.** Full flexibility in trading practices means full flexibility in transporting and storing products, access to credit and market information, and freedom to enter into different contract arrangements (spot and forward) and effective contract enforcement. Non-fulfillment of these conditions will result in poor market integration over space and time.

Measuring Market Performance in the Exchange of Commodities over Space

A4.7 **Testing for Market Integration.** The performance of agricultural markets in exchanging commodities over space is measured using the market integration analysis. Market integration analysis involves the study of the price relationships between homogeneous commodities sold in geographically separated markets. Markets are integrated when prices in different markets move together in response to changes in demand, supply, and other factors. Absence or weak market integration indicates poor marketing performance.[4] Perfect market integration is rarely achieved, but provides a useful benchmark against which to assess the performance of a particular market. In the case of the oilseed complex, market integration is measured separately for seeds, oils and oilseed meals, across pairs of individual markets.[5] Market integration is assessed in the short run --within a year-- by using (i) correlation coefficients between monthly prices --an indicator easy to understand but not statistically robust-- and (ii) a statistically more robust approach --the Ravallion market integration test.[6] The long-run market integration is investigated using the Johansen vector-autoregressive cointegration model. Vertical market integration --i.e., the stability of the relationship between oilseed, oil and meal prices for a given oilseed-- is also investigated using the Johansen vector-autoregressive cointegration model.

A4.8 **Market Integration Analysis Points at the Absence of a Common Market.** The results of the market integration analysis point at the absence of a fully functioning national market for oilseeds and oilseed products. This is supported by the fact that in general, markets for oilseeds, oils and meals are poorly integrated in the short run, except for those markets that are closer together, indicating a greater degree of regional market integration.

A4.9 **In the Short-Run, Oilseed Markets Appear to Perform Poorly.** In general, the correlation coefficients between monthly price differences[7] between the pairs of markets examined showed a high degree of instability from one year to another (See Appendix A4.1 for a full listing of the estimated correlation coefficients). The groundnut markets exhibit greater instability and lower correlation coefficients than the rapeseed markets (Figures A4.1 and A4.2). Groundnut markets also exhibit a sharp deterioration of its market performance during the 90's, which was especially pronounced for the Bombay-

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[4] Poor market integration may result from the absence or underdevelopment of the transportation infrastructure, government restrictions which impede the free movement of commodities, imperfect flow of information across markets, trader market power, periodic weather disruptions (e.g. monsoons, floods) or the absence of standardized grading system.

[5] The markets selected for analysis were chosen on the basis of (a) data availability and (b) active trade between the two markets.

[6] See M. Ravallion, 1986, "Testing Market Integration," *American Journal of Agricultural Economics*, pp. 102-9, for derivation of the model. Using the simplest form of the Ravallion model, the current price in the local market is taken to be a function of the lagged price (1 month) of the local market, the change in the price in the reference market, and the lagged price (1 month) in the reference market.

[7] It filters out the effect of trends (e.g., inflation) which would bias the results of correlation among absolute prices.

Rajkot markets. In the case of rapeseeds, the correlation coefficients in the Delhi and Kanpur, and Delhi and Hapur markets have consistently been highly correlated throughout the period 1985 to 1995. In contrast, price correlations between the Hapur and Kanpur markets have been highly unstable, despite the fact that that they are located within the same state.

A4.10 The results of the Ravallion test are summarized in Table A4.2. Most of the pairs of groundnut markets were not integrated in the short-run, while in the rapeseed market, several markets were found to be integrated. It is interesting to note, however, that distance does not always explain the absence of short-run price integration in the groundnut markets, as illustrated by the fact that while the Madras and Hyderabad markets are integrated with the Bombay market, the Hyderabad and Madras markets which are closer geographically to each other are not. Similarly, the Calcutta rapeseed market was found to be integrated with the Hapur market, but not with the Kanpur market which is geographically closer. In both cases, this may indicate the importance of the Bombay market as a reference market for groundnuts and the importance the Hapur market as a reference market for rapeseeds. Field visits confirm this, in that large trading firms operating from Hyderabad use the Bombay oilseed exchange quotations extensively for their purchase and arbitrage trading operations.

Figure A4.1: Groundnut Correlation Coefficients of Monthly Price Differences

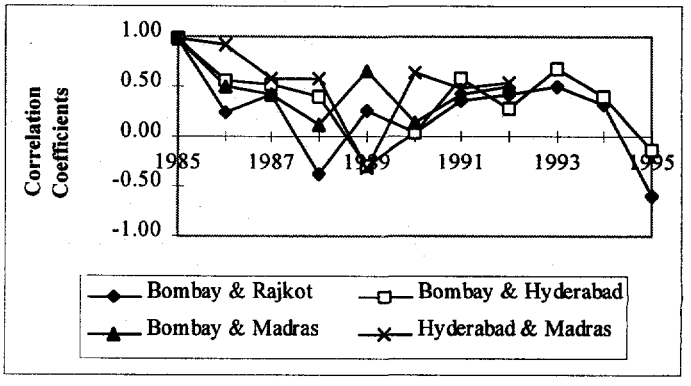
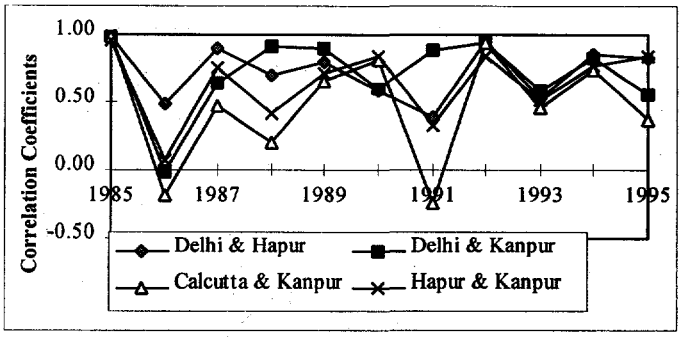


Figure A4. 2: Rapeseed Correlation Coefficients of Monthly Price Differences



Source: Computed.

Table A4. 2: Are Oilseed Markets Integrated in the Short Run (Ravallion Short Run Market Integration Test)

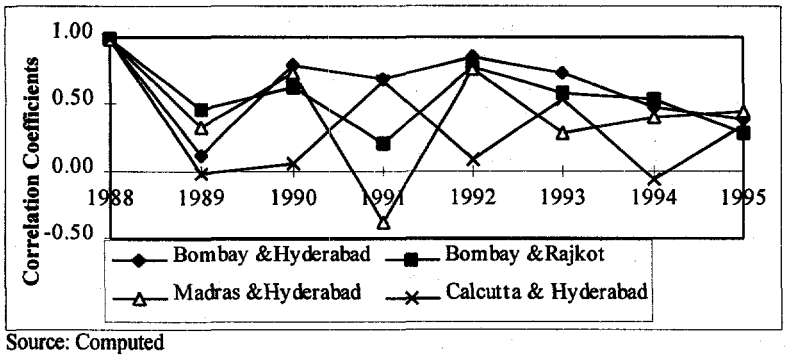
Groundnut	Bombay	Madras	Hyderabad
Nandyal	No**	No*	Yes
Hyderabad	Yes	No*	
Rajkot	No**		
Villapuram		No**	
Bombay		Yes	
Rapeseed	Calcutta	Kanpur	Delhi
Hapur	Yes	Yes	Yes
Kanpur	No**		No**
Soybean	Haldwani		
Indore	No**		
Sunflower	Bidar		
Khamgaon	Yes		

Note: F-test is used to test for short-run market integration. Null hypothesis is markets are integrated.
* - statistically significant at 1% level. ** -statistically significant at 5% level.
Source: Computed

A4.11 **In the Short-Run, Groundnut and Rapeseed Oil Markets are Highly Unstable.** The correlation coefficients on the pairs groundnut and rapeseed oil markets examined show a high degree of instability from year to year (Figures A4.3 and A4.4). Groundnut oil markets appear more unstable and less integrated than the rapeseed oil markets.

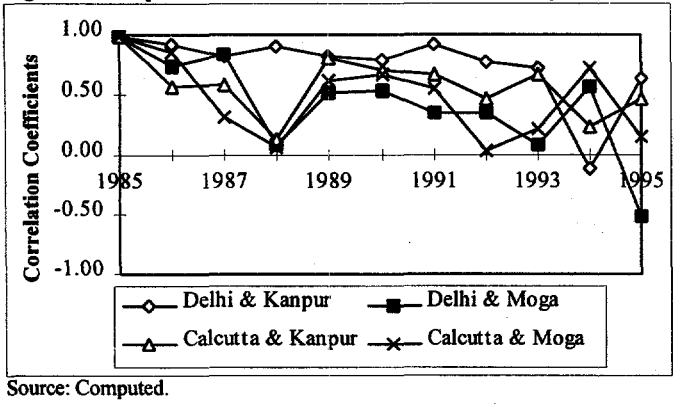
A4.12 The results of the Ravallion model confirm the poor integration of the edible oil markets for both groundnuts and rapeseed oils (Table A4.3). Among the groundnut oil markets, only the Nandyal and Hyderabad -- both in Andhra Pradesh-- and Nandyal and Calcutta markets

Figure A4.3: Groundnut Oil Correlation Coefficients of Monthly Price Differences



Source: Computed

Figure A4:4 Rapeseed Oil Correlation Coefficients of Monthly Price Differences



Source: Computed.

correlation coefficients between the price differences among the groundnut markets and the rapeseed markets exhibit lower values and even greater variability.

A4.14 **Oilseed, Oil and Oil Meal Markets are Generally Integrated in the Long-Run.** The long-run market integration in pairs of oilseed, oil and oil meal markets were tested using the Johansen vector auto-regressive cointegration model.[8] Using this approach, it is found that most pairs of oilseed, oil and oil meal markets were co-integrated in the long run (Table A4.4). Of the markets analyzed, the only markets which were not integrated in the long run were the Delhi and Sinhind and Delhi and Hindaun rapeseed markets and the Calcutta and Hapur rapeseed oil markets.

were found to be integrated in the short run. In the rapeseed oil market, none of the markets considered (Moga, Kanpur, and Hapur) were integrated with the Delhi market.

A4.13 **In the Short-Run Meal Markets Exhibit Poor Market Performance and Large Instability.** The correlation coefficients between monthly prices and price differences between oil meal markets vary significantly and are highly unstable (see appendix for actual figures). In the case of rapeseed meals, the Delhi and Kanpur and the Delhi and Hapur markets show relatively weak market integration in the short run. The Calcutta and Kanpur markets exhibit even poorer market integration, in view of the low and highly unstable correlation coefficients between absolute prices . The

Table A4.3: Are Oil Markets Integrated in the Short Run?
(Ravallion Short Run Market Integration Test)

Groundnut Oils			
	Nandyal	Rajkot	Hyderabad
Bombay	No*	No*	No*
Madras	No*		No*
Calcutta	Yes		No*
Hyderabad	Yes		
Rapeseed Oils			
	Delhi		
Moga	No*		
Kanpur	No*		
Hapur	No**		

Note: F-test is used to test for short-run market integration. Null hypothesis is markets are integrated.
* - statistically significant at 1% level. ** -statistically significant at 5% level.
Source: Computed

[8] See S. Johansen and K. Juselius, 1990, "Maximum Likelihood Estimation and Inference of Cointegration--with Applications to the Demand for Money," Oxford Bulletin of Economics and Statistics, Vol 52:2 pp. 169-210, for more detailed elaboration of the Johansen vector autoregressive cointegration model. In this test, the null hypothesis is that markets are not integrated and pairs of markets which exhibit a likelihood ratio greater than the specified critical values can be characterized as integrated in the long run (at different levels of statistical confidence).

Table A4.4 : Are Oilseed and Oilseed Product Markets Integrated in the Long-Run ?
(Results of the Johansen Vector Auto-Regressive Cointegration Model)

Groundnut	Nandyal	Hyderabad	Rajkot	Bombay	Madras	Villapuram
Nandyal						
Hyderabad	Yes*					
Rajkot						
Bombay	Yes*	Yes*	Yes*		Yes*	
Madras	Yes*	Yes*				Yes*
Villapuram						
Rapeseed	Hapur	Kanpur	Sinhind	Moga	Hindaun	
Hapur						
Kanpur	Yes*					
Sinhind	Yes*					
Moga			Yes*			
Hindaun						
Delhi	Yes*	Yes*	No		No	
Calcutta	Yes*	Yes*				
Sunflower	Bidar					
Khamgaon	Yes*					
Soybean	Indore					
Haldwani	Yes*					
Groundnut Oil	Nandyal	Hyderabad	Rajkot			
Nandyal						
Hyderabad	Yes*					
Rajkot						
Bombay	Yes*	Yes*	Yes*			
Madras	Yes*	Yes*				
Delhi						
Calcutta	Yes*	Yes*				
Rapeseed Oil	Hapur	Kanpur	Moga			
Delhi	Yes*	Yes*	Yes*			
Calcutta	No	Yes*	Yes*			
Sunflower Oil	Bidar					
Khamgaon	Yes*					

Note: Null hypothesis was that markets are not integrated in the long run. * - significant at 0.1 %,
** - significant at 5%. See Appendix A4.3 for computed values.
Source: Computed.

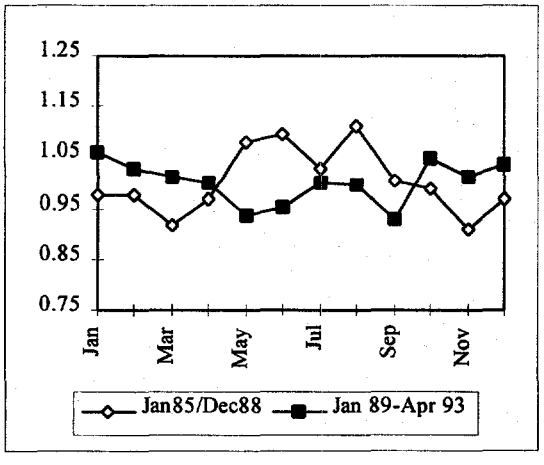
A4.15 **Markets Across Oilseed Products Are Well Integrated at the Regional Market.** The degree of long-run vertical market integration across oilseed products was tested in selected markets. In Rajkot the groundnut and groundnut cake markets are integrated in the long run, but the groundnut and groundnut oil markets are not (Table A4.5). In contrast, the groundnut and groundnut oil markets in Bombay are integrated, but the groundnut and groundnut meal markets are not. All the pairs of rapeseed and rapeseed oil and rapeseed and rapeseed meal markets are integrated in the long run. In general, however, in all pairs

of markets, rapeseed and rapeseed oil markets exhibit stronger levels of market integration than the rapeseed and rapeseed meal markets.

Measuring Market Performance in the Exchange of Commodities over Time

A4.16 Seasonal price behavior is a regularly repeating price pattern that is completed every twelve months, resulting from a seasonality in demand or in supply and marketing or a combination of both. In the case of oilseeds and oilseed products, it largely reflects the seasonality of production and marketing, since consumption would tend to be uniform all year round. Seasonal price indexes provide a rough measure of seasonal price patterns and can be used as an indicator of whether the seasonal price increases allow adequate room for covering storage costs during the year. The following section presents the results of the seasonal price analysis for selected oilseed and oil markets.

Figure A4.5 : Seasonal Price Index, Groundnut Rajkot



Source: Computed

A4.17 **Seasonal Price Behavior Varies Considerably Across Oilseeds and Across Markets.**[9] The seasonal price behavior varies considerably across different oilseeds (Appendix A4.3 presents figures of seasonal price indexes for selected markets). For example, the seasonal price rise is less sharp in groundnut markets and they tend to dip twice, around March and (much less in) September (Figure A4.5). These seasonal patterns reflect (i) the improved distribution of supply across seasons as a result of new technologies which allow both rabi and kharif production (Rajkot market) and (ii) greater regional diversification of production and sources of supply (Bombay and Delhi markets). In contrast, there is greater seasonality in rapeseed prices in view of the fact that rapeseed/mustard is generally only grown in one season. Rapeseed prices reach their lowest point at about February-March and reach their peak at about October-November. The degree of seasonality varies across markets for soybeans. The Indore market exhibits almost no seasonality at all, while the Haldwani market exhibits a distinct dip during November, rising thereafter and reaching a peak in August. Sunflower prices continue to exhibit a distinct seasonality, with prices reaching their lowest point around March and rising until it reaches a peak around July-August. The impact of the kharif crop is not as evident as it is in groundnuts.

A4.18 **Oilseed Seasonal Price Increases Offer Little Incentive for Storage.** A comparison of the percentage seasonal price increase with the cost of working capital per year provide an indication of private storage incentives.[10] Taking 15 % as the reference interest rate on working capital loans, the percentage seasonal price increase in different oilseed markets was less than the cost of capital (Table A4.6). During the 1990s, the only exceptions were the groundnut in Villapuram and the sunflower markets in Madras and Bidar. What this implies is that in general there is limited incentives to store commodities and if private traders do, it will be for only a very short period of time during the year.

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[9] These markets were selected largely on the basis of data availability.

[10] The cost of capital generally accounts for the largest share of storage costs.

A4.19 **Seasonal Behavior of Edible Oil Prices Closely Mimic Oilseed Price Seasonal Behavior.** The seasonal behavior of edible oil prices in all markets tend to mimic closely the behavior of the seasonal behavior of the oilseed prices. For example, in groundnut markets where the impact of kharif and rabi arrivals are evident in the seasonal behavior of prices, the same can be observed in the groundnut oil prices.

Table A4.5: Is the Oilseed Complex Integrated in the Long Run?
(Results of the Johansen Vector Auto-Regressive Cointegration Model)

Groundnut	Rajkot	Bombay	Hyderabad	
Oilseeds and Oil	No	Yes*	Yes**	
Oilseeds and Oil Meal	Yes*	No	Yes**	
Rapeseed	Delhi	Kanpur	Hapur	Moga
Oilseeds and Oil	Yes*	Yes*	Yes*	Yes*
Oilseeds and Oil Meal	Yes**	Yes*	Yes**	Yes*

Source: Computed.

A4.20 **Edible Oil Seasonal Price Increases Also Offer Little Financial Incentives for Storage.** The seasonal price increases in the edible oil markets offer little financial incentives for storage, since they are generally less than the cost of working capital (Table A4.7). Although the seasonal price rise tended to be higher in the late 1980s, especially for groundnuts, they further declined during the early 1990s. To some extent, this may reflect both the effects of increased domestic production as well as the improved timing of imports.

Table A4.6: Percentage Seasonal Price Increase in Selected Oilseed Markets

Market	Jan 85 - Dec 88	Jan 89 - Apr 93	Jan 91 - Apr 95
Groundnuts			
Bombay	6%	6%	
Nandyal	16%	12%	
Rajkot	11%	6%	
Villapuram	17%	17%	
Rapeseed			
Hapur	9%	9%	
Hindaun			11%
Moga			6%
Soybean			
Indore			3%
Haldwani			10%
Sunflower			
Madras			29%
Bidar			20%

Source: Computed.

A4.21 **Late 1980s and Early 1990s Characterized by Slight Reduction in Seasonality over Previous Period.** For the markets for which the price series for the period 1985 to 1993 were available, the seasonal prices indexes during the two periods were estimated and plotted to examine whether seasonal price behavior changed during the two periods. Plots of the seasonal price indexes during these periods are presented in the Appendix. Visual comparison of the plots indicate that there was a change in the behavior of prices, not only in terms of degree of seasonality, but also price movements during the year. Calculation of the

Table A4.7: Percentage Seasonal Price Increases in Selected Edible Oil Markets

Groundnut Oil	Jan 85 - Dec 88	Jan 89 - Apr 93	Jan 91 - Apr 95
Bombay	16%	5%	
Nandyal	17%	12%	
Rajkot	15%	5%	
Madras	10%	9%	
Delhi	9%	4%	
Calcutta	8%		
Hyderabad	18%	4%	
Rapeseed Oil			
Hapur	10%	8%	
Delhi	8%	9%	
Moga	6%	12%	
Calcutta		8%	
Soybean Oil			
Shivapuri			6%
Sunflower Oil			
Madras			5%
Bidar			12%

Source: Computed.

coefficient of variation (CV) of the indexes indicate that with the exception of groundnuts in Bombay, the CVs for all markets for both oilseeds and oils on average declined by 2-3 percentage points, indicating a slight reduction of the seasonality in prices. The reduction in price seasonality could in part be attributed to the Market Intervention Operations, although it could also be attributed to the growth in the processing sector and the corresponding increase in competition in the oilseed market which is bidding prices up during the harvest season and the improved timing of edible imports which poses a cap on the price rise.

A4.22 **Incidence of Price Instability is Low.** To measure the degree of instability in oilseed and oilseed product prices, the seasonal, trend and cyclical components were filtered out of the oilseed and oilseed product prices in selected markets. The coefficient of variation of the random components were estimate and the results are presented in Table A4.8. The analysis shows that with the exception of rapeseeds in the late 1980s, groundnut, soybean, sunflower, groundnut oil and rapeseed oil exhibited only a small degree of instability. To a large extent, this could be attributed to increased diversification of production over seasons, regions and states.

Table A4.8: Instability in Selected Oilseeds and Edible Oil Markets Coefficient of Variation of Detrended, Deseasonalized Prices for Selected

Year	Groundnut Nandyal	Rapeseed Hapur	Soybean Indore	Sunflower Khamgaon	Grndnut Oil Hyderabad	Rapeseed Oil Hapur
1985	0.5%	4.8%			1.3%	2.2%
1986	2.4%	2.8%			3.0%	1.9%
1987	1.6%	6.0%			1.2%	1.4%
1988	2.0%	5.6%			2.3%	3.1%
1989	2.2%	7.0%			0.9%	1.7%
1990	1.6%	2.6%			1.3%	1.3%
1991	1.9%	3.1%	2.1%	2.4%	1.2%	2.0%
1992	1.2%	3.4%	1.4%	2.1%	1.4%	2.3%
1993			1.9%	2.3%		
1994			0.9%	2.8%		
85-92	0.3%	1.3%			0.4%	0.5%
91-94			0.5%	0.9%		

Source: Computed.

A4.23 **Imports over Last Four to Five Years Had Limited Distortive Effects on Prices.** By importing edible refined oils into the country, the STC could disrupt the price behavior of such oils over time. However, the cautious approach observed over the last four to five years in limiting the amount and better scheduling of such imports does not seem to have resulted in noticeable disruption of domestic oil prices. The uncertainties created by the unpredictability of STC and NDDB imports at preferential tariffs, compounded by the absence of market-based hedging instruments, also risk creating misleading signals for private sector management, which cannot distinguish between losses caused by the effects of market intervention, and those caused by improper open positions taken by management. With the liberalization of trade, price seasonality observed on the international markets will be reflected in the domestic prices. A stronger seasonal pattern would facilitate storage and give significant competitive edge to Indian products during some periods of the year, while foreign products would complement demand in the other periods.

Constraints to Efficient Commodity Allocation Over Space and Time

A4.24 Several factors constrain the optimal allocation of oilseeds and oilseed products over space and time in India, most of which derive from government policies and regulations which impinge on the operations of the private sector. How these factors influence the efficiency of marketing is discussed in the following section

A4.25 **Central and State Government Regulatory Barriers to Intra-State and Inter-State Trade.** Two key government policies which hinder the movement of oilseeds and oilseed products within and between states are the state imposed movement control, and the central and state tax policies. The imposition of movement controls prevents traders from responding to supply and demand signals as reflected in prices. Moreover, the intermittent enforcement of these regulations imposes considerable uncertainty and reduces the efficiency of marketing operations of private traders. For example, movement controls have been enforced by state governments at various times with limited advance notice to traders. In Gujarat, for example, the transport of groundnut oil was banned seven times between 1990 and 1995. Andhra Pradesh exercised the same powers in 1992. The poor and declining groundnut market performance during the 90s lends testimony to the detrimental effects of these movement controls. The need to get official permission to transport oilseeds or oilseed products further increase transaction costs: e.g., the obligation to get permission from the District Controller to ship oilseeds to other states. In addition, the multiple taxation of commodities as commodities are transported add a further burden to traders.

A4.26 **Limited Stockholding in the Private Sector.** Due to direct (i.e. stock limits on oilseeds and oils) and indirect restrictions on storage (i.e. storage credit limits of the RBI and forward and futures market restrictions), storage activities and investments in the private non-cooperative sector have been limited. Storage on-farm is negligible. With the exception of cooperatives and a few of the larger private processing units, no bulk storage of seeds is currently available along the marketing chain. The low storage limits set by the ECA for traders and processors creates a lack of flexibility in normal commercial operations, and especially in the management of risks related to price fluctuations during storage. Faced with these constraints, little real investment has been made by the private sector in modern storage facilities for edible oilseeds and oils. Storage is therefore scattered over a multitude of small operators, traders and or processors, who are active for only a few months of the year. Storage limits have also had a downstream impact on processors, because they limit the capacity of oilseed suppliers to purchase, store and mix seeds of differing oil content to achieve the precise quality requirement of the processors. The only exception lies in the support provided to farmers by building storage facilities at *mandis*, to be used for only a few days until the actual sale of the products. Such godowns are financed by the *mandi* fees collected in the same state.

A4.27 **Storage and Movement Controls Impose a Major Barrier for Arbitrage Trade.** The absence of efficient storage infrastructure, as a result of the various restrictions imposed on oilseed and edible oil wholesalers, the low legal limits (a maximum of 11 days) on forward trading and movement controls do not leave much leeway for traders to make trade-offs between buying and selling, storage and forward sales, to be able to undertake arbitrage. Under these constraints, arbitrage is mainly limited to operations which result in the actual shipment of products from one location to another within the 11 day forward trading ceiling to take advantage of price differentials higher than the transportation costs plus transaction costs.

A4.28 **The Poor Quality And Poor Dissemination Of Information On Prices.** With the exception of a few key reference markets, it remains relatively difficult to gain access to detailed price information, even

though detailed statistics are collected, on a daily basis, at each *mandi.* Price data are reported regularly in local and national newspapers for only a few important locations. The limited success of arbitrage in achieving price stabilization over space might also come from the poor reliability of the prices that are reported. Although such reliability is difficult to assess, it appears to be viewed in quite a good light by most local oilseed traders. Also, it is evident that many of the larger oilseed processors each day determine the prices offered by their buyers on the basis of the quotations reported daily in one or two major urban centers, such as Bombay and Delhi. The NDDB, however, questions the reliability of the prices that are reported by the Bombay Oilseeds and Oils Exchange.[11]

A4.29 **The Small Scale Of Operations In The Crushing Industry** (in particular, in the groundnut and mustardseed sectors, as a result of Small Scale Industry Reservation) does not give the necessary incentives to processors to organize shipments of seeds from other regions to fulfill supply requirements and permit factories to reach full capacity. Oilseed crushing, therefore, remains a highly localized activity, in which processors do not fight hard to get access to seeds from other regions to reduce their unit fixed costs.

A4.30 **Lack of Hedging Instruments to Offset Risks of Price Fluctuations During Storage.** Forward and futures trading in oilseeds and oilseed products are heavily restricted in India. As a results, traders have very limited options for hedging their price risks nor do they have access to a long-term future price reference to guide operational decisions. The current pricing system for edible oilseeds and oils is based on cash sales for immediate or very short term delivery (with a maximum of 11 days). Market information systems operating in India only report cash prices for spot delivery, since, in common with forward trading, futures trading is not permitted for edible oilseed products[12]. The legal constraints on forward and futures trading force the few agents authorized to store edible oilseeds and oils to keep an open position, and, therefore, be at risk. Price fluctuations within and across crop years are such that, even if storage constraints were eased, the absence of hedging instruments with which to insure against price fluctuations would still constitute a significant barrier to the development of large scale commercial storage, similar to that found in many other countries. This is because speculative risks would still be too high to persuade the private sector to undertake such storage activities. If the legal constraints to forward trading are removed, several existing commodity exchanges, experienced in futures trading for castorseed and with a history of trading edible oilseed futures in the past, would be in a good position to start operating and become a major center of hedging activities and source of price reference for India and maybe for other countries in the region, too.

B. Quality Standards and Market Information: Performance and Key Determinants

A4.31 **Indian Markets Are Not Efficient in Reflecting Quality Differentials.** The Indian markets currently do not efficiently reflect through prices differences in product quality. For example, the price differentials between different qualities of refined oils display relatively large fluctuations and are sometimes even negative. Poor price translation of quality is mainly traced to a lack of a nationally recognized quality standards and their weak enforcement as well as the confusing web of overlapping regulations governing quality control.

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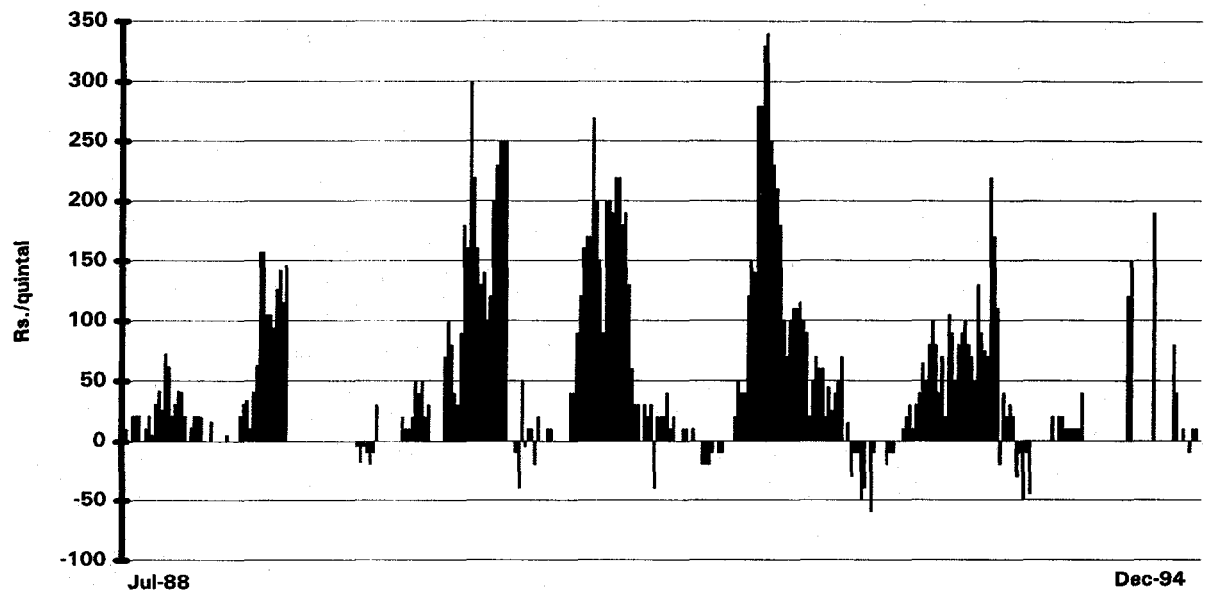
[11] See below the discussion on market information.

[12] The Bombay Oilseeds and Oils Exchange trades castorseed futures. Castorseed does not belong to the list of edible oilseeds: futures trading is therefore permitted.

A4.32 **Price differentials between different qualities of refined oils display relatively large fluctuations.** Price differentials for different types of refined oils, as reflected by the prices reported at the Bombay Exchange fluctuate widely. Figure A4.6 presents the price margin between soybean and rapeseed refined oils. In the case of soybean oil, some of the volatility may be result of shocks that the Indian market may have received from a temporary shortage of domestic supplies. In general, price differentials between the main types of refined oils have not stabilized. Consumers do not seem to switch easily from one category of oil to another.

Figure A4.6: Price Premium of Refined Soybean Oil Over Refined Rapeseed Oil, Bombay Commodity Exchange



Source: Bombay Commodity Exchange.

A4.33 **Weak Enforcement of Quality Standards, Particularly With Respect to Blended Oils.** The blending of two pure oils is now permitted under the Prevention of Food Adulteration Act, and consumers have to be informed on the label of the package. *Vanaspati,* by nature a blend of different refined oils, which is then hydrogenated, is sold to consumers with an obligation to indicate the raw materials used in the process; however, the labeling does not give any indication of the actual percentage of each oil. Edible oils are one of the few exceptions to the PFA rules of 1955, Article 32, which states that every label has to specify the names of the ingredients used in the product in descending order of their composition by weight or volume. Among the few exceptions to this rule, "... class titles may be used, namely: 'edible fats', 'edible oils', ..." There are widespread claims that amounts of high quality *vanaspati* (with a color close to white) are sold for adulteration with *ghee,* a much more expensive dairy product popular with Indian consumers. There were also persistent allegations that castor oil, an industrial oil, is widely blended with other oils sold for edible purposes. These allegations are surprisingly precise: it is said that castor oil accounts for 2 % of the edible oil consumed in India, and that the proportion ranges up to 10 % in extreme cases of adulteration. The current organization and facilities of the Government agencies responsible for preventing food adulteration do not seem to be adequate to stop such practices.

A4.34 **Lack of and Weak Enforcement of Regulations Have Adverse Consequences on Consumer Safety.** The health hazard associated with the existence of aflatoxin in groundnuts or of erucic acid and glucosinolates in mustard and rapeseed is not adequately being addressed in India. In other countries, these problems have resulted in significant changes in the choice of varieties and post-harvest techniques. There no indication from either the Government or private sector, that they saw action in these directions as a high priority. It is claimed that the relatively low per capita consumption of oils reduces the potential health hazards for the average consumer. It is also reported that, the strong pungent taste of raw mustard oil that consumers prefer in northern regions, is correlated with the presence of erucic acid, with a widespread belief that the use of the oil in the cooking of fish neutralizes the harmful effects of the erucic acid. No research has been reported into ways of catering to consumer preferences for pungent oils in several regions in India, while also reducing the health hazard resulting from the presence of erucic acid.

A4.35 **Poor Quality Control Especially with Respect to Aflatoxin and Glucosinolates in Oil Cakes Have Hurt Exports.** The presence of glucosinolates and aflatoxin in protein oilseed cakes (including DOC destined for export markets) is, to a large measure,[13] at the heart of the large discounts paid by foreign buyers for mustardseed and groundnut meal of Indian origin. Food inspection is currently based upon a punitive approach, with limited results in this respect. This can be contrasted with a prevention and educational approach, under which each producer and distributor would be in charge of guaranteeing the quality of the product and of informing its consumers about it. Then, quality control would fully become a private sector concern, with private inspection agencies certifying the quality of the product and the State agencies in charge of controlling the quality and the validity of such certification. In such a large country, with a extremely large number of small processing and marketing units, the evasion of quality control is pervasive. A review of the role, facilities and procedures of quality control should be undertaken, having in mind a more effective management of quality, the simplification of the supervision process, the right to contest quality control in the courts to avoid bribery, and the privatization of certain tasks (e.g., the quality inspection of imported edible oils). In addition, a review of the basic issues related to the intrinsic quality of seeds and oils should be made in relation to the best practices in foreign countries.

A4.36 **Storage Restrictions Indirectly Impact on Quality Management by Processors.** The ECA restrictions on stock-holding make it uneconomic for traders to develop the capacity to store and mix different seed qualities to meet the differing oil quality demands of processors. Although most medium to large scale processors are able to buy seeds in terms of their oil content, local traders are not equipped to store and mix, on a large scale, different qualities of seeds in order to achieve the precise quality that processors would expect. Such adjustments in the quality of products in response to market needs is one of the services that wholesalers, when properly equipped with laboratories, multiple cell silos, scales and conveyor belts, can achieve. These services are not offered by the private sector in India, and cooperatives only do it for their own operations.

A4.37 **Grading is Hardly Enforced in Oilseed Marketing Which Disadvantage Farmers.** Oilseed grading is generally undertaken in an unscientific manner in nearly all markets. In the regulated markets or *mandis*, grading by traders continues to be done by visual means (in terms of color, dust, moisture and foreign matter). A high moisture content and deterioration of oilseeds is an issue only during the *kharif* season, and some traders use moisture meters to measure the true moisture level during the season. Buyers claim that they are able to assess, without the use of any special equipment, the oil content of the seeds. In

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[13] Other reasons exist for the discounts suffered by Indian meal exporters, as explained in Annex 3. These include the very slow pace of the loading of vessels in the ports and the disruptions often observed in the supply of such products to the ports.

practice, unless supplies are low, they tend to be conservative in their estimate of the oil content and in their pricing as well, since the oil content is the main element sought by their industrial clients. An attempt has been made by the cooperative sector to apply more scientific techniques to the assessment of the quality of the seeds delivered by the local farmers, and to pay accordingly for the product. This could eventually have a beneficial educational impact upon producers but, so far, the small share of the market held by the cooperative sector has not resulted in the emergence of a similar approach by private traders, nor in improved payment practices based on scientifically assessed quality elements. In principle, edible oilseeds are traded on the basis of a fair average quality (FAQ), the definition of FAQ can differ from region to region and from year to year. The grading of oilseeds is based mainly on the presence of foreign matter in each lot offered for sale, and, in the case of groundnuts, on the quantity of seeds actually obtained from the pods. Traders start to discount the price of seeds when foreign matter exceeds a certain level, which is commonly 1 % for groundnuts; and 0.5 % for soybeans. Traders and processors state that the oil content is often not an issue *per se,* since they have a good understanding of the normal oil content at each local market. Therefore, they price the seeds on the basis of the average content which they believe to be representative of each specific *mandi.*

A4.38 **Overlapping Legislations on Quality Standards Complicate Quality Enforcement.** In addition to the Vegetable Oil Products Control Order, 1947 and the Solvent Extracted Oil, Deoiled Meal and Edible Flour (Control) Order, 1967, which both regulate the quality and packaging of edible oils to ensure consumer health and safety, other subsequent and more encompassing GOI legislations, such as the Prevention of Food Adulteration Act, 1954, the Weights and Measures Act, the Packaged Commodities Order, 1971 and the Blended Edible Vegetable Oils Grading and Marking Rules, 1991 under the Agricultural Produce (Grading and Marking) Act, 1937, also govern edible oil quality and safety standards. The multiplicity of legislations on quality and the subsequent overlapping jurisdictions of enforcement agencies and inspections only serve to increase the transaction costs for traders and processors. Inspections by these agencies are perceived by the private sector as a form of harassment, which create opportunities for rent-seeking. Although the GOI is aware of the overlapping regulations and enforcement responsibilities of several agencies, it has not taken any measures to rationalize the quality control system for edible oils and their products.

A4.39 **Conditions for Allowing Quality Improvement while Protecting Consumer Safety.** Promoting quality improvement in India entails both providing the enabling environment for the private sector to respond to market signals for quality while instituting regulations to protect consumer welfare. Private firms on their own may enforce and maintain quality standards through quality control systems during the manufacturing and distribution process, product labeling, and consumer information campaigns. However, public welfare considerations requires an important role for the state in terms of providing the legal and regulatory framework for setting the minimum quality standards to ensure consumer health. In India, the removal of price controls will contribute considerably to creating the market incentives for product quality improvement. But at the same time, there is a need to: (i)eliminate regulations which hinder quality diversification in response to consumer preferences (e.g. limits on the number of oils which could be blended); (ii) strengthen the enforcement of quality standards (e.g. aflatoxin contamination); and (iii) eliminate disincentives for improving product quality (e.g. unreasonable restrictions on packaging.)

A4.40 **Market Driven Incentives Can Play a Major Role in Addressing Quality Management Issues.** The private sector has the ability to adjust its practices in response to market-driven improvements in the quality of oil and cake, and improved health standards and controls. While the market shares of refined oils in the overall edible oil sector are small, it seems that quality management and quality enhancement, as exemplified by the fast rising demand for refined oils at the expense of filtered expeller

oils, are likely to remain largely demand-driven. The development of product differentiation strategies, in particular for refined oils, will play a significant role in this process. In this regard, significant efforts are underway on the part of several large enterprises, to improve i) the quality of the raw oils purchased for final processing, notably lowering their FFA content, ii) conditions of delivery and inspection, and iii) the settlement of disputes. Such efforts from major purchasers of oils create new incentives for raw material suppliers to adapt their practices all the way along the marketing chain from the farmers, in order to be able to meet the customers' requirements at the minimum cost. Hindustan Lever Ltd. published in May 1991, a 24 page booklet (the "yellow book") listing and describing the current set of general terms and conditions for its purchase of vegetable oils and fats. Such developments by private sector should be encouraged and support should be provided to suppliers to help them to adjust to these new circumstances. Private trade associations and cooperatives would be in the best position to take a lead in these efforts and collaborate with governmental institutions in this initiative.

Market Information

A4.41 **Market information by private sector and state agencies is collected extensively, but poorly disseminated.** The oilseed sector is characterized by an very extensive network of markets, on which the collection of data (mostly related to prices) is undertaken thoroughly on a daily basis. State Government agencies and private traders on the main commodity exchanges are doing a commendable and useful job in this regard. The dissemination of information also benefits from two large conferences (the *kharif and rabi* conferences) organized by an active, although poorly equipped, industry-wide organization in the area of oilseeds and oils: the Central Organization for Oil Industry and Trade, which prepares its own forecasts of the supply/demand balance within the sector. The information gathered within the sector and released at these conferences receives worldwide attention and is reported thoroughly in India and in foreign oilseed journals. A large number of newspapers and, in particular, the economic and business press, report the key market prices for prompt delivery for the main edible oilseeds and oils and for DOC on a daily basis in the major centers of production and consumption. Specialized commodity exchanges in several states also provide well organized market information on oilseeds and their derivatives and disseminate daily market prices. The publications of the Bombay Oilseeds and Oils Exchange are widely cited in this respect, and are given a significance as a reference source, which reflects Bombay's large consumer market and export shipments. The Bombay Exchange performs excellent work in the dissemination of general market information and price statistics.

A4.42 Within India, as a whole, three main deficiencies have been observed in the flow of information. They are:

- *The absence of information on the volumes* traded on the various market centers. They are collected each day in the *mandis;* but, are not collected for the main commodity exchanges. As a result, the significance of the prices reported on these markets is reduced, since it is not known whether they result from the trading of small quantities (which would threaten to give rise to narrow markets, which would not be representative of the balance of overall supply and demand);
- *The lack of information on the number of market participants reporting prices to the main commodity exchanges and whether they are truly representative of trading conditions*. Several companies in the cooperative sector and among leading end-users claim that the prices published by the Bombay Exchange are not representative of the terms on which actual trading is occurring. Nevertheless, there is firm evidence that large processors and traders in several regions of India believe otherwise, and use

Bombay prices to determine their daily strategy regarding the purchase prices at which their buyers make their offers at the *mandis.* This issue of the representative nature of the prices published at the major markets could be resolved by inviting a representative of the cooperative sector and of other vital interest groups, such as industrial end-users, to contribute to the daily reports. If forward trading becomes legal, some commodity exchanges could develop open trading floors where more clarity would be secured; and

- *The poor dissemination* of most of the prices collected at the *mandis.* It is not known what is done with all of the valuable information collected on a daily basis by *mandi* officials and then submitted on a daily basis to State and Central Government Ministries. Even the Bombay Exchange, which offers to fax and mail its daily prices, has a very small number of subscribers. However, the leading international specialized videotext systems, such as Reuters and Knight Ridder, are now collecting and disseminating this information in real time on their networks.

