Export Competitiveness of Sugarcane in Southern India

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Abstract: This paper combines policy analysis matrix techniques to model the analysis of profitability from sugarcane cultivation. Policy analysis matrices are computed for a sample of sugarcane growers located in the wet land of the Tamil Nadu under observed conventional and profit-efficient farming conditions. The EPC estimates showed that it was less than one in all the period under consideration indicating that the state had not protected the sugarcane crop during the period under consideration. The EPC ranged between 0.006 in 2010-11 and 0.038 in 2008-09 and it’s implied less import substitute. Thus the unfavorable EPC, ERP and DRC along with NPC of more than unity should be viewed in its proper perspective. The main conclusion is that the usefulness of the policy analysis matrix might be substantially enhanced by simulating profitability after efficiency-improving managerial decisions have been adopted.

Keywords: Tamil Nadu Sugarcane cultivators, Policy Analysis matrix, NPC, EPC, ERP, DRC, Indian agricultural policy, multifunctionality.

INTRODUCTION

This paper evaluates the private and social profitability of farming systems by the use of the policy analysis matrix (PAM). Here, it is shown that important additional insights might be obtained if the farmers’ efficient behaviour is considered, in addition to their observed behavior. This empirical application responds to the concern over whether or not those Tamil Nadu farming systems that can be deemed multifunctional, because of the important environmental functions performed, will be able to survive in the policy context of the post-2003 common agricultural policy (CAP).

For Indian authorities, the political problem of supporting farmers’ incomes in an increasingly open economic environment has been further compounded by the need to take on board the impact of trade liberalization on the non-commodity outputs of Indian agriculture. There is a growing recognition that, beyond its primary function of supplying food and fibre, agriculture can provide environmental benefits and contribute to the sustainable management of renewable natural resources, as well as to the preservation of biodiversity, and the maintenance of the economic viability of less favored rural areas. These new concerns are frequently summarized under the heading of multifunctional agriculture and have become an integral part of the Indian model of agriculture (EC, 1999, 2000). The research concerning the multifunctional character of agriculture is no longer restricted to international trade policy.

The impact of agricultural policies on farmers’ income might be widely different under observed and efficient behaviors. Likewise, the assessment of private and social profitability for a particular farming system can change substantially after major input adjustment decisions have been adopted in response to the diffusion of best management procedures. Profits obtained after all those adjustments could provide a useful benchmark for current production practices, showing whether enough room exists for an improvement in farms’ financial situation.

In this paper efficiency is used in connection with the PAM, refers to a social benchmark for the calculation of costs and revenues based on the adoption of international prices and the removal of the effects of subsidization and taxation.

DATA AND SAMPLE: IN SOUTHERN INDIA

The study relied on secondary data pertaining to export of sugarcane products (white sugar, Jaggery) in Tamil Nadu. The secondary data included production of the sugarcane in Tamil Nadu and India, export and import prices, domestic wholesale and world market prices for the periods between 1996-97 and 2012-13 at district and state level. These data were collected from various issues of Seasons and Crop Report of Tamil Nadu, Agro Stat published by different sources and web database of Food and Agriculture Organization and India Stat. Value of export of agricultural commodities through Chennai and Tuticorin ports was also collected from the custom houses (Sea Cargo) for the periods of ten years (2005-06 to 2014-15).

The price data are monthly quotations for nominal spot price (US $/metric ton) for sugarcane were collected from UNCTAD website. The data span from January 2005 to December 2015 was collected. The dataset used in this paper corresponds to a sample of 337 single crop sugarcane cultivated farms located in the Tamil Nadu districts. The data were collected from a comprehensive survey carried out by the authors with support from the Tamil Nadu Ministry of Agriculture and correspond to the year 2015. The dataset provides data for one output and seven inputs. Output is measured in kilograms of sugarcane production. The only
fixed input is cultivated land, measured in hectares. Variable inputs are: labour (working days), in addition to capital, fertilisers, seeds, herbicides and fungicides, all of which are measured in Indian rupees.

MEASURES OF COMPETITIVENESS

Nominal Protection Coefficient (NPC):
The Net Protection Coefficients were estimated for sugarcane crops under exportable hypothesis for the period from 2005 to 2014 in order to measure the extent to which domestic prices diverge from border equivalent prices. It was estimated as follows.

\[ \text{NPC} = \frac{P_d}{P_b} \]

Where,
- \( P_d \) = the domestic producer price; and
- \( P_b \) = the border equivalent producer price computed as explained below.

Border equivalent prices or world prices adjusted for transport, marketing and processing costs, were estimated to serve as yardstick to indicate the extent to which domestic prices have been distorted by the various government interventions.

