

Competitiveness of Dry Land Agricultural Crops : Empirical Evidence from India

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ABSTRACT. *The competitiveness of, the important dry land crops of India, such as sorghum, maize, groundnut and sunflower, have been analysed using the Nominal Protection Coefficient (NPC). The price policies have allowed domestic prices to deviate from world market prices. The NPCs revealed that barring groundnut, the other crops under study are good import substitutes, although none of these have encouraging export prospects at present. Groundnut, which occupies around 10% of the gross cropped area in the country, has an NPC of greater than one, both under importable and exportable hypotheses. Therefore, in a liberalized trade regime groundnut producers can be seriously affected through cheaper imports, forcing them to switch over to other crops.*

INTRODUCTION

Agriculture is yet the backbone of the Indian economy, and nearly two thirds of the people depend on agriculture and about one third of the national income is derived from this sector. Agriculture in India is characterized by the predominance of rainfed cultivation, which accounts for over 65% of the gross cropped area and contributes to about 45% of total production. A small increase in the productivity of dry land crops, therefore, will result in considerable increase in food grain production. The major crops of the dry land areas are sorghum, ragi, bajra, maize, tur, gram, groundnut, sunflower and cotton. These crops are grown either in the *kharif* (wet) or *rabi* (winter) seasons.

In recent years, especially after the early 1990's, rapid changes have taken place on the global economic scene and also in the Indian economy. Since agriculture has now been brought under the realm of GATT and the World Trade Organization (WTO), the freedom of the government to support this sector beyond a certain point is limited. India, a signatory of GATT, has a commitment to liberalize its agricultural trade. Hence, all the crops under

study namely sorghum, maize, groundnut and sunflower will face global competition when the provisions of GATT take effect.

Increased liberalization could have a profound impact on India's exports as well as domestic production, which will also be threatened by imports under the minimum access provision of GATT. Trade regimes are becoming more free and therefore the likely impact on the agricultural sector in general and the highly vulnerable dry land sector in particular needs to be assessed. In such a situation, production patterns will be normally guided by considerations of comparative advantage. In this context it is imperative to understand the extent of comparative advantage and thereby the global competitiveness of various agricultural commodities grown in the dry land areas.

The paper attempts to quantify the degree to which the domestic markets are insulated from world market prices due to the policies of protectionism practiced in the past. There have been earlier attempts to capture such price distortions. Senaur (1985) studied the rice pricing policy in Panama where the domestic prices were well above the world market level. Although the producers were benefited by this policy, it imposed significant drain on consumer's income, increased the government expenditures and affected economic efficiency. The policy recommendation was to bring domestic prices in line with the international level.

Mishra (1986) examined the protection policy for wheat and rice in India using nominal protection indices. Jamal (1987) documented the cotton pricing policies pursued by Pakistan Government and the nature of its intervention to be adopted in its trade with the help of NPCs. Support prices were found to be closer to revenue maximization prices than to the border prices adjusted to farm gate level. Valdes *et al.* (1990) estimated the degree of distortion in trade pricing policies of five products *viz.*, milk, beef, wheat, apples and grapes in Chile. The study found wide variations in direct, nominal and effective rates of protection for the products examined. Gulati (1989) analysed the pricing policies with regard to Indian seed cotton (Kapas), by estimating the nominal protection coefficient, effective protection coefficient and effective subsidy coefficient. The results indicate an overall situation of disprotection to Indian cottons, *i.e.*, domestic prices are lower than external prices.

METHODOLOGY

This study focuses on four major dry land commodities namely, sorghum and maize which represent the cereals, and groundnut and sunflower as representatives of oilseeds crop complex. These four crops account for approximately 40% of the gross cropped area in Karnataka, India. Karnataka is a typical dry land state with about 82% of the gross cropped area under rainfed agriculture and hence it was chosen for the study.

The study adopts the standard approach of measuring comparative advantage through the estimation of the Nominal Protection Coefficient (NPC). This approach indicates how agricultural policies affect the differential between domestic and international prices. The Nominal Protection Coefficient (NPC) is defined as the ratio of the domestic price to the world reference price of the commodity under consideration (Equation 1),

$$NPC = \frac{P^D}{P^R} \quad (1)$$

where, NPC = Nominal Protection Coefficient, P^D = domestic price of the commodity, and P^R = reference price of the commodity in question, *i.e.* what the farmer would have received in the case of free trade.