C. Performance of the Market in Exchanging Risks

Principles of Crushing Margin Hedging

A4.43 **Why are International Crushing Margins So Low and Volatile?** The international oilseed industry is characterized by crushing margins that are typically low, highly unstable and sometimes negative. The peculiarities of the oilseed complex explain this unusual situation. The prices of individual oils are highly correlated with one another, by virtue of the substitutability between different oils, and the same is true for meals. Since crushing margins are determined as the comparatively small gap between different oil and meal on the one hand, and the prices of oilseeds on the other, their values are derived as the result of the interaction of three quite different markets: (a) the market for oils and the position of the individual oil in the entire constellation of other oils; (b) the market for meals and the standing of the relevant meal in the much broader market for livestock feed; and (c) the supply and demand conditions in the individual oilseed sector in question.

A4.44 **High Technical Efficiency and Risk Management Techniques Enable Oilseed Processors Worldwide to Operate in an Environment of Low and Volatile Crushing Margins.** In order to survive financially, crushers operating in open international markets have to operate according to two distinct objectives. First, they have to maximize their technical and economic efficiencies--by economizing on their use of inputs per unit of output; by minimizing the extraction of losses of oil during processing; and by holding down their production costs. Second, they need to take full advantage of the few moments when crushing margins are favorable by employing risk management techniques. A standard technique is through hedging techniques on futures markets. Specifically, they have to ensure that when margins are profitable, they lock in forward crushing margins by using futures and forward sales as forms of hedging, so that they are assured of several weeks or months of future profitable activity, untroubled by the day-to-day fluctuations in seed, oil and meal prices. In the meantime, they look out for other windows of opportunity, when they lock in crushing margins for another few weeks. Hence, on average, such processor's margins are better than the simple annual arithmetic mean. . This expertise in futures trading, far from the technical expertise about processing technologies *per se,* is so important that, since the 1970s, the restructuring of the oilseed crushing industry in a number of large producing countries has occurred primarily under the lead of large international commodity trading firms. Their trading expertise, as well as the benefits from the integration of new flows of products into their trading activities, became key elements in the restructuring of crushing enterprises which were often chronic loss-makers. Another complementary technique is the flexibility in the sourcing of raw materials, either on the domestic or the international market. Flexibility

allows a processor to acquire its raw material needs at the best price. Processors, therefore, usually locate their facilities in a port where large sea vessels could deliver large and uniform quantities of imported seeds, when the use of domestic products become less profitable. This is crucial for the success of this important element of the oilseed marketing chain. To protect farmers from the adverse effects of price instability, some countries operate partial price stabilization programs (see Text Box 1 in Chapter 3).

Figure A4.7a: Frequency Distribution of Real Monthly Crushing for Groundnut in Rajkot, Jan 88 to Dec 1992

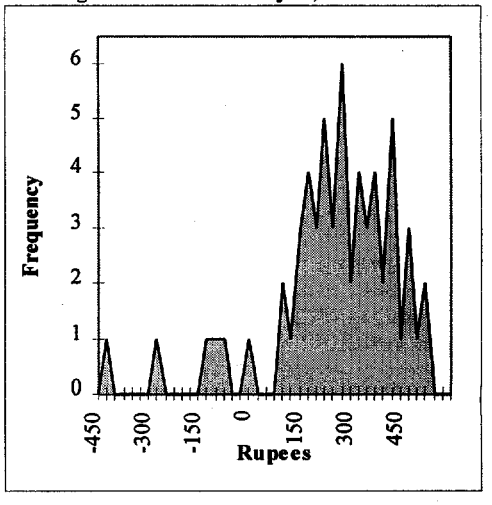
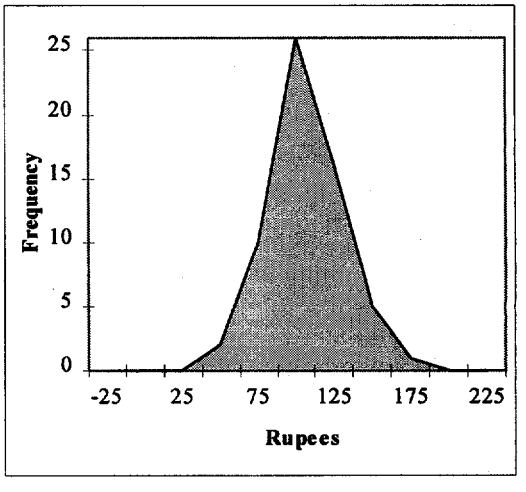


Figure A4.7b: Frequency Distribution of Real Monthly
Rapeseed Crushing Margins, Kanpur
Jan 1988 - Dec 92



Source: Annex 4

Indian Oilseed Crushing Industry

A4.45 **Crushing Margins in India are Also Highly Volatile and Exhibit Negative Values.** Like their foreign counterparts, oilseed processors in India also face a high degree of crushing margin volatility. Figures A4.7a and A4.7b present the frequency distribution of the theoretical gross crushing margins (1990 rupees) in selected markets in India (Appendix A4.4 presents the crushing margins for groundnut in Bombay and Hyderabad, for rapeseeds in Moga, Hapur, Kanpur and Delhi).[14] In groundnuts, the gross crushing margins (GCM) are highly unstable and in many cases exhibit negative values (Table A4.9). Rajkot market displayed the highest instability with a coefficient of variation of 76 %, with absolute values of GCM ranging from Rs -441 per 100 kg to Rs 509 per 100 kg . The Hyderabad and Bombay markets exhibit lower CVs of 51 and 39 % respectively. They also exhibit negative GCMs, but unlike the Rajkot market only reach Rs-30 per 100 kg. The spread between the highest and lowest GCMs in all the markets are also very large: Rs 895 in Hapur, Rs 424 in Hyderabad, and Rs 420 in Delhi.

[14] These markets were selected solely on the basis of data availability. The gross crushing margins for groundnut and rapeseed was calculated using the following formulas:

Groundnut: Crushing Margin Without Shell = (Oilcake Price * 0.57) + (Oil Price * 0.41) - Oilseed Price
Crushing Margin With Shell = (Oilcake Price * 0.57) + (Oil Price * 0.41) - (Oilseed Price*1.428)
Rapeseed: Crushing Margin = (Oilcake Price * 0.60) + (Oil Price * 0.37) - Oilseed Price

Table A4.9: Crushing Margin Statistics in Selected Markets

Rapeseed	Hapur	Kanpur	Delhi	
CV	0.88	0.27	0.18	
Mean, Rs/100 kg	143	93	172	
Max, Rs/100kg	240	173	257	
Min. Rs/100 kg	71	31	85	
Groundnut	Rajkot	Hyderabad	Bombay	Moga
CV	0.76	0.51	0.39	0.27
Mean, Rs/100 kg	242	171	213	276
Max, Rx/100kg	509	386	390	557
Min. Rs/100 kg	-441	-38	-30	120

Source: Computed

A4.46 The real gross crushing margins of rapeseed are also highly volatile, but unlike groundnuts, remain consistently positive. Of the markets analyzed, the GCM of the Hapur market displayed the highest degree of instability with a CV of 88 %, in contrast to Kanpur (27%) and Delhi (18%). The spread between the maximum and minimum GCM values in the markets are also large: Rs 169 in Hapur, Rs 142 in Kanpur and 172 in Delhi.

A4.47 **Government Policies and Regulations Inhibit Indian Processors from Effectively Coping with Crushing Margin Instability.** Government policies and regulations inhibit Indian processors from effectively responding to the considerable uncertainty in their processing operations by imposing constraints on their ability to improve their technical and economic efficiency and increase their operational flexibility to respond to price risks. First, government policy, in particular the Small-Scale Industry Reservation Policy, prevents processors from adopting the optimal size and type of processing technology. Second, storage and movement controls and access to risk management instruments (the Forward Markets Regulations Act, only allows forward sales of oilseeds and oilseed products up to 11 days in the future) foster economic inefficiencies in processing. For example, forward or futures trader would at least enable processors to lock into profitable crushing margins far in advance. Even if profitable crushing margins exist in the market, processors' capacity to accumulate stock is restricted by storage limits under the Pulse, Edible Oilseeds and Edible Oils (Storage Control) Order and caps on working capital loans under the Selective Credit Control Policy by the Reserve Bank of India. Third, flexibility in sourcing of inputs as another means of coping with crushing margin risks is constrained by import controls and multi-point, non-unitary taxation imposed on intra and inter-state trade.

A4.48 **Absence of Instruments Coping with High Crushing Margin Instability Have Several Adverse Consequences.** The limited options processors have in coping with crushing margin instability are major factors contributing to higher crushing margins overall and the creation of incentives for processors to adopt "creative methods" to assure profitable operations. Due to the high degree of crushing margin instability, processors are forced to incorporate a higher risk premium in their margins to cover for such risks. Crushing margin instability also encourages some processors to pursue creative methods to improve profitability. including both legal--taking advantage of export performance incentives-- and illegal means --tax evasion, adulteration of products and export commodity switching. These alternative sources of profits are discussed below.

A4.49 **Alternative sources of profits, derived from financial and fiscal operations, have been discovered by the industry to make up for losses on their high risk and low margin processing, and trading activities.** Due to the limited options for hedging against price risks, processors have been obliged to find alternatives and to develop financial and fiscal strategies to offset these problems. The existence of strict foreign exchange control in India has created a separate market for foreign exchange that results in significant benefits for those, such as oilseed crushers, who are able to export oil cake. There are several ways in which the foreign exchange regime boosts the returns from export sales. The first arises as a direct result of the incentives which are provided to companies which earn foreign exchange. Companies which earn foreign exchange are classified into trading houses, export houses, star trading houses and superstar

trading houses, according to their export earnings. As they move up this scale, they receive improved access to import licenses. This access has its own premium value in an economy in which foreign exchange is firmly regulated. For those companies which do not attribute a high implicit shadow exchange rate to access to import licenses, there is a second way in which export sales can generate special benefits to the DOC producer. The company can sell its export contracts to other companies, who want to secure proof of foreign earnings. The resulting premium which is paid, over and above the official exchange rate, is known as "export performance". In 1995, it tended to average 3 to 4 % of the reported export price, which translates into a bonus for the producer of DOC.

A4.50 **Rupee-Ruble Escrow Accounts Provided Another Opportunity for Obtaining Additional Export Revenues.** Another avenue for generating extra revenues is through DOC export sales (or any other export product) to Russian trading companies within the framework of the Rupee-Ruble escrow account. This escrow account is part of the inter-government agreement to ensure that there is a balance in trade between the two countries. Russian traders use the escrow account's Rupees to pay for Indian exports, which do not necessarily have to be delivered to Russia, but which can also be delivered to third countries. The typical situation is one in which Russia has an underlying trade surplus with India. Therefore, Russian buyers enjoy a premium exchange rate when they purchase Indian export products. The actual escrow account premium has been in the range of 5 to 8 % in 1995. This figure is somewhat higher than that for export performance for three main reasons: (a) the exporters in such contracts are obliged to accept the LIBOR rate on their Rupee receipts, and are not allowed to earn the forward premium for the Rupee against the US dollar (which other exporters are permitted); (b) the exporter is not given access to pre-shipment credit, and therefore pays a commercial rate of up to 13 % on such short term finance, as against concessionary rates of 8.5 % which applied in mid-1995 on other export sales; (c) the organization of export sales under this scheme is more time-consuming and more fraught with risks. The premium over the export performance bonus reflects the higher risks associated with these trades.

A4.51 **Increased Incentive for Other Illegal Actions to Overcome Highly Uncertain Environment.** The highly uncertain environment in oilseed processing has fostered the adoption of other illegal practices. It is well recognized that tax evasion is occurring in India as a means of compensating for poor margins. Illegal transactions have also been undertaken in DOC export sales. There exists a sizable blocked Rupee escrow account, accumulated during the period of past imbalances in the trade between the two countries, and this is meant to be used solely on exports destined for Russia. In 1992, India's protocol with Russia covered a debt of Rs 120 billion which will be repayable over 40 years without interest, and a Rupee escrow account liability totaling Rs 240 billion, which carries 2% annual interest and is repayable in ten equal installments. The GOI set itself the target of liquidating the latter account rapidly by making exports of Rs 30 billion each year under the escrow arrangements. Cases have arisen in which exports have been discovered to have been made, ostensibly under this scheme, but in which the cargoes were sent to third countries; this is known as "switch trade". The premium which is offered for illegal switch trades is over 30 %, divided equally between the Russian trader and the Indian exporter. In late 1994, one shipment of soybean DOC was discovered to have been shipped to Singapore and the Philippines, without having received the Soybean Processors' Association registration certificate, as required by Reserve Bank of India guidelines. SOPA subsequently refused to register any other contracts by the same exporter, but the company in question approached the Ministry of Commerce, which requested that SOPA to register the company's next export contract. The Ministry of Commerce has tried to prevent any further switch trades of this sort by requiring a new 10 % bank guarantee for such Rupee escrow exports.

Competition and Marketing Performance.

A4.52 **The improvement in the performance of the edible oilseed and oil marketing chain did not accompany the surge in oilseed production.** The spectacular development of oilseed production, in particular in rainfed areas, materialized in spite of the obstacles created by an inefficient marketing and processing system. The efficient allocation of oilseeds over space, time and quality, is disrupted by numerous constraints, both legal and technical (including constraints to private sector physical exchange of products and inadequate infrastructure and facilities). The legal framework of the 1950s, when the Central Government, with the support of State Governments, was i) planning and controlling the allocation of products over time, space and quality; and ii) managing foreign trade behind strict quantitative barriers, is still largely in effect. Although the enforcement of these laws has been significantly lessened, at any moment they can be revived, as they are from time to time. They create a potential threat to investors in the marketing chain. The low level of investment in improving the marketing of edible oilseeds and oils, while resulting, to a large extent, from the provisions of the ECA, has been acknowledged by the Government of India, and the task of improving the efficiency of marketing has been and is still entrusted primarily to the cooperative sector and to the NDDB through its market intervention operations. In effect, market failure, mostly caused by Central and State Government intervention, is expected to be alleviated, if not solved, by the NDDB. Not only is it dangerous to place a large part of a country's industrial and commercial strategy in this vital sector in the hands of a single agency which is still a parastatal, but, to achieve this difficult task, this agency has been given special permission to operate under less restrictive and more favorable conditions than private enterprises. Consequently, this policy creates unfair competition for the private sector. An alternative way of improving market performance would be to base the implementation of this policy in the private sector itself, with the proper incentives and surveillance by a State agency.

A4.53 **The easing of barriers to domestic commerce has not accompanied the continuing lifting of trade barriers.** In view of a) the gradual reduction in trade barriers for edible oils and the growing competition from imported oils, and b) the exposure of India to world movements on the export markets for protein cake, domestic marketing and processing enterprises are increasingly having to contend with only a limited degree of insulation from world price trends. Accordingly, they have to try to shift the burden of their relatively high marketing and processing costs, and their need for larger margins to make up for unhedgeable price risks, onto farmers, which inevitably results in lower farm-gate prices. This is in stark contrast to the normal objectives of competition.

Appendix A4.1
Correlation Coefficients Between Oilseed, Oil, and Oil Meal Markets

Appendix Table A4.1a: Groundnut Market Correlation Coefficients of Monthly Prices

Year	Bombay & Rajkot	Bombay & Hyderabad	Bombay & Nandyal	Hyderabad & Nandyal	Madras & Bombay	Madras & Hyderabad	Madras & Nandyal	Madras & Villapuram
1985	0.00	0.12	0.184	0.909	0.207	0.670	0.569	0.725
1986	0.65	0.87	0.648	0.903	0.837	0.978	0.885	0.955
1987	0.92	0.64	0.771	0.794	0.722	0.891	0.891	0.958
1988	0.73	0.59	0.646	0.657	0.577	0.728	0.665	0.444
1989	0.85	0.62	0.916	0.352	0.823	0.149	0.945	0.945
1990	0.78	0.09	0.514	0.176	0.762	0.215	0.887	0.848
1991	0.73	0.63	0.559	0.636	0.415	0.579	0.896	0.317
1992	0.38	0.34	0.600	0.655	0.495	0.728	0.711	0.816
1993	0.81	0.90						
1994	0.26	0.65						
1995	0.33	0.53						
85-95	0.92	0.95						
85-92	0.90	0.94	0.944	0.924	0.946	0.928	0.971	0.967

Source: Computed

Appendix Table A4.1b: Groundnut Market Correlation Coefficients of Monthly Prices Differences

Year	Bombay & Rajkot	Bombay & Hyderabad	Bombay & Nandyal	Hyderabad & Nandyal	Madras & Bombay	Madras & Hyderabad	Madras & Nandyal	Madras & Villapuram
1985	0.975	0.973	0.987	0.990	0.980	0.984	0.981	0.985
1986	0.231	0.569	0.014	0.765	0.503	0.921	0.800	0.829
1987	0.426	0.529	0.381	0.277	0.425	0.582	0.323	0.667
1988	-0.377	0.405	-0.265	0.209	0.110	0.574	-0.032	-0.008
1989	0.266	-0.292	0.628	-0.214	0.670	-0.313	0.801	0.825
1990	0.038	0.035	-0.018	0.557	0.142	0.648	0.599	0.517
1991	0.367	0.577	0.503	0.605	0.420	0.485	0.863	0.126
1992	0.425	0.289	0.388	0.609	0.504	0.549	0.489	0.489
1993	0.498	0.683						
1994	0.326	0.405						
1995	-0.602	-0.140						
85-95	0.171	0.426						
85-92	0.531	0.684	0.585	0.674	0.680	0.700	0.783	0.699

.Source: Computed.

Appendix Table A4.1c: Rapeseed Market Correlation Coefficients of Monthly Prices

Year	Delhi & Hapur	Delhi & Kanpur	Delhi & Sinhind	Delhi & Hindaun	Hapur &	Hapur & Sinhind	Sinhind & Moga	Calcutta & Hapur	Calcutta & Kanpur
1985	0.516	0.551						0.451	0.590
1986	0.953	0.965						0.956	0.960
1987	0.990	0.959						0.795	0.711
1988	0.760	0.865						0.626	0.625
1989	0.937	0.929						0.869	0.944
1990	0.981	0.979						0.976	0.990
1991	0.981	0.967	0.563	0.819		0.601	0.271	-0.450	-0.474
1992	0.801	0.891	0.348	0.850		0.463	0.268	0.817	0.916
1993	0.915	0.948	0.901	0.974		0.850	0.696	0.908	0.897
1994	0.954	0.900	0.808	0.959		0.852	0.683	0.935	0.884
1995	0.887	0.703	-0.028	0.724		-0.144	0.143	0.807	0.736
85-95	0.947	0.645			0.617			0.337	0.234
91-95	0.801	0.945	0.657	0.694	0.756	0.422	0.914	0.016	0.047

Source: Computed.

Appendix Table A4.1d: Rapeseed Market Correlation Coefficients of Monthly Price Differences

Year	Delhi & Hapur	Delhi & Kanpur	Delhi & Sinhind	Delhi & Hindaun	Hapur & Kanpur	Hapur & Sinhind	Sinhind & Moga	Calcutta & Hapur	Calcutta & Kanpur
1985	0.983	0.992			0.961			0.977	0.992
1986	0.490	-0.011			0.078			0.521	-0.183
1987	0.900	0.640			0.755			0.857	0.475
1988	0.703	0.909			0.418			0.162	0.199
1989	0.801	0.897			0.710			0.663	0.663
1990	0.586	0.607			0.850			0.837	0.817
1991	0.383	0.892	0.342	0.416	0.323	-0.190	0.605	-0.027	-0.246
1992	0.954	0.937	-0.051	0.900	0.841	-0.019	-0.261	0.758	0.942
1993	0.528	0.592	0.165	0.822	0.519	0.189	-0.304	0.296	0.454
1994	0.854	0.835	0.166	0.629	0.776	0.470	-0.323	0.733	0.743
1995	0.824	0.553	-0.002	0.566	0.839	-0.057	-0.028	0.440	0.375
85-95	0.544	0.174			0.109			0.002	0.010
91-95	0.445	0.783	0.177	0.498	0.410	-0.128	0.485	-0.013	-0.085

Source: Computed

Appendix Table A4.1e: Soybean Market Correlation Coefficients of Monthly Prices and Monthly Price Differences

	Monthly Prices	Monthly Price Differences
Year	Indore & Haldwani	Indore & Haldwani
1991	0.488	0.880
1992	0.741	0.574
1993	0.733	0.254
1994	0.678	0.111
1995	0.273	0.201
91-95	0.850	0.770

Source: Computed.

Appendix Table A4.1f: Rapeseed Market Correlation Coefficients of Monthly Prices and Monthly Price Differences

	Monthly Prices	Monthly Price Differences
Year	Bidar & Khamgaon	Bidar & Khamgaon
1991	0.643	0.980
1992	0.768	0.623
1993	0.743	0.321
1994	-0.641	-0.268
1995	-0.688	-0.971
91-95	-0.080	0.041

Source: Computed.

Appendix Table 4.1g: Groundnut Oil Market Correlation Coefficients of Monthly Prices

	Nandyal &	Bombay &	Bombay &	Bombay &	Madras &	Madras &	Calcutta &	Calcutta &
Year	Hyderabad	Hyderabad	Nandyal	Rajkot	Hyderabad	Nandyal	Hyderabad	Nandyal
1985	0.759	0.607	0.811	0.551	0.542	0.711	0.503	0.822
1986	0.975	0.939	0.966	0.929	0.966	0.955	0.635	0.713
1987	0.985	0.933	0.919	0.943	0.966	0.963	0.901	0.892
1988	0.860	0.952	0.927	0.970	0.827	0.793	0.163	0.346
1989	0.697	0.741	0.920	0.915	0.672	0.963	0.045	0.223
1990	0.935	0.976	0.955	0.911	0.960	0.921	0.846	0.913
1991	0.838	0.758	0.810	0.835	0.579	0.791	0.401	0.300
1992	0.904	0.969	0.861	0.752	0.890	0.839	0.404	0.258
1993		0.940		0.922	0.823		0.801	
1994		0.955		0.631	0.895		0.380	
1995		0.682		0.701	-0.231		0.658	
85-95		0.986		0.967	0.962		0.910	
88-92	0.986	0.986	0.986	0.982	0.974	0.983	0.936	0.932

Source: Computed.

Appendix Table A4.1h: Groundnut Oil Market Correlation Coefficients of Monthly Price Differences

Year	Nandyal & Hyderabad	Bombay & Hyderabad	Bombay & Nandyal	Bombay & Rajkot	Madras & Hyderabad	Madras & Nandyal	Calcutta & Hyderabad	Calcutta & Nandyal
1988	0.988	0.985	0.962	0.980	0.979	0.974	0.980	0.994
1989	0.303	0.113	0.373	0.453	0.332	0.764	-0.023	0.010
1990	0.215	0.790	0.402	0.624	0.723	0.236	0.050	0.367
1991	0.810	0.681	0.758	0.206	-0.375	-0.097	0.670	0.730
1992	0.951	0.848	0.816	0.777	0.757	0.678	0.092	0.085
1993		0.736		0.580	0.276		0.537	
1994		0.477		0.530	0.393		-0.058	
1995		0.382		0.273	0.446		0.340	
88-95		0.920		0.769	0.235		0.679	
88-92	0.912	0.875	0.844	0.854	0.224	0.259	0.754	0.749

Source: Computed.

Appendix Table A4.1j: Rapeseed Oil Market Correlation Coefficients of Monthly Prices

Year	Delhi & Hapur	Delhi & Kanpur	Delhi & Moga	Calcutta & Hapur	Calcutta & Kanpur	Calcutta & Moga
1985	0.802	0.557	-0.040	0.688	0.722	0.537
1986	0.940	0.985	0.982	0.936	0.97	0.990
1987	0.991	0.976	0.981	0.873	0.849	0.867
1988	0.789	0.676	0.491	0.724	0.849	0.621
1989	0.901	0.919	0.758	0.824	0.943	0.775
1990	0.985	0.989	0.981	0.984	0.981	0.973
1991	0.949	0.984	0.716	0.840	0.802	0.870
1992						
1993		0.971	0.748		0.945	0.840
1994		0.206	0.397		0.866	0.931
1995		0.777	0.853		0.713	0.904
85-95		0.930	0.792		0.973	0.834
85-92	0.979	0.985	0.877	0.970	0.965	0.856

Source: Computed.

Appendix Table A4.1k: Rapeseed Oil Market Correlation Coefficients of Monthly Price Differences

Year	Delhi & Hapur	Delhi & Kanpur	Delhi & Moga	Calcutta & Hapur	Calcutta & Kanpur	Calcutta & Moga
1985	0.995	0.989	0.981	0.985	0.989	0.990
1986	0.263	0.913	0.729	0.263	0.575	0.856
1987	0.885	0.810	0.831	0.442	0.577	0.312
1988	0.874	0.899	0.083	0.111	0.137	0.059
1989	0.757	0.810	0.524	0.679	0.805	0.622
1990	0.729	0.777	0.538	0.745	0.693	0.662
1991	0.768	0.919	0.353	0.798	0.671	0.542
1992	0.645	0.767	0.354	0.730	0.474	0.026
1993		0.711	0.090		0.674	0.220
1994		-0.110	0.563		0.24	0.718
1995		0.630	-0.519		0.467	0.148
85-95		0.383	0.140		0.685	0.252
85-92	0.820	0.892	0.421	0.732	0.728	0.335

Source: Computed.

Appendix Table A4.1l: Sunflower Oil Market Correlation Coefficients of Monthly Prices

Year	Monthly Prices Bidar & Madras	Monthly Price Differences Bidar & Madras
1991	0.450	0.993
1992	0.227	-0.059
1993	0.842	0.404
1994	0.675	-0.150
1995	0.993	0.990
91-95	0.902	0.932

Source: Computed.

Appendix Table A4.1m: Groundnut Meal Market Correlation Coefficients of Monthly Prices

Year	Bombay & Rajkot	Bombay & Hyderabad
1988	0.740049	0.92505
1989	0.725017	-0.45223
1990	0.768749	0.473505
1991	0.541136	0.833519
1992	0.744447	0.781863
88-92	0.84536	0.80159

Source: Computed.

Appendix Table A4.1n: Groundnut Meal Market Correlation Coefficients of Monthly Price Differences

Year	Rajkot	Hyderabad
1988	0.235272	0.53791
1989	0.22608	-0.03065
1990	0.294729	0.192379
1991	0.154292	-0.01291
1992	0.637424	0.661608
88-92	0.344892	0.266345

Source: ComPuted.

Appendix Table A4.1o: Rapeseed Meal Market Correlation Coefficients of Monthly Prices

Year	Delhi & Moga	Delhi & Kanpur	Calcutta & Kanpur
1988	0.547814	0.573013	0.325403
1989	0.732452	0.582146	-0.04179
1990	0.965594	0.856495	0.874896
1991	0.528368	0.851174	0.825797
1992	0.542512	0.733527	-0.14147
88-92	0.901456	0.917307	0.733131

Source: Computed.

Appendix Table A4.1p: Rapeseed Meal Market Correlation Coefficients of Monthly Price Differences

Year	Delhi & Moga	Delhi & Kanpur	Calcutta & Kanpur
1988	-0.23197	0.28596	0.481058
1989	0.752352	0.610792	0.047205
1990	0.598882	0.020456	0.098799
1991	0.11072	0.446504	0.147342
1992	0.419826	0.508374	0.545551
88-92	0.413846	0.412689	0.218901

Source: Computed

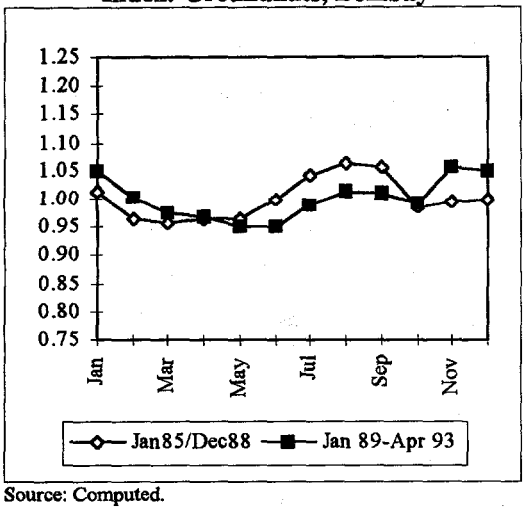
Appendix A4.2
Johansen Vector Auto-Regressive Cointegration Analysis: Maximum Likelihood Ratios

Groundnut	Nandyal	Hyderabad	Rajkot	Bombay	Madras	Villapuram
Nandyal						
Hyderabad	30.2					
Rajkot						
Bombay	55.8	98.4	72.6			
Madras	68.78	37.01			62.16	
Villapuram						113.5
Rapeseed	Hapur	Kanpur	Sinhind	Moga	Hindaun	
Hapur						
Kanpur	114.91					
Sinhind	66.86					
Moga			77.79			
Hindaun						
Delhi	94.83	68.75	9.51		5.35	
Calcutta	173.67	32.86				
Sunflower	Bidar					
Khamgaon	53.96					
Soybean	Indore					
Haldwani	35.96					
Groundnut Oil	Nandyal	Hyderabad	Rajkot			
Nandyal						
Hyderabad	39.85					
Rajkot						
Bombay	70.95	96.8	23.35			
Madras	68.59	48.42				
Delhi						
Calcutta	40.26	43.26				
Rapeseed Oil	Hapur	Kanpur	Moga			
Delhi	29.61	123.67	98.45			
Calcutta	5.89	99.52	106.65			
Sunflower Oil	Bidar					
Khamgaon	56.86					
Oilseed Complex						
Groundnut	Rajkot	Bombay	Hyderabad			
Oilseed and Oil	10.31	34.61	17.649			
Oilseed and Meal	24.698	9.88	16.138			
Rapeseed	Delhi	Kanpur	Hapur	Moga		
Oilseed and Oil	32.256	63.93	57.858	48.779		
Oilseed and Meal	15.894	22.652	15.588	36.431		

Note:Critical Values are 13.338 - 10%, 15.197 - 5%, 19.310 - 0.1%

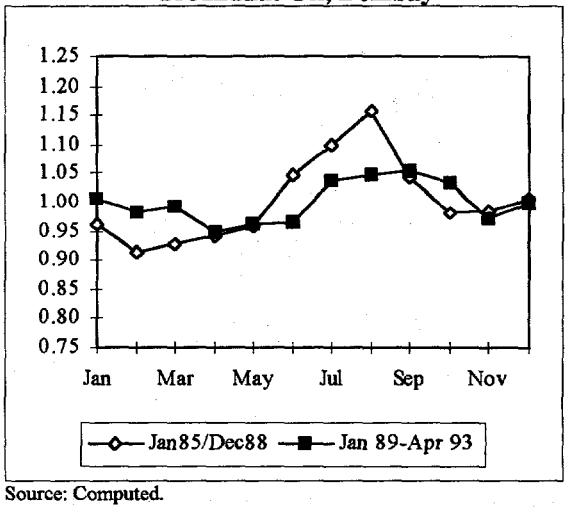
Appendix A4.3
Groundnut and Groundnut Oil Seasonal Price Indexes

Appendix Figure A4.3.1: Seasonal Price Index: Groundnuts, Bombay



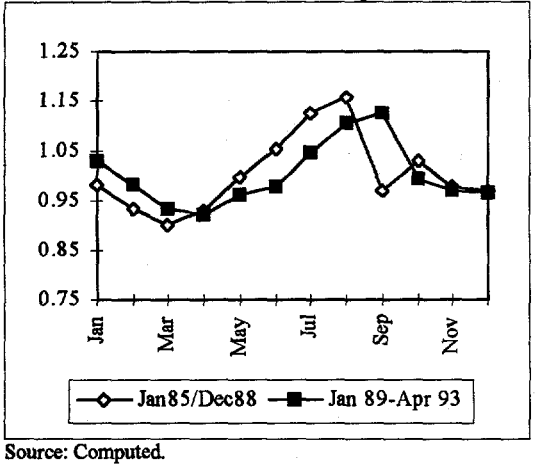
Source: Computed.

Appendix Figure A4.3.2: Seasonal Price Index, Groundnut Oil, Bombay



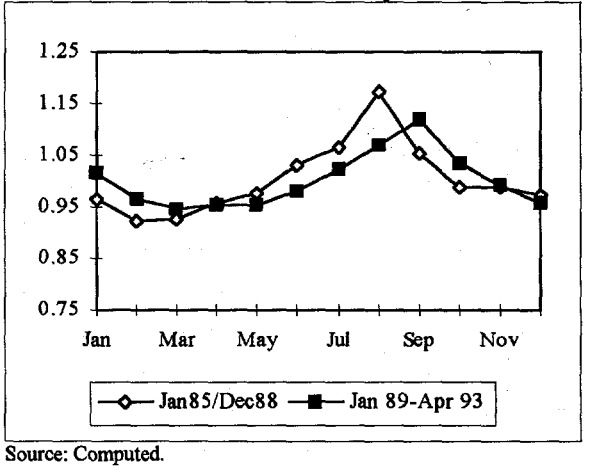
Source: Computed.

Appendix Figure A4.3.3: Seasonal Price Index, Groundnut, Nandyal



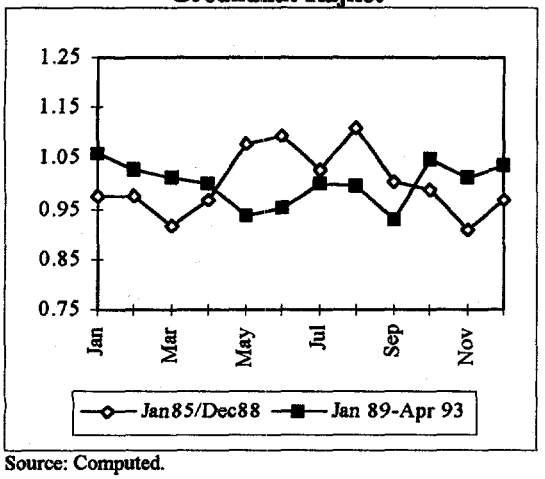
Source: Computed.

Appendix Figure A4.3.4: Seasonal Price Index, Ground Oil Nandyal



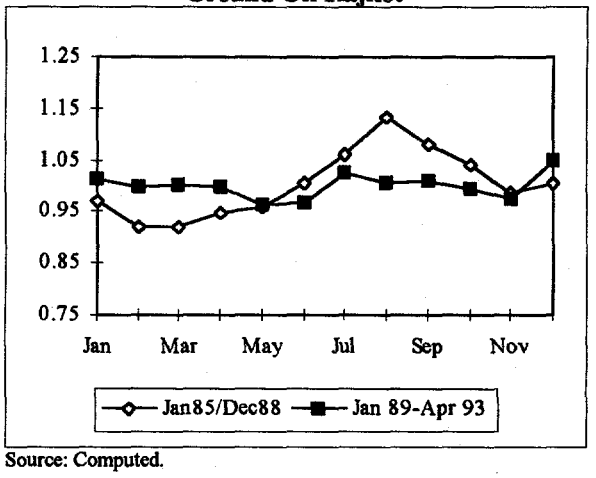
Source: Computed.

Appendix Figure A4.3.5: Seasonal Price Index, Groundnut Rajkot



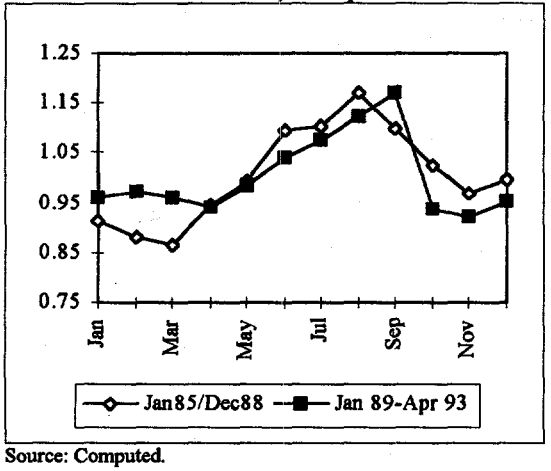
Source: Computed.

Appendix Figure A4.3.6: Seasonal Price Index, Ground Oil Rajkot



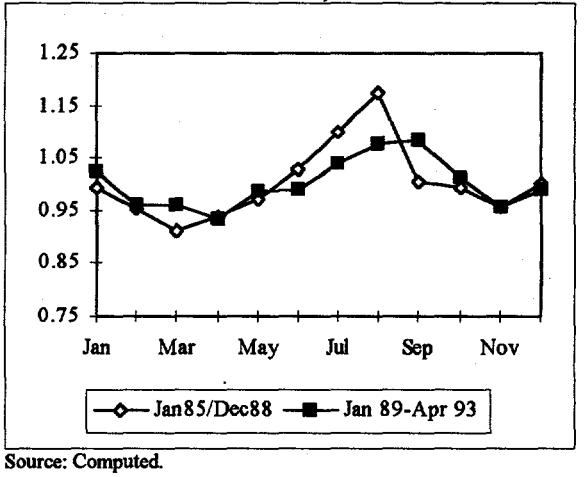
Source: Computed.

Appendix Figure A4.3.7: Seasonal Price Index, Groundnut, Villapuram



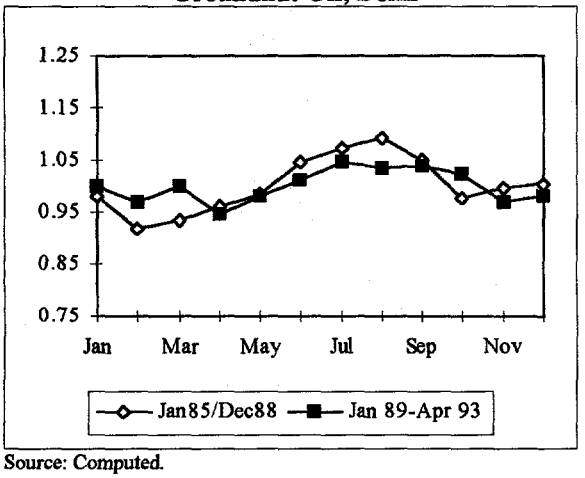
Source: Computed.

Appendix Figure A4.3.8 : Seasonal Price Index, Groundnut Oil, Madras



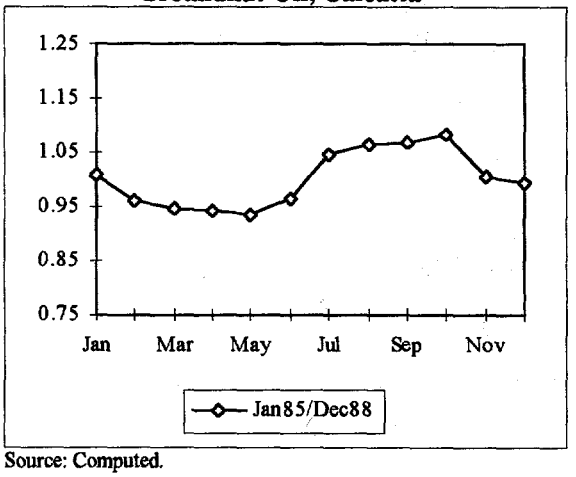
Source: Computed.

Appendix Figure A4.3.9: Seasonal Price Index, Groundnut Oil, Delhi



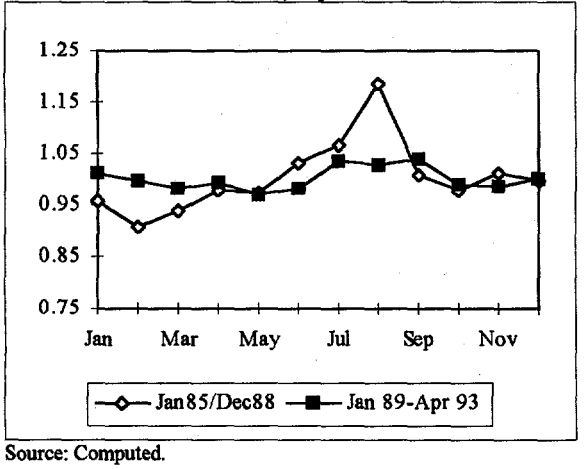
Source: Computed.

Appendix Figure A4.3.10: Seasonal Price Index, Groundnut Oil, Calcutta



Source: Computed.

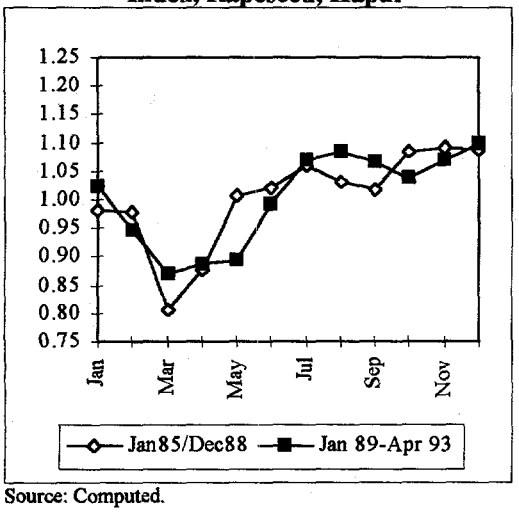
Appendix Figure A4.3.11: Seasonal Price Index, Groundnut Oil, Hyderabad



Source: Computed.

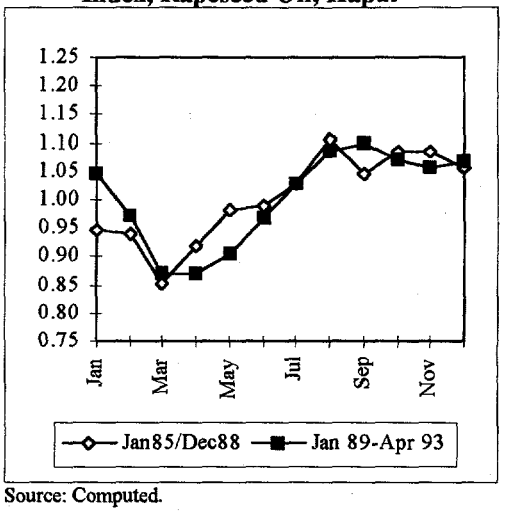
Rapseed and Rapeseed Oil Seasonal Price Indexes

Appendix Figure A4.3.12: Seasonal Price Index, Rapeseed, Hapur



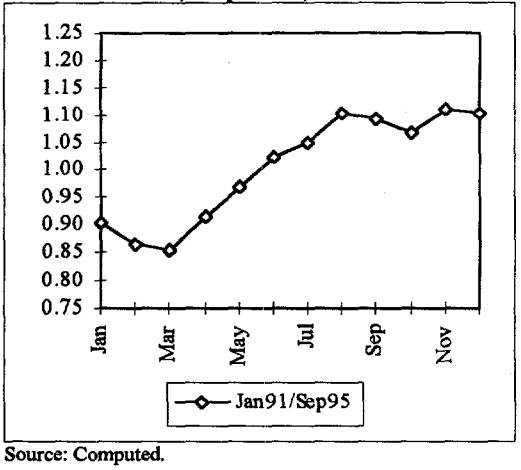
Source: Computed.