Algebraically,

\[ P_b = P_w - T_w - T_d - C_d + V_b \]

Where,
- \( P_b \) = Border Price
- \( P_w \) = World Price
- \( T_w \) = Ocean freight and insurance charges
- \( T_d \) = Handling, transport and marketing charges from port to domestic markets
- \( C_d \) = Transport, processing and marketing charges farm gate to domestic market
- \( V_b \) = The value of by-products.

An NPC greater than one would show that the domestic market price of the commodity exceeded the border price, which discouraged the export of that particular commodity.

Effective Protection Coefficient (EPC):
In the present study, Effective Protection Coefficient (EPC) was estimated as the ratio of value added in private prices to value added in social prices. The EPC indicates the combined effects of policies in the tradable sugar markets.

\[ \text{EPC} = \frac{VAD_p}{VAB_p} \]

Where,
- \( VAD_p \) = Value added at domestic price
- \( VAB_p \) = Value added at border price

An EPC greater than one would indicate positive incentive effects of commodity policy (an export subsidy to producers), whereas an EPC less than 1 shows negative incentive effects (a tax on producers). Both the EPC and the NPC ignored the effects of transfers in the factor market and therefore do not reflect the full extent of incentives to farmers.

Domestic Resource Cost (DRC):
To measure the comparative advantage (or) efficiency of Indian sugar in the world market, domestic resource cost coefficient was estimated as given below.

\[ \text{DRC} = \frac{SP_d}{VP_b} \]

Where,
- \( SP_d \) = the shadow price of the sugar; and
- \( VP_b \) = the value added measured at world prices.

DRCs greater than one would indicate that the value of domestic resources used to produce the commodity exceeded its value added in social prices. Production of the commodity, therefore, does not represent an efficient use of the country's resources. DRCs less than one would imply that a country has a comparative advantage in produce in the commodity. Values less than one would mean that the denominator (value added measured at world prices) exceeded the numerator (the cost of the domestic resources measured at their shadow prices).

Effective Rate of Protection (ERP):
To measure the structure of protection like tariffs, import bans, quantitative restrictions on Indian sugar exports, Effective Rate of Protection coefficient was estimated, which measured the percentage increase above value added in world prices that was permitted by the structure of protection.

\[ \text{ERP} = \frac{VAD_p - VAB_p}{VAB_p} \]

Where,
- \( VAD_p \) = Value added at domestic price
- \( VAB_p \) = Value added at border price

ERP = EPC + 1

Greater the ERP, higher would be the protection for that commodity to be traded in the world markets and vice versa. In this paper, the PAM methodology is employed in order to learn about the possibilities of maintaining groundnut cultivation in the Tamil Nadu sugarcane cultivators.

RESULTS AND DISCUSSION

Details of the Competing Countries:
Details of competing countries and their average market share along with the growth rate for the sugarcane crop for the period from 2005 to 2014 are furnished in the Table 1. As mentioned elsewhere, the details were collected from the website of Food and Agricultural Organization and growth rate was worked out country wise.

The export of sugar was found to be high in Brazil and shared 27.56 per cent of world sugar export. India accounted for 4.91 per cent of world sugar export. Both Brazil and India witnessed a negative trend in the export of sugar during the period of consideration. France and Thailand shared 9.28 and 8.00 per cent of the world export of sugar, both countries export trend declined at the rate of 2.1 and 1.3 per cent per annum respectively. The sugar export at world level also exhibited a marginal increase of 0.3 per cent per annum.

From the foregoing analysis it is evident that among the different agricultural commodities exported in the world, India had a considerable share in the world total export in the case of pulses, groundnut, tea and Sugarcane in that order.
Export Competitiveness of Sugar:
Trade competitiveness of the sugarcane crop was analyzed using the framework of Policy Analysis Matrix. As mentioned elsewhere, the PAM was constructed taking into consideration of free on board prices. Similarly, for domestic factors which are not internationally traded social cost was calculated using the value of marginal product approach using factor shares of various inputs along with the mean values of inputs, output and prices.

Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC), Effective Rate of Protection (ERP) and Domestic Resource Cost (DRC) computed to reveal the trade competitiveness. Trade competitiveness was estimated using the aforesaid measures for sugarcane crop for the period from 2005 to 2014.

India as well as Tamil Nadu has surplus sugar production to meet the domestic demand and exports as well the Tamil Nadu is one of the major sugar producing states in India. The NPC for sugarcane ranged between 1.07 in 2005-06 to 1.86 in 2013-14 with an average of 1.43 under exportable hypothesis (Table 2).