The domestic price is approximated by what the cultivators of the relevant commodity receive. The world reference price is derived from the international price adjusted for transport cost (both foreign and domestic), and marketing and trading margins, including any processing necessary to make the domestic commodity equivalent to the internationally traded form (Gulati *et al.*, 1990). Commodities with ratios exceeding one are protected by the policy regime and those with ratios below one are disprotected (in effect taxed). These deviations suggest that domestic prices are not aligned with world market prices.

The NPC is a straightforward measure of disparity between domestic price and international price. A second is a more complex one and is only partially accomplished by the estimate of the Effective Rate of Protection (EPR), a less valid measure of disparity between domestic value added and international price. Because farm level agricultural prices of developing countries are often very close to value added levels, the impact of many agricultural price policies at farm level may be assessed by looking at NPCs only (Lutz and Scandizzo, 1980). Domestic Resource Cost (DRC), which is

yet another measure of protection, requires primary data on cost of production over a period of time.

The NPC can be estimated under two scenarios, *i.e.* an importable scenario and exportable scenario. If one is interested in knowing whether a particular commodity is an efficient import substitute, it is the importable scenario, which is relevant. If the NPC under this scenario is less than the unity, the commodity is an efficient import substitute. To determine whether a commodity is an efficient exportable commodity, it is the exportable scenario, which is relevant.

The international border prices have been used as the point of reference to measure the impact of national pricing policies. International prices reflect the opportunities open to the country through trade. However, distortions from international prices are not easy to measure since even relatively homogeneous commodities often show a large range in international prices. Further, these prices may be widely fluctuating and may themselves be affected by domestic distortions. While world markets are the natural forum to appraise the value of tradables, care has to be exercised in selecting a system of border prices that would meaningfully apply to a specific country. In the present study, care was taken to select the prices of a comparable variety of commodities under investigation.

The international price of the crops considered for the study was collected from the various issues of the FAO Production Year Book (1984-1993). The international prices considered for sorghum and maize were the USA (F.o.b. GULF) price and the Rotterdam price in Europe for groundnut and sunflower. For the exportable hypothesis, the C.i.f. price of the Indian exports were compared with the F.o.b. prices in the selected markets and for the importable hypothesis the C.i.f. price of imports was compared with the domestic price of the corresponding commodity. The maritime freight rates for wheat were collected from the FAO Trade Year Books (1984-1993). The domestic prices for sorghum and maize were obtained from the Directorate of Economics and Statistics, Government of Karnataka, and for groundnut and sunflower were collected from the Karnataka State Agriculture Marketing Board, Bangalore, India.

RESULTS AND DISCUSSION

The Nominal Protection Coefficients (NPCs) estimated for sorghum, maize, groundnut and sunflower are presented in Table 1. The cultivated

Table 1. Nominal protection coefficients for dry land crops.

Commodity	Particulars	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	Average 1984/85 to 1990/91	Average 1991/92 to 1993/94
Sorghum	NPC ^I	0.87	0.98	0.13	1.12	0.91	0.96	0.74	0.85	1.00	0.77	0.96	0.87
	NPC ^E	1.76	2.20	2.72	3.05	2.59	2.45	2.07	2.15	2.42	2.06	2.41	2.21
Maize	NPC ^I	1.76	2.20	2.72	3.15	2.59	2.45	2.07	2.15	2.47	2.06	2.41	2.21
	NPC ^E	1.28	1.82	2.53	2.81	2.32	2.00	1.82	1.82	1.77	1.63	2.08	1.74
Groundnut	NPC ^I	1.64	1.92	2.00	2.53	1.80	1.36	1.30	1.23	1.29	1.15	1.79	1.22
	NPC ^E	2.16	2.56	2.83	3.85	2.75	2.16	1.87	1.76	1.97	1.72	2.60	1.82
Sunflower	NPC ^I	1.28	1.56	1.89	1.70	1.09	1.23	1.26	0.98	0.96	0.70	1.43	0.88
	NPC ^E	1.33	2.02	2.57	2.37	1.49	1.67	1.67	1.29	1.19	0.91	1.87	1.13

NPC^I Normal protection coefficient (Importable hypothesis)
 NPC^E Normal protection coefficient (Exportable hypothesis)

extent under these crops accounts for about 50% of the rainfed area. Further, the other important rainfed dry land crops namely ragi, bajra and minor millets do not have an international reference price for comparison. Hence, they were not included in the study.