Appendix Figure A4.3.13: Seasonal Price Index, Rapeseed Oil, Hapur



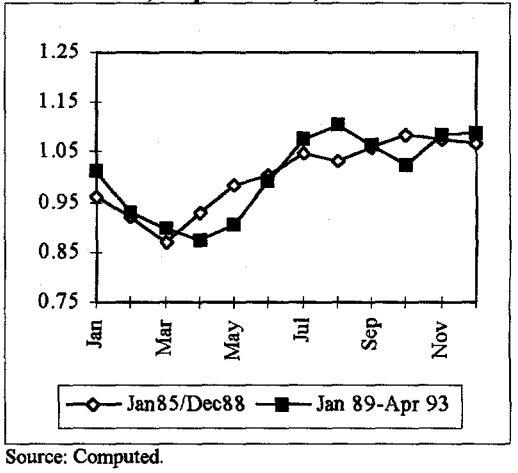
Source: Computed.

Appendix Figure A4.3.14: Seasonal Price Index, Rapeseed, Hindaun



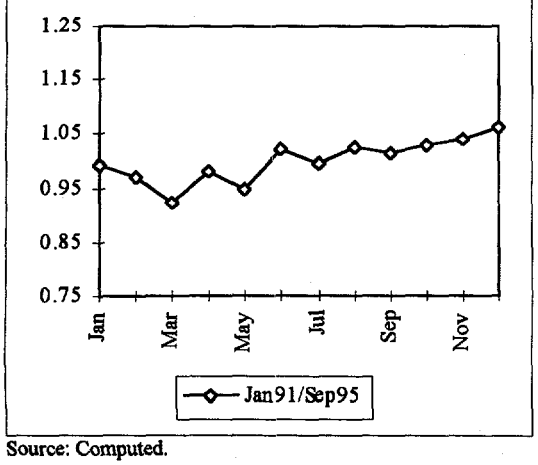
Source: Computed.

Appendix Figure A4.3.15: Seasonal Price Index, Rapeseed Oil, Delhi



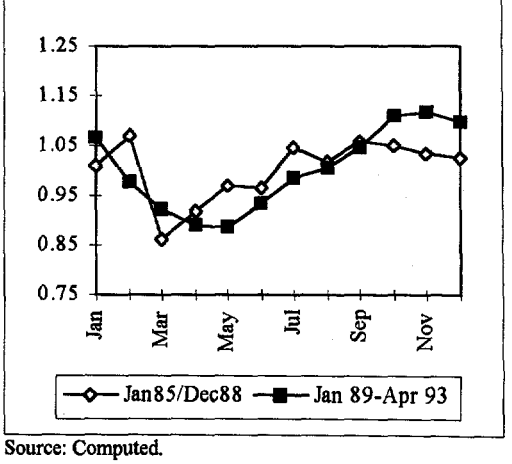
Source: Computed.

Appendix Figure A4.3.16: Seasonal Price Index, Rapeseed, Moga



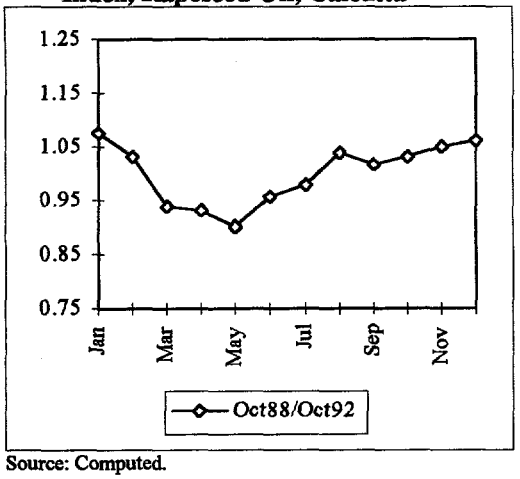
Source: Computed.

Appendix Figure A4.3.17: Seasonal Price Index, Rapeseed Oil, Moga



Source: Computed.

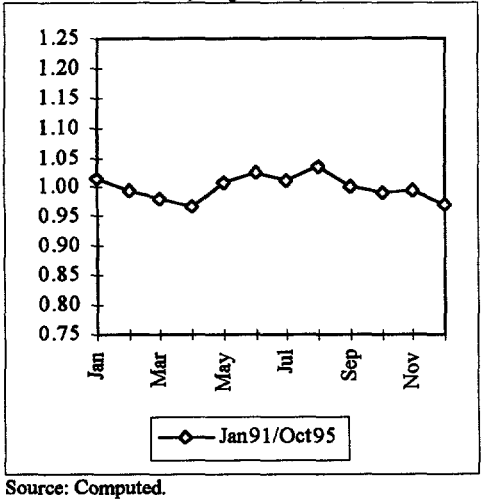
Appendix Figure A4.3.18: Seasonal Price Index, Rapeseed Oil, Calcutta



Source: Computed.

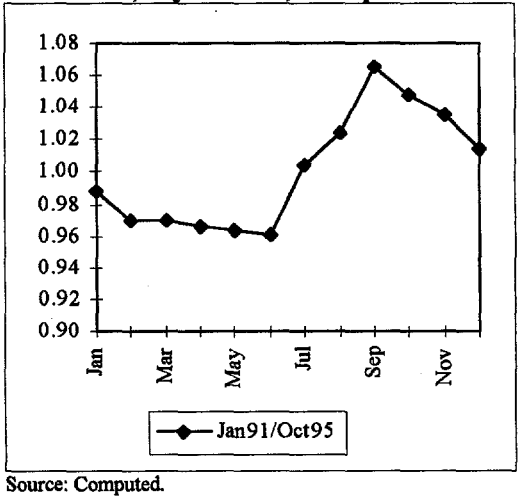
Soybean and Soybean Oil Seasonal Price Indexes

Appendix Figure A4.3.19: Seasonal Price Index, Soybean, Indore



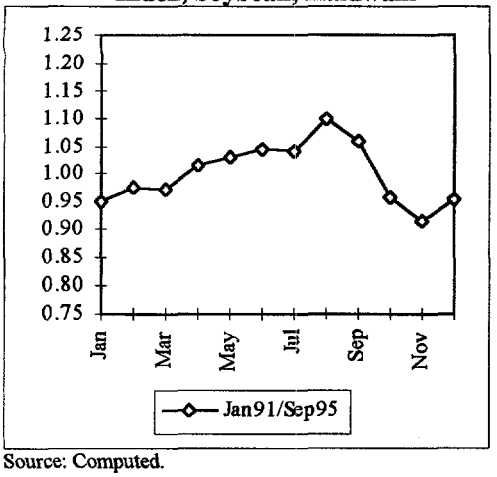
Source: Computed.

Appendix Figure A4.3.20: Seasonal Price Index, Soybean Oil, Shivapuri



Source: Computed.

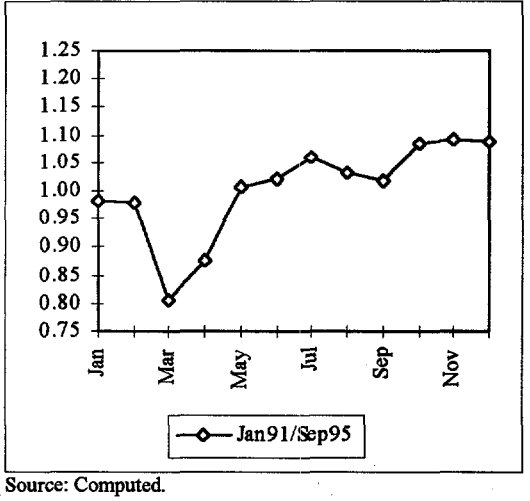
Appendix Figure A4.3.21: Seasonal Price Index, Soybean, Haldwani



Source: Computed.

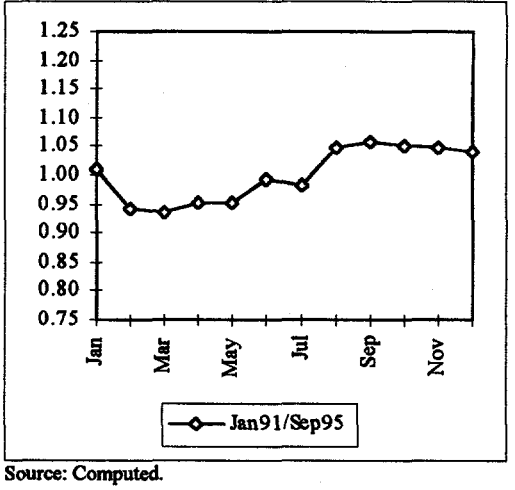
Sunflower and Sunflower Oil Seasonal Price Indexes

Appendix Figure A4.3.22: Seasonal Price Index, Sunfllower, Madras



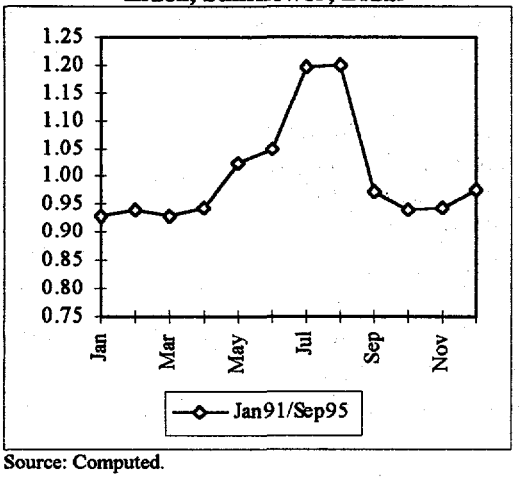
Source: Computed.

Appendix Figure A4.3.23: Seasonal Price Index, Sunfllower Oil, Madras



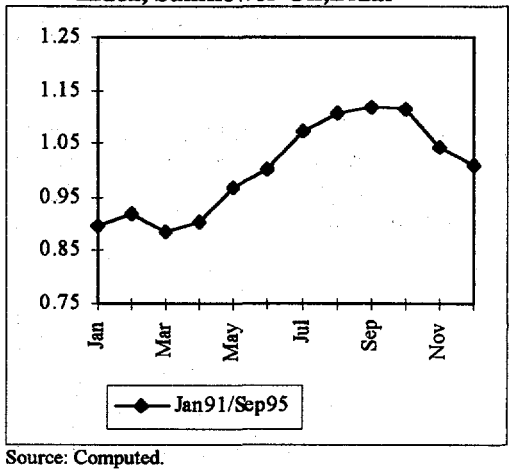
Source: Computed.

Appendix Figure A4.3.24: Seasonal Price Index, Sunfllower, Bidar



Source: Computed.

Appendix Figure A4.3.25: Seasonal Price Index, Sunfllower Oil,Bidar

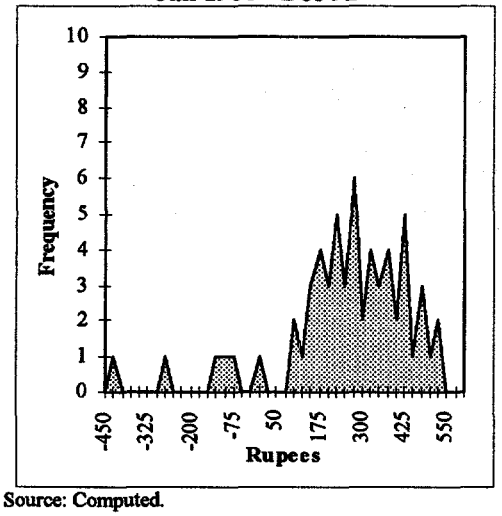


Source: Computed.

Appendix 4.4
Oilseed Crushing Margins:

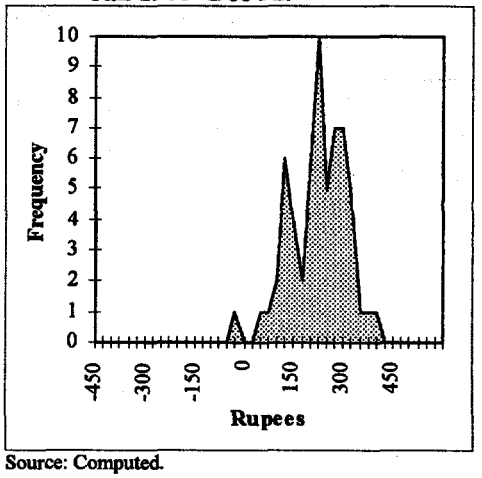
Groundnuts

Appendix Figure A4.4.1 : Frequency Distribution of Real Groundnut Crushing Margins, Rajkot Jan 1988 - Dec 92



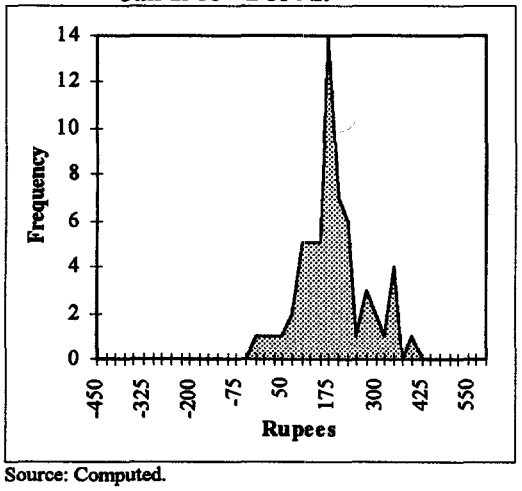
Source: Computed.

Appendix Figure A4.4.2 : Frequency Distribution of Real Groundnut Crushing Margins, Bombay Jan 1988 -Dec 92.



Source: Computed.

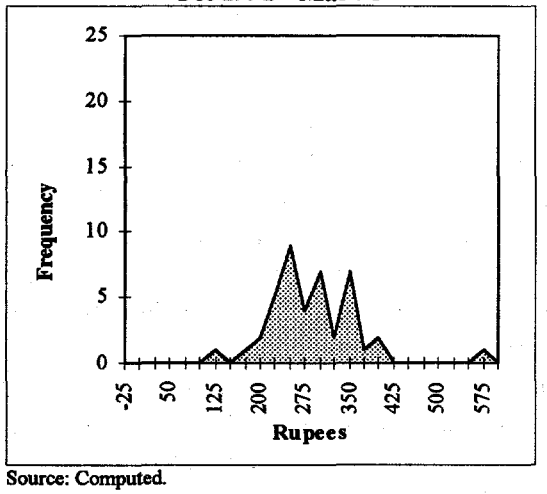
Appendix Figure A4.4. 3: Frequency Distribution of Real Groundnut Crushing Margins, Hyderabad Jan 1988 - Dec 92.



Source: Computed.

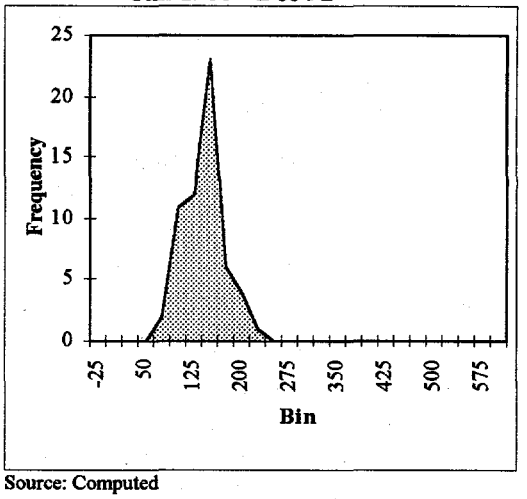
Rapeseed

Appendix Figure A4.4. 4: Frequency Distribution of Real Rapeseed Crushing Margins, Moga Oct 1991 - Mar 95



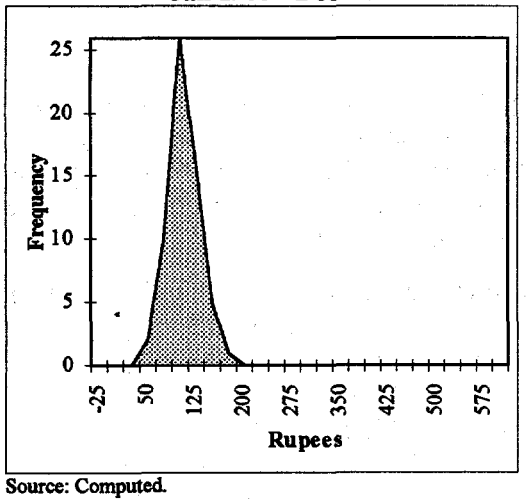
Source: Computed.

Appendix Figure A4.4.5 : Frequency Distribution of Real Rapeseed Crushing Margins, Hapur Jan 1988 - Dec 92



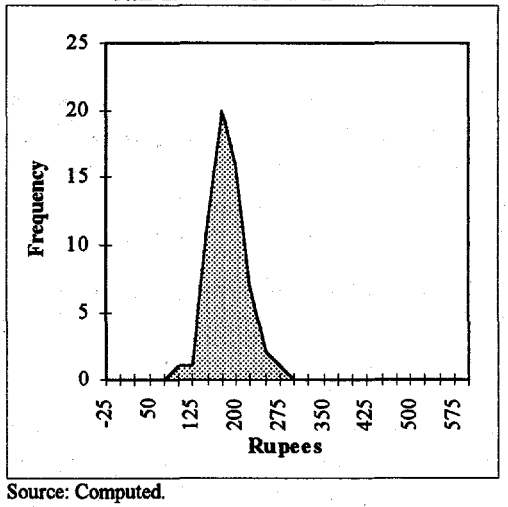
Source: Computed

Appendix Figure A4.4. 6: Frequency Distribution of Real Rapeseed Crushing Margins, Kanpur Jan 1988 - Dec 92



Source: Computed.

Appendix Figure A4.4.7 : Frequency Distribution of Real Rapeseed Crushing Margins, Delhi Jan 1988 -Dec 1992



Source: Computed.

Annex 5

Technical and Economic Performance in Oilseed Processing

A. Technical Competitiveness

Indicators & Sources of Data

A5.1 **Evaluating technical efficiencies in the Indian oilseed processing sector.** In this section we assess the technical efficiency of India's oilseed processing industry. The technical efficiency analysis is undertaken for (a) soybean solvent extractors; (b) non-soybean (soft seed) solvent extractors, (c) mustardseed expellers, (d) groundnut expellers and (e) vegetable oil refiners. The data on the technical efficiency of crushing and refining plants are analyzed in terms of electricity, steam and hexane use per tonne of oilseeds or oils processed.

A5.2 **The definition of international norms and best practice.** The international standards of technical efficiency against which the performance of Indian processors' performance has been compared were derived from major international crushers and refiners who provided data on the normal operating performance of their West European and North American factories, and from China. The Indian averages were derived as weighted averages of data from the sample, using rated capacities as the relevant weights. The comparisons have relied upon four different sources of data: from a large number of field visits in early 1995 in India; from information provided by leading processors in Europe and North America; from a 1993 field trip to China; and from production cost estimates prepared by LMC International.

A Bird's Eye View

A5.3 **Economies of scale are most important in the use of solvents; they are moderate for steam, and small in respect of electric power.** In general, there appear to be scale advantages for hexane use in solvent extraction. For refiners and groundnut expellers, larger scale plants tend to be more efficient in their use of steam. Only mustardseed expellers show any economies of scale for electricity usage. The economies of scale in labor intensities are reviewed for expellers alone.

A5.4 **Low agricultural yields and poor infrastructure reduce the optimal size of processing factory.** The low agricultural yields of Indian oilseed crops by international standards mean that a larger area has to be planted to oilseed crops to provide the needs of a given oilseed processing capacity. The larger the supply area, the higher are the costs of delivering seeds to a factory. In the case of India, these costs are raised by the poor road infrastructure. Therefore, the costs of delivering seeds to processors limit the optimal scale of processing capacity. Informed estimates suggest that the limit is in the region of 1,200 tons of oilseeds per day, if a factory is to operate at close to full utilization.

A5.5 **Legal and credit constraints help to explain a poor technical performance:** Legal and credit controls over the oilseed processing sector provide a partial explanation of the poor performance of the Indian industry. Laws reserving the operation of groundnut and mustardseed expellers to Small Scale Industries prevent firms from taking advantage of economies of scale, and from integrating different stages of oilseed processing with one another. Credit controls applied by the Reserve Bank of India (RBI) establish precise limits to the amount of credit which can be advanced by commercial banks for the financing of oilseed processing capacity, with the limits determined as a

function of capacity alone. This has led to a willingness by many processors to adopt inefficient technologies, whose main merit is their low capital cost.

A5.6 **The poor performance is compounded by the waste caused by erratic electric power supplies:** A further external obstacle to greater operating efficiencies in the Indian processing sector is the persistent dislocations to electric power supplies in factories. Power cuts cause potentially serious losses of efficiency throughout the production process, and encourage firms to resort to batch methods of operation, even when it is generally accepted that continuous methods would be more appropriate and more economic if power supplies could be trusted.

A5.7 **A side-effect of the inefficiencies and poor productivity in the use of inputs in Indian oilseed processing plants has been a failure to come close to international environmental standards.** The main pollution and environmental problems associated with oilseed processing are (a) the losses of hexane to the atmosphere; (b) the failure to control emissions from boilers; and (c) poor treatment of liquid effluent. Indian factories fare very poorly in all three respects. Hexane losses are exacerbated by intermittent electric power cuts and by the small scale of Indian factories, and are compounded by the biases created by RBI credit controls in favor of false economies in expenditures on capital equipment.

Soybean Expanders and Solvent Extraction

A5.8 **Indian soybean processing efficiencies lag behind EU and US standards, and are slightly behind those in China, too. Co-operatives perform worse than privately-owned factories.** Table 1 describes the efficiencies achieved by Indian soybean expanders and solvent extraction factories, distinguishing between private factories and co-operatives. Cooperatives have a lower average capacity than private firms, and tend to be less efficient, using more inputs per tonne of beans. The Indian data are compared with normal operating efficiencies for West European and North American factories, and also with the typical best practice expected of new factories in those countries. The table highlights the very much smaller capacity of Indian factories when compared with international norms. Because Indian processors often economize on equipment, and accept a poor level of efficiency in return for a smaller investment outlay, the country has a much higher hexane use than the international norm, using nearly three times as much per tonne of beans. The poor performance in this respect is compounded by the lack of concern about the environmental harm caused by solvent releases to the atmosphere, and by the losses which occur during frequent electric power breakdowns, when operations cease. Indian factories are also somewhat less efficient users of electricity and steam than their counterparts in the EU and US, although to a much lesser extent.

A5.9 To see how far differences in efficiency between the Indian industry and international standards — in Europe and North America, and also in China — can be attributed to economies of scale, we have compared data on an individual plant level within India. In each of the followin figures, international norms (the penultimate column in Table A5.1) are represented by the extreme right-hand point, with a processing capacity of 2,000 tonnes per day. The Chinese data represent the averages of information gathered in 1993, and indicate that Chinese efficiencies were typically somewhat better than in India, once account is taken of the small size of Chinese factories. Higher capacity utilization in China is undoubtedly one important factor in explaining the difference.

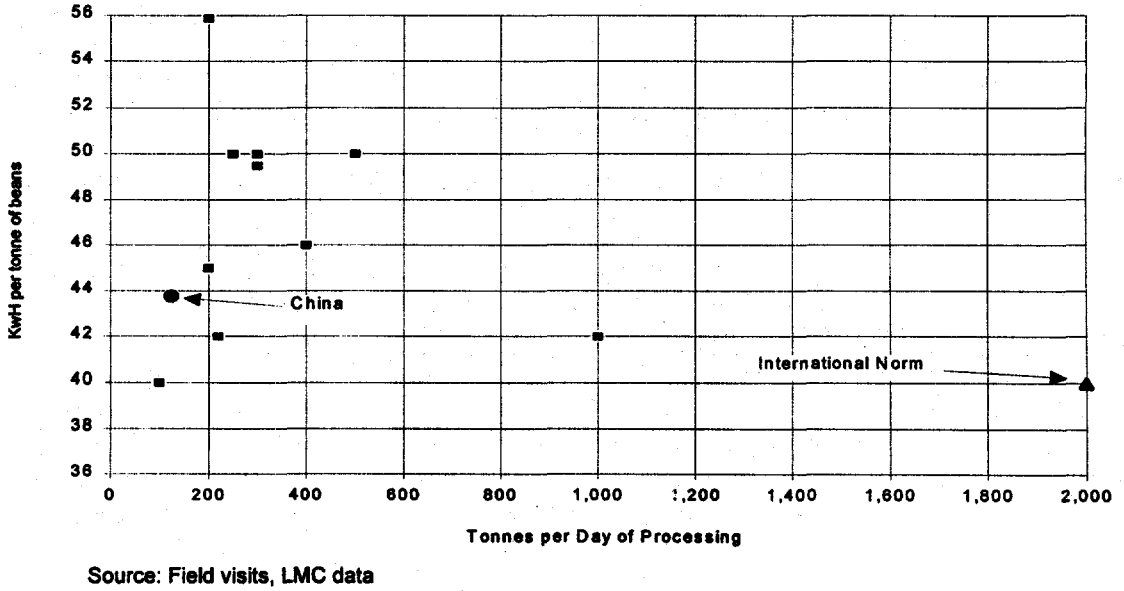
Table A5.1: Comparison of Indian Efficiencies and International Norms in Soybean Expanders and Solvent Extraction Factories

Technical Data/Tonne of Input	Units	INDIA			EU & US Performance as % of Indian Average	
		Cooperative	Other Private	Average	NORM	BEST
Capacity	Tonnes/Day	286	418	334	2,000	3,000
Electric Power	Kwh/Tonne	49	43	46	86%	75%
Steam	Kgs/Tonne	597	474	541	55%	46%
Hexane	Kgs/Tonne	6.3	5.5	5.9	17%	12%

Source: Field visits, LMC data

A5.10 **Few signs of economies of scale exist in soybean processing in electric power or steam use, but they are significant in the use of hexane.** Figure A5.1 summarizes the data on electric power use by Indian soybean crushers, in relation to factory size. The data indicate a wide spread in factory efficiency, with little indication of any economies of scale. A similar pattern emerges from Figure A5.2, which relates to steam use. The majority of factories in India process less than 500 tonnes per day, and vary widely in the amount of steam used per tonne of beans. Economies of scale are more apparent in hexane use, as shown in Figure A5.3. Factories with larger throughputs use fewer litres of hexane per tonne of beans. In part, such economies help to explain the particularly large difference between Indian use of hexane and international norms, noted above.

Figure A5.1: Electric Power Use in India, by Scale of Soybean Factory



Source: Field visits, LMC data

Figure A5.2: Steam Use in India, by Scale of Soybean Factory

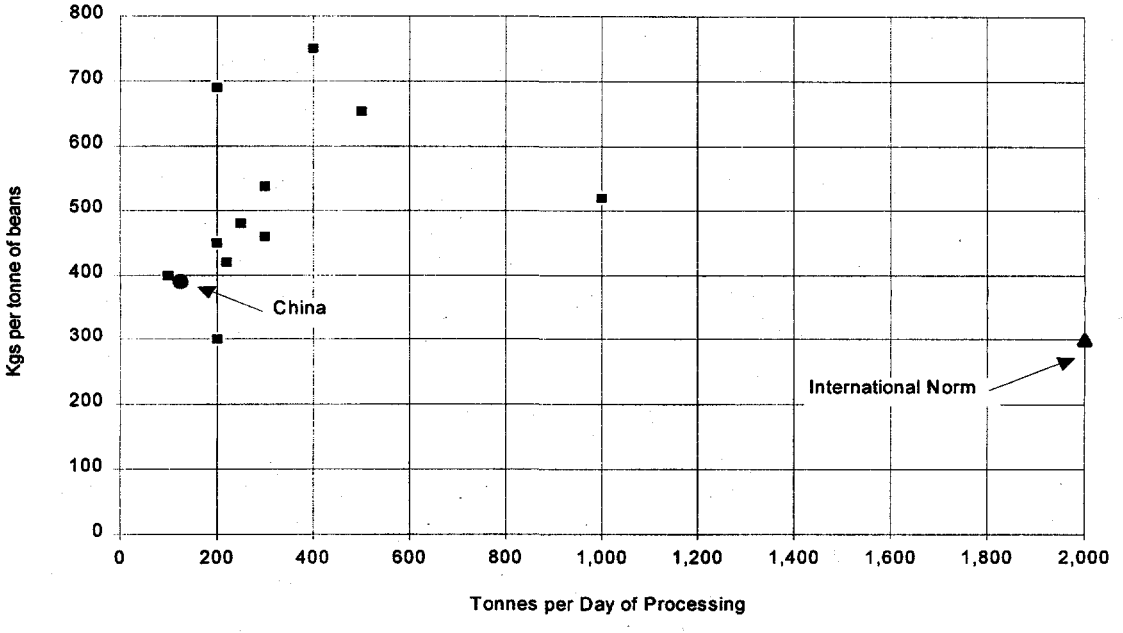
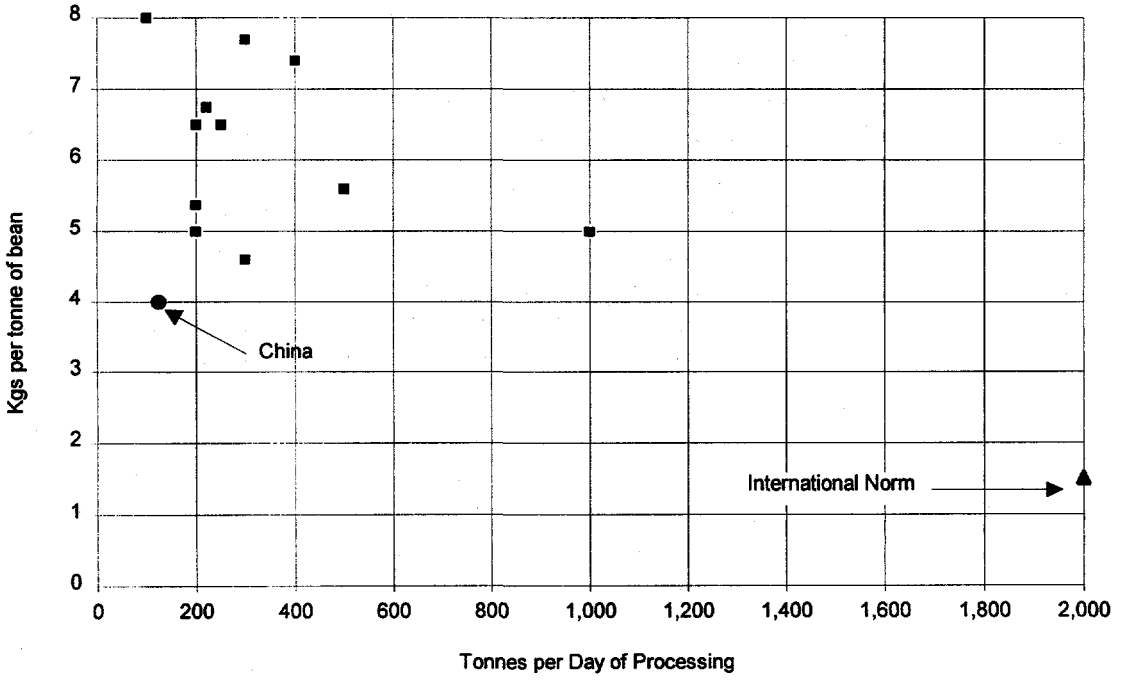


Figure A5.3: Hexane Use in India, by Scale of Soybean Factory



Soft Seed Expellers Plus Solvent Extraction

A5.11 **Indian soft seed processing efficiencies are adversely affected by Small Scale Industry (SSI) Reservation.** Table A5.2 presents the comparable data for the soft seed (non-soybean) solvent extraction industry, showing the average level of inputs used by Indian factories and those expected in Europe and North America with existing factories and under international best practice. Small Scale Industry Reservation plays a major role in determining the structure of the soft seed processing, since the use of expellers for the processing of groundnuts and mustardseed/rapeseed is reserved for SSIs among enterprises outside the co-operative sector. Co-operatives are exempt from these restrictions. The inability to integrate expellers with solvent extraction for the two main soft seeds means that integrated plants are to be found primarily in three areas of operation: among co-operatives, in the processing of oilseeds such as sunflowerseed, and where processors have installed expanders (which are employed mainly in the processing of soybeans, and are not really adapted for use in groundnut and mustardseed processing, but which lies outside the scope of SSI Reservation). The small sample of factories for which we have data means that it is not useful to distinguish between co-operative and private factories in Table A5.2.

A5.12 **Economies of scale are important for solvent use in soft seed factories, but are not significant for electric power and steam.** The small scale of Indian crushers is again apparent: while the normal size of a soft seed expeller plus solvent extraction plant in the EU or the US would be around 2,000 tonnes per day, Indian crushers process on average 233 tonnes per day, and the industry's own target is for a factory size of only 450 tonnes per day, which is less than 25% of the international norm. As with soybean processing, hexane is used much more heavily on soft seed solvent extraction in India than is implied by international standards. We have again tried to assess how much of the greater international efficiency can be attributed to the larger plant size. The international benchmark is represented by the point to the far right of the figures. For soft seed crushers, we could only obtain data on electricity and steam use for a few factories. Figure A5.4 does not contain enough information to allow us to speculate on the existence of economies of scale in electricity use. However, these economies would appear not to exist in the case of steam use (Figure A5.5), since Indian factories operating at below 500 tonnes a day use the same level of steam as international factories operating at 2,000 tonnes per day. The data relating to hexane use are again limited. However, it does appear that, as in the case of soybean crushing, there are some economies of scale, with larger factories using fewer litres of hexane per tonne of seed (Figure A5.6). Once again, Chinese factories compare well with similar sizes of Indian plants in their efficiencies.

Table A5.2: Comparison of Indian Efficiencies and International Norms in Integrated Soft Seed Expellers/Expanders and Solvent Extraction Factories

Technical Data/ Tonne of Input	Units	INDIA Average	EU & US Performance as ← % of Indian Average → NORM	BEST
Capacity	Tonnes/Day	233	2,000	3,000
Electric Power	Kwh/Tonne	76	66%	53%
Steam	Kgs/Tonne	415	72%	60%
Hexane	Kgs/Tonne	6.7	19%	10%

Source: Field visits, LMC data

Figure A5.4: Electric Power Use in India, by Scale of Integrated Soft Seed Factory

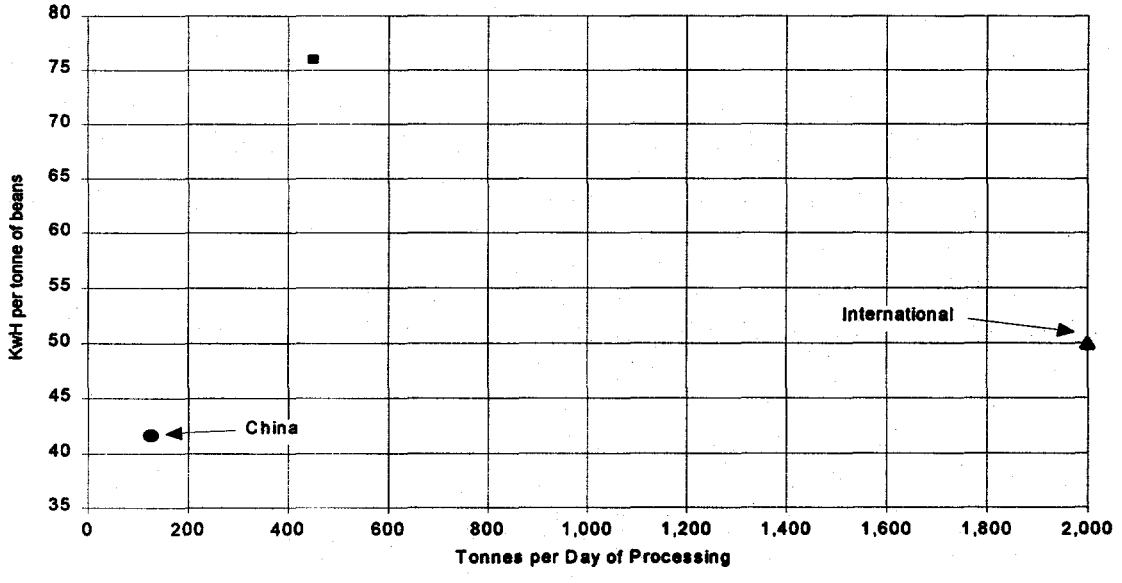


Figure A5.5: Steam Use in India, by Scale of Integrated Soft Seed Factory

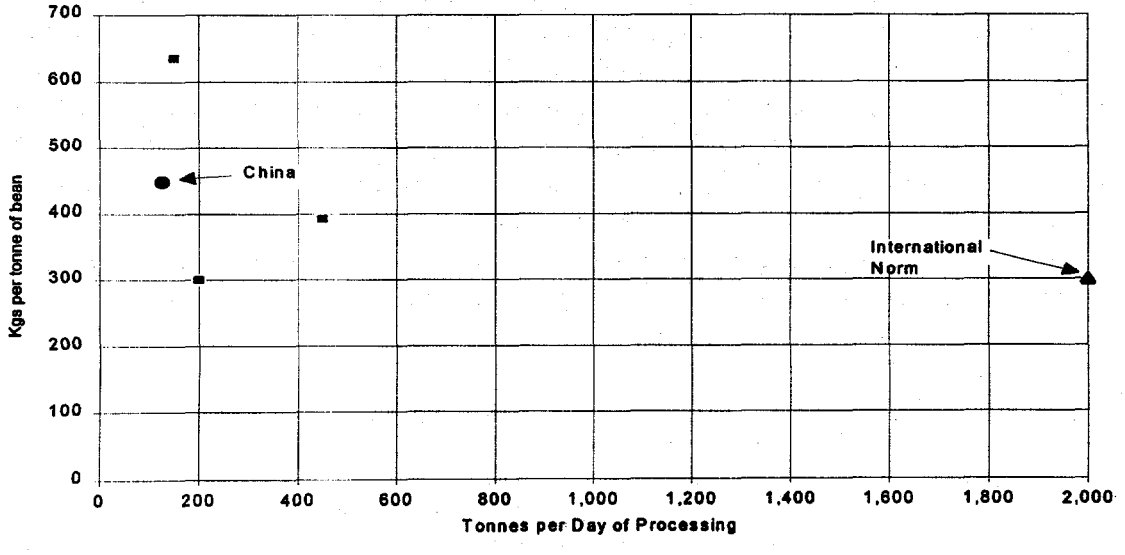
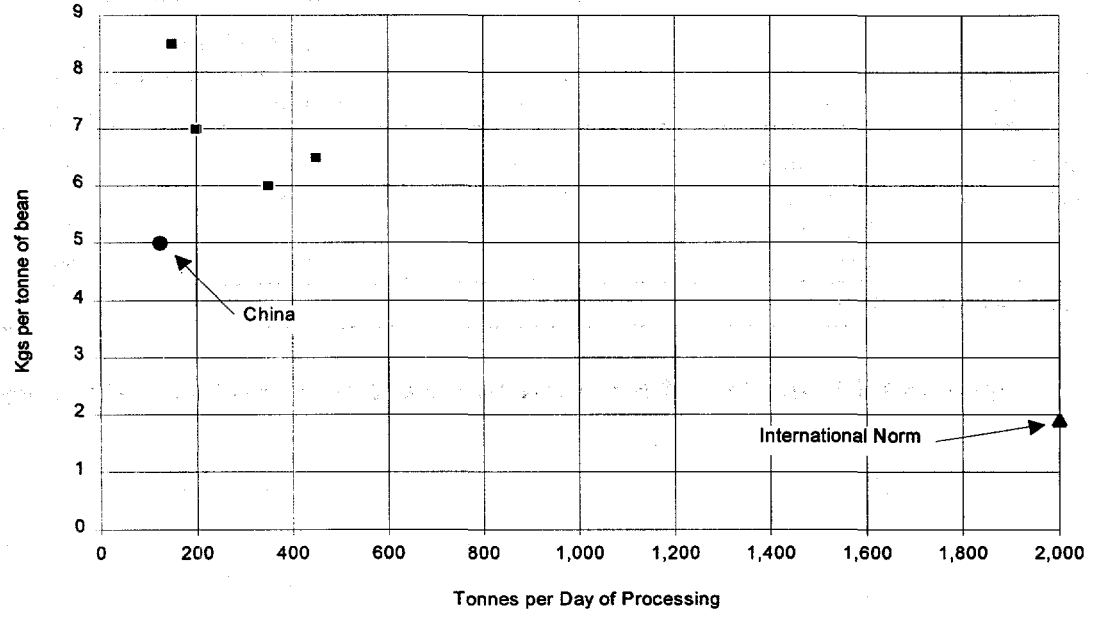


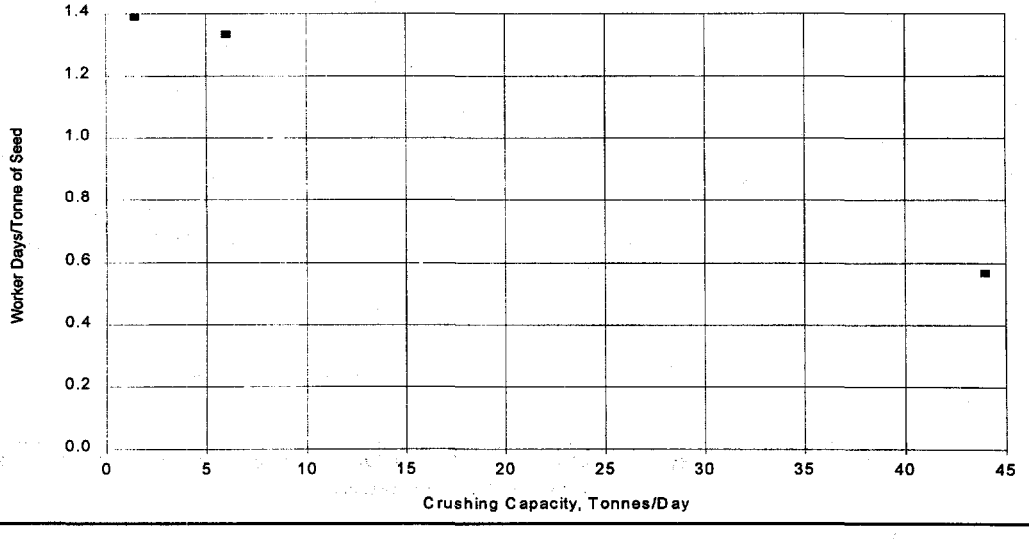
Figure A5.6: Hexane Use in India, by Scale of Integrated Soft Seed Factory



Mustardseed and Groundnut Expellers

A5.13 **Small Scale Industry Reservation prevents factories from taking advantage of scale economies in oilseed expelling.** Having considered efficiency and economies of scale in solvent extraction, we now turn to the small scale oilseed expellers. In other countries, it is normal to find expellers integrated with the solvent extraction of the expeller cake on a large scale. Accordingly, we do not present any international technical comparisons, and we concentrate instead on the evidence of the existence of economies of scale in India. Figures A5.7 to A5.9 present data on labor utilization, electric power use and direct costs for mustardseed expellers. Although there were only a limited number of expellers surveyed, all three figures do appear to indicate that there are efficiency savings in larger sized plants; however, Small Scale Industry Reservation prevents factories outside the cooperative sector

Figure A5.7: Mustardseed Expeller Labour Intensity



from taking advantage of these economies of scale.