This implies that sugar was competitive in the international market due to its highest productivity of 110 tonnes /ha in Tamil Nadu. The EPC estimates showed that it was less than one in all the period under consideration indicating that the trade competitiveness. Though the EPC, ERP and DRC along with NPC of more than unity should be viewed in its proper perspective. However, there status could be altered if sugar industry is made competitive on the international market.

Table 1. Competing Countries and their Average Market Share

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Major Exporting Countries</th>
<th>Quantity (tonnes)</th>
<th>Per cent to Total</th>
<th>CGR (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>Brazil</td>
<td>6318648</td>
<td>27.56</td>
<td>-0.9*</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>2127710</td>
<td>9.28</td>
<td>-2.1*</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>1833591</td>
<td>8.00</td>
<td>-1.3</td>
</tr>
<tr>
<td></td>
<td>India</td>
<td>1126385</td>
<td>4.91</td>
<td>-0.5*</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td>1076172</td>
<td>4.69</td>
<td>-3.1</td>
</tr>
<tr>
<td></td>
<td>United Arab Emirates</td>
<td>765934</td>
<td>3.34</td>
<td>-0.7</td>
</tr>
<tr>
<td></td>
<td>World</td>
<td>22927333</td>
<td>100.00</td>
<td>0.2</td>
</tr>
</tbody>
</table>


Table 2. Competitive Measures for Sugar

<table>
<thead>
<tr>
<th>Year</th>
<th>NPC</th>
<th>EPC</th>
<th>ERP</th>
<th>DRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>1.07</td>
<td>0.03</td>
<td>-0.97</td>
<td>0.031</td>
</tr>
<tr>
<td>2006-07</td>
<td>1.27</td>
<td>0.00</td>
<td>-1.00</td>
<td>0.000</td>
</tr>
<tr>
<td>2007-08</td>
<td>1.35</td>
<td>0.03</td>
<td>-0.97</td>
<td>0.028</td>
</tr>
<tr>
<td>2008-09</td>
<td>1.86</td>
<td>0.04</td>
<td>-0.96</td>
<td>0.038</td>
</tr>
<tr>
<td>2009-10</td>
<td>1.73</td>
<td>0.05</td>
<td>-0.97</td>
<td>0.027</td>
</tr>
<tr>
<td>2010-11</td>
<td>1.34</td>
<td>0.01</td>
<td>-0.99</td>
<td>0.006</td>
</tr>
<tr>
<td>2011-12</td>
<td>1.77</td>
<td>0.02</td>
<td>-0.98</td>
<td>0.022</td>
</tr>
<tr>
<td>2012-13</td>
<td>1.35</td>
<td>0.02</td>
<td>-0.98</td>
<td>0.018</td>
</tr>
<tr>
<td>2013-14</td>
<td>1.36</td>
<td>0.02</td>
<td>-0.98</td>
<td>0.017</td>
</tr>
<tr>
<td>2014-15</td>
<td>1.18</td>
<td>0.02</td>
<td>-0.98</td>
<td>0.016</td>
</tr>
<tr>
<td>Average</td>
<td>1.43</td>
<td>0.02</td>
<td>-0.98</td>
<td>0.022</td>
</tr>
</tbody>
</table>

From the foregoing discussion, it is evident that among the selected agricultural commodities rice alone was found to be competitive and the measures taken by the Government are in the desired direction. The agricultural commodities like pulses and sugar had the comparative disadvantage and efforts have to be taken to avert the situation. In the present study, the crops like tobacco, tea, coffee, cashew and fruit

CONCLUDING REMARKS
The study had shown that exports of sugar from India had responded differently in terms of comparative advantage during the post-reforms period. A gradual decline in India’s comparative advantage had been depicted for exports of sugar. Domestic market price, Quantity produced for domestic market, Quantity produced for foreign market and Export cost of commodities were found to be negatively influencing the export participation of the State exporters. Hence the government should take appropriate policy measures like minimum support price, market complex and precision/contract farming for the exportable agricultural commodities. Tamil Nadu had the comparative disadvantage in agricultural commodities sugar. Hence all efforts are
needed to increase the productivity of the sugar crop by
providing the market intelligence. The decreasing rate of
EPC implies that the competitiveness of sugar in Tamil
Nadu is on a decreasing trend. This could be due to the high
cost of production. Similarly the negative ERP indicates the
disadvantages of diverting subsidized resources to sugar
production. In such a situation, efficient use of resources in
sugar production is of paramount importance to make su-
gar production in Tamil Nadu more competitive and cost
effective for which technology plays vital role than
subsidizing factor inputs.

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