Sorghum

Sorghum is the staple food in the northern parts of the state and occupies about 17% of the gross cropped area. The area under sorghum was approximately 2.2 million ha for the triennium ending 1993/94. The major sorghum growing districts in the state are Bijapur, Gulbarga, Raichur, Dharwad and Belgaum, and account for nearly 78% of the total area under the crop in the state. Sorghum, although not traded internationally, has an international market price in the U.S.A. However, it is an important crop from the standpoint of Karnatakas' agriculture, and in order to know the level of global competitiveness, it was included in the study.

The nominal protection coefficients of sorghum for the years 1984/85 to 1993/94 under the importable hypothesis were found to be below unity in most of the years except in 1986/87 (1.13) and 1987/88 (1.12). The average of NPCs for the pre-liberalization (1984/85 to 1990/91) and post-liberalization (1991/92 to 1993/94) periods indicated that after liberalization, the global competitiveness for sorghum had improved as NPC declined from 0.96 to 0.87 between these two periods. These lower protection coefficients thus imply that domestic prices received by farmers were below the international prices for sorghum, which suggests that sorghum prices are not integrated with the world prices.

The resulting set of NPCs under exportable hypothesis indicates a high average coefficient of 2.35 for the period 1984/85 to 1993/94, although it fluctuated between 1.76 in 1984/85 to 3.05 in 1987/88. The results indicate that sorghum is not competitive in the international market. Hence, the scope and opportunity for exports are limited. This is substantiated by the fact that sorghum is used mostly as a fodder crop in most of the developed countries.

Maize

Maize is grown both under irrigated and rainfed conditions. In Karnataka, the area under maize was more than 0.33 million ha for the triennium ending 1993/94 accounting for 3% of gross cropped area.

The NPCs of maize under the importable hypothesis were found to be less than unity in most of the years under reference except for the two years, 1986/87 (1.07) and 1987/88 (1.03) with an average NPC of 0.82 for the pre-liberalization period and 0.61 for the post-liberalization period. The lower NPCs for maize under importable hypothesis, indicate that domestic prices received by farmers were lower than the international prices implying that the maize cultivators in Karnataka were receiving lower prices when compared to world market prices.

Under exportable hypothesis, the resulting set of NPCs for maize indicates a high average value of 2.16 for the period 1984/85 to 1993/94. The NPCs were found to be higher in 1987/88 (2.81) followed by 1986/87 (2.53) and 1988/89 (2.32). Relatively lower NPCs were recorded at 1.28 in 1984/85 and 1.63 in 1993/94. The level of incentives thus was significantly higher under exportable hypothesis than that estimated under importable hypothesis, indicating that maize does not represent an efficient export crop in the state. However, it is a commodity with considerable industrial use and therefore a big international demand could emerge in the future.

Groundnut

Groundnut is the dominant oilseed crop in India accounting for 39% of the total output, followed by rapeseed and mustard which accounts for 27%. Soyabean and sunflower oils emerged as important oilseeds later. In Karnataka, groundnut is cultivated on 1.2 million ha (1994/95) occupying 10% of the gross cropped area of the state with a production of 0.95 million tonnes.

The NPCs for groundnut fluctuated between 1.15 in 1993/94 to 2.53 in 1987/88 with an average of 1.79 for the pre-liberalization period and 1.22 for the post-liberalization period. It may be noted that during 1986/87 and 1987/88 there was a sudden upward jump in the protection coefficient, which is primarily due to a sharp decline in international prices of groundnut oil and meal, thus affecting the price of groundnut kernels. The world price of groundnut oil at 1985 constant US dollars, for example, dropped from \$ 905 MT⁻¹ in 1985 to \$ 481 MT⁻¹ in 1986 and further to \$ 382 MT⁻¹ in 1987. During 1987/88, India experienced a severe drought and Karnataka was no exception where groundnut was one of the most affected crops resulting in a sharp increase in domestic price. In general, the NPCs were more than unity in all the years of the reference period indicating that the domestic prices of groundnuts were more than the international prices. These results implied that

groundnut received a significant protection from the existing policies. However, this analysis does not consider removal of subsidies and other measures of support by the government. Removal of such support would adversely affect the NPC for ground nut.