Figure A5.8: Mustardseed Expeller Electric Power Use

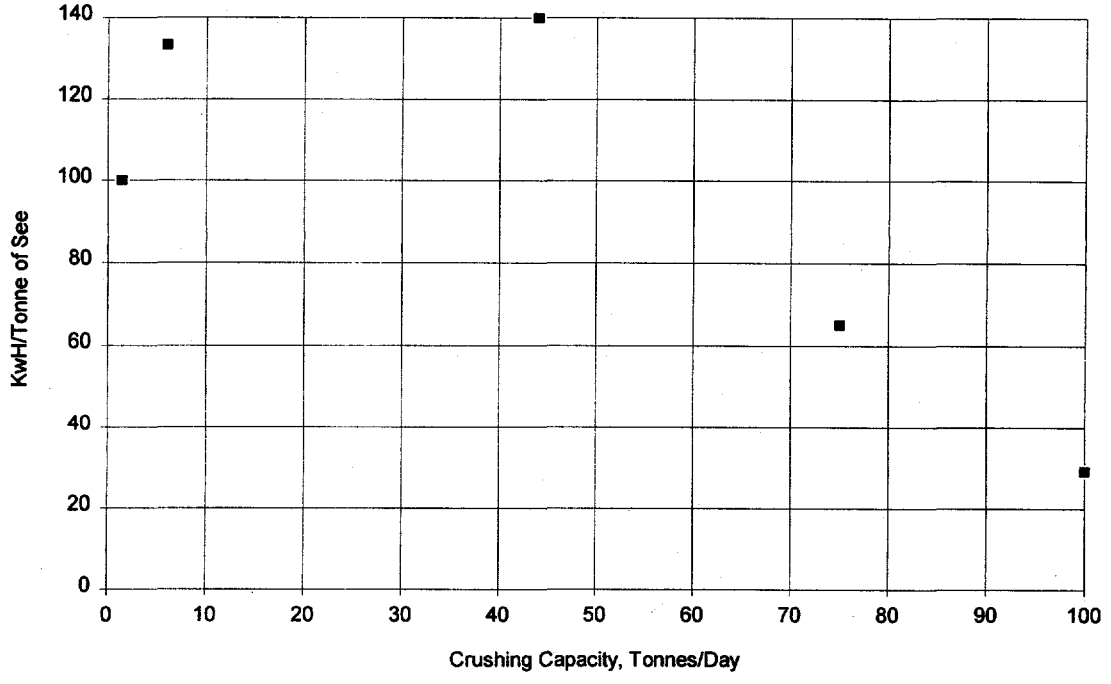
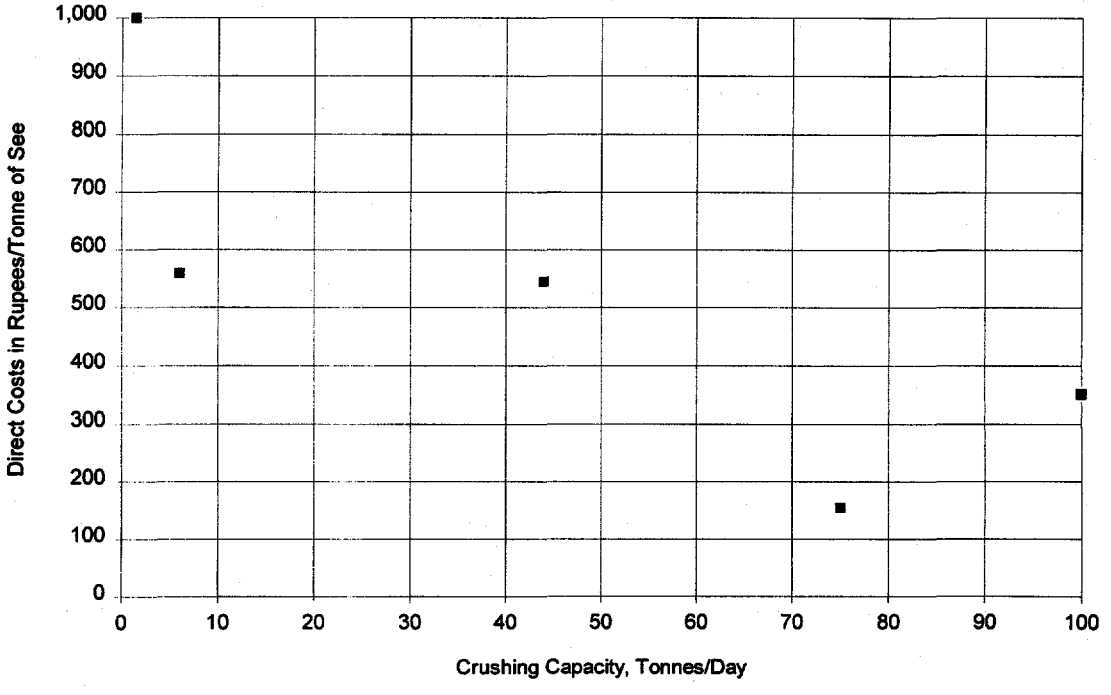


Figure A5.9: Mustardseed Expeller Direct Costs



A5.14 **Groundnut expellers enjoy economies of scale, too.** For groundnut expellers, too, which are also subject to the restrictions of Small Scale Industry Reservation, the data again indicate economies of scale in labor and steam utilization (Figures A5.10 to A5.12).

However, electricity usage appears to be roughly similar among all plants surveyed, regardless of their size (Figure A5.13).

Figure A5.10: Groundnut Expeller Labour Intensity (all plants)

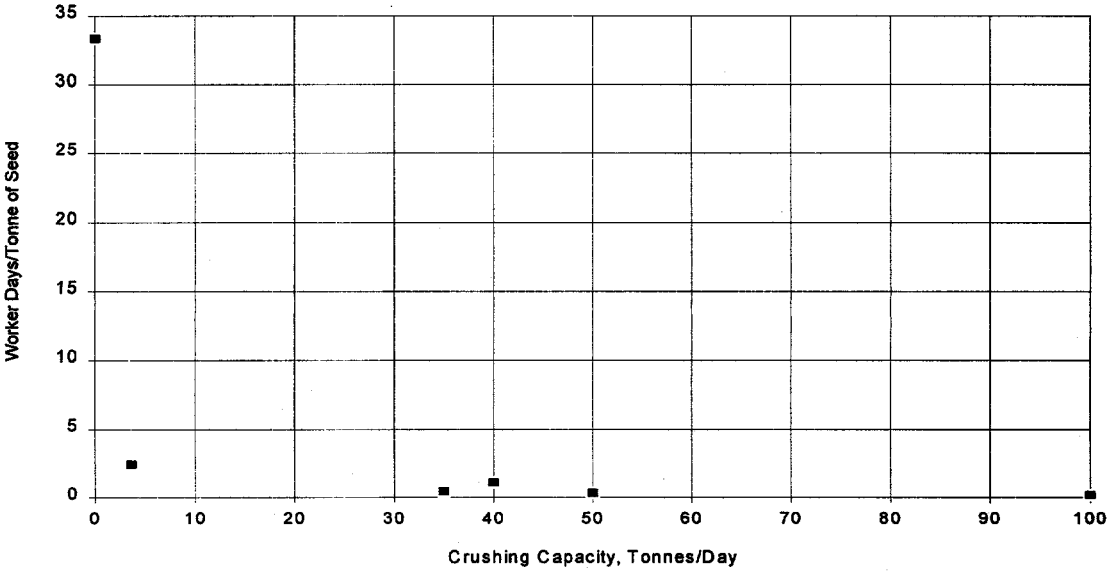
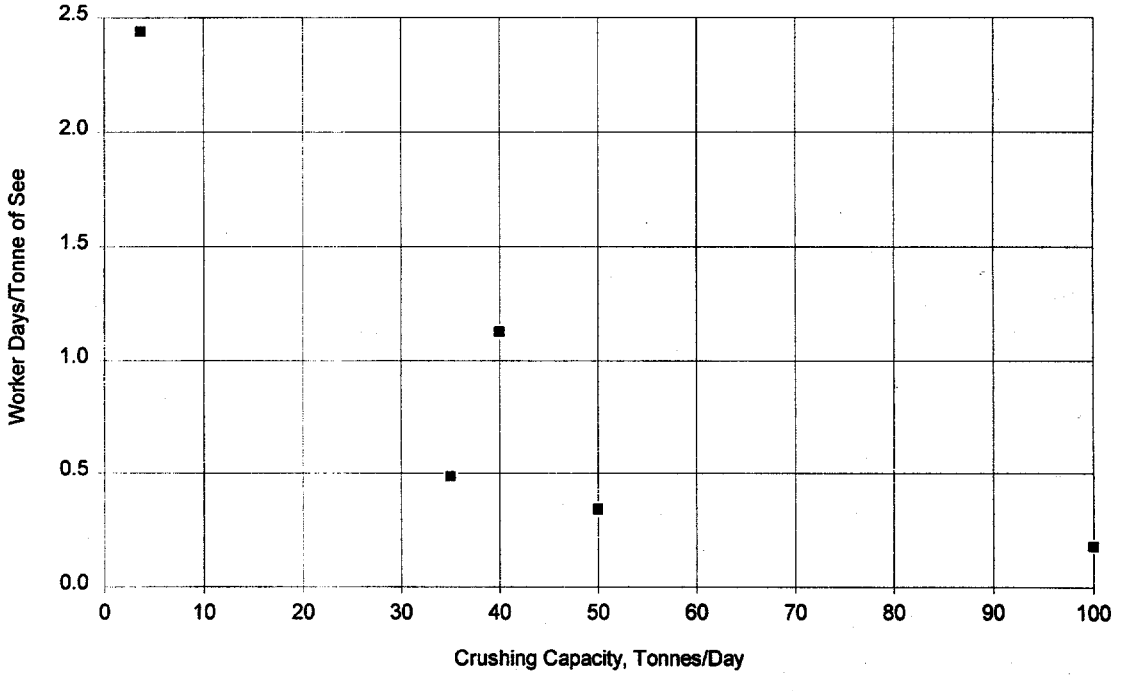


Figure A5.11: Groundnut Expeller Labor Intensity (excluding the smallest plant)



Note: The smallest *kacchi ghani* factory has been excluded because its labor-intensity was very much higher than any other factory surveyed, and would have reduced the value of the figure.

Figure A5.12: Groundnut Expeller Steam Use

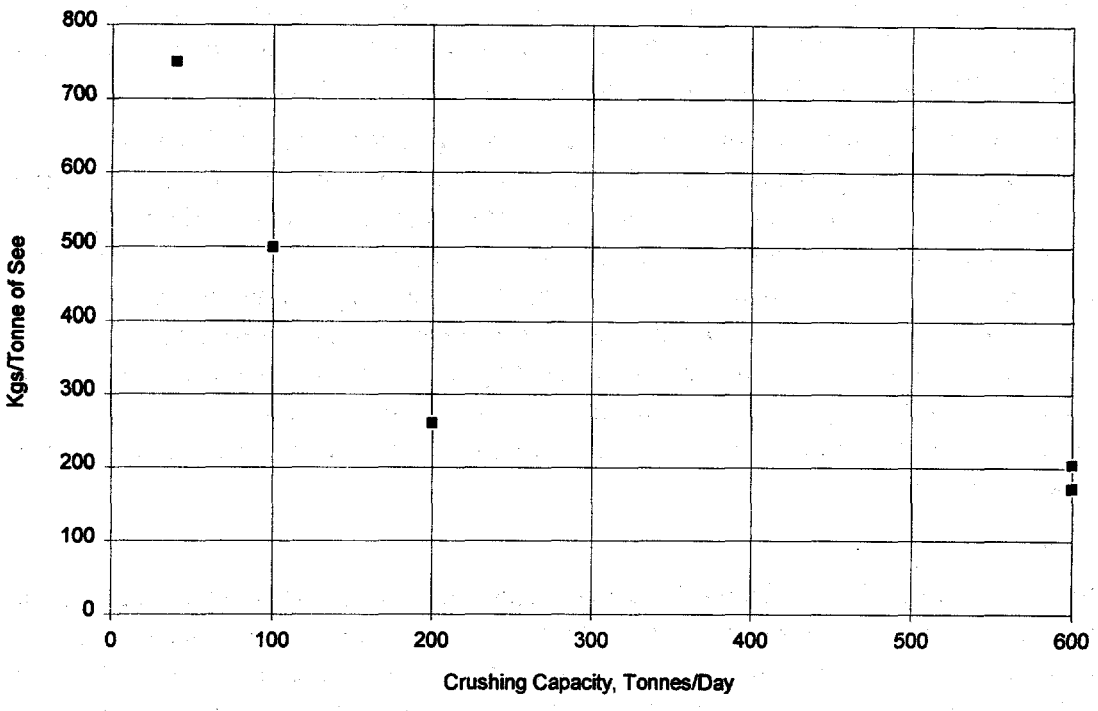
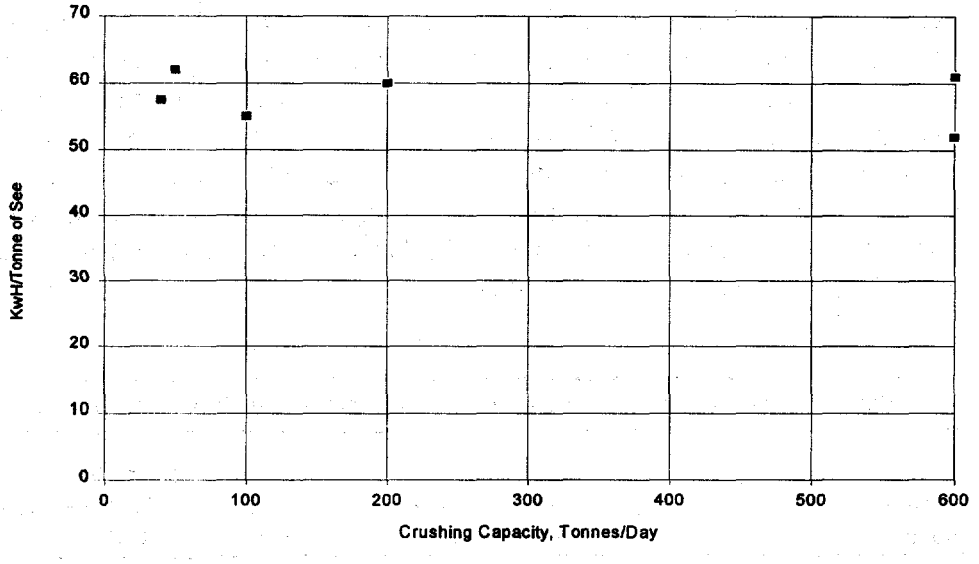


Figure A5.13: Groundnut Expeller Electricity Use



The Economic & Technical Consequences of Small Scale Industry Reservation

A5.15 **SSI Reservation results in a failure to exploit economies of scale and the adoption of the sub-optimal technology of expanders in order to circumvent these restrictions.** SSI Reservation in the cases of groundnut and mustardseed expelling has led to grossly inefficient processing of these two oilseeds, because economies of scale cannot be attained.

It has also led to the adoption of expander technology (which is really intended for low oil content seeds) for the processing of these high oil content seeds, as a means of circumventing the Small Scale Industry (SSI) Reservation, even though expanders are less suitable than expellers in the processing of groundnuts and mustardseed.

A5.16 **High processing losses result from a lack of vertical integration.** SSI Reservation has prevented the three vertically linked operations of (a) expelling groundnuts and mustardseed, (b) the solvent extraction of the resultant oilseed cake, and (c) the refining of expeller and solvent extraction oil, from being integrated within one building, as is normal elsewhere in the world. The separation of these stages causes high losses of oil along the processing chain, as well as an inability to share infrastructure overheads, and also jeopardizes the quality of the expeller cake entering the solvent extraction plant. The resulting expeller cake is high in its oil content, and a great deal of this oil is not extracted subsequently at extraction plants, but is fed to local cattle, without a full reflection of the value of the oil content.

Oil Refining

A5.17 **Scale economies are a factor in oil refining, and Indian efficiencies are again poor, especially in the co-operative sector.** In the final part of this section, we turn to efficiency in the oil refining sector. Table A5.3 compares capacity and electricity and steam usage in the co-operative and private sectors in India. The regulatory environment has favored the expansion of co-operatives, who on average have the larger capacity. However, they are less efficient, utilizing more electricity and steam per tonne of oil than private firms. The efficiency of the Indian refining industry is compared with EU and US norms and with international best practice. The normal size of a vegetable oil refining plant in the EU or the US is 500 tonnes per day, much larger than the Indian average of just over 60 tonnes per day. The Indian industry uses more than twice the international standard amounts of electricity and steam. Figures A5.14 and A5.15 examine the relationship between output and electricity and steam use, respectively (we do not have comparable Chinese data in this case). The picture which emerges for electricity shows a mixed range of efficiency, with no clear economies of scale. However, with steam there do appear to be increased efficiencies as plant size expands.

Table A5.3: Comparison of Indian Efficiencies and International Norms in Oilseed Refining

Technical Data/ Tonne of Input	Units	← INDIA → Cooperative	Private	Average	EU & US Performance as ← % of Indian Average → NORM	BEST
Capacity	Tonnes/Day	75	59	63	500	500
Electric Power	Kwh/Tonne	110	71	84	36%	30%
Steam	Kgs/Tonne	817	678	718	49%	42%

Source: Field visits, LMC data

Figure A5.14: Electric Power Use in India, by Scale of Refinery

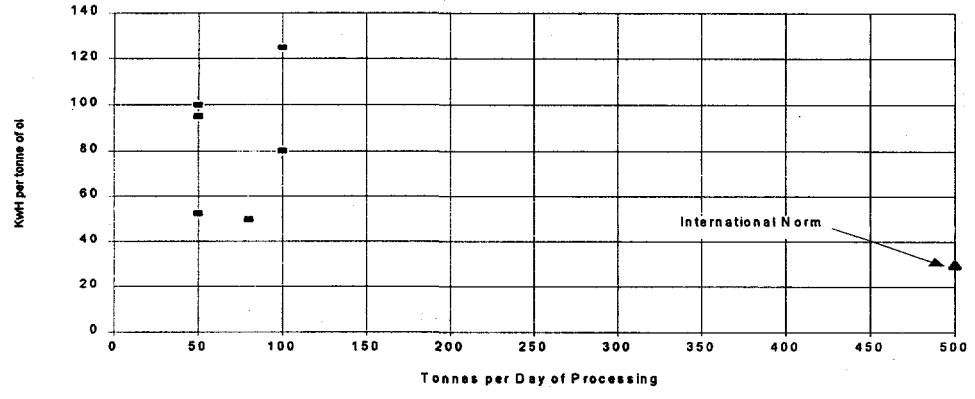
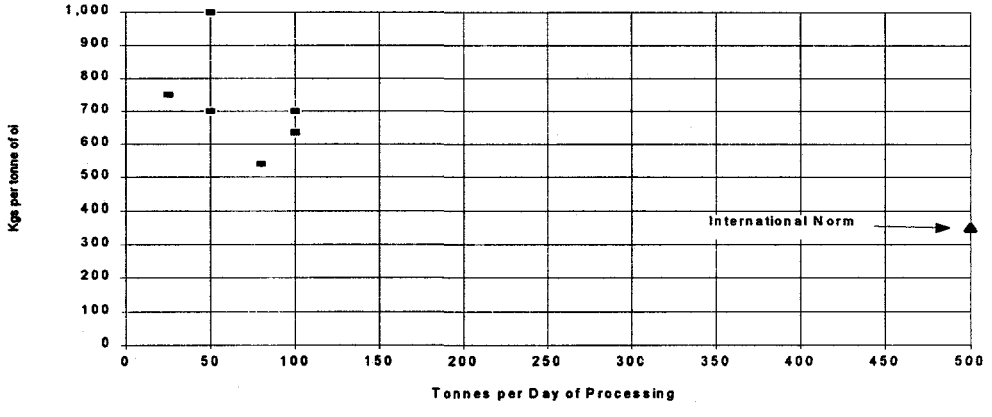


Figure A5.15: Steam Use in India, by Scale of Refinery



Key Conclusions

A5.18 **Government policy is to blame for much of the poor technical performance of the Indian oilseed processing industry.** The productivity of the key inputs in Indian oilseed processing is very poor by world standards. Low labor productivity would be anticipated, on account of low wage rates, but poor steam and electricity use, and exceptionally inefficient use of solvents are unrelated to labor costs, and reflect several distortions caused by official policy. The more important of these can be summarized as (a) the small scale of Indian factories — a phenomenon explained, in part, by artificial barriers against the construction of medium or large sized expellers; (b) the use of backward technology — exacerbated by the rigid, inflexible application of credit controls; (c) a failure to apply environmental controls; and (d) a willingness on the part of processors to tolerate low productivity and low capacity utilization, since poor crushing margins can be made up through tax evasion associated with the failure of many State Governments to collect the stipulated taxes.

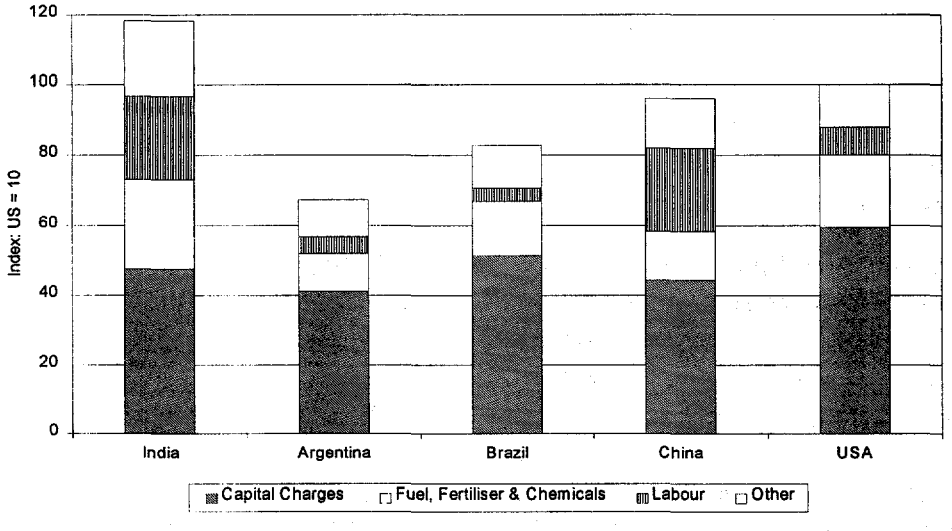
B. Costs Comparisons

A5.19 **Preparing consistent international comparisons:** In the following section, we compare oilseed field and factory costs in India and other major oilseed producing countries. To achieve consistency in the estimates, we have relied upon LMC International's engineering cost methodology, in which costs are built up by multiplying the matrices describing the production technologies by vectors of local input prices. For India, costs of cultivation data from CACP have been used. Field Costs are broken down into four categories: capital (land, machinery, storage, interest, repair and maintenance, and depreciation); fuel, fertilizer and chemicals; labor; and other (management charges, cost of seed).

Field Costs

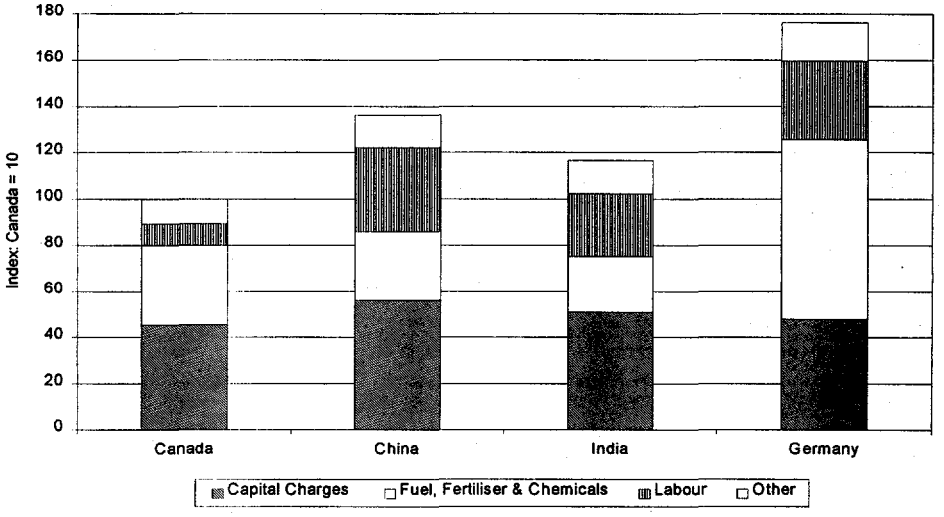
A5.20 **Low agricultural yields raise Indian soybean costs.** Figures A5.16 to A5.18 plot field costs per ton of soybeans, rapeseed and groundnuts, broken down into capital charges; fuel, fertilizer and chemicals; labor; and other costs. Data in Figure 1 on soybean costs are 1989-93 national averages, expressed as indices, with US costs set at 100. Indian field costs are the highest of the five countries considered, with total costs per ton nearly 20% above those in the US. Indian unit costs of both labor and fuel, fertilizer and chemicals are particularly high. However, Indian costs per hectare are typically lower than those elsewhere, but this advantage is more than offset by the country's low yields.

Figure A5.16: Average Field Costs per Tonne: Soybeans



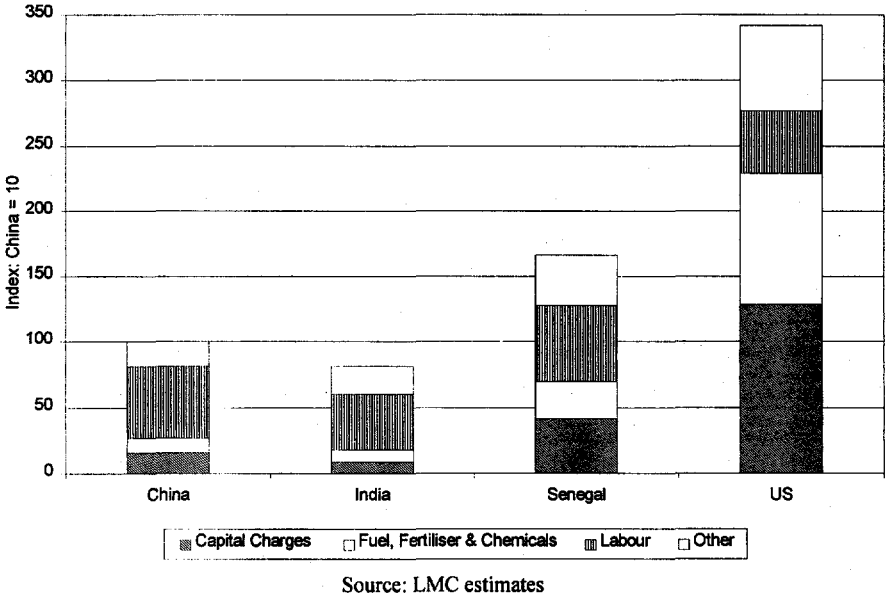
A5.21 **Low agricultural yields also raise Indian rapeseed field costs.** Figure A5.17 presents rapeseed cost comparisons, where Canada is the benchmark. In this case, Indian costs are less uncompetitive. Above-average capital charges and fuel, fertilizer and chemical costs leave total Indian field costs 16% above Canadian levels. However, German costs that are far ahead of those in India. As with soybeans, average Indian rapeseed field costs per hectare are usually below those elsewhere, but any benefits are more than offset by low agricultural yields in India.

Figure A5.17: Average Field Costs per Tonne: Rapeseed



A5.22 **India is a competitive groundnut producer, despite low agricultural yields.** Figure A5.18 depicts groundnut field costs in the US, India, China and Senegal, with China as the benchmark. India is the lowest cost producer. US costs are not fully comparable to those in the other countries, since they refer mainly to high value confectionery nuts. Indian unit field costs are nearly 20% below China's. In addition, as with other oilseeds, average Indian groundnut field costs per hectare tend to be below those elsewhere.

Figure A5.18: Average Field Costs per Tonne: Groundnut



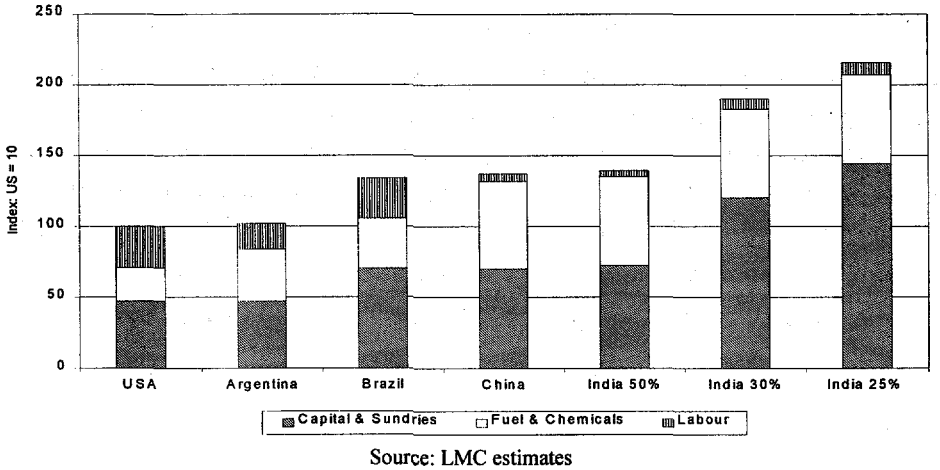
Source: LMC estimates

Factory Costs

A5.23 **Low capacity utilization destroys the cost-competitiveness of average Indian soybean processors.** Earlier, we evaluated the technical competitiveness of oilseed processing in India at the individual plant level. In the next two figures, we compare

average factory costs in India with costs in other major producing countries. Figure A5.19 illustrates average soybean processing costs in five countries, with costs in the US taken as the benchmark. For India, we have computed three alternative factory costs, assuming 50%, 30% and 25% capacity utilization. Table A5.4 reveals that recent average utilization rates have actually been around 30%, but it could be argued that the total capacity estimate is over-stated by including factories which do not operate. However, even if one assumes that average utilization rates in India reached 50%, India would still have a higher level of costs than all of the other four countries shown in the figure, with total processing costs nearly 40% above those in the US. With lower levels of capacity utilization, fixed costs in India rise accordingly, pulling total costs to more than double those in the US in the case of 25% utilization, and outweighing the benefit of very low unit labor costs in India. For reference, capacity utilization rates are: 75% in Argentina, 53% in Brazil, and 48% in China.

Figure A5.19: Average Factory Costs per Ton of Soybeans

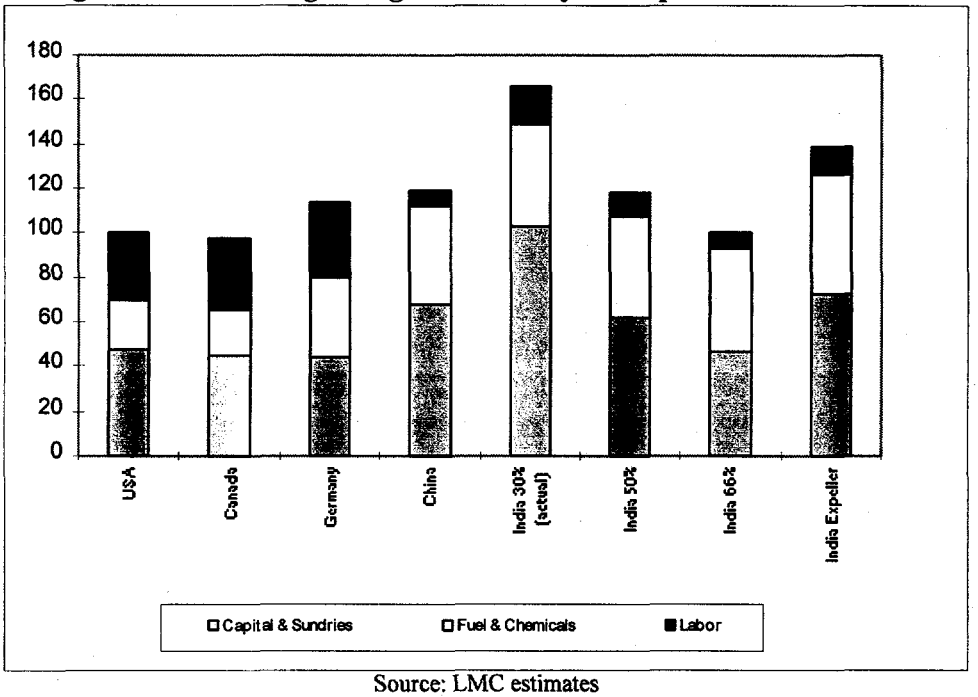


Source: LMC estimates

A5.24 **Low capacity utilization also undermines the cost-competitiveness of Indian soft seed processors.** Figure A5.20 presents a similar cost comparison for integrated soft seed crushing and solvent extraction. This definition excludes the very large number of heavily under-utilized small scale expellers, protected by Small Scale Reservation. Nevertheless, there remains considerable excess capacity among integrated soft seed processors. Three alternative rates of capacity utilization, 30%, 50% and 66%, are contrasted for India in Figure A5.20; 30% is probably closer to reality, although higher capacity utilization rates are achieved among the largest sunflowerseed crushers. The US is again the benchmark country with Canada emerging as the lowest cost processor --with capacity utilization in both countries equal to 75%. If the Indian industry can achieve a capacity utilization rate of 66%, total softseed processing costs start to become competitive at international levels, being only 1% above those in the US. Higher unit charges for fuel and chemicals are offset to some extent by much lower labor costs. However, if Indian capacity utilization is only 30%, increased capital charges raise total costs to nearly 70% above US costs, or 40% above Chinese costs, which also has a poor utilization of its capacity. For reference, capacity utilization is 81% in Germany, and 50% in China.

A5.25 **Groundnut and mustardseed expellers have particularly high costs.** In Figure A5.20, we have included an estimate of the costs of groundnut and mustardseed small-scale expellers in India. These expellers operate within the framework of Small Scale Industry Reservation, and are penalized both by their low scale of operations and by their poor utilization rates (of 30%, exactly the same as the utilization rate in the solvent extraction sector). The true economics of expellers are even less competitive than the poor impression conveyed by the figure. The expellers have a much poorer rate of extraction of oil than the integrated expeller/solvent extraction plants. Therefore, one should add an extra cost -- corresponding to the loss of revenue from poor extraction rates-- to the figures shown in Figure A5.20.

Figure A5.20: Average Integrated Factory Costs per Ton of Soft Seeds



Source: LMC estimates

A5.26 **Capacity utilization for solvent extraction plants averages barely 30%.** Capacity utilization is a critical determinant of India's overall processing costs, and hence relative competitiveness. Table A5.4 presents aggregate data on capacity utilization and processing throughputs per year in the solvent extraction sector from 1987 to 1994. Although average utilization rose from the low level of 30% in 1987, it peaked at only 38% in the early 1990s, before falling back to 30% in the wake of the wave of heavy new investment. The causes of the remarkable degree of over-investment are to be found in a combination of (a) generous Backward Area incentives for new capacity; (b) high domestic crushing margins, made possible by tariff protection on oil imports and a prohibition on most oilseed exports; and (c) very widespread tax avoidance, as described elsewhere in this report.

Table A5.4: Capacity Utilisation: Indian Oilseed Sector

Year	No. of Units	Average Capacity per Unit (t)	Average Processing per Unit (t)	Utilization Rate
1987	305	34,815	10,449	30%
1990	395	39,381	15,020	38%
1991	396	41,574	15,718	38%
1992	494	43,608	15,298	35%
1993	516	47,562	15,226	32%
1994	550	48,890	14,691	30%
1995	553	53,885		

Source: Indian Solvent Extractors' Association, LMC estimates

C. International Comparisons of Extraction Rates & Crushing Margins

A5.27 **The difficulties of comparing crushing performance.** It is difficult to compare extraction rates and crushing margins in different countries. Because of tax avoidance and the poor level of data monitoring within many factories, the data on crushings, oil output and meal production are inaccurate. Furthermore, even when the data are recorded accurately, there is substantial scope for deriving misleading conclusions about the recovery rates from processing. The moisture content of meal is not recorded on a standardized basis. In practice, Indian meal output is increased by several percent by the common practice of adding water to meal before bagging, in order to maximize the quantity exported, within the tolerances permitted in export contracts. This practice reduces substantially the reported wastage of product during soybean processing in India.

A5.28 **International comparisons.** With these qualifications in mind, it is still important to try to place India's oilseed crushing industry in an international context. In this section we consider comparative extraction rates for soybeans, rapeseed, sunflowerseed and groundnuts, derived from data published by Oil World and the US Department of Agriculture (USDA). Using these calculated extraction rates, we then proceed to derive typical gross crushing margins, both in India, in the European Union, the US, and Latin American countries.

Extraction Rates

A5.29 **Indian oil extraction rates are typically lower than for other countries, except for groundnuts, but wastage is not out of line with levels in other countries.** Table A5.5 lists the average extraction rates for the four main oilseeds achieved by major producing countries over the last three years. Differences in yields can be due to both efficiency variations and varietal differences, as well as the reporting biases noted above: it is not possible to separate out the pure efficiency difference. This should be borne in mind when interpreting the figures. India emerges from the table as the most efficient groundnut oil producer, achieving an extraction rate of over 41%, just ahead of that attained in the US. For the other oilseeds, India has a generally lower extraction rate than the major producing

nations, with the exception of China. However, wastage levels, at 2% for rapeseed and 16% for sunflowerseed, are not out of line with international practice: only the EU manages a significantly lower wastage for sunflowerseed than the average. This implies that, in India, the meal product contains higher levels of oil than in other countries, although varietal differences may also explain part of the lower oil yield. The figures point to an exceptionally low wastage in soybean crushing for India, close to that of Argentina, but still significantly better than general international results. This is reflected in higher meal extraction rates: soybean oil extraction in India is, again, below that in the major producing nations, with the exception of China, although the difference is not large. The low wastage and high meal extraction figures are a result of the addition of moisture to the de-oiled cake, noted above.

Gross Crushing Margins — International Comparisons

A5.30 **Definition**. Gross crushing margin simply measures the gross value-added in the crushing industry. It is equal to the combined value of the oil and the meal --each weighted by their respective extraction rates-- in one unit (e.g., ton) of oilseeds minus the unit price of the oilseeds. Average extraction rates for oils and meals indicated in Table A5.5 have been used to compute crushing margins for each respective country. For India, the same domestic prices used for estimating Nominal Protection Coefficients have been used to compute the gross crushing margins. This means that meal prices correspond to the FOB values of the DOC exports, from which port charges, marketing costs and transport costs to the factory have been subtracted.

A5.31 Gross crushing margins in India tend to be higher than those in the EU or US, with growers bearing the main burden of processing inefficiencies. Figures 21 to 23 present a comparison of the gross crushing margins in India, the US and the EU for rapeseed, sunflowerseed and soybeans, respectively. In general, with the exception of the rapeseed industry, Indian crushers appear to have enjoyed higher margins than those in the EU and the US. This reflects the protection, both from tariffs and from transport costs, given to vegetable oils in India, which has sustained edible oil prices at levels well above world market quotations. At the same time, domestic meal prices are below world quotations, since local processors, as net exporters, are penalized by the high level of internal freight and handling costs. There is a comparatively free domestic market for the seeds themselves, in which GOI minimum price supports seldom have much impact, since these supports have been set well below recent domestic producer prices. The weak bargaining power of local farmers, who are not permitted to turn to export sales as an alternative to the domestic market (other than for high grade HPS groundnuts), has caused local oilseed prices to fall close to world levels, as crushers, in effect, force them to absorb the inefficiencies of the processing industry. The data on the crushing margin for groundnuts in Figure 24 relates only to India, without attempting a comparison with other countries. This is because there is no comparable industry in the US (where groundnuts are high quality, and destined predominantly for direct edible uses) or the EU.

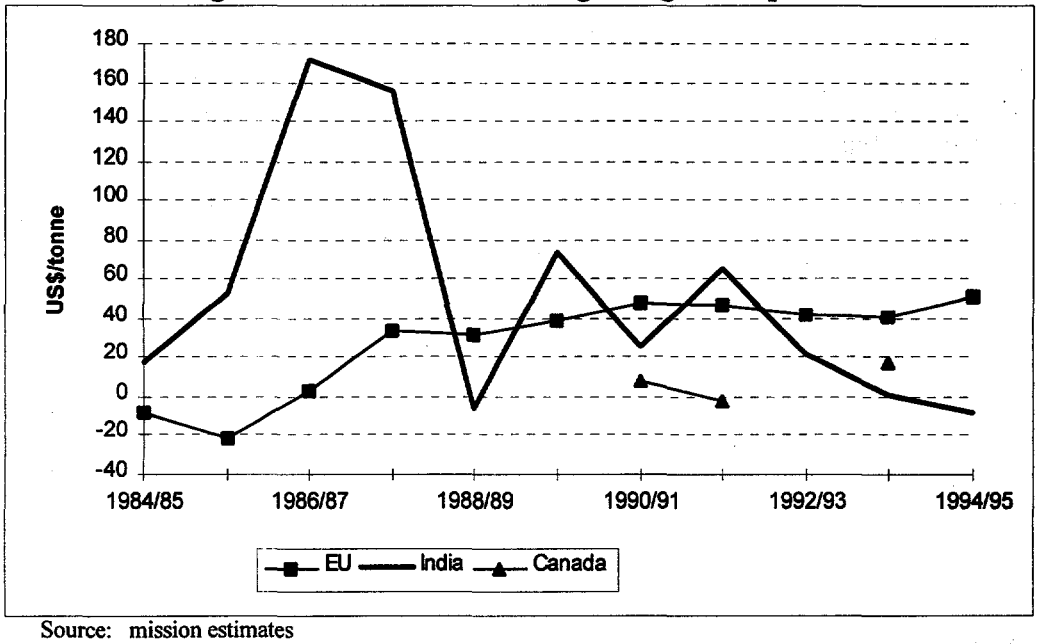
Table A5.5: Average Extraction Rates 1992/3-1994/5

	Soybeans			Rapeseed			Sunflower			Groundnut		
	Oil	Meal	Wastage	Oil	Meal	Wastage	Oil	Meal	Wastage	Oil	Meal	Wastage
India	17.6%	82.0%	*0.5%*	37.3%	60.3%	*2.4%*	35.3%	48.8%	*16.0%*	41.4%	56.6%	*2.0%*
US	18.2%	79.2%	*2.6%*	40.0%	57.0%	*3.0%*	39.5%	50.1%	*10.4%*	40.2%	57.0%	*2.8%*
EU	17.9%	79.1%	*3.0%*	40.8%	58.1%	*1.1%*	40.6%	54.0%	*5.4%*	38.5%	59.9%	*1.6%*
China	16.1%	79.5%	*4.4%*	35.0%	63.6%	*1.4%*	26.0%	58.0%	*16.0%*	38.5%	59.5%	*2.0%*
Argentina	18.8%	81.0%	*0.3%*	-	-	-	40.6%	42.5%	*16.9%*	-	-	-
Brazil	18.9%	78.2%	*2.9%*	-	-	-	-	-	-	-	-	-
Canada	-	-	-	41.7%	58.0%	*0.3%*	-	-	-	-	-	-
Ex-USSR	-	-	-	-	-	-	42.1%	42.0%	*15.9%*	-	-	-

Note: Dashes indicate that the values were not calculated since the country is not a major producer of the relevant oil.

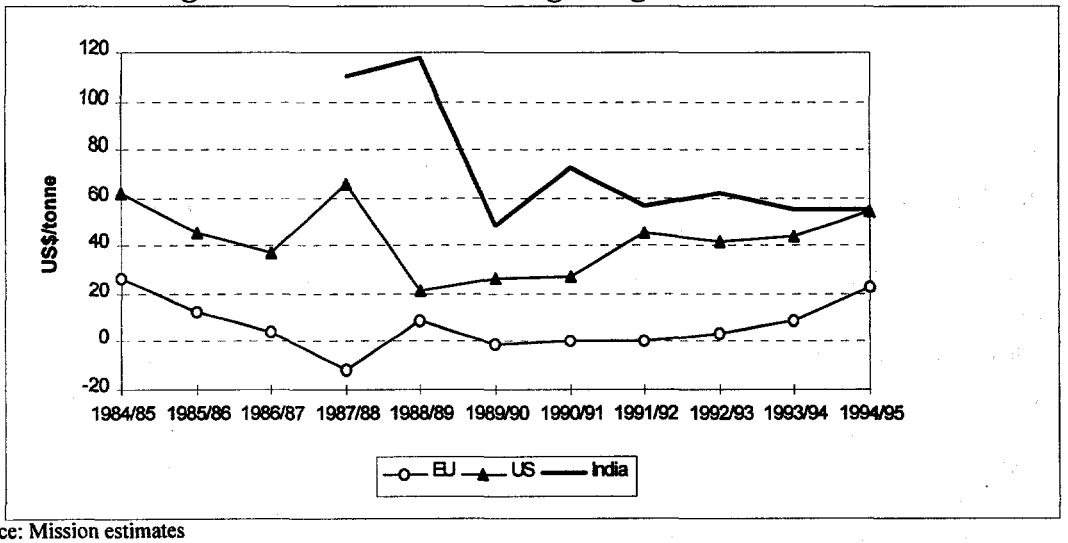
Source: *Oil World, USDA*

Figure A5.21: Gross Crushing Margin - Rapeseed



Source: mission estimates

Figure A5.22: Gross Crushing Margins - Sunflowerseed

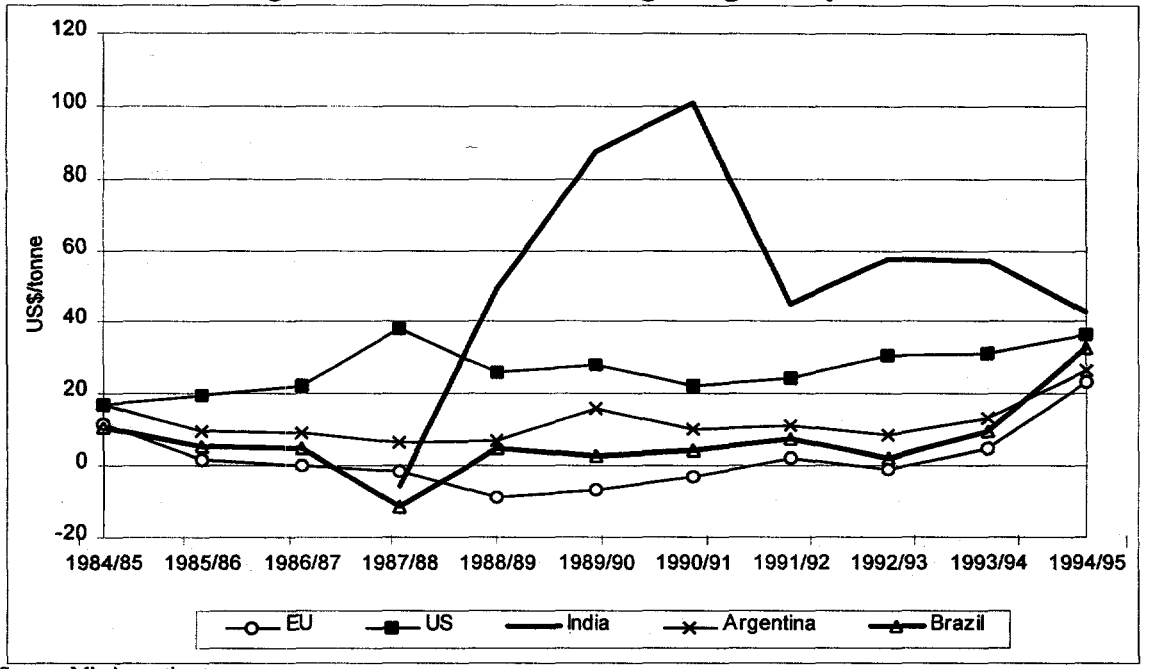


Source: Mission estimates

A5.32 **Rapeseed-mustardseed crushing margins are at international norms.** Figure A5.21 presents the margins calculated for Rajasthan market, together with those in the EU, and Canada. Rapeseed-mustardseed margins in India have been close to those prevailing in the EU prices since the late 80s, and declined since 1991/92 to become even negative (US$-9 per ton) in 1994/95.

A5.33 **Sunflowerseed crushing margins are high.** Local crushing margin in India (Karnataka) is much higher than that in either the US or the EU, except in 1994/95 (Figure A5.22). Since 1989/90, the margin in India has averaged around US$58 per tonne, compared to around US$40 in the US and only US$6 in the EU. The high crushing margins in the sunflowerseed industry may reflect the more limited competition which prevails in that sector.

Figure A5.23: Gross Crushing Margin - Soybean



Source: Mission estimates

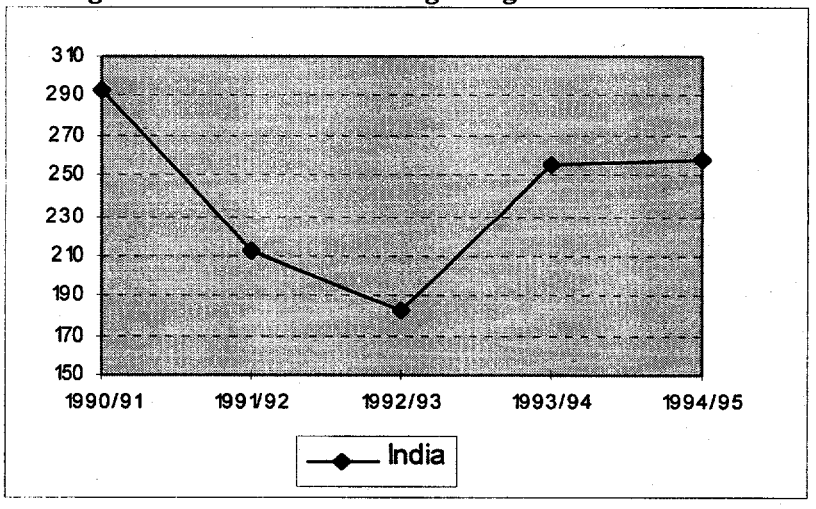
A5.34 **Soybean crushing margins in India are much higher than elsewhere in the world.** Figure A5.23 indicates that the crushing margin for soybeans in the US has been consistently above that in the EU and Latin American countries. The margin in India (Madhya Pradesh) appears to have been somewhat erratic, being negative in 1987/88, before jumping to about US$100 per tonne in 1990/91. Since 1991/92, soybean gross crushing margins average about US$51 per tonne. This is 60% higher than the US margin (US$31 per tonne), and considerably higher than margins in Brazil (US$13 per tonne), Argentina (US$15 per tonne), and the EU (US$7 per tonne). The decline in Indian crushing margin during 1994/95 may be explained by the poor harvest which led firms to bid up bean prices in order to meet meal export commitments.

A5.35 One difficulty in evaluating gross crushing margins outside India is that processors have access to risk management instruments, and are able to use forward and futures markets to lock in profitable crushing opportunities when they occur. Consequently, the calculation of margins from spot prices of beans and products (oils and meals) is not representative of the true situation facing the predominant part of the processing sector outside India. The access to risk management instruments explain how

crushing industries survive in spite of apparent low, erratic and sometimes negative gross crushing margins.

A5.36. **Ground nut crushing margins are high in India, and sustained at these levels by Small Scale Industry Reservation.** Figure A5.24 presents the crushing margin in the groundnut industry in Andhra Pradesh. The margin are high, averaging around the US$200 per tonne. The high crushing margins are affected by the restriction of expelling activity to Small Scale Industries, whose costs are higher than for modern plants with optimal economic scale. It has not been possible to compare Indian crushing margins with those in other countries, since the EU is not a significant groundnut producer, and US prices are distorted by the system of production quotas and by the emphasis upon the production of high quality nuts for direct edible use.

Figure A5.24: Gross Crushing Margins — Groundnuts



D. Nominal & Effective Protection in the Oilseed Complex

Methodological Note

A5.37 **Nominal Protection Coefficient**. The Nominal Protection Coefficient (NPC) of a commodity is defined as the ratio of its domestic price to its international reference price, both expressed in the local currency and measured at the same location or reference point. The NPC is simply an estimate of the extent of government interventions on the price of the commodity under consideration. If greater than unity (i.e., the domestic price is greater than the reference price), that commodity enjoys a positive protection from government policies. Its production is encouraged, while its consumption is discouraged. If the NPC is less than unity (i.e., the domestic price is less than the reference price), then the commodity under consideration is dis-protected or "taxed", its production discouraged, and its consumption encouraged.

A5.38 NPCs have been estimated for each the four main commodities of the Indian oilseed complex: groundnut, rapeseed-mustardseed, soybean, and sunflower. For each of these four commodities, NPCs have been estimated for the seed (or bean), and the corresponding oil. NPC estimates for the four oilseeds have been borrowed from G. Pursell & A. Gupta (forthcoming), and the NPC estimates for oils have been borrowed

from A. Gulati, A. Sharma & D.S. Kohli. In the case of both oilseeds and oils, NPCs have been estimated on an import basis, and with the up-country market in the major producing states(s) as the reference point (where the prices of the imported and domestic oilseeds are compared) since India is a net importer of edible oils and, by implication, of oilseeds. The NPC estimates reported in the annex tables differ from those by Pursell & Gupta, and Gulati, Sharma & Kohli because of our assumptions differ from theirs regarding the location of the reference point.

A5.39 In the case of meals, the estimates reported in Annex for groundnut, rapeseed-mustardseed, soybean and sunflower compare the unit export values of DOC Indian exports to their corresponding world, reference prices. The price comparison for meals has been estimated under the exportable hypothesis since India is a net exporter of meals. The comparison between domestic and reference prices could potentially reflect both government policy interventions on the Indian meal markets and quality differentials. Since Indian meals exports are basically free of government interventions, except for the small distortion induced by export incentives, the observed difference between domestic and reference prices should be mostly attributed to quality differentials, not to government interventions. Accordingly, we refer to the price comparison as a Quality Discount Coefficient which measures the price discount faced by Indian meal exports on the world market largely as a result of inferior quality (aflatoxin in groundnuts, glucosinolates in rapeseed-mustardseed).

A5.40 **Effective Protection of the Crushing Industry**. The effective protection simply measures the protection to the crushing industry provided by government policies. It is defined as the difference between the gross crushing margin faced by Indian crushers (i.e., using domestic prices) and gross crushing margin which would have prevailed at reference prices, both measured at factory, up-country. Reference prices have been estimated under the importable hypothesis for oilseeds and oils, and under the exportable hypothesis for meals; i.e., using similar assumptions than for calculating NPCs. The gross crushing margin at reference price also uses the Indian extraction rates for oils and meals to avoid introducing biases in the results.

A5.41 Measuring the effective protection to the Indian crushing industry is important to get an accurate picture of the true extent of protection to the industry given its joint-production nature. Indeed, the relatively high edible oil prices faced by Indian consumers (NPC greater than unity) may be a reflection of the relatively low meal prices (NPC lower than unity) Indian crushers can realize having to export a significant share of the meal production.

A5.42 **Groundnut**. Tables A5.6 to A5.9 give the NPC estimates for oilseeds and oils, the Quality Discount Coefficient estimate for meals, and the effective protection estimate for the groundnut industry, respectively. In the case of groundnuts, the NPC is estimated for the three largest producing states (Andhra Pradesh, Gujarat, and Tamil Nadu), and for India as a whole by aggregating the three state NPCs (as a convention, in the NPC oilseed tables, the second calendar year of the fiscal year is used to indicate that fiscal year; e.g., 1995 corresponds to the fiscal year 1994/95). The NPC for groundnut oil is estimated at Bombay as the reference point. The Quality Discount Coefficient for meals is estimated

at Bedi port, as the reference export point. The effective protection has been measured for a factory located in Andhra Pradesh.

A5.43 On average, groundnuts have received no protection (1965-1995), while groundnut oil has enjoyed a substantially higher level of protection (69% between 1981 and 1995). During the 80s, groundnuts received increasing level of protection (about 25% on average), but groundnut oil continued to enjoy even higher protection (83% on average). Since 1991, however, the protection level in the groundnut complex has fallen dramatically as a result of the increased domestic production and Rupee devaluation. Groundnut oil domestic prices are now below the protection offered by the (30% in 1995/96, 20% since mid-1996) tariff barriers. Groundnut prices have fallen even lower and well below import parity prices since 1992/93.

A5.44 Groundnut crushers are enjoying very high levels of effective protection (about 65% on average between 1990/91 and 1994/95), in spite of the low meal realization and 20% quality discount on the world market. The ability of the groundnut crushing industry to maintain a high and stable level of effective protection since 1991 has clearly come at the cost of the groundnut growers who now stand dis-protected.

A5.45 **Rapeseed-Mustardseed.** Tables A5.10 to A5.13 give the NPC estimates for oilseeds and oils, the Quality Discount Coefficient for meals, and the effective protection estimate for the rapeseed-mustardseed industry, respectively. In the case of rapeseed, the NPC is estimated for the largest producing state (Rajasthan) and one of the largest wholesale market for rapeseeds (Hapur in Uttar Pradesh), and for India as a whole by aggregating the two NPCs. The NPC for rapeseed oil is estimated at Kanpur (Uttar Pradesh) as the reference point. The Quality Discount Coefficient for meals is estimated at Bedi port, as the reference export point. The effective protection has been measured for a factory located in Rajasthan.

A5.46 In the rapeseed-mustardseed complex also, seeds always receive a much more modest level of protection (18% between 1985 and 1995) than the oil (120% between 1985 and 1995). During the 80s, the protection level increased for both seeds and oils until 1988. With increased domestic production driving their domestic prices down, and the Rupee devaluation, the protection level started falling after 1988 for both oils and seeds. By 1995, rapeseed oil enjoyed a positive level of protection virtually in line with its tariff barrier; by contrast, the protection for rapeseed-mustardseed turned slightly negative, implying that rapeseed growers received a lower than import parity price. On the meals side, the estimates indicate that Indian exports face substantial quality discounts (about 50%) on the world market.

A5.47 The effective protection enjoyed by the crushing industry has fallen significantly over the period (1985-1995), but remains positive and significant (US$ 48/ton). Unlike the groundnut crushing industry, the rapeseed crushing industry was less successful in maintaining its initial and very high level of effective protection. Rapeseed-mustardseed growers suffered a loss, but smaller than that imposed on groundnut growers.

A5.48 **Soybean.** Tables A5.14 to A5.17 give the NPC estimates for oilseeds and oils, the Quality Discount Coefficient for meals, and the effective protection estimate for the

soybean solvent extraction industry, respectively. In the case of soybean, the NPC is estimated for the largest producing state (Madhya Pradesh). The NPC for soybean oil is estimated at Betul (Madhya Pradesh) as the reference point. The Quality Discount Coefficient for meals is estimated at Bedi port, as the reference export point. The effective protection has been measured for a factory located in Madhya Pradesh.

A5.49 On average, soybean farmers have been dis-protected throughout the period (NPC of 0.87 between 1974 and 1995), but less so in the late 80s. By contrast, soybean oil consumers have been heavily taxed consistently, paying domestic prices more than twice the import parity level (NPC of 2.16 between 1988 and 1995). By 1994/95, the protection level of soybean oil had declined significantly but remained well above the tariff level for edible oils. Soybean meals (DOC) face little to no quality discounts on the world market.

A5.50 The soybean solvent extraction industry was extremely successful in maintaining a very high level of effective protection (US$ 120/ton), even in the face in declining protection level on the oil side. This success, however, was achieved at the cost of lower prices for soybean growers. Only in years of poor harvest (1995) pushing domestic farmgate prices higher was the soybean solvent industry compelled to trim its margins.

A.5.51 **Sunflower**. Tables A5.18 to A5.21 give the NPC estimates for oilseeds and oils, the Quality Discount Coefficient for meals, and the effective protection estimate for the sunflower industry, respectively. In the case of sunflower, the NPC is estimated for the largest producing state (Karnataka). The NPC for sunflower oil is estimated at Bidar (Karnataka) as the reference point. The Quality Discount Coefficient for meals is estimated at Bedi port, as the reference export point. The effective protection has been measured for a factory located in Karnataka.

A.5.52 Sunflower seeds, like all other oilseeds, have been much less protected than sunflower oil (18% and 118% protection levels between 1988 and 1994, respectively). The protection level has fallen for both sunflower seeds and oil since the late 80s in response to increased domestic production and Rupee devaluation. While the protection level of sunflower oil was approaching by 1995 the floor set by the import tariff level, sunflower seed prices were falling at or below world price levels, except in a poor production year (1995).

A.5.53 The sunflower processing industry has been therefore fairly successful in maintaining a high level of effective protection (US$ 120/ton), in spite of the falling protection for sunflower oil prices and hefty quality discounts for meals on the world market (about 50%).

Table A5.6: Nominal Protection Coefficient
Groundnut

YEAR	WORLD PRICE CIF EUROPE OIL YR.	FREIGHT	FOB PRICE.		FREIGHT	BORDER PRICE	EXCHANGE RATE OCT-SEPT	PORT CHARGE	LDF INDIAN PORT PODS	MARKETING		ANDHRA PRADESH				GUJARAT		TAMIL NADU		ALL INDIA
		US GULF-ROTTERDAM	KERNAL	POD	US GULF-INDIA	POD				COSTS	REF PR.	DOM. PRICE	TRANSPORT COST	REF. PRICE	NPC	DOM. PRICE	NPC	DOM. PRICE	NPC	NPC
	USD/MT	USD/MT	USD/MT	USD/MT	USD/MT	USD/MT	RS/USD	RS/QLT		RS/ QTL		RUPEES/QUINTAL				RS/QTL		RS/QTL		
1965	201.3	6.30	194.95	136.46	21.46	151.5	4.76	1.47	73.6	7.4	81.0	87.7	1.8	82.8	1.06	79.8	0.99	88.6	1.09	1.05
1966	191.0	6.85	184.15	128.91	23.33	145.2	5.67	1.58	84.0	8.4	92.4	132.4	1.9	94.3	1.40	137.8	1.49	120.7	1.31	1.40
1967	180.0	6.42	173.58	121.51	21.84	136.8	7.50	1.79	104.4	10.4	114.8	150.8	2.0	116.8	1.29	103.8	0.90	139.7	1.22	1.14
1968	169.0	8.21	160.79	112.55	27.97	132.1	7.50	1.99	101.1	10.1	111.2	99.2	2.1	113.3	0.88	122.7	1.10	92.7	0.83	0.96
1969	196.8	6.99	189.76	132.83	23.82	149.5	7.50	1.99	114.1	11.4	125.5	131.3	2.3	127.9	1.03	142.2	1.13	127.1	1.01	1.05
1970	224.3	7.46	216.79	151.76	25.39	169.5	7.50	2.01	129.2	12.9	142.1	173.0	2.4	144.4	1.20	138.3	0.97	147.8	1.04	1.08
1971	248.8	7.55	241.20	168.84	25.71	186.8	7.50	2.12	142.2	14.2	156.5	148.1	2.5	159.0	0.93	138.1	0.88	136.4	0.87	0.90
1972	259.5	5.01	254.49	178.14	17.06	190.1	7.45	2.18	143.9	14.4	158.2	132.4	2.6	160.8	0.82	134.3	0.85	120.9	0.76	0.81
1973	354.8	8.24	346.51	242.56	28.06	262.2	7.75	2.14	205.4	20.5	226.0	220.6	2.8	228.8	0.96	195.8	0.87	211.8	0.94	0.94
1974	530.8	22.18	508.57	356.00	75.54	408.9	8.07	2.05	332.1	33.2	365.3	268.6	3.1	368.4	0.73	235.7	0.65	243.0	0.67	0.68
1975	471.8	18.74	453.01	317.11	63.79	361.8	8.17	2.73	298.4	29.8	328.2	251.7	3.6	331.8	0.76	237.7	0.72	247.3	0.75	0.74
1976	427.8	10.43	417.32	292.12	35.52	317.0	8.97	3.32	287.6	28.8	316.4	160.0	3.8	320.2	0.50	152.4	0.48	165.9	0.52	0.50
1977	513.5	10.38	503.12	352.18	35.36	376.9	8.82	3.29	335.7	33.6	369.2	276.8	4.2	373.4	0.74	194.0	0.53	252.6	0.68	0.60
1978	601.5	10.21	591.29	413.90	34.77	438.2	8.30	3.71	367.7	36.8	404.4	214.6	4.5	408.9	0.52	253.4	0.63	236.4	0.58	0.59
1979	579.0	15.89	563.11	394.18	43.95	424.9	8.12	4.12	349.2	34.9	384.1	200.0	4.9	389.0	0.51	248.4	0.65	218.3	0.57	0.59
1980	516.3	26.96	489.29	342.50	72.06	392.9	7.95	4.60	317.0	31.7	348.7	287.7	4.9	353.6	0.81	304.8	0.87	284.9	0.82	0.84
1981	662.0	29.63	632.37	442.66	86.18	503.0	8.32	5.26	424.0	42.4	466.3	379.7	5.1	471.4	0.81	364.5	0.78	396.6	0.85	0.80
1982	409.0	20.16	388.84	272.19	74.27	324.2	9.31	5.96	307.8	30.8	338.6	376.9	6.2	344.8	1.09	390.0	1.15	400.6	1.18	1.14
1983	379.0	17.07	361.93	253.35	47.26	286.4	9.94	6.65	291.3	29.1	320.4	397.8	7.3	327.7	1.21	390.8	1.22	419.5	1.31	1.24
1984	441.0	18.80	422.20	295.54	48.00	329.1	10.91	7.94	367.1	36.7	403.8	431.7	8.3	412.1	1.05	458.8	1.14	466.1	1.15	1.10
1985	368.0	20.19	347.81	243.47	48.00	277.1	12.39	8.97	352.1	35.2	387.3	449.2	8.9	396.3	1.13	453.1	1.17	451.4	1.17	1.16
1986	338.0	17.54	320.46	224.32	48.00	257.9	12.37	9.53	328.7	32.9	361.6	458.1	9.6	371.2	1.23	470.7	1.30	458.3	1.27	1.26
1987	283.0	18.50	264.50	185.15	40.53	213.5	12.97	10.63	287.6	28.8	316.3	600.0	10.5	326.9	1.84	450.0	1.42	604.7	1.91	1.72
1988	289.0	25.41	263.59	184.51	41.20	213.4	13.44	12.00	298.7	29.9	328.6	670.0	11.6	340.1	1.97	759.0	2.31	646.6	1.97	1.98
1989	342.0	28.34	313.66	219.56	69.73	268.4	15.73	14.55	436.6	43.7	480.3	548.2	12.6	492.9	1.11	492.2	1.02	547.5	1.14	1.08
1990	420.8	35.50	385.25	269.67	67.20	316.7	17.21	16.01	561.1	56.1	617.2	751.7	13.8	631.0	1.19	726.0	1.18	698.9	1.13	1.17
1991	449.0	30.40	418.61	293.03	65.60	338.9	20.79	17.61	722.4	72.2	794.7	950.6	15.9	810.6	1.17	1027.5	1.29	819.8	1.03	1.17
1992	408.2	27.07	381.17	266.82	65.60	312.7	25.89	20.83	830.6	83.1	913.7	1003.4	18.0	931.6	1.08	1068.7	1.17	964.5	1.06	1.08
1993	395.9	29.90	366.00	256.20	62.40	299.9	31.17	23.95	958.7	95.9	1054.6	866.7	20.3	1074.9	0.81	843.7	0.80	795.4	0.75	0.79
1994	506.3	16.48	489.86	342.90	55.20	381.5	31.37	26.59	1223.5	122.4	1345.9	828.1	23.2	1369.1	0.60	1001.7	0.74	903.9	0.67	0.65
1995	540.7	25.92	514.82	360.37	62.40	404.1	31.58	30.16	1306.3	130.6	1437.0	977.9	25.9	1462.9	0.67	1164.2	0.81	1079.2	0.75	0.72
65-73															1.06		1.02		1.01	1.04
74-80															0.65		0.65		0.66	0.65
81-87															1.19		1.17		1.26	1.20
88-95															1.08		1.17		1.06	1.08
65-95															1.00		1.01		1.00	1.00

Source: Adapted from Pursell, Garry and Anju Gupta, 1996. *Trade Policies and Incentives in Indian Agriculture. Background Statistics and Protection and Incentive Indicators, 1965-1995.* Background Papers nos 1-6. World bank, mimeo.

Table A5.7: Nominal Protection Coefficient
Groundnut Oil

	Units	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Price (cif,Rotterdam) (Nov-Oct)	US $/MT.	1104.67	635.58	639.58	1016.50	910.67	638.17	510.42	576.25	723.50	936.67	955.67	619.33	702.75	990.92	1007.44
Minus Freight from Rotterdam to US Gulf	US $/MT.	37.04	25.20	21.34	23.50	25.24	21.92	23.12	31.76	35.42	44.38	38.00	33.84	37.38	37.38	37.38
Plus Freight From US Gulf to India (Bombay)	US $/MT.	107.72	92.84	59.08	60.00	60.00	60.00	50.66	51.50	87.16	84.00	82.00	82.00	84.42	84.42	84.42
CIF Prices at Bombay	US $/MT.	1175.35	703.22	677.32	1053.00	945.43	676.25	537.96	595.99	775.24	976.29	999.67	667.49	749.79	1037.96	1054.48
Exchange Rate (Official)	US$= Rs.	8.53	8.96	10.06	11.24	12.09	12.55	12.98	13.57	15.90	17.31	21.39	25.89	29.65		
Cif Bombay at OER	Rs./qtl	1002.57	630.09	681.38	1183.57	1143.02	848.69	698.27	808.76	1232.63	1689.96	2138.29	1728.13	2223.13	3257.12	3308.96
Port Clearance Charges	Rs./qtl.	6.74	7.63	8.53	10.18	11.49	12.22	13.62	15.38	18.65	20.53	22.57	26.69	30.57	32.71	32.71
Landed Cost at Port	Rs./qtl.	1009.31	637.72	689.91	1193.75	1154.51	860.91	711.89	824.14	1251.28	1710.49	2160.86	1754.82	2253.70	3289.83	3341.67
Marketing Cost and trader's margin	Rs./qtl.	60.56	38.26	41.39	71.63	69.27	51.65	42.71	49.45	75.08	102.63	129.65	105.29	135.22	197.39	200.50
Reference Price	Rs./qtl.	1069.87	675.98	731.31	1265.38	1223.79	912.57	754.61	873.59	1326.36	1813.12	2290.52	1860.11	2388.92	3487.22	3542.17
Wholesale Price (Bombay)	Rs./qtl.	1339.58	1353.08	1549.58	1612.92	1514.25	1866.58	2282.42	2228.83	2125.00	2694.83	3498.75	3406.25	3027.50	3446.36	3831.25
NPC		1.25	2.00	2.12	1.27	1.24	2.05	3.02	2.55	1.60	1.49	1.53	1.83	1.27	0.99	1.08

Source: Adapted from A. Gulati, A, Sharma, & D.S. Kohli, (1996): "Self-Sufficiency & Allocative Efficiency: Case of Oilseeds in India", National Council of Appiled Economic Research, New Delhi

Table A5.8: Quality Discount Coefficient
Groundnut Meal

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
Rott c.i.f. US$/ton	147	164	157	199	205	187	155	153	153	184	161
Freight US$/ton											
From West Africa to Far East1	38	36	40	34	58	56	54	54	56	50	50
Minus from West Africa to Rotterdam2	20	18	19	25	28	36	30	27	29	28	28
Minus from India to Far East3	18	16	17	23	26	34	28	25	27	26	26
Reference Price (estimated India f.o.b.) US$/t	147	167	162	184	208	174	150	155	153	180	157
Export Values Rs (Crores)							34.8	64.7	110.7	194.2	153.4
Quantity Exported ('000 tonnes)							140	207	293	440	49
Exchange Rate	12.39	12.37	12.97	13.44	15.73	17.21	20.79	25.89	30.65	31.37	31.41
India f.o.b. (Actual) $/ton	n/a	n/a	n/a	n/a	n/a	n/a	120	121	123	141	140
Quality Discount Coefficient (Exports)	n/a	n/a	n/a	n/a	n/a	n/a	0.80	0.78	0.81	0.78	0.89

Note: 1 In the absence of other information, the West Africa to Far East freight rate has been estimated as being the same as that for the US to the Far East
2 In the absence of other information, the West Africa to EU freight rate has been estimated as being the same as that for the US to the EU, as the distances are similar.
3 Thailand to Far East freight typically $20 per tonne

Table A5.9
Effective Protection
in the Groundnut Complex
(US$/ton)

Extraction rate	India Actual Margin (At Factory) 41%/57%	Reference Price Margin (At factory) 41%/57%	Effective Protection
1987/88	-	113	-
1988/89	-	148	-
1989/90	-	165	-
1990/91	297	151	146
1991/92	216	25	191
1992/93	187	63	124
1993/94	260	126	133
1994/95	262	94	168
Av 1990/91-1994/95	244	92	152

Note: Extraction rates from Oil World
Prices from NPC tables

Table A5.10: Nominal Protection Coefficient
Rapeseed-Mustardseed

YEARS	CIF EUROPE PRICE USD/MT	FREIGHT CAN.-ROTT. USD/MT	FOB CAN. PRICE USD/MT	FREIGHT CAN-INDIA USD/MT	BORDER PRICE (CIF) USD/MT	EXCHANGE RATE RS/USD	BORDER PRICE (CIF) RS/QTL	PORT COSTS RS/QTL	LDF RUPEE PR. RS/QTL	MAR-KETING COST RS/QTL	UP (HAPUR) DOM. PR RS/QTL	UP (HAPUR) T. COSTS RS/QTL	UP (HAPUR) REF. PR. RS/QTL	UP (HAPUR) NPC	RAJASTHAN DOM. PR RS/QTL	RAJASTHAN T. COSTS RS/QTL	RAJASTHAN REF. PR. RS/QTL	RAJASTHAN NPC	ALL INDIA NPC
1965	134	6.30	127.7	21.5	149.2	4.76	71.0	1.47	72.5	4.3	99.0	5.1	81.9	1.21	102.9	4.8	81.7	1.26	1.21
1966	122	6.85	115.2	23.3	138.5	5.22	72.3	1.58	73.8	4.4	115.6	5.2	83.5	1.38	130.4	5.0	83.2	1.57	1.40
1967	130	6.42	123.6	21.8	145.4	7.50	109.1	1.79	110.9	6.7	138.0	5.5	123.0	1.12	145.7	5.2	122.8	1.19	1.13
1968	122	8.21	113.8	28.0	141.8	7.50	106.3	1.99	108.3	6.5	176.4	5.6	120.4	1.47	178.3	5.3	120.1	1.48	1.47
1969	105	6.99	98.0	23.8	121.8	7.50	91.4	1.99	93.4	5.6	134.0	6.0	104.9	1.28	133.5	5.7	104.6	1.28	1.28
1970	120	7.46	112.5	25.4	137.9	7.50	103.5	2.01	105.5	6.3	150.5	6.1	117.8	1.28	150.2	5.7	117.5	1.28	1.28
1971	137	7.55	129.4	25.7	155.2	7.50	116.4	2.12	118.5	7.1	163.8	6.4	132.0	1.24	167.0	6.1	131.7	1.27	1.24
1972	142	5.01	137.0	17.1	154.0	7.30	112.4	2.18	114.6	6.9	167.0	6.7	128.2	1.30	166.3	6.4	127.8	1.30	1.30
1973	134	8.24	125.8	28.1	153.8	7.67	118.0	2.14	120.1	7.2	176.8	7.1	134.4	1.32	181.2	6.7	134.1	1.35	1.32
1974	254	22.18	231.8	75.5	307.4	8.12	249.5	2.05	251.6	15.1	207.5	7.6	274.3	0.76	214.7	7.2	273.9	0.78	0.76
1975	377	18.74	358.3	63.8	422.1	7.94	335.0	2.73	337.7	20.3	313.8	9.1	367.1	0.85	335.8	8.6	366.6	0.92	0.86
1976	293	10.43	282.6	35.5	318.1	9.00	286.2	3.32	289.5	17.4	219.5	10.2	317.0	0.69	234.2	9.6	316.5	0.74	0.70
1977	246	10.38	235.6	35.4	271.0	8.83	239.2	3.29	242.5	14.6	189.8	11.1	268.2	0.71	186.7	10.5	267.6	0.70	0.71
1978	336	10.21	325.3	34.8	360.1	8.30	298.9	3.71	302.6	18.2	352.5	11.2	332.0	1.06	380.8	10.6	331.4	1.15	1.07
1979	313	15.89	296.7	44.0	340.7	8.18	278.8	4.12	282.9	17.0	341.2	11.7	311.5	1.10	331.7	11.0	310.9	1.07	1.09
1980	305	26.96	277.9	72.1	349.9	7.96	278.4	4.60	283.0	17.0	308.5	12.4	312.4	0.99	307.2	11.8	311.8	0.99	0.99
1981	293	29.63	263.5	86.2	349.7	8.26	288.9	5.26	294.1	17.6	399.0	13.4	325.2	1.23	414.2	12.7	324.5	1.28	1.24
1982	305	20.16	284.8	74.3	359.1	9.27	333.1	5.96	339.0	20.3	442.5	17.2	376.6	1.18	455.8	16.3	375.7	1.21	1.18
1983	300	17.07	283.1	47.3	330.4	9.95	328.6	6.65	335.3	20.1	398.8	21.0	376.4	1.06	390.8	19.9	375.3	1.04	1.05
1984	289	18.80	269.9	48.0	317.9	10.86	345.1	7.94	353.0	21.2	453.7	23.7	397.9	1.14	466.7	22.4	396.6	1.18	1.15
1985	380	20.19	360.0	48.0	408.0	12.67	516.9	8.97	525.8	31.5	501.7	25.1	582.5	0.86	520.0	23.8	581.2	0.89	0.88
1986	314	17.54	296.1	48.0	344.1	12.41	426.8	9.53	436.4	26.2	405.7	27.1	489.6	0.83	403.3	25.6	488.2	0.83	0.83
1987	237	18.50	218.3	40.5	258.9	12.90	333.9	10.63	344.5	20.7	458.3	29.4	394.6	1.16	418.3	27.8	393.0	1.06	1.11
1988	245	25.41	219.6	41.2	260.8	13.24	345.2	12.00	357.2	21.4	702.5	32.8	411.4	1.71	683.3	31.0	409.7	1.67	1.69
1989	211	28.34	182.2	69.7	251.9	15.69	395.3	14.55	409.8	24.6	727.5	35.2	469.6	1.55	733.3	33.3	467.8	1.57	1.56
1990	232	35.50	196.5	67.2	263.7	17.19	453.2	16.01	469.2	28.2	580.8	40.3	537.6	1.08	561.7	38.2	535.5	1.05	1.06
1991	219	30.40	188.8	65.6	254.4	19.67	500.3	17.61	517.9	31.1	904.3	44.2	593.2	1.52	951.7	41.9	590.9	1.61	1.58
1992	202	27.07	174.8	65.6	240.4	25.90	622.6	20.83	643.4	38.6	939.2	48.0	730.0	1.29	931.7	45.5	727.5	1.28	1.28
1993	199	29.90	169.1	62.4	231.5	31.20	722.3	23.95	746.2	44.8	889.2	54.8	845.8	1.05	916.7	51.9	842.9	1.09	1.08
1994	226	16.48	209.5	55.2	264.7	31.37	830.4	26.59	857.0	51.4	1003.3	64.1	972.5	1.03	1044.2	60.7	969.1	1.08	1.06
1995	310	25.92	283.7	62.4	346.1	31.44	1088.2	30.16	1118.4	67.1	1140.0	71.0	1256.5	0.91	1220.0	67.2	1252.8	0.97	0.95
65-73														1.29				1.33	1.29
74-80														0.88				0.91	0.88
81-87														1.06				1.07	1.06
88-95														1.27				1.29	1.28
65-95														1.14				1.17	1.14

Source: Adapted from Pursell, Garry and Anju Gupta, 1996. *Trade Policies and Incentives in Indian Agriculture. Background Statistics and Protection and Incentive Indicators, 1965-1995.* Background Papers nos 1-6. World bank, mimeo.