Under the exportable hypothesis, the assumption is that Indian groundnut would compete with US groundnut in Europe (Rotterdam), which is the World's biggest market for groundnuts. The resulting set of NPCs also indicate a high level of protection with an average NPC being 2.36 for the period 1984/85 to 1993/94, although it fluctuated between 1.72 to 1993/94 to 3.85 in 1987/88. This implies that groundnut is less competitive in the international market and does not represent an efficient exportable commodity.

From the standpoint of comparative advantage, groundnut is neither an efficient import substitute nor an efficient exportable commodity. These results support the findings of Gulati *et al.* (1990), that the NPCs of groundnut for three states, namely, Tamil Nadu, Andhra Pradesh and Gujarat averaged at 1.53, 1.50 and 1.47, respectively, under importable hypothesis, while the NPCs under exportable hypothesis averaged at 1.95, 1.91 and 1.87, respectively for the period 1980/81 and 1986/87. Thus, the results suggest that groundnut cultivators have been highly protected through Government policies mainly by restricting the edible oil imports, which gradually pushed the domestic price of groundnut upward. However, in a liberalized trade regime groundnut producers can be seriously affected through cheaper imports forcing them to switch over to other crops.

Sunflower

Sunflower has emerged as an important oilseed crop after groundnut in the state. The area under sunflower steadily increased from 1980 onwards. In Karnataka, sunflower cultivation during 1994/95 was 0.84 million ha and production was about 0.36 million tonnes.

The NPCs for sunflower in Karnataka for the years 1984/85 to 1993/94 under the importable hypothesis was found to be in the range 1.56 to 1.89. The NPCs were found to be more than unity for the pre-liberalization period (1984/85 to 1990/91). However, after liberalization, the competitiveness improved as NPC declined from 1.43 to 0.88 between the

pre- and post-liberalization periods. These lower protection coefficients for later years testifies that sunflower is emerging as an efficient import substitute crop.

The estimates of NPCs under exportable hypothesis suggest that the sunflower seed is less competitive in the international market and does not represent an efficient export commodity as indicated by the higher NPCs (>2). In general, for almost all the years under reference, NPCs were more than unity except for the year 1993/94 (0.91) with an average NPC of 1.48 for the ten-year period.

Thus, it is obvious that sunflower production in Karnataka is less competitive in reference to world market prices and does not represent an efficient exportable commodity as indicated by higher protection coefficients. However, lower protection coefficients in later years under importable hypothesis suggest that sunflower is emerging as an import substitute.

POLICY IMPLICATIONS

What do the results of the NPCs reveal? What signals do they provide for agricultural price and trade policy? The overall results suggest that sorghum and maize cultivators, on an average, have experienced disprotection, on the pricing front during the study period, compared to what would have prevailed under free trade. Under the importable hypothesis, the estimates of the NPCs were well below unity for the ten-year period. This implies that sorghum and maize are good import substitutes. Under the exportable hypothesis, the protection coefficients were above one for the entire study period suggesting that sorghum and maize are not efficient exportable commodities.

The results of the NPCs for groundnut reveal that the cultivators on balance received protection, albeit lower in recent years. This was largely due to lower world prices for groundnut oil and meal. The NPCs for sunflower were above unity for the pre-liberalization period. However, these coefficients declined to below unity in later years. This subscribes to the fact that the cultivators of oilseeds were supported in the 1980s through the Technology Mission on Oilseeds and National Oilseed Development Project which were launched in late the 1980s for improving oilseed production. The lower protection coefficient in later years suggests that sunflower is emerging as an import substitute.

Since agricultural development is vital for improving the status of a large chunk of the rural population, efforts should be made to develop the competitiveness of this sector to withstand the adverse affects of liberalization under WTO. Research and development could alter the structure of comparative advantage. Therefore, a synergy between private and public funded resources should be fostered. To improve the export prospects of agricultural commodities, research should focus on improving both the quality and productivity. Changes are required in the area of agricultural policy, which should aim at supporting the market forces, rather than working against it. Infrastructure and institutional development needs strengthening, as the present status in rural areas is totally inadequate. Institutional development should help in reducing the role of the Government in the agricultural sector, which at present is all pervasive.

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