Table A5.11: Nominal Protection Coefficient
Rapeseed-Mustardseed Oil

-	-	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Price (cif,Rotterdam) (April-March)	US $/MT.					586.00	338.00	297.00	428.00	411.67	415.33	423.00	409.58	426.67	496.33	581.00
Minus Freight from Rotterdam to US Gulf	US $/MT.	37.04	25.20	21.34	23.50	25.24	21.92	23.12	31.76	35.42	44.38	38.00	33.84	37.38	37.38	37.38
Plus Freight From US Gulf to India (Bombay)	US $/MT.	107.72	92.84	59.08	60.00	60.00	60.00	50.66	51.50	87.16	84.00	82.00	82.00	84.42	84.42	84.42
CIF Prices at Bombay	US $/MT.					620.76	376.08	324.54	447.74	463.41	454.95	467.00	457.74	473.71	543.37	628.04
Exchange Rate (Official)	1 US$= Rs.	7.91	8.97	9.67	10.34	11.89	12.34	12.78	12.97	14.48	16.65	17.94	24.47	26.43	31.37	31.37
Cif Bombay	Rs./qtl.					738.08	464.08	414.76	580.72	671.02	757.49	837.80	1120.09	1252.02	1704.55	1970.16
Port Clearance Charges	Rs./qtl.	6.74	7.63	8.53	10.18	11.49	12.22	13.62	15.38	18.65	20.53	22.57	26.69	30.57	32.71	32.71
Landed Cost at Port	Rs./qtl.					749.57	476.30	428.38	596.10	689.67	778.02	860.37	1146.78	1282.59	1737.26	2002.87
Marketing Cost and trader's margin	Rs./qtl.					44.97	28.58	25.70	35.77	41.38	46.68	51.62	68.81	76.96	104.24	120.17
Transportation cost (Bombay to Kanpur)		16.74	21.55	26.28	29.62	31.43	33.82	36.71	40.98	43.99	50.39	54.27	59.91	67.70	71.94	76.18
Reference Price	Rs./qtl.					825.98	538.70	490.80	672.84	775.04	875.09	966.26	1275.50	1427.24	1913.44	2199.22
Wholesale price (Kanpur) (April-March)	Rs./qtl.	1260.83	1318.75	1170.00	1485.42	1357.50	1195.83	1654.17	2333.42	1814.55	1752.08	2602.08	2877.08	2502.08	2578.64	2959.30
NPC						1.64	2.22	3.37	3.47	2.34	2.00	2.69	2.26	1.75	1.35	1.35

Source: Adapted from A. Gulati, A, Sharma, & D.S. Kohli, (1996): "Self-Sufficiency & Allocative Efficiency: Case of Oilseeds in India", National Council of Appiled Economic Research, New Delhi

Table A5.12: Quality Discount Coefficient
Rapeseed-Mustardseed Meal

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
Hamburg c.i.f. US$/ton	95	118	95	153	167	137	131	139	162	156	134
Freight US$/ton											
Rotterdam to Far East1	38	36	40	34	58	56	54	54	56	50	50
Minus from India to Far East3	18	16	17	23	26	34	28	25	27	26	26
Reference Price (estimated India f.o.b.) US$/t	115	139	119	164	198	159	157	168	191	180	158
Export Values Rs /ton	998	819	881	925	1422	1276	1348	1380	1893	2634	2726
Exchange Rate	12.39	12.37	12.97	13.44	15.73	17.21	20.79	25.89	30.65	31.37	31.41
India f.o.b. (Actual) $/ton	81	66	68	69	90	74	65	53	62	84	87
Quality Discount Coefficient (Exports)	0.70	0.48	0.57	0.42	0.46	0.47	0.41	0.32	0.32	0.47	0.55

Table A5.13: Effective Protection in the Rapeseed-Mustardseed Complex
(US$/ton)

Extraction rate	India Actual Margin (At Factory) 37%/60%	Reference Price Margin (At factory) 37%/60%	Effective Protection
1984/85	18	-171	189
1985/86	53	-170	223
1986/87	172	-112	285
1987/88	156	-44	200
1988/89	-7	-19	13
1989/90	74	-50	124
1990/91	26	-39	64
1991/92	66	-17	83
1992/93	25	-8	33
1993/94	5	4	1
1994/95	-5	-66	61
Av 1990/91-1994/95	23	-25	48

Note: Extraction rates from Oil World
Prices from NPC tables

Table A5.14: Nominal Protection Coefficient
Soyabean

YEAR	CIF ROTT CROP YR	FREIGHT US-ROTT.	US,FOB	FREIGHT US-INDIA	BORDER PRICE	EXCHANGE RATE	BORDER PRICE	PORT CHARGES	LDF PRICE INDIAN PORT	DOMESTIC PRICE	TRANS. COST	MARKET COST	REF. PRICE	NPC
	USD/MT	USD/MT	USD/MT	USD/MT	USD/MT	RS/USD	RS/QTL	RS/QTL	RS/QTL	RS/QTL	RS/QTL	RS/QTL	RS/QTL	
1974	218	22.2	196	75.5	271	8.2	221	2.1	223	209	5.1	13.4	242	0.86
1975	214	18.7	196	63.8	259	8.0	206	2.7	209	200	5.8	12.5	228	0.88
1976	193	10.4	183	35.5	218	8.9	195	3.3	198	150	6.3	11.9	216	0.69
1977	282	10.4	271	35.4	307	8.9	272	3.3	275	222	6.9	16.5	299	0.74
1978	240	10.2	229	34.8	264	8.4	221	3.7	224	196	7.3	13.5	245	0.80
1979	285	15.9	269	44.0	313	8.2	255	4.1	260	171	7.9	15.6	283	0.60
1980	274	27.0	247	72.1	319	8.1	258	4.6	262	190	8.0	15.7	286	0.66
1981	328	29.6	298	86.2	384	8.0	305	5.3	311	281	8.3	18.6	338	0.83
1982	257	20.2	237	74.3	311	9.2	285	6.0	291	273	10.2	17.5	319	0.86
1983	232	17.1	215	47.3	262	9.8	257	6.7	264	262	12.1	15.8	292	0.90
1984	313	18.8	294	48.0	342	10.5	361	7.9	368	345	13.7	22.1	404	0.85
1985	243	20.2	223	48.0	271	12.5	339	9.0	348	267	14.8	20.9	383	0.70
1986	214	17.5	196	48.0	244	12.2	298	9.5	307	279	16.0	18.4	342	0.81
1987	200	18.5	181	40.5	222	13.0	289	10.6	299	421	17.4	18.0	335	1.26
1988	242	25.4	216	41.2	257	13.0	335	12.0	347	551	19.2	20.8	387	1.42
1989	313	28.3	284	69.7	354	15.1	535	14.6	549	529	20.9	33.0	603	0.88
1990	243	35.5	207	67.2	274	17.0	466	16.0	482	509	23.1	28.9	534	0.95
1991	242	30.4	212	65.6	278	18.4	512	17.6	530	586	26.3	31.8	588	1.00
1992	237	27.1	210	65.6	275	25.9	713	20.8	734	813	29.5	44.0	807	1.01
1993	233	29.9	203	62.4	266	31.5	836	23.9	860	730	33.4	51.6	945	0.77
1994	271	16.5	254	55.2	309	31.4	971	26.6	997	791	38.4	59.8	1095	0.72
1995	240	25.9	214	62.4	276	31.4	868	30.2	898	926	42.8	53.9	994	0.93
74-80														0.75
81-87														0.89
88-95														0.96
74-95														0.87

Source: Adapted from Pursell, Garry and Anju Gupta, 1996. *Trade Policies and Incentives in Indian Agriculture. Background Statistics and Protection and Incentive Indicators, 1965-1995.* Background Papers nos 1-6. World bank, mimeo.

Table A5.15: Nominal Protection Coefficient
Soyabean Oil

		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Price (CIF,Rotterdam) (Oct-Sept)	US $/MT	-	-	-	-	-	-	-	443.42	435.42	437.25	454.00	438.00	452.33	580.08	647.2
Minus Freight from Rotterdam to US Gulf	US $/MT.	37.04	25.2	21.34	23.5	25.24	21.92	23.12	31.76	35.42	44.38	38.00	33.84	37.38	37.38	37.38
Plus Freight From US Gulf to India (Bombay)	US $/MT.	107.72	92.84	59.08	60	60	60	50.66	51.5	87.16	84	82.00	82.00	84.42	84.42	84.42
CIF Prices at Bombay	US $/M								463.16	487.16	476.87	498.00	486.16	499.37	627.12	694.24
Exchange Rate (Official)	1 US$=Rs.	8.53	8.96	10.06	11.24	12.09	12.55	12.98	13.57	15.9	17.31	21.39	25.89	29.65	31.37	31.37
Cif Bombay	Rs./qtl.								628.51	774.58	825.46	1065.22	1258.67	1480.63	1967.28	2177.83
Port Clearance Charges	Rs./qtl.	6.74	7.63	8.53	10.18	11.49	12.22	13.62	15.38	18.65	20.53	22.57	26.69	30.57	32.71	32.71
Landed Cost at Port	Rs./qtl.								643.89	793.23	845.99	1087.79	1285.36	1511.20	1999.99	2210.54
Marketing Cost and trader's margin	Rs./qtl.								38.63	47.59	50.76	65.27	77.12	90.67	120.00	132.63
Transportation cost (Bombay-Bhopal)	Rs./qtl.	10.41	12.73	15.15	17.17	18.49	19.95	21.77	23.97	26.1	28.86	31.10	34.04	38.62	40.96	43.31
Reference Price	Rs./qtl.								706.49	866.93	925.61	1184.16	1396.52	1640.49	2160.94	2386.48
Wholesale Price (Betul) (Oct-Sept)	Rs./qtl.								2050	1903.75	2228.75	3262.40	3453.44	2660	3067	3610.37
NPC at OER									2.90	2.20	2.41	2.76	2.47	1.62	1.42	1.51

Source: A. Gulati, A, Sharma, & D.S. Kohli, (1996): "Self-Sufficiency & Allocative Efficiency: Case of Oilseeds in India", National Council of Appiled Economic Research, New Delhi

Table A5.16: Quality Discount Coefficient
Soyabean Meal

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
Hamburg f.o.b. US$/ton	170	196	202	270	274	218	210	217	216	223	197
Freight US$/ton											
From US Gulf to Far East1	38	36	40	34	58	56	54	54	56	50	50
Minus from US Gulf to Rotterdam2	20	18	19	25	28	36	30	27	29	28	28
Minus from India to Far East3	18	16	17	23	26	34	28	25	27	26	26
Reference Price (estimated India f.o.b.) US$/t	170	199	207	255	277	205	205	219	216	219	193
Export Values Rs (Crores)	60.9	98.8	131.0	86.2	276.9	359.1	473.9	656.9	1114.4	1500.7	1027.8
Quantity Exported (tonnes)	265,225	481,365	577,920	311,275	699,690	927,570	1,352,626	1,376,294	1,825,038	2,381,493	1,637,206
Exchange Rate	12.39	12.37	12.97	13.44	15.73	17.21	20.79	25.89	30.65	31.37	31.41
India f.o.b. (Actual) $/ton	190	164	175	204	249	224	164	184	206	201	200
Quality Discount Coefficient (Exports)	1.12	0.82	0.84	0.80	0.90	1.09	0.80	0.84	0.95	0.92	1.04

Note: 1 US Gulf to Far East freight rate estimated
2 Thailand to Far East freight rate typically $ 20 per ton

Table A5.17: Effective Protection in the Soyabean Complex
(US$/ton)

Extraction rate	India Actual Margin (At Factory) 18%/82%	Reference Price Margin (At factory) 18%/82%	Effective Protection
1987/88	-6	-18	12
1988/89	49	-91	141
1989/90	87	-76	163
1990/91	101	-41	142
1991/92	45	-64	109
1992/93	58	-64	121
1993/94	57	-76	133
1994/95	43	-53	96
Av 1990/91 - 1993/94	61	-60	120

Note: Extraction rates from Oil World
Prices from NPC tables

Table A5.18: Nominal Protection Coefficient
Sunflower

YEAR	USA/CAN, CIF, ROTT. USD/MT	FREIGHT US-ROTT. USD/MT	FOB PR. USD/MT	FREIGHT US-INDIA USD/MT	BORDER PR. (CIF) USD/MT	EXCHANGE RATE RS/USD	BORDER PRICES RS/QTL	PORT COSTS RS/QTL	LANDED COST RS/QTL	DOMESTIC PRICE RS/QTL	TRANSPT COST RS/QTL	MARKET COST RS/QTL	REF. PRICE RS/QTL	NPC
1976.0	275	10.4	265	35.5	300	9.0	269	3.3	273	166	4.4	16.4	293	0.57
1977	304	10.4	294	35.4	329	8.8	290	3.3	293	279	4.8	17.6	316	0.88
1978	300	10.2	290	34.8	325	8.3	270	3.7	273	220	5.1	16.4	295	0.75
1979	330	15.9	314	44.0	358	8.1	291	4.1	295	234	5.6	17.7	318	0.74
1980	291	27.0	264	72.1	336	7.9	267	4.6	272	268	5.7	16.3	294	0.91
1981	331	29.6	301	86.2	388	8.3	323	5.3	328	360	5.8	19.7	353	1.02
1982	298	20.2	278	74.3	352	9.3	328	6.0	334	374	7.1	20.0	361	1.04
1983	269	17.1	252	47.3	299	9.9	297	6.7	304	425	8.3	18.2	331	1.28
1984	366	18.8	347	48.0	395	10.9	431	7.9	439	431	9.5	26.4	475	0.91
1985	290	20.2	270	48.0	318	12.4	394	9.0	403	409	10.2	24.2	437	0.94
1986	214	17.5	196	48.0	244	12.4	302	9.5	312	502	11.0	18.7	342	1.47
1987	201	18.5	183	40.5	223	13.0	289	10.6	300	696	12.1	18.0	330	2.11
1988	253	25.4	228	41.2	269	13.4	361	12.0	373	640	13.3	22.4	409	1.57
1989	343	28.3	315	69.7	384	15.7	605	14.6	619	600	14.5	37.1	671	0.89
1990	267	35.5	231	67.2	299	17.2	514	16.0	530	787	15.9	31.8	578	1.36
1991	292	30.4	262	65.6	328	20.8	681	17.6	699	1057	18.2	41.9	759	1.39
1992	241	27.1	214	65.6	279	25.9	723	20.8	744	1018	20.6	44.6	809	1.26
1993	259	29.9	229	62.4	292	31.2	910	23.9	934	917	23.3	56.0	1013	0.90
1994	286	16.5	270	55.2	325	31.4	1019	26.6	1046	1055	26.6	62.8	1135	0.93
1995	262	25.9	236	62.4	298	31.6	942	30.2	972	1230	29.7	58.3	1060	1.16
77-80														0.77
81-87														1.25
88-95														1.18
77-95														1.10

Source: Adapted from Pursell, Garry and Anju Gupta, 1996. *Trade Policies and Incentives in Indian Agriculture. Background Statistics and Protection and Incentive Indicators, 1965-1995.* Background Papers nos 1-6. World bank, mimeo.

Table A5.19: Nominal Protection Coefficient
Sunflower Oil

		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Price (CIF,Rotterdam) (Oct-Sept)	US $/MT.	-	-	-	-	-	-	-	457.67	477.25	485.92	480.75	457.75	490.17	635	-
Minus Freight from Rotterdam to US Gulf	US $/MT.	37.04	25.2	21.34	23.5	25.24	21.92	23.12	31.76	35.42	44.38	38.00	33.84	37.38	37.38	
Plus Freight From US Gulf to India (Bombay)	US $/MT.	107.72	92.84	59.08	60	60	60	50.66	51.5	87.16	84	82.00	82.00	84.42	84.42	
CIF Prices at Bombay	US $/MT.								477.41	528.99	525.54	524.75	505.91	537.21	682.04	
Exchange Rate (Official)	1 US$=Rs.	8.53	8.96	10.06	11.24	12.09	12.55	12.98	13.57	15.9	17.31	21.39	25.89	29.65	31.37	31.37
Cif Bombay	Rs./qtl.								647.85	841.09	909.71	1122.44	1309.80	1592.83	2139.56	
Port Clearance Charges	Rs./qtl.	6.74	7.63	8.53	10.18	11.49	12.22	13.62	15.38	18.65	20.53	22.57	26.69	30.57	32.71	32.71
Landed Cost at Port	Rs./qtl.								663.23	859.74	930.24	1145.01	1336.49	1623.40	2172.27	
Marketing Cost and trader's margin	Rs./qtl.								39.79	51.58	55.81	68.70	80.19	97.40	130.34	
Transportation cost (Bombay-Karnataka)	Rs./qtl.	11	13.48	16.05	18.2	19.59	21.13	23.05	25.4	26.4	27.4	28.4	29.4	30.4	31.4	32.4
Reference Price	Rs./qtl.								736.19	947.82	1024.37	1255.58	1461.80	1756.10	2334.01	
Wholesale Price (Bidar) (Oct-Sept)	Rs./qtl.								2144.44	2108.33	2329.17	3279.17	3154.17	2918.18	3243.32	3752.2
NPC at OER									2.91	2.22	2.27	2.61	2.16	1.66	1.39	

Source: A. Gulati, A, Sharma, & D.S. Kohli, (1996): "Self-Sufficiency & Allocative Efficiency: Case of Oilseeds in India", National Council of Appiled Economic Research, New Delhi

Table A5.20: Quality Discount Coefficient
Sunflower Meal

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
Hamburg f.o.b. US$/ton	84	111	119	148	148	123	113	123	134	130	101
Freight US$/ton											
Rotterdam to Far East1	38	36	40	34	58	56	54	54	56	50	50
Minus from India to Far East3	18	16	17	23	26	34	28	25	27	26	26
Reference Price (estimated India f.o.b.) US$/t	104	132	143	159	179	145	139	152	163	154	125
Export Values Rs /ton	1015	608	890	1016	1294	1439	1537	1693	2320	2503	2457
Exchange Rate	12.39	12.37	12.97	13.44	15.73	17.21	20.79	25.89	30.65	31.37	31.41
India f.o.b. (Actual) $/ton	82	49	69	76	82	84	74	65	76	80	78
Quality Discount Coefficient (Exports)	0.79	0.37	0.48	0.48	0.46	0.58	0.53	0.43	0.47	0.52	0.63

Note: 1 Freight Rotterdam to Far East similar to US Gulf to Far East

Table A5.21: Effective Protection in the Sunflower Complex
(US$/ton)

Extraction rate	India Actual Margin (At Factory) 35%/49%	Reference Price Margin (At factory) 35%/49%	Effective Protection
1987/88	110	-47	157
1988/89	118	-141	258
1989/90	48	-68	116
1990/91	72	-96	169
1991/92	57	-51	108
1992/93	62	-61	123
1993/94	55	-37	92
1994/95	-	-	-
Av 1990/91 - 1993/94	61	-61	123

Note: Extraction rates from Oil World
Prices from NPC tables

E. Efficiency Gains from Improved Marketing & Processing Performance

Improvement Scenarios

A5.54 The preceding analysis indicates that the Indian oilseed complex suffers from structural inefficiencies: low oil extraction rates except in the case of groundnut, poor technical and economic efficiency in processing (reflected by high crushing margins), and poor meal realization stemming from both high export costs and quality discounts. Altogether, these inefficiencies result in un-necessarily high processing and marketing costs and/or low market realization borne almost entirely by oilseed growers. With edible oils now freely imported under modest tariffs, domestic prices for edible oils cannot exceed import parity levels. As a result, oilseed growers bear the costs of the inefficiencies in the marketing and processing of oilseeds, and see their farmgate prices fall unnecessarily low. Unless the oilseed processing industry and trade is allowed to modernize and trim its marketing and processing costs, farmers will shift out of oilseed production.

A5.55 **Estimating Efficiency Gains From De-Regulation of Marketing and Processing.** How much could be gained by addressing each of these marketing and processing inefficiencies? This section seeks to estimate the gains from overcoming the observed inefficiencies in oilseed processing and marketing. The gains will be measured in terms of potential improvement in oilseed prices which growers could receive from improvements in the marketing and processing of oilseeds and its derived products.

A5.56 **Potential Sources of Efficiency Gains**. Four different scenarios for improvements are considered:

Improvement in technical efficiency in processing and marketing alone. This is captured by raising the oil recovery ratio from oilseeds to best practice international standards. The structure of the processing industry remains unchanged, and crushing margins remain remain also unchanged. Higher oil recovery ratio will come from improvements in the genetic material of the seed, marketing practices, and extraction technology (e.g., integration of expelling and solvent-extraction to reduce losses) and management. In the case of groundnut, the oil extraction rate in India is higher than elsewhere in the world; at the same time, losses are important in groundnut extraction because of poor technical efficiency in expelling and solvent-extraction, and absence of vertical integration. It is therefore assumed that reduced losses could raise the groundnut oil extraction from 41% to 44%.

Improvements in technical and economic efficiency processing and marketing. In addition to the first scenario improvement, this scenario captures the efficiency gains from moving to economically and technically efficient, large-scale, integrated and higher capacity utilization factories. It is assumed that operating costs of crushing factories are reduced by 52% in the case of softseeds (groundnut, rapeseed-mustarseed, and sunflowerseed), and by 35% in the case of soyabean.

Improvements in technical and economic efficiency processing and marketing, combined with lower quality discounts for meals. Improved meal realization would come from lower quality discount on the world market for meals. This gain is added to the previous scenario. It is assumed that the quality discounts faced by Indian exporters, as identified by the NPCs for meals, are simply eliminated. Quality discounts would disappear as a

result of improved quality management and reliability on the domestic market, improved seed material, improved reliability and timeliness in delivery.

Improvements in technical and economic efficiency processing and marketing, combined with lower export costs for meals. Lower meal export costs are further added to the preceding scenario, contibuting to a higher meal realization. Lower meal export costs would come from investments in bulk transportation and storage system in India and in bulk loading directly into the hold of the export vessel An estimated US$18 per ton (or about Rs 570 per ton) savings in export costs could be achieved which such investments.

A5.57 **Efficiency Gains Are Estimated Under Free Imports and 20% Tariff Policy for Edible Oils**. In order to reflect the current policy situation, we assume that edible oils are freely imported under 20% tariffs. Practically, this means that, for the recent years, we derive the implied domestic price for edible oils under 20% tariffs and observed import and domestic transport costs. We also derive the implied domestic oilseed prices that would result from lower oil prices and observed domestic crushing margins. This means that the observed inefficiencies in marketing and processing are being passed-on to oilseed farmers. This is consistent with the observed evolution of prices in the oilseed industry analyzed earlier (see paras A.5.42 to A.5.53).

Results

A5.58 **Free and cheap oil imports do not need to come at the expense of mostly rainfed farmers**. Free oil imports need not threaten overall agricultural growth, in particular in the rainfed areas; nor do they need to threaten the remarkable achievements in oilseed production achieved during the 80s. The results indicate that the de-regulation of domestic trade and oilseed processing industry could fully compensate farmers for the lower seed prices resulting from free edible oil imports. With de-regulation enabling the processing industry to trim its marketing and processing costs, oilseed growers could see their farmgate prices increase significantly without however imposing higher prices on consumers. It stems from the fact that the gains from technical and economic efficiency improvements in the oilseed complex are large. Oilseed producer prices could be raised by as much as 25% in the case of groundnut, 22% for soyabean, 57% for rapeseed-mustardseed, and 44% in the case of sunflower, on average between 1990/91 and 1994/95.[1]

A5.59 In the case of **groundnut** (Table A5-22), the simulated efficiency gains suggest that the largest gains would come from improved marketing and processing performance alone (scenario 2). This is consistent with the earlier findings about the high crushing margins and poor processing efficiency associated with a fragmented, small-scale, technically inefficient and under-utilized capacity utilization in the groundnut processing industry. Together, the potential gains under scenario 2 in 1994/95 could have yielded an additional US$ 54/ton of groundnut (about Rs 170/quintal). Gains from improved meal realization (from lower quality discounts and reduced export costs) would yield comparatively less since quality discounts are relatively small to start with, and meals account for a relatively small share in the value of groundnut. Clearly, groundnut growers who are currently highly taxed by the current inefficiencies in processing and marketing (NPC groundnut has fallen well below unity) would gain a lot from the de-regulation

[1] The percentage increases are calculated relative to the implied oilseed price which are generally lower than the actual prices, except for groundnut and soyabean.

of domestic trade and groundnut crushing industry; it would come at no costs to either consumers or processors.

A5.60 The **rapeseed-mustarseed** industry stands to benefit the most from de-regulation and investments in bulk-handling facilities. The gains, measured in terms of potential increases in rapeseed prices, would come almost equally from improvements in marketing and processing performance (scenario 1 and 2), and from improved meal realization (scenario 3 and 4). The rapeseed-mustarseed complex would gain significantly (US $ 41/ton or Rs 125/quintal of rapeseed in 1994/95; scenario 3, Table A5-23) from improvements in the quality of the seed material, such as double zero-varieties, which would lower discounts on the meals export markets by reducing the content in erucic acid and glucosinolate. The rapeseed complex would also benefit (an additional US$ 11/ton or Rs. 34/quintal of rapeseed) from investments in bulk handling facilities which would lower the costs of exporting meals (scenario 4). This is consistent with the observed large price discounts faced by rapeseed DOC exports on the world market. The small-scale reservation and other regulatory constraints are likely to stand in the way of raising oil recovery, even with improved seed varieties, and would need to be lifted to allow oilseed growers to reap the full benefits from adopting new, improved seed varieties. Higher oil extraction and lower processing costs could yield an additional US $ 50/ton or Rs. 155/quintal of rapeseed in 1994/95 (scenario 4). We cannot predict how the potential gains would be actually distributed between consumers, growers and processors. However, from the simulations, it is clear that all three groups would benefit. With improved marketing and processing performance, while consumers would benefit from lower rapeseed oil prices, growers could receive higher prices and the processing industry simultaneously raises its margins and level of profitability.[2]

A5.61 **Soybean** complex could benefit comparatively more from investments that reduce the costs of exporting soybean meals (US$ 15/ton or Rs 47/quintal of soyabean in 1994/95; scenario 4 in Table A5-24). This is consistent with the very large weight of the meal in the value of the bean and its relatively low oil content. The gains from technology up-gradation and improved capacity utilization in the soyabean processing industry remain nevertheless significant (US$ 9 and 11/ton in scenario 1 and 2, respectively, or Rs. 28 and 34/quintal). This is consistent with the observed high margins and effective protection of the soya solvent processing industry. Note that the gains from raising oil recovery in soyabean would more than compensate for the lower recovery of meals. The gains from efficiency gains would benefit both growers and consumers, without negatively affecting the profitability of the soyabean extraction industry.[3]

A5.62 In the case of **sunflower**, the efficiency gains are particularly large. The sunflower complex would gain the most from improvements in the processing industry (US$ 56/ton or Rs. 173/quintal in 1994/95 from improved oil recovery alone, and an additional 17/ton or Rs. 53/quintal from lower processing costs; scenario 1 and 2 in Table A5-25). This is consistent

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[2] Consumers could benefit since the rapeseed oil price implied under 20% import tariff is lower than the observed, actual price. Rapeseed prices are virtually at import parity levels (NPC close to unity in 1994/95, see Table A5-10), but crushing margins are getting smaller and even negative in 1994/95. The efficiency gains are therefore large enough to raise both producer prices and crushing margins.

[3] As indicated by Table A5-24, there is room for the soyabean oil price to fall since the implied price under 20% import tariff is lower than the observed, actual price. Similarly, soyabean growers are currently taxed by inefficiencies in the marketing and processing soya industry (NPC are below unity).

with the observed low oil extraction rates and high crushing margins in the industry. The gains from improved meal realization are just as large (US$ 50/ton or Rs. 155/quintal; scenario 4), and consistent with the high quality discounts faced on the world market together with the important export costs. Consumers, growers and industry all have to gain from improved marketing and processing performance in the industry.

A5.63 A reform strategy which concentrates on the domestic regulatory reforms and investments needed to bring about such efficiency gains, would benefit growers as well as consumers, and need not come at the expense of the processing industry. Today, the protection of the oilseed industry is being dissipated in poor processing and marketing performance, and poor meal realization, which eventually tax oilseed producers and, until recently consumers. A reform strategy that aims directly at alleviating the root causes for these inefficiencies has the potential to benefit the large constituencies of oilseed growers, the bulk of whom live in poorly endowed rainfed areas. Raising farmgate prices and returns to quality, would give the necessary incentives for growers to continue to grow oilseeds and invest in new oilseed production technologies. Improving the performance of the transformation and marketing chain in the oilseed complex would give therefore a tremendous boost to productivity growth in oilseed production, allowing domestic production to keep-up with the rapid increases in projected demand. Such a strategy would simultaneously benefit consumers who would gain from improved quality of oils while keeping oil prices low under modest tariffs. Indeed, faster productivity growth in oilseed production would alleviate the need for renewed protection policy of the oilseed complex, keep domestic price of oils in line with world price levels, and reduce import needs substantially. In addition, such a strategy would also benefit the oilseed industry which has the capacity to improve its profitability, and raise the necessary resources for its modernization and restructuration. It would therefore escape the pitfalls of a strategy limited to changes in the foreign trade policies by minimzing the inherent conflicts between growers, consumers, and processors. Government would also benefit from a strategy of de-regulation of the oilseed industry and markets since it would strengthen food security objectives, promote sustained agricultural growth and rural development in rainfed areas, and facilitate the pursuit of essential public concerns such as health safety and environmental concerns.

Table A5-22:
Potential Producer Price Gains
from Alternative Scenarios of Improved Marketing & Processing Performance
With Free Imports of Edible Oil at 20% Tariff:
The Case of Groundnut
(US $ per ton)

	India Actual Domestic Prices (extraction rate: 41%/57%)				Free Edible Oil Import Tariff: 20%			Scenario 1: Best Practice Oil Extraction (44%/54%)		
	Seed	Meal	Oil	Crushing Margin	Seed Price (implied)	Decline in Seed Price (implied)	Oil Price (implied)	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1990/91	457	95	1683	293	297	160	1307	333	36	12%
1991/92	388	97	1316	212	193	195	852	215	23	12%
1992/93	283	100	988	183	253	29	924	278	25	10%
1993/94	264	115	1099	256	351	-87	1319	387	36	10%
1994/95	311	113	1220	258	356	-44	1338	392	37	10%
Av 1990/91 - 1994/95						51			31	11%

	Scenario 2: Scenario 1 + Processing cost savings				Scenario 3: Scenario 2 + No Meal Quality Discount				Scenario 4: Scenario 3 + Lower Export Costs			
	Processing Cost Savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Implied Meal Price	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Export cost savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1990/91	20	353	56	19%	114	363	66	22%	18	373	76	26%
1991/92	18	234	41	21%	128	250	58	30%	18	260	67	35%
1992/93	19	297	44	17%	138	318	64	25%	18	327	74	29%
1993/94	18	404	54	15%	128	412	61	17%	18	422	71	20%
1994/95	18	410	54	15%	99	402	47	13%	18	412	56	16%
Av 1990/91 - 1994/95			50	18%			59	22%			69	25%

Source: NPC Tables; World Bank estimates.

Table A5-23:
Potential Producer Price Gains
from Alternative Scenarios of Improved Marketing & Processing Performance
With Free Imports of Edible Oil at 20% Tariff:
The Case of Rapeseed-Mustardseed
(US $ per ton)

	India Actual Domestic Prices (extraction rate: 37%/60%)				Free Edible Oil Import Tariff: 20%			Scenario 1: Best Practice Oil Extraction (41%/58%)		
	Seed	Meal	Oil	Crushing Margin	Seed Price (implied)	Decline in Seed Price (implied)	Oil Price (implied)	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1984/85	420	48	1096	18	296	124	786	326	30	10%
1985/86	326	30	967	53	181	145	511	201	20	11%
1986/87	323	32	1275	172	155	168	442	172	17	11%
1987/88	508	28	1736	156	203	306	587	226	23	11%
1988/89	466	49	1154	-7	210	256	578	232	22	11%
1989/90	326	34	1018	74	203	124	597	226	23	11%
1990/91	458	27	1252	26	176	281	545	198	21	12%
1991/92	360	18	1111	66	180	180	579	202	23	13%
1992/93	299	26	816	21	166	133	547	188	21	13%
1993/94	333	46	822	1	233	100	719	261	28	12%
1994/95	388	47	942	-9	266	122	826	299	32	12%
Av 1990/91 - 1994/95						163			25	12%

	Scenario 2: Scenario 1 + Processing cost savings				Scenario 3: Scenario 2 + No Meal Quality Discount				Scenario 4: Scenario 3 + Lower Meal Export Costs			
	Processing Cost Savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Implied Meal Price	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Export cost savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1984/85	19	345	49	17%	82	365	69	23%	18	375	80	27%
1985/86	18	219	38	21%	103	261	80	44%	18	272	91	50%
1986/87	17	189	34	22%	82	219	64	41%	18	229	74	48%
1987/88	18	244	41	20%	122	299	96	47%	18	309	106	52%
1988/89	18	250	40	19%	157	313	103	49%	18	323	113	54%
1989/90	19	245	42	21%	119	294	91	45%	18	304	102	50%
1990/91	20	217	41	23%	119	271	94	54%	18	281	105	59%
1991/92	18	221	41	23%	133	288	108	60%	18	298	118	66%
1992/93	19	207	40	24%	155	281	115	69%	18	292	126	76%
1993/94	18	278	46	20%	142	334	101	44%	18	344	112	48%
1994/95	18	316	50	19%	118	358	91	34%	18	368	102	38%
Av 1990/91 - 1994/95			44	22%			102	52%			112	57%

Source: NPC Tables; World Bank estimates.

Table A5-24:
Potential Producer Price Gains
from Alternative Scenarios of Improved Marketing & Processing Performance.
With Free Imports of Edible Oil at 20% Tariff:
The Case of Soyabean
(US $ per ton)

	India Actual Domestic Prices (extraction rate: 18%/82%)				Free Edible Oil Import Tariff: 20%			Scenario 1: Best Practice Oil Extraction (19%/81%)		
	Seed	Meal	Oil	Crushing Margin	Seed Price (implied)	Decline in Seed Price (implied)	Oil Price (implied)	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1987/88	410	166	1525	-6	262	148	667	267	5	2%
1988/89	336	210	1210	49	269	67	810	275	6	2%
1989/90	296	189	1295	87	216	80	822	222	6	3%
1990/91	282	131	1569	101	188	94	1008	196	9	5%
1991/92	314	152	1334	45	262	52	1013	271	9	3%
1992/93	238	175	868	58	281	-43	1085	290	9	3%
1993/94	252	168	978	57	296	-44	1197	306	10	3%
1994/95	295	166	1150	43	287	8	1076	296	9	3%
Av 1990/91 - 1994/95						14			9	4%

	Scenario 2: Scenario 1 + Processing cost savings				Scenario 3: Scenario 2 + No Quality Discount				Scenario 4: Scenario 3 + Lower Export Costs			
	Processing Cost Savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Implied Meal Price	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Export cost savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1987/88	13	279	18	7%	217	321	59	23%	18	336	74	28%
1988/89	13	288	19	7%	238	311	42	15%	18	325	56	21%
1989/90	14	236	20	9%	170	220	4	2%	18	235	19	9%
1990/91	14	211	23	12%	173	244	57	30%	18	259	71	38%
1991/92	14	285	23	9%	187	313	51	20%	18	328	66	25%
1992/93	16	306	25	9%	185	313	33	12%	18	328	47	17%
1993/94	16	322	26	9%	186	337	41	14%	18	351	55	19%
1994/95	13	308	22	8%	159	303	16	6%	18	317	31	11%
Av 1990/91 - 1994/95			24	9%			40	16%			54	22%

Source: NPC Tables; World Bank estimates.

Table A5-25:
Potential Producer Price Gains
from Alternative Scenarios of Improved marketing & Processing Performance
With Free Imports of Edible Oil at 20% Tariff:
The Case of Sunflower
(US $ per ton)

	India Actual Domestic Prices (extraction rate: 35%/49%)				Free Edible Oil Import Tariff: 20%			Scenario 1: Best Practice Oil Extraction (41%/54%)		
	Seed	Meal	Oil	Crushing Margin	Seed Price (implied)	Decline in Seed Price (implied)	Oil Price (implied)	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1987/88	476	48	1596	110	137	340	638	177	41	30%
1988/89	381	54	1340	118	155	227	703	200	45	29%
1989/90	457	57	1353	48	223	234	695	267	45	20%
1990/91	508	49	1577	72	199	310	705	243	45	23%
1991/92	393	41	1218	57	194	199	660	236	42	21%
1992/93	299	51	952	62	200	100	675	243	43	22%
1993/94	336	54	1034	55	280	57	880	335	56	20%
Av 1990/91 - 1993/94						166			46	21%

	Scenario 2: Scenario 1 + Processing cost savings				Scenario 3: Scenario 2 + No Quality Discount				Scenario 4: Scenario 3 + Lower Export Costs			
	Processing Cost Savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Implied Meal Price	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change	Export cost savings	Implied Oilseed Price	Increase in Seed Price	% Oilseed Price Change
1987/88	18	195	59	43%	131	240	104	76%	18	250	113	83%
1988/89	18	218	63	41%	151	270	115	75%	18	280	125	81%
1989/90	19	286	63	28%	118	319	96	43%	18	329	106	48%
1990/91	20	263	65	33%	114	298	100	50%	18	308	109	55%
1991/92	18	254	60	31%	128	301	107	55%	18	311	117	60%
1992/93	19	262	62	31%	138	309	109	55%	18	318	119	60%
1993/94	18	353	73	26%	128	393	113	41%	18	403	123	44%
Av 1990/91 - 1993/94			65	30%			86	40%			117	44%

Source: NPC Tables; World Bank estimates.

Annex 6

The Oilseed Complex and the GATT

A6.1 In 1995, India signed the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). In signing the GATT, India committed to: (i) converting all non-tariff measures into tariffs (known as tariffication); and (ii) following GATT rules regarding market access, domestic support, and export competition. This Annex reviews the implications of the GATT on oilseed and edible oil trade in the world in general and India in particular. It also examines the impact of the current trade regime on domestic price stability and explores the feasibility alternative mechanisms for managing the price risks associated with a more open trade environment.[1]

A. Implications of GATT on Trade of Agricultural Products

A6.2 The Uruguay Round of the GATT mandated trade measures specific to developing countries. It required India and other developing countries to:

- convert non-tariff barriers into bound duties;
- bind all tariffs and tariff equivalents;
- reduce the new bound tariffs, as well as tariffs which had been bound in previous negotiations, by at least 10 % per tariff item and by 24 % on a simple (unweighted) average over ten years (1995-2004);
- for commodities subject to tariffication, establish minimum access opportunities at 2 % of 1986-88 consumption in 1995, rising to 4 % in 2004.

A6.3 The Uruguay Round agreement in agriculture defines non-tariff measures to include quantitative restrictions, minimum import prices, variable import levies, discretionary import licensing regimes, non-tariff measures applied through state-trading enterprises, voluntary export restraints, and similar border measures other than ordinary customs duties. These non-tariff measures had to be replaced by a tariff equivalent. This tariff equivalent is a customs duty designed to provide the same level of protection as the non-tariff measure.

A6.4 Developing countries had the option of setting maximum tariff ceiling bindings[2] instead of tariff equivalents of existing non-tariff measures. The binding of all tariff items at the established maximum levels was also accepted in lieu of reduction commitments. In addition, if

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[1] This Annex is based on M. Ingco, 1995, "India's Domestic and External Trade Policy Environment, Implications for Marketing Policies and Strategies in Oilseeds and Vegetable Oil Markets," International Economics Department, mimeo.

[2] Developed countries were required to convert non-tariff barriers into tariff based on tariff equivalents of NTBs in the base period, 1986-88. Bindings or bound rates refer to tariff rates that resulted from GATT negotiations and were incorporated in a country's schedule of concessions. Bindings are thus enforceable and form an integral part of the GATT. The purpose of a tariff binding is to provide greater commercial certainty by imposing a ceiling which cannot be breached without recourse to the GATT.

the option of maximum tariff ceilings is chosen, the country is exempted from the minimum access commitments.[3]

A6.5 For agriculture, India chose the option to establish maximum tariff ceiling bindings in converting quantitative restrictions into tariffs for all agricultural commodities, including oilseeds and edible oils. For most products, India is also not required to reduce the tariffs during the 10-year implementation period (1995-2004). However, India is not allowed to introduce any new non-tariff measures, unless they can be justified under the WTO provisions. Since India also pursued this option, it is also exempted from minimum access commitments.

B. Implication of the GATT on Oilseed Trade

India's Current Tariff Levels and GATT Commitments

A6.6 **India's current tariffs on oilseeds are set at significantly lower levels than their GATT ceiling bindings.** India's tariff ceiling bindings for oilseed imports (soybeans, copra, linseed, rapeseed, colza, and sunflower) are set at 100 % (Table A6.1). But these bindings are not relevant at the present time, since the tariff levels for these oilseeds have been set at 50 % since 1995.

Table A6.1: Current and GATT Tariff Ceiling Bindings for Oilseeds and Edible Oils

Commodities	Current Tariff Rate	GATT Final Bound Rate
Soybeans, Rapeseed, Sunflower, Groundnuts	50	100
Copra and Linseed	50	100
Soybean oil, Rapeseed & Colza, or mustard oil	30	45
Palm oil & Coconut oil	50	300
Groundnut oil &		
Sunflower seed oil	30	300
Other Vegetable oils	30	300

Source: Appendix Table A-1.

A6.7 Oilseed imports, however, continue to be canalized through the two state corporations-- the State-Trading Corporation (STC) and Hindustan Vegetable Oils Corporation Ltd (HVOC). The canalization of imports is considered legal under the UR agreement. Thus although current tariffs much below the ceiling bindings, the volume of imports will remain a government prerogative, via the two state corporations.

A6.8 If imports are decanalized, the GATT bindings will impose the upper bound on the nominal protection for these oilseeds. These maximum tariffs will likely be binding for three commodities at least, that is rapeseed, groundnut, and copra. This is due to the fact that their domestic prices occasionally exceeded border prices by even more than the ceiling bindings in 2-7 years during 1965-1993.

A6.9 **India's current tariffs for the major edible oils are also significantly lower than its GATT ceiling bindings** (Table A6.1). The tariff ceiling bindings for most edible oils--with the exception of soybean, rapeseed, mustardseed and colza oil whose ceiling bindings are set at 45 %--are 300 %. Actual tariffs for vegetable oils, however, have been reduced to 30 % from the previous level of 65 % for most oils and 35 % for soybean and rapeseed oils.

A6.10 Unlike oilseeds, the lowering of the tariffs was also accompanied by complete elimination of the monopoly on edible oil imports by the state trading corporations. Prior to 1995, only palm olein was allowed to be imported by the private sector. Edible oils are now freely importable under open general license. The STC and the National Dairy Development

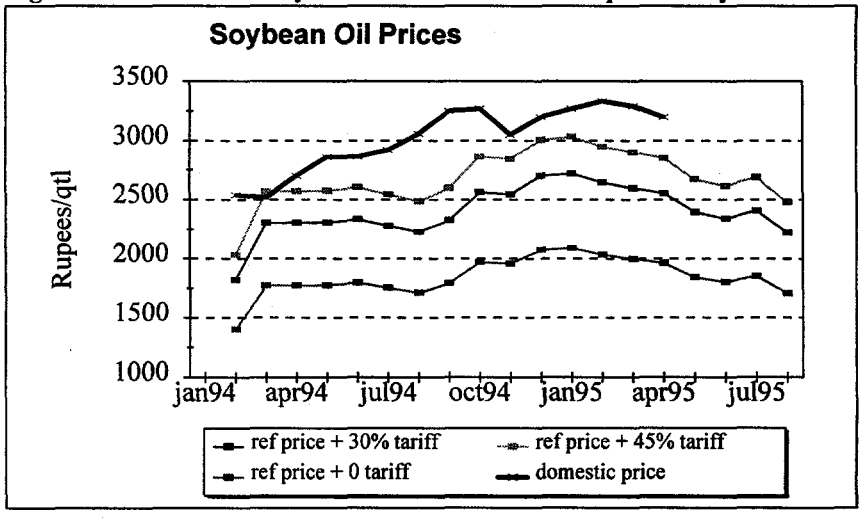
[3] Contracting parties are to provide minimum level of import access opportunities for products subject to tariffication. Minimum access will be ensured by a tariff-quota.

Board (NNDB), however, benefit from a concessional import tariff of 20 % on edible oil imports. The preferential access to imports is permitted under the GATT provided that in the process of importing, there is no discrimination with respect to the sourcing of supply.

A6.11 **The freeing up of edible oil imports at the a 45 % tariff level will set the ceiling on domestic prices of edible oils.** To the extent that various oils are substitutable in consumption,[4] an increase in available supplies of particular edible oils (such as soybean, rapeseed , or mustardseed oil) will also have an effect on the price of other oils.[5] Substitutability will be high in food consumption, although tastes and habits will influence choice. In industrial use, substitutability is high because fats and oils are used in mixed form, but technical requirements may restrict choice and use. But ultimately, substitutability between oils is determined at the processing level where the manufacturer is subject to the constraint of input prices relative to output prices.

A6.12 The tariff binding of 45 % on major edible oils will also indirectly influence the level of protection of oilseeds. The upstream effect of oilseed protection results from the fact that oilseed prices are influenced not only by supply-demand conditions for oilseeds, but also by the prices of its joint-products, edible oil and oilseed meals. Such a spill-over effect is highly likely for soybeans. A comparison of monthly import parity prices (inclusive of UR tariff commitments) with domestic prices for soybean oil, groundnut oil and palm oil for the period January 1994-August 1995,6 show that for domestic soybean oil are significantly higher than import parity prices (inclusive of tariffs) (Figure A6.1).

Figure A6.1: Domestic Soybean Prices Relative to Import Parity Prices



[4] The technical substitutability varies according to use. In markets with specific demands, end users attach high importance to certain natural characteristics which cannot be reproduced and for which they are prepared to pay a higher price. In markets with interchangeable demands, end users are largely indifferent to manufacturers choice of inputs and favor products with prices consistent with least-cost formulation. The latter is true in oils used in soaps, margarine, and oleic acid manufacture.

[5] There is some evidence that the demand schedule of particular oils becomes more elastic over time if the supplies of that particular oil continue to expand relative to other oils. Palm oil provides an example.

[6] The import parity prices are derived assuming constant transport costs and marketing margins. Estimates of marketing margins and transportation costs are adapted from Gulati, A. and Pursell G. Trade Policy, Incentives and Resource Allocation in Indian Agriculture (Draft book manuscript, 1995).

State-Trading Enterprises and the GATT

A6.13 **India's canalized STE imports of oilseeds and some oils is permitted under GATT Rules.** Imports of oilseeds and coconut oil remain canalized through the State Trading Corporation of India and the Hindustan Vegetable Oils Corporation (Table A6.2). This is permitted under the GATT provided India notifies the WTO about its intention to retain these state trading enterprises (STEs) (Box A6.1). India has already done so, by registering the two corporations as State-Trading Enterprises (STEs). The right of countries to maintain state-trading monopolies in imports or exports are described in Article XVII of the GATT.

Table A6.2. Canalized Agencies and products

Product Description	Canalizing Agency
Seeds (copra, groundnut, palm, rapeseed, safflower, soybean, sunflower, cotton)	The State Trading Corporation of India Limited
Palm stearin, excluding crude palm stearin; and tallow amines of all types	The State Trading Corporation of India Limited
Coconut oil	The State Trading Corporation of India Limited
All other seeds or any other material from which oil can be extracted (whether edible or non-edible)	The State Trading Corporation of India Limited and Hindustan Vegetable Oils Corporation Limited

Source: India Trade Policy Review, GATT, December 1993.

A6.14 Under the new WTO rules, any monopoly of the importation of any product covered in the GATT schedule of commitments shall not result in protection which is on average in excess of the amount of protection provided for that schedule. The import mark-ups of STEs will be bound by the tariffs ceiling, and once bound should not provide protection above the resulting tariff equivalent. Given the high tariff bindings on most oilseeds, the new rules will not severely constrain import policies of STEs in India. Given that India is exempted from minimum access commitments and canalization of imports can potentially be expanded from oilseeds to other oilseed products, the protection levels for oilseeds and their derivative products can actually potentially exceed the ceiling bindings. Nonetheless, the greater transparency provided by the notification requirements could constrain greater trade restrictiveness.

Box A6.1: India's State Trading Enterprises and the GATT

In the Uruguay Round of the GATT, attempts were made to impose constraints on the operations of state-trading enterprises (STEs) and increase surveillance by requiring countries to notify World Trade Organization (WTO) about their STEs. The GATT definition of a STE is an agency that has "exclusive or special privileges, including statutory or constitutional powers, in the exercise of which they influence through their purchases or sales the level or direction of imports or exports." The enterprise does not have to be a state enterprise per se in order to be covered; it need only enjoy "exclusive or special privileges" granted by the government. It therefore includes a private corporation or enterprise, or marketing board that receives some special favor from the State, giving it an advantage over other firms.

Under the new WTO rules, any monopoly of the importation of any product covered in the GATT schedule of commitments shall not result in protection which is on average in excess of the amount of protection provided for that schedule. The import mark-ups of STEs will be bound by the tariffs ceiling, and once bound should not provide protection above the resulting tariff equivalent. Given the high tariff bindings on most oilseeds, the new rules will not severely constrain import policies of STEs in India. In practice, if there are no actual imports by the state-trading monopoly, as in the case of most oilseeds, the tariff bindings will not effectively constrain domestic protection on oilseeds. However, the greater transparency provided by the notification requirements could constrain greater trade restrictiveness.

The WTO notification rules for STEs will require India to provide the reason and purpose for introducing or maintaining the enterprise. For instance, India has to notify whether the purpose is to prevent prices to consumers from exceeding certain limits, or to protect domestic producers by the control of imports, or to make it possible to establish a stabilization program. In addition, India has to describe, item by item, the functioning of the enterprise in the following areas:

- whether private traders are allowed to import or export and if so, under what conditions; whether there is free competition between traders and the state-trading enterprise;
- criteria used in determining quantities of imports or exports;
- how import mark-ups on imported products are determined and how re-sale prices of imports compare with domestic prices;
- whether long-term contracts are negotiated by the state-trading enterprise.

Domestic Support Measures for the Oilseed Sector

A6.15 **India will not be required to reduce domestic support levels for agriculture.** This is due to the fact that India's aggregate measure of support (AMS) for agriculture was estimated to be negative. The AMS included both product-specific and non-product specific support (Box A6.2). According to Gulati and Sharma (1994), the AMS amounted to minus Rs 196 billion, which is equivalent 22 % of the total value of agricultural output. Although the oilseed sector received the positive support.

Export Subsidies

A6.16 **Since India does not have direct export subsidies, GATT Rules on export subsidies are not relevant a present time.** The GATT requires developing countries to reduce export subsidies by 24 % over 10 years from the base period of 1986-90. India, however, is not directly subsidizing any agricultural imports.[7] India has de facto subsidies, where oilmeal exporters receive a premium on exchange rates paid for by importers who need foreign exchange. However, these de facto subsidies are not covered in the UR rules on export subsidies.

A6.17 The UR rules prohibits the introduction of export subsidies in products to which they have not hitherto applied. However, as part of special and differential treatment given to developing countries, India is not required to reduce the cost of marketing exports and internal transport subsidies. This also implies that the UR rules do not constrain India from instituting subsidies on marketing and transport in oilseeds and edible oils.

Trade Restrictions for Balance of Payments Provisions

A6.18 **GATT rules permit countries to use quantitative restrictions (QRs) in special situations, including cases where the country is facing balance of payment difficulties and temporary market disruptions.** India obtained the right from the GATT to use quantitative restrictions (Qrs.) for balance of payments reasons (Article XVIII:B) in 1949 and has retained it ever since. This right is maintained in the Uruguay Round commitments. The document called "Understanding on the Balance of Payments Provisions of the GATT" clarifies the disciplines and procedures governing the use of BOP safeguard measures while safeguarding existing rights and obligations. The Uruguay Round rules attempts to strengthen these disciplines, in order to control the practice of balance-of-payments provisions as a means of providing protection to particular industries. A basic principle of the new rules is that they should apply to a wide range of imports, and not be targeted to particular sectors such as the oilseed industry. Selective targeting

Box A6.2: Domestic Support Measures and the GATT

Under the Uruguay Round of the GATT, developing countries are required to reduce aggregate producer subsidies by 13.3 % over 6 years. However, it provides exemptions for developing countries with an aggregate measure of support (AMS) of 10 % or below on agricultural products. The AMS include product- and non-product specific support. Product-specific AMS includes market price support and non-exempt direct income payments. The estimated product-specific AMS for India (for 17 products) was negative, amounted to about -Rs 242 billion during the triennium ending 1988/89. This is equivalent to minus 27.7 % of the total value of agricultural production (excluding forestry and fisheries) during the period. Non-product specific AMS includes various public expenditures and subsidies (such as input, fertilizer, and irrigation, subsidies) which are non-crop specific. The non-product specific AMS was estimated at Rs 46 billion, about 5 % of the total value of agricultural production.

[7] Direct export subsidies include (i) sale or disposal for export of stocks at a price lower than that in the domestic market; (ii) payments on exports financed by producers by virtue of governmental action; (iii) subsidies to reduce the costs of marketing exports including handling, upgrading, and other processing costs, and the costs of international transport (but excluding widely available export promotion and advisory services); (iv) internal transport subsidies on export shipments.

of a particular commodity or a range of products for BOP-based protection, however, appears to be inconsistent with the WTO rules[8].

A6.19 If India wishes to impose restrictions and raise tariffs beyond the tariff bindings for BOP reasons, it should do so in the least trade-disruptive manner and should favor price-based measures, such as import surcharges and import deposits, rather than quantitative restrictions. The new rules require India to avoid the imposition of new quantitative restrictions unless, because of critical balance-of-payments situations, price-based measures cannot arrest a sharp deterioration in balance of payments situation.. The agreement also established a WTO Balance of Payments Committee to handle consultations and notifications of BOP measures. The committee will decide the type of procedure for consultations while the WTO Secretariat will be available to assist in preparing documentation for the consultations.

A6.20 In the context of these consultations, the IMF will provide information on recent economic developments and assess whether a balance of payments problem exists. It is possible that the balance of payments justification for India's use of QRs. could be challenged in the WTO in the future. During the past few years, India's balance of payments situation has improved, as there has been as a positive current account, large foreign exchange reserves and capital inflows. It is unlikely that BOP provisions could be invoked under these circumstances.

Safeguard Measures[9]

A6.21 **The safeguard provision allows India to impose tariffs or quantitative restrictions on imports for a limited time period if they cause or threaten serious injury[10] to the domestic oilseed and edible oil industry**. The UR safeguards provisions provide for a tighter discipline and increased flexibility (Box A6.3). It also aimed to deter countries from using other "gray area" measures to restrict imports.[11] Under the new arrangements, safeguard actions may discriminate among suppliers in exceptional circumstances where imports from a member country increase disproportionately, which is something that the old GATT Article XIX did not allow. Discrimination is to be carefully controlled, however, to ensure that it responds only to disproportionate increases in imports from particular countries, and is not resorted to as a matter of course.

Box A6.3: How Countries Can Introduce Safeguard Measures?

The procedures for introducing safeguard measures differ according to the nature and degree of injury cause by imports. In critical circumstances where delayed action against imports would prove difficult to repair, provisional safeguards measures may be adopted for a maximum of 200 days, during which time a proper investigation must be carried out. In less "critical circumstances" provisions, the imposition of safeguards must be preceded by a transparent and thorough investigation of the case by the authorities, and confirmation of actual or threatened serious injury, and of the causal relationship between the injury and increase imports.

Countries may invoke safeguard measures for a maximum of four years, but can be extended for a further period of four years, provided the underlying conditions provoking the initial action persists, and there is evidence that the industry concerned is adjusting. Safeguard measures must be reviewed by country members if they have been in place for three years, and progressive liberalization must take place during the life of the measure. All existing safeguard measures must be eliminated over five years to eight years (10 years for developing countries) after they entered into force. The determination of injury must demonstrate a causal link between imports and injury. The agency that conducts the investigation and makes the determination must publish a detailed analysis, setting out its findings and conclusions, and how these relate to the facts developed and to the applicable law. The agreement establishes a Committee on Safeguards to monitor the operations, consultations and notifications requirements.

[8] GATT (1994) explicitly mandates members to give preference to price-based measures.

[9] A mechanism available during the implementation period (1995-2004) for temporarily applying higher tariff rates in particular circumstances.

[10] The conditions under which safeguard actions are possible under the rules are described in Article XIX of the Agreement.

[11] Aside from voluntary export restraints, gray area measures include: orderly marketing arrangements, export-price or import-price monitoring systems, export or import surveillance, compulsory import cartels and discretionary export or import licensing schemes.

C. Trade Regime, UR Trade Rules and Management of World Price Risks

A6.22 India's recent move to liberalize external trade links the domestic economy closer to the global market. While the more open trade regime will enable India to capture emerging opportunities in the world market, it also exposes the domestic economy to the risks of fluctuating world market prices. This section looks into the incidence of price risks in oilseed and edible oil markets in India and the world market and evaluates their implications, given India's UR commitments and the new UR trade rules on India's domestic price stabilization programs.

How Volatile Have Oilseed and Edible Oil Prices Been?

A6.23 To evaluate the incidence of price risks associated with a more open trade regime, the volatility of world and domestic prices is analyzed in this section. The level of price risks is assumed to be determined by the instability of prices over time as measured by the standard deviation and coefficient of variation (CV). For oilseeds, these instability measures were calculated using actual and de-trended annual average world and domestic prices (in Rs/quintal) for major oilseeds during the years 1960 to 1995.[12] To measure the volatility of world prices, similar measures were calculated using monthly averages of world prices (in dollars/ton). For comparison, the volatility measures of world prices for other major commodities such as grains, cotton and sugar are also reported. The results of the analysis are presented in Table A6.3.

A6.24 **Most domestic oilseed prices display greater price volatility than world oilseed prices.** Both domestic and world market price of oilseeds displayed significant price variability. Their CVs range from 35 to 70 % (Table A6.3). However, with the exception of soybeans, domestic oilseed market prices displayed greater price instability than world market prices during the last 35 years. Although similar analysis on domestic edible oil and meal prices could not be undertake due to data limitations, it is likely that they would also show significant price volatility, because of joint-product characteristics. In the case of palm oil, since it is mostly imported, the volatility of domestic prices would mainly reflect the volatility of world palm oil prices.

[12] The coefficients of variation were estimated using average annual data of actual and de-trended price series. Monthly data of world product prices tend to show seasonality, which appears to raise the estimated volatility.

A6.25 **World market prices for edible oils show a high degree of price volatility.** This is illustrated by the frequency distribution of monthly prices show in Figures A6.2a to A6.2d. The historical world price volatility in oilseeds and edible oils results from three major factors. First, policy shocks and weather variations in major producing countries, particularly in the United States and the European Union, contributed to sharp changes in output levels. Policy reorientation towards lower support prices but increased direct income payments to farmers linked to supply control measures in OECD countries resulted in high levels of support for the oilseed sector in these countries. For example, In addition, soybeans account for 75 % of international trade in oilseeds. The United States alone accounts for over 50 % of world soybean production and over 65 % of world soybean exports.[13] In 1992/93, Brazil and Argentina combined accounted for 20-25 % of world soybean exports. Because so few countries constitute such a large proportion of world soybean supply, factors affecting production in any single country can produce significant consequences in world markets.

Table A6.3: *Instability index for Oilseed and Vegetable Oil Prices*

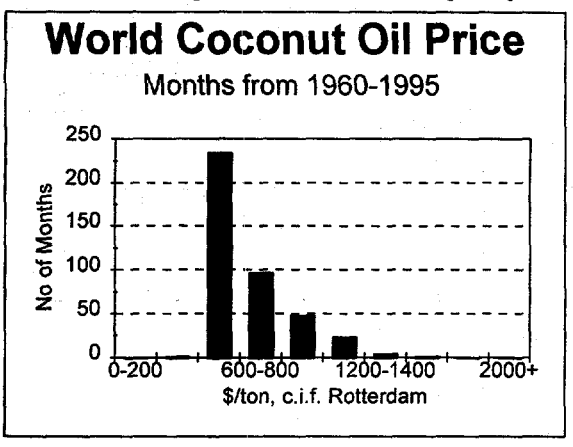
Commodity	Coefficient of Variation (%)	Standard % Deviation from Trend, (1960-1995)
Domestic Prices of Oilseeds Rs/quintal		
Groundnut	71	35
Rapeseed-mustardseed	66	32
Copra	67	34
Sunflower	53	28
Soybean	55	22
World Prices of Oilseeds, Rs/quintal		
Groundnut	61	25
Rapeseed-mustardseed	54	21
Copra	62	30
Sunflower	46	25
Soybean	54	20
World Prices of oilseeds, edible oils and meals US$/ton		
Soybeans	38	12
Soybean meal	40	13
Soybean oil	24	18
Palm oil	43	21
Groundnut oil	46	24
Groundnut meal	35	43
Copra	49	29
Coconut oil	47	31
World Prices of Other Major Products, US$/mt		
Wheat	37	13
Rice	42	23
Sorghum	36	14
Maize	35	15
Cotton	40	16
Sugar	83	46

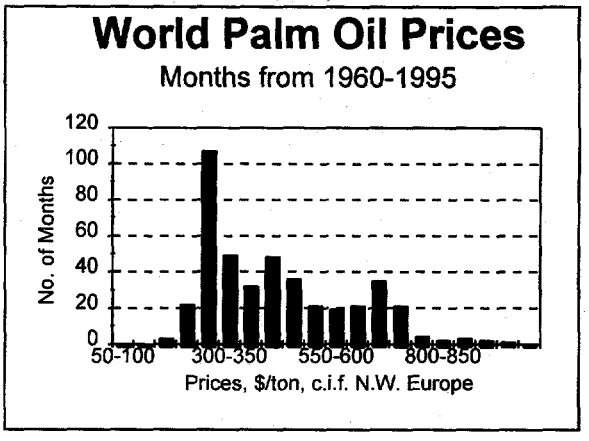
Source: IECCP, World Bank.
a - CV = standard deviation/ mean; b - quintal = 100 kg

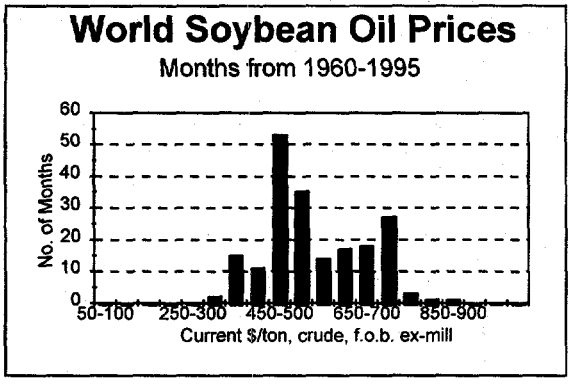
A6.26 Second, the joint-production of vegetable oils and meals, combined with high substitutability among the oils and substitution of the meals with other feeds, contribute to the high volatility of prices. Oilseeds are not consumed directly, but are crushed to produce oil and meal. The markets for these by-products are determined by very different factors. The demand for meals is driven by livestock production and competition among livestock feeds (soybean meal, maize, wheat, etc.), while demand for vegetable oils is influenced by large substitution possibilities in direct and industrial uses. The complexity in market conditions in the two markets contribute to the volatility in prices.

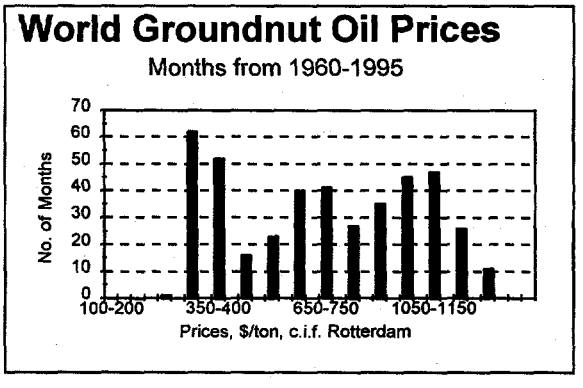
[13] World production of soybeans is dominated by five major producers (the United States, Brazil, Argentina, China, and India), accounting for more than 90 % of world production.

Figure A6.2a to 2d: Frequency Distribution of World Edible Oil Prices









A6.27 Third, the fixed nature of perennial vegetable oil production influences the extent of price instability. While farmers of annual oilseed crops can change production plans in response to price changes every year, oil palm and coconut trees are planted based on projections of long-term price movements. The trees take several years to reach fruit-bearing stage, and some may take a decade to reach maturity. The yield of the trees follow a biological cycle and may produce for more than 50 years. In addition, for modern palm oil plantations, the majority of the costs of producing vegetable oil from tree crops are generally fixed. In addition to the fixed cost of planting, processing plants are usually built near the plantation, since the oil contained in the picked fruit quickly becomes rancid. Since most of the processing plants are fueled by waste products, the variable costs of palm oil production are quite low. Hence, tree-crop farmers are unable to adjust production as quickly as producers of annual crops in response to price changes.

A6.28 The price instability analysis on world market prices was done in both Rupee and dollar terms. The results also indicate that there was greater price variation in world markets prices when analyzed in rupee terms (Rs/quintal) than in dollar terms ($/mt). This implies that there is additional risk resulting from exchange rate volatility.

India's UR Commitments and Management of Price Risks

A6.29 **Given the volatility of world market prices of oilseeds and edible oils, the effects of a more open trade regime are a major concern.** Discriminatory interventions such as quantitative restrictions have been used by the GOI ensure some measure of price stability. However, the lessons from experiences in other countries indicate that price stabilization schemes point to several implementation problems. They also have the tendency to function

more as a price support program than a neutral price stabilization program (see Valdes, 1992). As the government liberalizes its trade policy and moves toward more transparent and non-discriminatory tariffs as agreed in the UR, the implications of transitional tariff-based price stabilization measures are being considered by the government.

A6.30 This section examines the effects of various kinds of stabilization measures on price variability. In principle, trade liberalization would reduce the extent of insulation of domestic markets, thereby enhancing the risk-spreading role of international markets. The conversion of non-tariff barriers into fixed tariffs (tariffication) would contribute to the reduction of the instability of international prices and of domestic prices in relatively open economies. This is particularly relevant for India in the case of oilseeds, since domestic prices have been more volatile than world prices.

A6.31 Evidence of lower estimated instability in world prices resulting from tariffication have been shown in the case of grains and meat products (Anderson and Tyers, 1992). While there is no empirical evidence available in the case of oilseeds and edible oils, there is reason to expect that tariffication will have a similar effect, but of a different degree on the instability of world prices of these commodities. However, because world oilseed and edible oil markets are generally less protected than grains and meat products, the impact of liberalization on the instability of world oilseed and edible prices is expected to be less than the effect on the more heavily protected commodities.

A6.32 **How would India's UR tariff commitments affect import price instability?** In the case of oilseeds, the current restrictive policies on imports (monopoly by STC), the absence of minimum access commitments, the high tariff ceiling bindings and the right to continue using QRs due to balance of payments considerations in the UR, provide India with significant flexibility to maintain the current insulation of domestic oilseed prices. Thus, how India's tariff commitments will affect import price stability will depend primarily on India's actual implementation of its commitments. As described in section 1, the final commitments would allow wide discretion in setting actual applied tariffs. The frequency at which India changes the applied tariff rates will determine how much import price instability would increase. At the same time, because of the relatively high level of the tariff bindings committed by India in the UR, the tariff bindings will allow India more room to manage world price spikes in the context of a tariff-based price stabilization scheme.

A6.33 Although the actual implementation rules on tariff bindings are quite uncertain, it appears that India is allowed under the UR to apply variable tariffs within the margin of the binding. The tariff could be set as the difference of the given domestic price and the world price as long as the tariff does not exceed the binding. In practice, the tariffs could be varied within the binding to achieve a certain level of stability for the long-run domestic price (internal and import prices) as in price band mechanisms. In this context, import prices could be stabilized within a pre-determined band.

A6.34 In implementing a price stabilization scheme, it is important to devise procedures such that the mechanisms will not undermine the stability objective of bindings and the transparency objective of tariffication in general. Such transparency of government policies is important in providing an favorable environment for increased private sector participation in India's oilseed and edible oil sector. Imposing a variable tariff has the disadvantage of reducing the potential gains from increased transparency of the trade regime. Therefore, careful consideration of potential implementation problems and the tendency over time for measures to function more as a price-support program should be carefully evaluated.

A6.35 The import parity prices, subject to the range of tariffs committed in the UR and assuming similar incidence of world price instability as in the past. World Bank projections of world prices for oilseeds and edible oils are used in the analysis. Figures A6.3a and A6.3b show that there is considerable instability in border prices for major edible oils, particularly for groundnut oil and coconut oil.(See Appendix Figures A6.1a and A6.1b for projected import prices for soybean and palm oil).

Figure A6.3a: Projected Groundnut Prices under Different Tariff Scenarios.

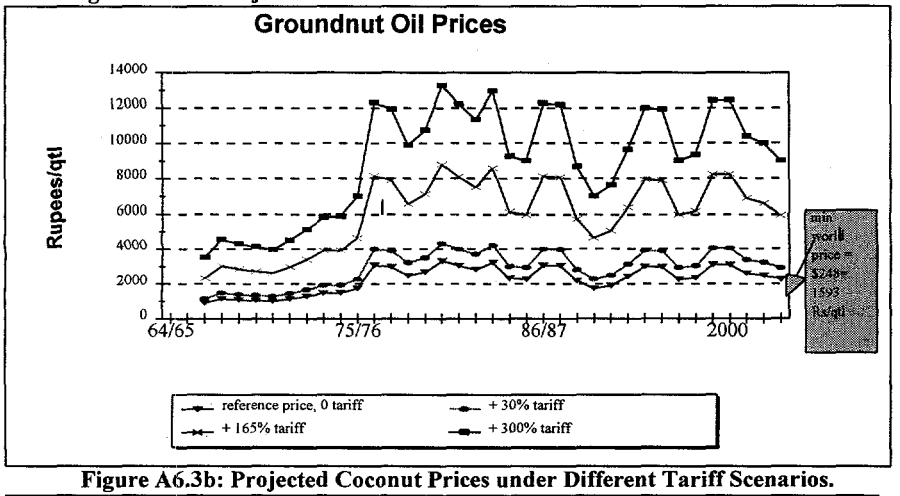
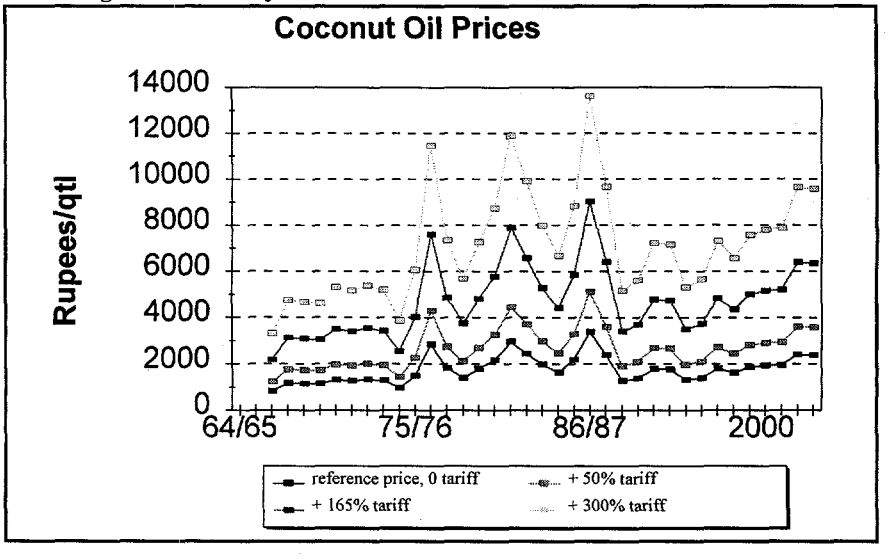


Figure A6.3b: Projected Coconut Prices under Different Tariff Scenarios.



Impact of Selected Tariff Based Price Stabilization Mechanisms

A6.36 The impact of four alternative tariff-based price stabilization measures for selected major edible oils were examined. The mechanisms examined were:

- *Scenario I*: Variable tariff to maintain a particular reference price
- *Scenario II*: Scenario I with 30 % nominal protection
- *Scenario III*: Scenario II with a price band set at 10 % above and below the reference price
- *Scenario IV*: Scenario II with a price band set at 30 % above and below the reference price

A6.37 Scenario I involves maintaining a reference price level using variable tariffs, so that a given price is guaranteed in each period to producers and consumers. The reference price is assumed to be equivalent to the 5-year moving average of past world prices. Given that the moving average of past prices is more stable than the underlying price itself, the scheme reduces the variability of prices facing producers and consumers. If the border price is below the reference price, the tariff is positive to ensure that the reference price prevails in the domestic market. If the border price is above the reference price a subsidy is required. Over time, the reference price does not raise the average domestic price, since the average (mean) of the reference price is equal to the average of the underlying world price. Thus, in the long-run, the tariff revenues and subsidy payments will match. The length of the moving average is critical. If a long moving average of prices is used as the reference price and real prices have been falling over time, then the world price will tend to be below the reference price for long periods, requiring persistent government tariffs.

A6.38 In Scenario II, the reference price to adjusted to provide 30 % nominal protection. In Scenario III, in addition to the 30 % protection rate, a price band mechanism is also introduced. The price band scheme, sets the upper and lower limits on the level of domestic prices. In this case the prices are allowed to move freely within the band of 10 % above and below the reference price. When the world price falls below the lower band, a tariff is levied in order to raise the price of imports to the lower band level. If the world price exceeds the upper band, subsidy payments are made in order to lower the price of imports to the upper band price level. Scenario IV expands the price band introduced in Scenario III to 30 %.

A6.39 The period of analysis extended over 10 years and each of the schemes was analyzed using nominal prices.[14] Subsidies in certain periods are excluded by normalizing the tariffs so that the average normalized tariff would be set at the level of the largest estimated subsidy.[15]

Tariff Variability under Different Scenarios

A6.40 The mean, standard deviation, and coefficient of variation (CV) of the variable tariffs under each scenario are summarized in Table A6.4a and A6.4b. The differences in the standard deviations and coefficients of variation between world prices and stabilized domestic prices (5-year moving average of world prices) provide a measure of the degree of risk reduction. To account for risks associated with changes in exchange rates, shipping, port and other handling charges, the prices are translated into Rs/qtl.[16] However, while these risk components are important, they have a more global impact on trade in general, and their variations are not directly related specifically to commodity trade. Hence, the costs and benefits of stability in exchange rates and shipping charges should be analyzed separately for the economy as a whole.

[14] The denomination of prices used has implications on the results. For example, if the price bands and reference prices are in nominal terms, and if prices rise in nominal terms, then in most periods the current price will be above the reference price and frequently will exceed the upper band level. This results in lower government tariffs needed to maintain the upper band level. In periods of abnormally high prices, subsidies (cases where tariffs are shown negative) are necessary to maintain the upper band price level. Alternatively, if prices are in real terms, real prices decline during periods of stable nominal prices. During these periods, the current real price will tend to be below the reference price or even below the lower band level. In this case, the lower band price is maintained by increasing the tariff rate.

[15] Subsidies, indicated by negative tariffs, are required to maintain the upper band when world prices exceed the upper band by more than the basic tariff.

[16] A quintal (qtl) is equal to 100 kg.

In analyzing price risks faced by the Indian producer, the relevant price variable are prices in terms of Rs/qtl. Figures A6.4 shows the results based on 5-year moving average of nominal world prices translated in Rs/qtl for soybeans, thus accounting for exchange rate variations. (See Appendix for the results for coconut oil and palm oil.)

Table A6.4a: Price Stabilization Schemes and Tariff Variability

Commodity	Scenario I				Scenario II	
	CIF Europe price US$/ton	Border rupee price Rs/qtl	5-yr. moving average Rs/qtl	Normalized tariff %	5-yr. mv+30% reference price Rs/qtl	Normalized tariff %
Coconut Oil						
Mean	546.76	1101.84	852.88	52.08	1108.74	67.71
Std Deviation	228.50	537.34	209.43	39.75	272.26	51.67
CV	42	49	25	76	25	72
Min	284	559.33	670.54	0	871.7	0
Max	738	2356.52	1497.06	92.15	1946.18	119.81
Soybean Oil						
Mean	487.53	1025.13	758.46	30.84	986.00	40.10
Std Deviation	121.62	524.71	244.30	25.72	317.58	33.43
CV	25	51	32	83	32	80
Min	318	451.61	610.8	2.57	794.04	3.35
Max	706.00	2356.52	1483.67	82.97	1928.77	107.87
Palm Oil						
Mean	423.46	897.73	667.53	41.90	867.79	54.48
Std Deviation	146.50	503.98	181.21	31.71	235.57	41.22
CV	35	56	27	76	27	76
Min	267.00	428.26	524.07	0.00	681.29	0.00
Max	719	2397.3	1289.97	85.95	1676.96	111.74

Source: M. Ingco, 1995, "India's Domestic and External Trade Policy Environment, Implications for Marketing Policies and Strategies in Oilseeds and Vegetable Oil Markets," World Bank.

A6.41 **Except for soybean oil, the variable tariffs required to perfectly stabilize domestic prices in all four scenarios are well within the UR tariff binding commitments.** However, the tariffs required change significantly from year to year. The implied import prices associated with the variable tariffs also exhibit large variability. In general, the scheme of variable tariffs undermine the objective of stability and transparency in government policies. In addition, its management would likely impose large administrative costs.

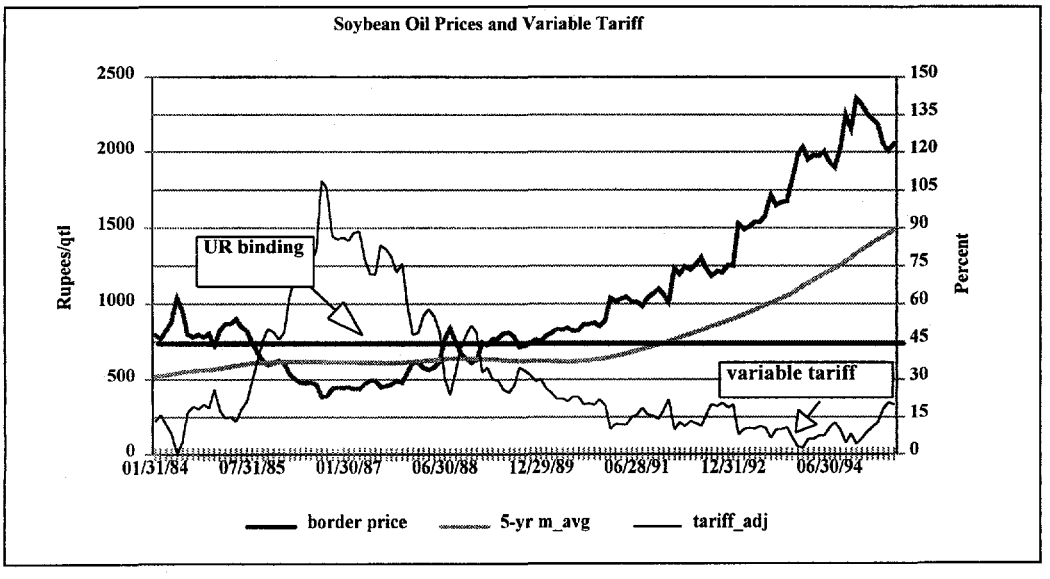
A6.42 **The 30% nominal protection introduced in Scenario II provides greater insulation of domestic prices, but only reduces slightly the instability of the variable tariffs obtained in Scenario 1.** For example, the coefficient of variation (CV) of the normalized variable tariffs required to stabilize domestic prices at the 5-year moving average prices was 0.83 for soybean oil under Scenario 1 and 0.80 in Scenario II. The means of the variable tariffs (estimated as simple average of monthly tariffs over 1988-1995) required to stabilize domestic prices (at the 5-year moving average plus a 30 % nominal protection) in Scenario II, however, is higher Scenario I, because of the higher protection under this scheme.

Table A6.4b: Price Stabilization Schemes and Tariff Variability

	Scenario III: Price Band with -/+10%					Scenario IV: Price Band with -/+30%				
	5-yr. mv+30% Rs/qtl	floor= -10% Rs/qtl	ceiling= +10% Rs/qtl	Stabilized border price Rs/qtl	norma-lized tariff	5-yr. mv+30% Rs/qtl	floor= -30% Rs/qtl	ceiling= +30% Rs/qtl	Stabilized border price Rs/qtl	norma-lized tariff
Coconut Oil										
Mean	1108.74	997.87	1219.62	1114.57	58.02	1108.74	776.121	1441.37	1105.10	38.91
Standard deviation	272.26	245.03	299.48	357.66	41.56	272.26	190.58	353.93	472.11	24.03
CV	25	25	25	32	72	25	25	25	43	62
Min	871.7	784.53	958.87	784.53	-	871.7	610.19	1133.21	610.19	0
Max	1946.18	1751.56	2140.8	2140	97.44	1946.18	1362.32	2530.03	2297.62	52.7
Soybean Oil										
Mean	986.00	887.40	1084.60	1015.45	32.40	986.00	690.20	1281.80	1035.38	14.62
Standard deviation	317.58	285.83	349.34	388.24	24.04	317.58	222.31	412.86	500.58	9.00
CV	32	32	0	38	74	32	32	32	48	62
Min	794.04	714.64	873.45	714.64	3.68	794.04	555.83	1032.25	555.83	4.35
Max	1928.77	1735.89	2121.65	2058.51	83.46	1928.77	1350.14	2507.4	2287.56	34.64
Palm Oil										
Mean	867.79	781.01	954.57	875.37	44.81	867.79	607.46	1128.13	888.10	26.71
Standard deviation	235.57	212.02	259.13	305.62	31.79	235.57	164.90	306.25	429.24	15.79
CV	27	27	27	35	71	27	27	27	48	59
Min	681.29	613.16	749.42	613.16	0.00	681.29	476.90	885.67	503.00	0.00
Max	1676.96	1509.26	1844.65	1844.65	88.74	1676.96	1173.87	2180.04	2121.25	42.74

Source: M. Ingco, 1995, "India's Domestic and External Trade Policy Environment, Implications for Marketing Policies and Strategies in Oilseeds and Vegetable Oil Markets," World Bank.

Figure A6.4: Variable Tariffs and Border Prices for Soybeans.



A6.43 **Scenario III and IV introduce a price band which sets upper and lower limits on the level of reference prices** (maintained at the 5-year moving average plus 30 % nominal protection). The bands are set at 10 % and 30 %, respectively, above and below the reference price level. In any given year, producers and consumers are protected against extremely high or low prices. Another advantage of the price band scheme is that it does not discourage private storage as much as other schemes because there is some price variability left. Maintaining the

incentives for private storage becomes a problem, however, if prices remain persistently high or low, and the upper or lower price bands prevail for long periods

A6.44 **The results suggest that the price band schemes in Scenario III and IV reduce the variability of the tariffs.** The CVs of the variable tariffs are lower in all the edible oils. Figures A6.5a and b shows a comparison of the variable tariffs and stabilized prices across schemes for soybean oil (See Appendix for the figures for palm oil and coconut oil). The tariffs are all within the tariff ceilings committed in the UR. The mean and CV of the variable tariffs further declined significantly as the size of the price band is increased in Scenario IV. Associated with the decreased variability in tariffs, however, is the increased variability of the stabilized border prices. However, in terms of price variations, the price band schemes (scenarios III and IV) result in larger CV of domestic prices than the reference price schemes (scenarios I and II).

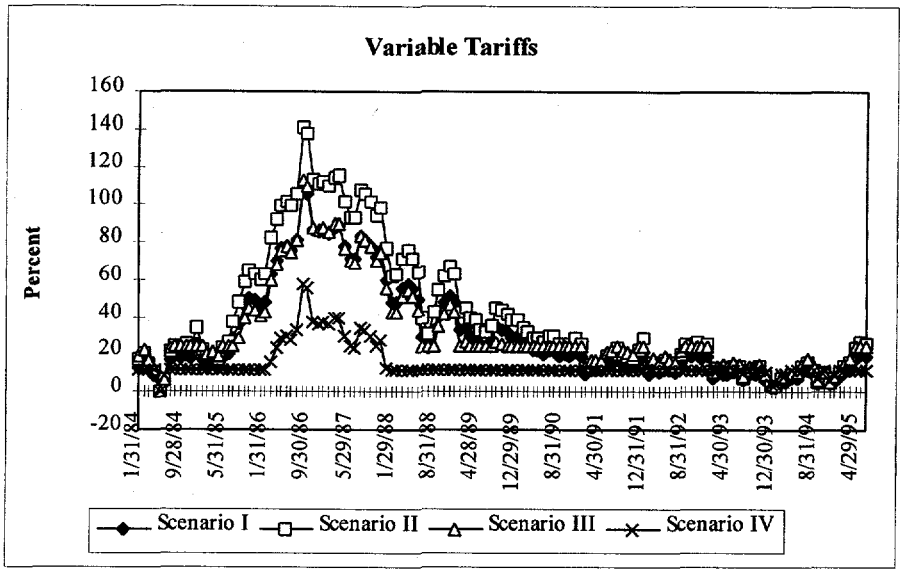
Price Variability under the Different Scenarios

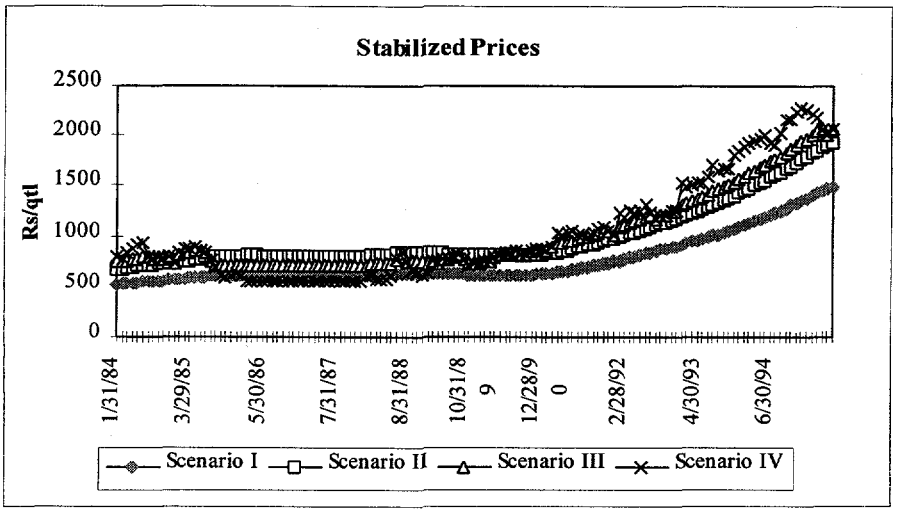
A6.45 **There is very little difference in the degree of reduction of price risks between Scenario I and II.** The additional 30 % nominal protection raised the level of the mean of stabilized prices under scenario II, but retained the same level of the volatility of domestic prices (5-year moving average) as in scenario I.

A6.46 **Scenario III permits greater reduction in price risks relative to Scenario IV.** As shown in Table A6.4a, world border prices (in Rs/qtl) are highly volatile as measured by the coefficients of variation: coconut oil (49 %), soybean oil (51 %) and palm oil (56 %). Under the price band schemes, the CV of stabilized border prices are reduced and the reduction in price risks is greater in Scenario III than Scenario IV. For coconut oil, the CV of stabilized domestic prices declines to 43 % in scenario IV and to 32 % under scenario III. For soybean oil, the CV declines to 38 and 48 %, under scenarios III and IV, respectively. For palm oil, the CV declines to 35 % in scenario III and to 48 % in scenario IV. However, in terms of tariff volatility, scenario IV displayed lower volatility in the normalized tariffs than scenario III for all the three oils considered in the analysis.

A6.47 **Overall, the results indicate that India's commitments on tariffication and tariff bindings will not impose any significant restrictions on India's domestic policies in oilseeds and edible oils.** Given the relatively high level of tariff bindings, significant flexibility exists in setting the level of tariffs in the context of alternative price stabilization schemes, such as those explored in this study. However, the analysis also shows the high variability in tariffs required to stabilize prices under the four schemes, which puts into question the administrative feasibility of these schemes.

Figures A6.5a & b: Level of Variable Tariffs to Stabilize Soybean Prices and the Stabilized Prices Under Different Scenarios.





D. Impact of the Uruguay Round Agreement on World Oilseed and Vegetable Oil Markets.

A6.48 Given the commitments under the Uruguay Round in three major areas of market access, domestic support, and export competition, an important concern for oilseed producing and oilseed product consuming countries is what is likely to be the impact of these commitments on world prices of oilseeds, vegetable oils and meals. This section briefly evaluates the implications of the agreed reforms on world trade and prices of oilseeds, vegetable oils and meals. The prospects for world prices under a scenario that incorporates import access

output of $262.8 billion in 1993, India is one of Asia's largest economies. India's extensive land and water resources allow it to rank among the world's largest producers and consumers of major commodities. Among major oilseed crops, India accounts for more than one-third of world groundnut production and nearly one-fifth of world rapeseed-mustardseed production. Oilseed crops (groundnut, rapeseed-mustardseed, soybean, sunflower, sesame, linseed, castor, and safflower) occupy about 15.5 % of the total cropped area in India. In edible oils, India accounts for more than 40 % of world groundnut oil production, 34 % of world sesame oil production, and 20 % of world rapeseed-mustardseed oil production.

A6.58 **Despite a large share in world production, India's share in world trade of edible oils and oilseeds has been very small** (Tables A6.6 and A6.7). The high price support policies combined with input subsidies boosted India's oilseed production--with output growth of about 6 % per year during 1980-94. While oilseed imports remain under a parastatal monopoly, imports of most edible oils by the private sector were allowed under a 30% tariff since February 1995. India has almost attained self-sufficiency in edible oils, importing only small amounts in recent years. India's share in world trade (both exports and imports) has been very small, ranging between 0.7 % in world coconut oil trade to 2.64 % in world palm oil trade in 1990-94. In total, India's share in world edible oil trade (about 26 million mt) is less than 2 % in 1990-94.

Table A6.6 . India and the World Oilseed Market, Average 1992-94

	Groundnut	Rapeseed	Sunflower	Soybean
I. Production, mil mt				
World	23.64	26.33	22.33	108.54
India	7.76	5.04	1.12	2.55
Share of India, %	32.8	19.4	5.02	2.35
II. Imports, mil t				
World	1.11	4.73	2.13	27.55
India	0.00	0.00	0.00	0.00
Share of India, %	0.00	0.00	0.00	0.00
III. Exports, mil mt				
World	1.08	4.64	2.16	27.46
India	0.02	0.00	0.00	0.00
Share of India, %	0.00	0.00	0.00	0.00
self-sufficiency, %	100.2	100.0	99.9	100.0

Source: *Oil World*, various years

A6.59 The question arises whether India's increased participation in world markets there would have a significant influence on international prices. If such a significant "large-country" effect occurs, then there would be a case for India to intervene in the oilseed and edible oil industries, and an "optimal" trade policy need to be evaluated. A analysis of India's "large-country" effect in a multi-commodity framework (individual oilseed and edible oil products) and the potential impact of liberalization of Indian import policies in these commodities require further analysis and are beyond the scope of this paper. To provide benchmark estimates, a very simplified approach is followed in this section.

A6.60 The impact of Indian import demand on the world market is examined under two different scenarios:

- Scenario I: Trade is not liberalized, World Bank population and income growth assumptions are used.
- Scenario II: Trade in oilseeds and oils is liberalized, using Subramanian's (1993) estimates of potential edible oil imports.

Table A6.7 . India and the World Edible Oil Markets, Average 1992-94

Category	Ground-nut oil	Soybean oil	Rapeseed oil	Sun-flower oil	Sesame oil	Palm oil	Coco nut oil	Total edible oils
I. Production								
World, mil mt	3.97	16.70	9.12	8.02	0.66	12.2	2.99	83.4
India	1.76	0.39	1.78	0.35	0.22	0.01	0.27	6.7
Share of India, %	44.4	2.32	19.5	4.36	33.8	0.07	9.02	7.92
II. Imports								
World, mil mt	0.33	3.97	2.00	2.38	0.02	8.98	1.52	26.9
India	0.00	0.06	0.01	0.00	0.00	0.24	0.01	0.33
Share of India, %	0.00	1.6	0.00	0.00	0.00	2.64	0.67	1.24
III. Exports								
World, mil mt	0.32	3.96	1.96	2.38	0.02	8.95	1.55	26.85
India	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Share of India, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Self-sufficiency	100.0	84.0	100.0	100.0	100.0	3.40	96.0	96.0

Source: *Oil World*, various years

A6.61 In Scenario I, projections of Indian import demand and trade balance on selected products are estimated using the World Bank's econometric simulation model.[18] The estimates assume that external trade oilseeds and oils have not be liberalized and uses the projections of population and income growth to 2000. In addition, the baseline assumptions with respect to policies in other countries discussed in the previous section are maintained.

A6.62 In Scenario II, estimates of changes in import demand growth in edible oils resulting from liberalization of Indian agriculture, including oilseeds and edible oils are used.[19] The estimates by Subramanian (1993) are used in this section given its comprehensive coverage. These estimates of India's potential edible oil imports under a liberalized trade policy are then used as exogenous shocks in the World Bank oilseed and vegetable oil simulation model. The latter estimates are, however, only for aggregated edible oils.

A6.63 **Projected population and income growth under Scenario 1 is estimated to boost total Indian demand for edible oils, but increased demand will likely be met by oil imports with only a small impact on world prices.** Net import demand for edible oils are estimated to rise by about 3.5 % per year during 1995-2000, reaching about 0.86 million tons in 2000 (Table A6.8). But the increased edible oil imports will not significantly affect world prices over the next 5-6 years.

A6.64 **Oilseed imports, however, are estimated to remain negligible because of the continuation of canalization of imports.** Moreover, crushing of imported oilseeds is projected to remain unprofitable, due to the large domestic surplus of oilmeals, which drives down domestic oilmeal prices and projected crushing margins. High domestic prices are estimated to continue to limit oilseed exports to small amounts of confectionery groundnuts. The very poor

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Description of the 1995 World Bank econometric simulation model of world oilseeds and edible oils markets is described in Ingco, M. "Agricultural Liberalization: Impact on World Oilseeds and Vegetable Oils Markets," draft manuscript, 1995.

Several studies of Indian agriculture based on computable general equilibrium models (CGE) have analyzed the impact of policy reforms including the effects of trade liberalization. Notable examples include Quizon and Evenson (1986); Naryana, Parikh and Srinivasan (1991); Subramanian, (1993) and Parikh, Narayana, Panda and Kumar (1994).

logistics for domestic transportation and storage and at the port level are very likely to reduce the beneficial impact of world price changes on domestic production and export activities.

Table A6.8. Baseline projections for India's oilseeds and oilseed products, million tons

Commodity	Average								
	1979-82	1989-92	1994	1995	1996	1997	1998	1999	2000
Total Edible Oils									
Production	2.64	4.75	5.58	5.80	6.04	6.28	6.53	6.79	7.06
Net Imports	1.22	0.42	0.45	0.61	0.66	0.69	0.75	0.79	0.83
Consumption	3.87	5.22	6.03	6.25	6.48	6.72	6.97	7.23	7.50
Total Oilseeds									
Production	12.04	20.72	23.84	24.70	25.59	26.51	27.46	28.45	29.48
Net Exports	0.04	0.04	0.00	0.04	0.04	0.05	0.05	0.05	0.05
Consumption	12.00	20.68	23.91	24.77	25.66	26.59	27.54	28.54	29.56
Total Oilmeals									
Production	4.68	9.29	11.08	11.56	12.05	12.57	13.11	13.68	14.26
Net Exports	0.94	2.19	2.81	2.98	3.15	3.34	3.53	3.74	3.96
Consumption	3.75	7.15	7.92	8.21	8.52	8.83	9.16	9.50	9.85

Source: Ingco, M. "Agricultural Liberalization: Impact on World Oilseeds and Vegetable Oils Markets, IECCP, World Bank, 1995.

A6.65 **Liberalization of Indian oilseed and edible oil trade results in increased net import demand for edible oils but only an 4-5% increase in world prices.** Edible oil imports are projected to double under the liberalized trade environment. The projected increase in total edible oil imports from trade liberalization is estimated to be between 1 million to 3.7 million tons. This is estimated to result in a real world price rise of edible oils of between 2 to 4 % in the year 2000 relative to baseline levels. Given the high substitutability of the different edible oils in consumption, it is very difficult to isolate the price effects for individual oils. Because palm oil is the least expensive oil in the world market, it is reasonable to expect that palm oil will continue to dominate India's edible oil imports. Thus, most of the direct price effects from trade liberalization would be in the palm oil sector (4 %). Rapeseed oil and soybean oil prices are also estimated to rise in 2000, albeit only slightly by about 2.5 to 3.0 %, respectively. At current relative prices, the composition of edible oil imports will have the following structure: 87 % palm oil, 9 % rapeseed oil, and about 6 % soybean oil.

A6.66 **The small estimated response in real world prices of edible oils in the medium- to long-term (5 to 10 years), due to increased Indian imports is partly due to adjustments in world supply and demand.** Brazil and Argentina are projected to continue expansion of area into soybeans, although at a much slower rate than in the past ten years. China has been rapidly switching crop area into soybeans due to the increase in soybean prices relative to competing crops that has taken place as a result of the 1992 grain and oilseed policy reform. Soybean area increased by 2.6 million hectares in 1993/94, pushing China ahead of Argentina as the world's third largest producer of soybeans. Over the next ten years, China is not projected to shift significant area into soybeans as the prices of competing crops stabilize. However, soybean area in the United States is projected to increase by 1.6 million hectares between 1995 and 2005 a: area is flexed into soybeans due to relative prices and as land in Conservation Reserve Progran is brought back into production. Other adjustments in world markets result from increasc competition from other feeds and vegetable oils, resulting in downward pressure on edible o and oilseed prices.

Appendix Table 6A-1
Schedule XII - INDIA
PART I - MOST-FAVOURED-NATION TARIFF
SECTION I - Agricultural Products

Tariff item number	Description of products	Basic applied rate 1995, Ad valorem (%)	Uruguay Round	
			Base rate of duty Ad valorem (%)	Bound rate of duty Ad valorem (%)
1201.00	**Soya beans, whether or not broken**	50	0	100
1202.10	- In shell	50	0	100
1202.20	- Shelled, whether or not broken	50	0	100
1203.00	**Copra**	50	100	100
1204.00	**Linseed, whether or not broken**	50	100	100
1205.00	**Rape or colza seeds, whether or not broken**	50	0	100
1206.00	**Sunflower seeds, whether or not broken**	50	0	100
1207.10	- Palm nuts and kernels	50	0	100
1207.20	- Cotton seeds	50	100	100
1207.30	- Castor oil seeds	50	100	100
1207.40	- Sesamum seeds	50	100	100
1207.50	- Mustard seeds	50	100	100
1207.60	- Safflower seeds	50	100	100
1207.91	-- Poppy seeds	50	100	100
1207.92	-- Shea nuts (karite nuts)	50	100	100
1207.99	-- Other	50	100	100
1208	**Flour and meals of oil seeds or eleaginous fruits,other than those of mustard**			
1208.10	- Of soya beans	50	100	150
1208.90	- Other	50	100	150
1507	**Soybean oil and its fractions, whether or not refined, but not chemically modified**			
1507.10	-Crude oil, whether or not degummed	30	45	45
1507.90	-Other	30	45	45
1508	**Groundnut oil and its fractions, whether or not refined, but not chemically modified**			
1508.10	-Crude oil	30	165	300
1508.90	-Other	30	165	300
1509	**Olive oil and its fractions, whether or not refined, but not chemically modified**			
1509.10	-Virgin	45	165	45
1509.90	-Other	45	165	45
1510.00	Other oils and their fractions, obtained solely from olives, whether or not refined, but not chemically modified, including blends of these oils or fractions with oils or fractions of heading No 1509	45	165	45

Appendix Table 6A-1 cont'd

Tariff item number	Description of products	Basic applied rate 1995, Ad valorem (%)	Uruguay Round	
			Base rate of duty Ad valorem (%)	Bound rate of duty Ad valorem (%)
1511	**Palm oil and its fractions, whether or not refined, but not chemically modified**			
1511.10	-Crude oil	50	165	300
1511.90	-Other	50	165	300
1512	**Sunflower seed, safflower or cotton-seed oil and fractions thereof, whether or not refined, but not chemically modified**			
1512.11	--Crude oil	30	165	300
1512.19	--Other	30	165	300
1512.21	--Crude oil, whether or not gossypol has been removed	30	165	300
1512.29	--Other	30	165	300
1513	**Coconut, palm kernel or babassu oil and fractions thereof, whether or not refined, but not chemically modified**			
1513.11	--Crude oil	50	165	300
1513.19	--Other	50	165	300
1513.21	--Crude oil	50	165	300
1513.29	--Other	50	165	300
1514	**Rape, colza or mustard oil and fractions there of, whether or not refined, but not chemically modified**			
1514.10	-Crude oil	30	45	45
1514.90	-Other	30	45	45
1515	**Other fixed vegetable fats and oils (including jojoba oil) and their fractions, whether or not refined, but not chemically modified**			
1515.11	--Crude oil	30	165	300
1515.19	--Other	30	165	300
1515.21	--Crude oil	30	165	300
1515.29	--Other	30	165	300
1515.30	-Castor oil and its fractions	30	165	100
1515.40	-Tung oil and its fractions	30	165	100
1515.50	-Sesame oil and its fractions	30	165	300
1515.60	-Jojoba oil and its fractions	30	165	100
1515.90	-Other	30	165	300

Appendis Table A-6.1 cont'd

Tariff item number	Description of products	Basic applied rate 1995, ad-valorem	Uruguay Round	
			Base rate of duty Ad valorem (%)	Bound rate of duty Ad valorem (%)
1516	**Animal or vegetable fats and oils and their fractions, partly or wholly hydrogenated,inter-esterified, re-esterified or elaidinized, whether or not refined, but not further prepared**			
1516.10	-Animal fats and oils and their fractions	30	100	300
1516.20	-Vegetable fats and oils and their fractions	30	165	300
1517	**Margarine, edible mixtures or preparations of animal or vegetable fats or oils of of fractions of different fats of oils of this chapter, other than edible fats and oils of heading 1516**			
1517.10	-Margarine, excluding liquid margarine		100	300
1517.90	-Other	50	100	300
1518.00	Animal or vegetable fats and oils and their fractions, boiled, oxidised, dehydrated, sulphurised, blown, polymerised by heat in vacuum or ininert gas or otherwise chemically modified, excluding those of heading No 1516; inedible mixtures or	50	100	300

Explanatory Notes:
(i) Except for items falling under sub-heading Nos. 3501.10 and 3501.90, the rates indicated in the base rate column are the rates which were prevalent on 1.9.86 and are inclusive of other duties and charges. In the case of items falling under sub-headings Nos. 3501.10 and 3501.90, the rate indicated in the base rate column was the rate which was prevalent on 1.1.90 and is inclusive of other duties and charges;
(ii) Except for bound items, items falling under sub-heading Nos. 3501.10 and 3501.90 (to be bound at 40%) and items falling under sub-heading Nos. 4101.10, 4101.21, 4101.22, 4101.29, 4101.30, 4101.40, 4102.10, 4102.21, 4102.29, 4103.10, 4103.20 and 4103.90 (to be bound at 25%), tariffs on all other items would be bound at 100%, 150% or 300%, as indicated in the Schedule. Reductions, where needed, will be done in equated annual instalments beginning 1.3.95 or 1.3.96 (depending on the date on which the agreement establishing the World Trade Organisation comes into force) and ending in 2004. However, for bound items staging does not apply as these concessions are either already in effect or will be implemented immediately; and
(iii) In the case of items falling under sub-heading Nos. 3501.10 and 3501.90, tariffs would be reduced to 40% in six equated annual instalments taking tariffs as on 1.1.90 as the base.
Source: GATT/WTO

Appendix Table 6A-2. Comparison of World Prices and India Domestic Prices of Oilseeds

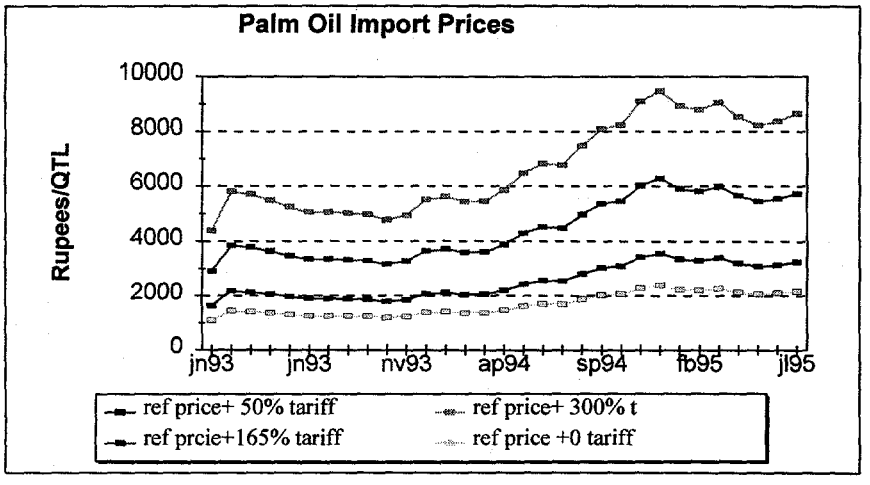
YEAR	DOMESTIC PRICE					OILSEEDS		
	GROUND NUT	MUSTARD	COPRA	SUNFLOWER	SOYBEAN	DOMESTIC	WORLD	REFERENCE
	RUPEES/QUINTAL					RS/QTL	USD/MT	RS/QTL
1965	84.50	99.58	246.25			99	139	74
1966	131.69	117.91	310.00			149	131	81
1967	127.63	139.18	302.34			146	127	105
1968	107.63	176.72	345.85			140	121	107
1969	133.36	133.89	310.63			154	131	112
1970	153.09	150.46	449.53			178	146	124
1971	140.63	163.98	438.17			168	161	136
1972	129.44	166.89	340.33			154	168	135
1973	213.11	177.38	483.96			229	205	175
1974	249.65	208.71	806.05		209.00	279	333	313
1975	244.71	316.02	619.63		200.00	304	326	305
1976	157.79	220.83	569.14	166.27	150.00	195	287	279
1977	222.87	189.55	749.97	279.36	221.67	249	312	301
1978	238.34	354.98	805.10	219.83	196.17	298	391	350
1979	226.48	339.76	812.12	233.91	170.50	296	382	339
1980	294.49	308.29	915.18	268.11	189.67	342	335	313
1981	375.44	401.65	1061.88	360.25	281.00	437	372	362
1982	388.83	444.74	919.92	373.78	272.67	437	273	304
1983	400.64	396.44	1281.99	424.50	262.20	458	267	297
1984	450.03	458.13	2226.96	430.57	345.25	534	316	378
1985	451.38	509.80	1743.88	409.36	266.67	555	279	384
1986	460.09	404.44	1283.39	501.89	278.57	489	230	332
1987	548.92	438.24	1964.76	695.83	420.83	591	194	290
1988	664.51	692.20	2249.55	640.00	550.83	776	193	299
1989	522.48	731.01	2161.36	600.08	528.50	664	230	442
1990	729.93	569.05	1817.96	787.00	508.67	720	236	493
1991	944.10	932.47	1839.90	1056.50	603.33	953	238	585
1992	1015.75	934.18	2214.42	1018.08	831.00	1073	217	677
1993	841.23	907.71	2470.86	916.67	707.00	986	215	812
Mean	367.20	382.21	1094.52	521.22	359.68	415.64	239.86	307.04
Stdev	260.97	251.74	734.08	277.73	196.61	277.31	82.35	176.66
CV	0.71	0.66	0.67	0.53	0.55	0.67	0.34	0.58

Appendix Table 6A-2. Comparison of World Prices and India Domestic Prices of Oilseeds, cont'd

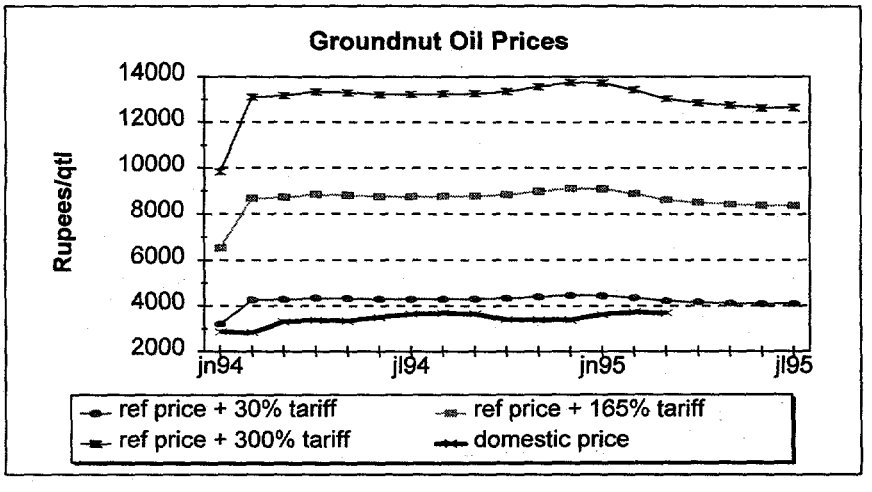
YEAR	WORLD PRICE (FOB) IN USD/MT					REFERENCE PRICE				
	GROUND NUT	MUSTARD	COPRA	SUNFLOWER	SOYBEAN	GROUND NUT	MUSTARD	COPRA	SUNFLOWER	
						RUPEES/QUINTAL				
1965	136.47	128.70	201.10			73.06	67.92	104.45		
1966	128.91	115.15	179.77			83.44	62.33	112.95		
1967	121.51	123.58	180.58			103.78	88.77	148.79		
1968	112.55	113.79	201.74			100.43	102.77	168.12		
1969	132.83	98.01	191.92			113.29	87.42	158.55		
1970	151.76	112.54	199.06			128.33	99.46	164.76		
1971	168.84	129.45	179.84		116.20	141.51	112.07	150.62		
1972	178.14	136.99	141.95		131.49	143.10	110.94	116.97		
1973	242.56	125.76	276.68		244.26	204.28	111.87	232.04		
1974	356.00	231.82	536.14		258.07	330.93	232.46	477.87		
1975	317.11	358.26	314.44		215.52	297.24	335.58	296.50		
1976	292.13	282.57	245.16		217.82	286.59	259.63	245.69		
1977	352.18	235.62	345.27	293.62	257.37	334.91	235.06	329.76		269.83
1978	413.90	301.79	429.19	289.79	260.79	366.47	286.68	380.54		251.73
1979	394.18	284.11	594.44	314.11	280.11	347.79	261.34	509.64		271.63
1980	342.50	285.04	462.90	264.04	254.04	315.52	282.46	408.44		249.97
1981	442.66	281.37	332.46	301.37	280.37	422.58	280.99	329.07		302.37
1982	272.19	278.84	278.89	277.84	232.84	306.06	294.62	316.04		306.75
1983	253.35	269.93	383.81	251.93	240.93	288.87	285.88	418.02		277.36
1984	295.54	300.20	677.80	347.20	282.20	364.06	336.33	779.41		403.32
1985	243.47	328.81	448.19	269.81	212.81	349.27	412.60	598.52		368.20
1986	224.32	269.46	169.54	196.46	193.46	324.47	375.90	257.01		282.26
1987	185.15	196.50	262.97	182.50	190.50	283.95	280.96	380.30		269.86
1988	184.51	143.59	369.21	227.59	256.59	292.53	219.67	529.33		337.53
1989	219.56	210.66	329.61	314.66	263.66	432.40	370.71	598.06		567.50
1990	269.68	196.50	256.30	231.50	211.50	555.56	404.88	511.64		482.37
1991	289.08	173.60	236.98	261.96	210.60	708.30	394.24	583.58		639.70
1992	238.10	171.93	317.97	213.69	209.93	749.78	514.79	943.91		680.65
1993	219.15	180.10	283.12	229.29	216.10	846.95	613.45	1023.63		870.85
Mean	247.53	209.13	311.28	262.79	227.70	320.53	259.37	388.77		401.88
Stdev	91.60	77.65	133.77	45.15	42.85	195.55	139.89	241.17		183.65
CV	0.37	0.37	0.43	0.17	0.19	0.61	0.54	0.62		0.46

SOURCE: Gulati, A. and Pursell, G., "Trade Policy, Incentives and Resource Allocation in Indian Agriculture", forthcoming.

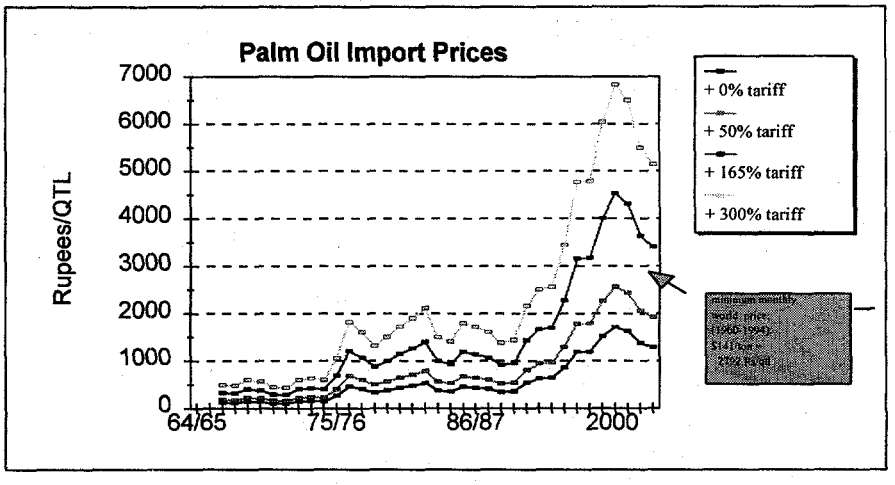
Appendix Figure A6.1: Palm Oil Import Parity Prices Under Different Tariff Structures



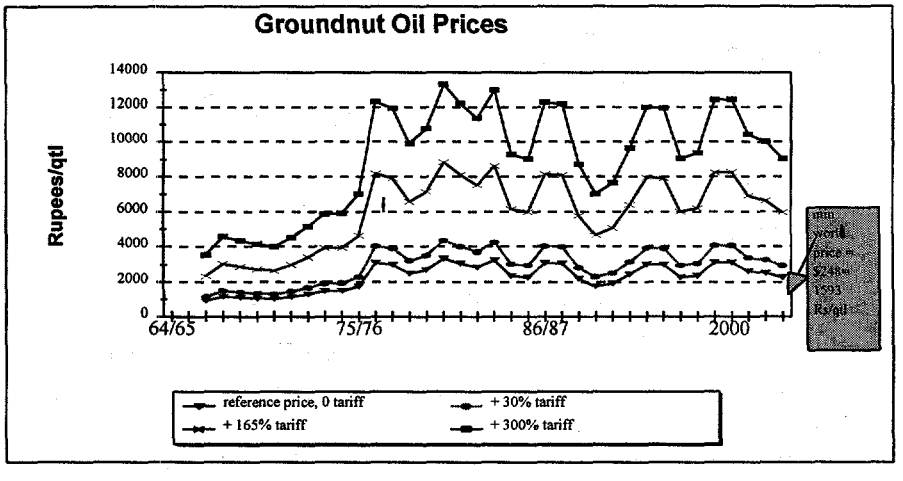
Appendix Figure A6.2: Groudnut Oil Import Parity Prices Under Different Tariff Structures



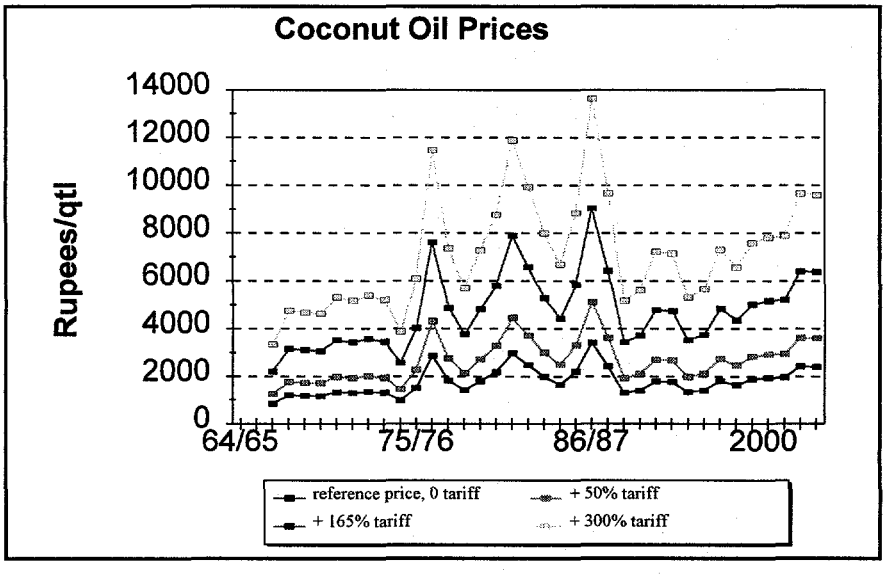
Appendix Figures A6.3: Projected Palm Oil Import Parity Prices under Different Tariff Structures



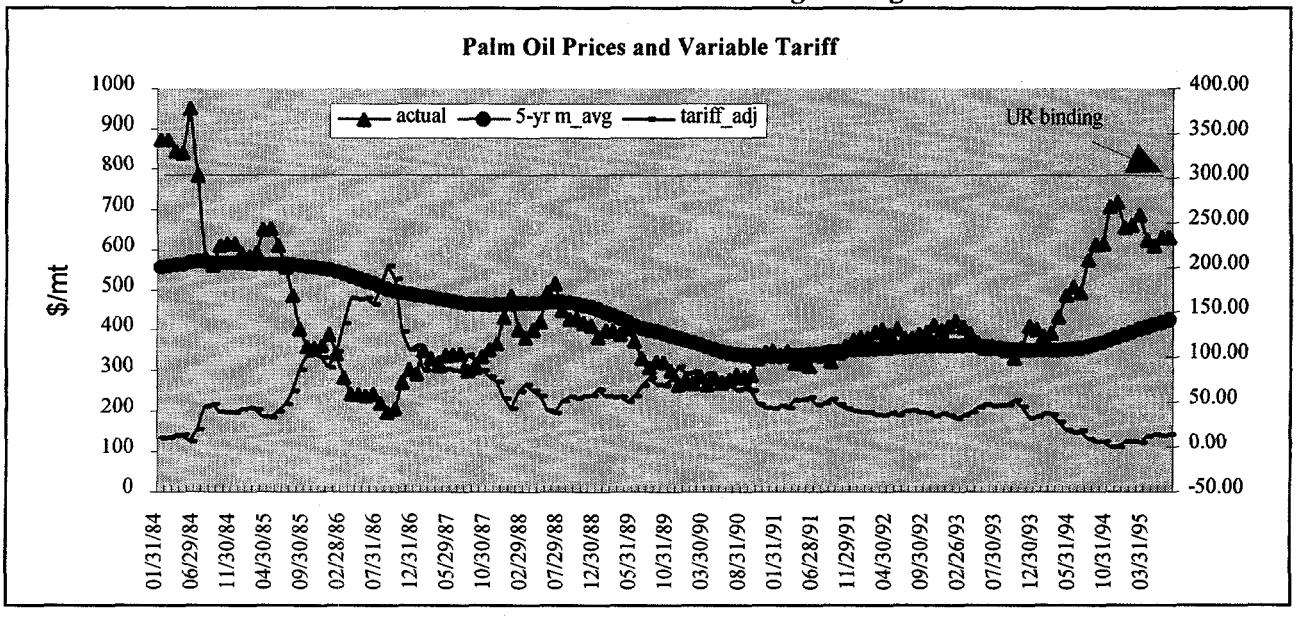
Appendix Figures A6.4: Projected Groundnut Oil Import Parity Prices under Different Tariff Structures



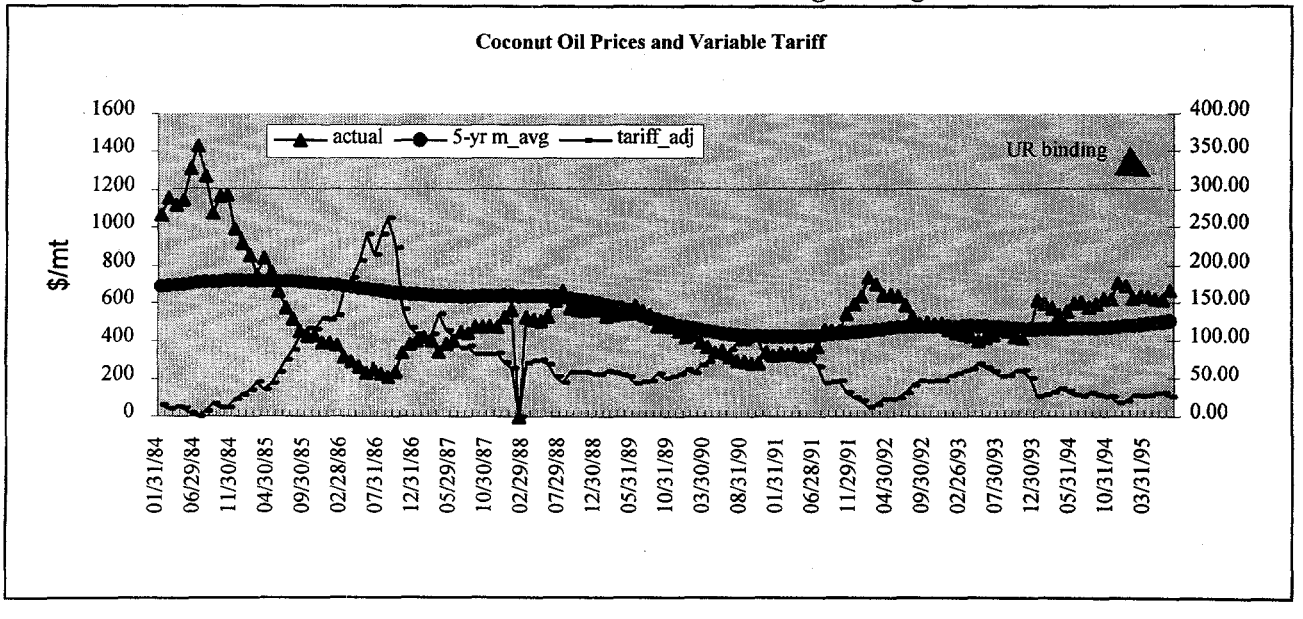
Appendix Figures A6.5: Projected Coconut Oil Import Parity Prices under Different Tariff Structures



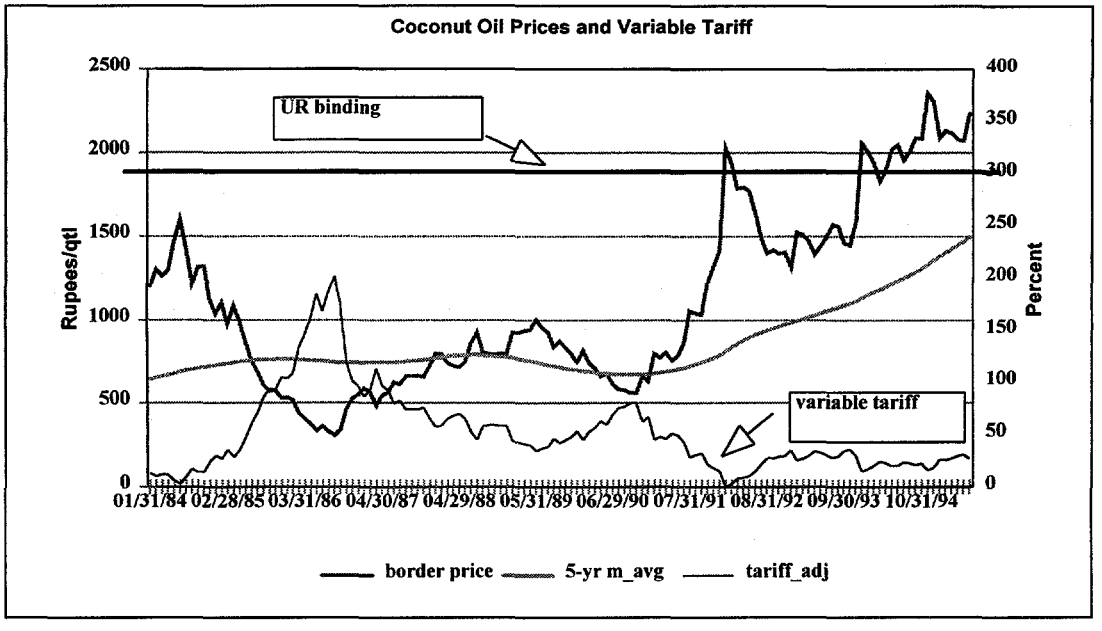
Appendix Figure A6.6: Variable Tariffs Required To Stabilize Palm Oil Prices at 5-Yr Moving Average



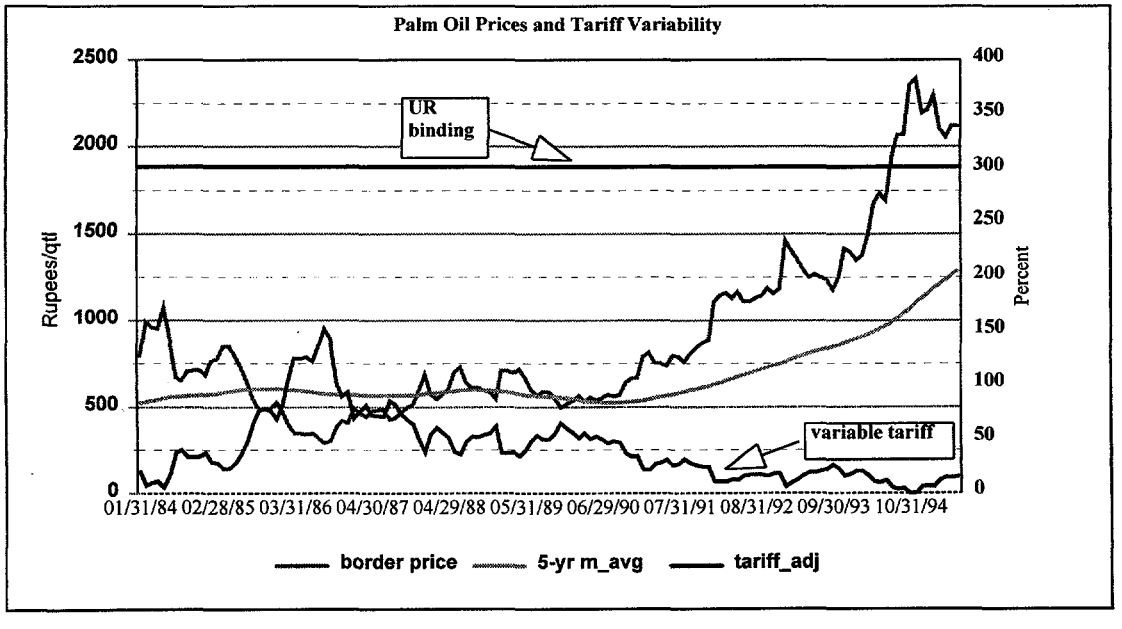
Appendix Figure A6.7: Variable Tariffs Required To Stabilize Coconut Oil Prices at 5-Yr Moving Average



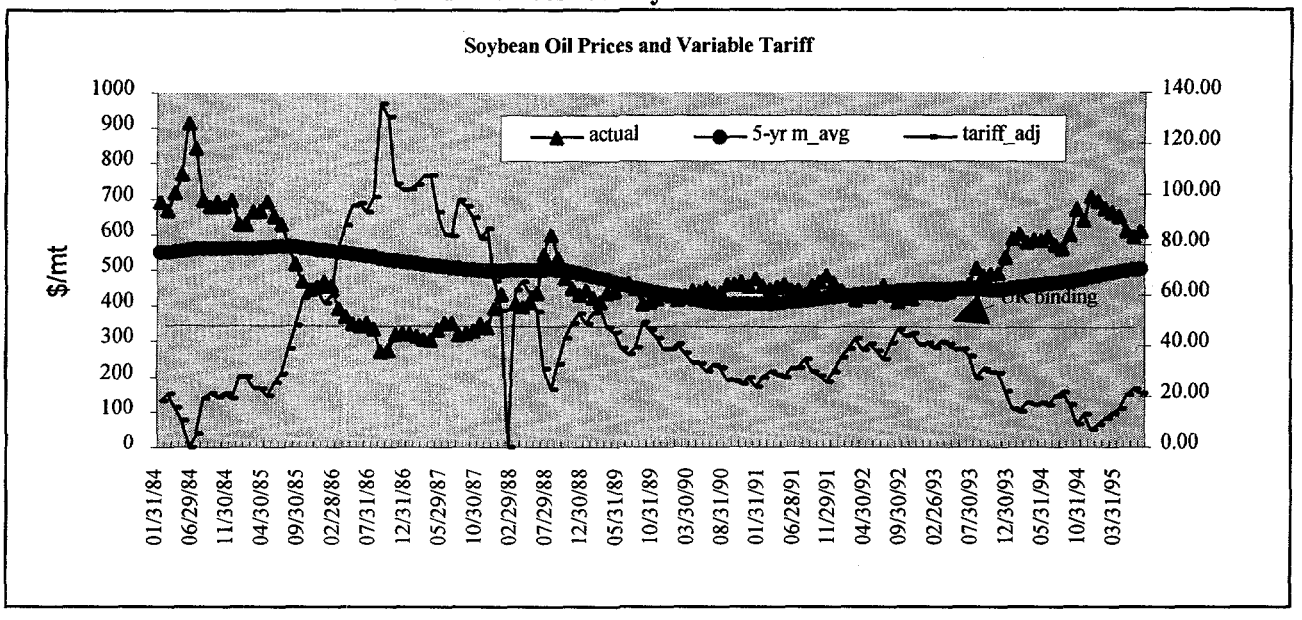
Appendix A6.8: Variable Tariffs, Stabilized Prices, Average Border Prices for Coconut Oil



Appendix A6.9: Variable Tariffs, Stabilized Prices, Average Border Prices for Palm Oil



Appendix A6.10: Variable Tariffs, Stabilized Prices, Average Border Prices for Soybean Oil



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