RICE TRADE COMPETITIVENESS IN POST-WTO PERIOD IN ANDHRA PRADESH

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Abstract : Rice is the major staple food of Andhra Pradesh and is widely grown in all regions of the State. There are significant changes in the macro policy environment and its implications for crop competitiveness since early 1990s. This paper examines the trends in production and competitiveness of rice in Andhra Pradesh in pre and post-WTO period and its implications in producer and consumer surplus and social cost benefits at State level. Rice registered an impressive growth in production in post-WTO period. Trade competitiveness of rice increased in post-WTO period as shown by DRC and NPC levels. EPC shows that rice production was fairly protected by the government policies even after post-WTO period. Overall, liberalization has positive impact on the welfare of the State. Distortion in domestic prices would result in a change in revenue to producers and consumers. Due to free trade of rice, welfare gains were much larger than the respective welfare losses to the economy. The policy prescriptions from the study are (i) reduced cost of production by educating the farmers on improved crop management practices in rice farming systems (ii) ensuring supply of quality inputs, replacement of low potential/ pest susceptible old varieties by new high yielding varieties with high yield potential (iii) encourage hybrid rice cultivation in suitable areas by conducting demonstrations and making seed available to the farmers (iv) providing farm implements and farm machinery for improving efficiency in farm operations and cost of cultivation and lastly (v) keep exports and imports free. Only use tariffs as an adjusting instrument.

Key words : Policy analysis matrix, Regression coefficient, Compound growth rate, Exponential growth model.

1. Introduction

Andhra Pradesh State has a prominent position in the agricultural economy of India. A large proportion of the cultivated area in the State is devoted to the production of rice, which is a staple crop of the State and India. International and domestic trade in rice is highly protected with high level of non-tariff barriers. It is also thinly traded commodity among staple food, resulted in high international year-to-year price fluctuations. Its wide range of grades coupled with thin markets makes international trade opportunities difficult to estimate. Many players enter market due to favourable production as suppliers in some years and all withdrawn in bad years (not responsive to prices) resulting in gluts and dip in international prices in years of surplus production.

Andhra Pradesh contributes to about 16-18% of India's rice production with an area of 10%. It is high-input intensive crop mostly grown in Coastal Andhra and irrigated areas of both Telangana and Rayalaseema regions. Even though, rice production is competitive in high productive zones like Coastal Andhra, irrigated areas of Telangana and Rayalaseema districts in Andhra Pradesh, inefficiency in production is building up mostly due to the old rice mills with excess capacity resulting in inefficiency in the rice production value chain. In the post-WTO period, the main criteria in prioritizing crop choices at State level are relative competitiveness. However, the competitiveness and profitability of rice is becoming questionable in the recent years as some farmers announced crop holiday in the rice growing areas citing the low profitability or loss and increasing cost of production. It is noted that to some extent liberalization policies during post-WTO period affected highly subsidized crop like rice. It is in this context that this study has been undertaken to assess the competitiveness of major crops of Andhra Pradesh based on performance of the crops during the two time periods *viz.*, pre-WTO (1985-86 to 1994-95) and post-

WTO period (1995-96 to 2004-2005). The specific objectives of the present study are (i) to analyze the global competitiveness of rice in Andhra Pradesh and (ii) to quantify the welfare gains and losses due to liberalization of agricultural trade in rice. Following are the hypothesis framed with regard to each of the above objectives (i) Andhra Pradesh enjoys comparative advantage in rice production and (ii) trade liberalization benefits the consumer more than the producer.

The paper is organized into four sections as described below: Section 1 : Introduction – deals with the importance of the research problem, objectives and hypotheses of the study. Section 2 : Methodology – presents the design, method of data collection and various analytical techniques employed in the study. Section 3 : deals with the results of analysis of the crops selected. Section 4 : Summary and Conclusions – deals with the summary of the findings and conclusions are drawn with policy implications.

2. Methodology

Growth in area, yield and production of rice in A.P., integration of domestic and international markets, competitiveness and implications of WTO on agriculture are analyzed and the analytical tools employed in the study are discussed. To study the competitiveness of exports of rice from Andhra Pradesh, the free on board (FOB) prices, cost insurance freight (CIF) prices and domestic wholesale prices that prevailed in major markets were collected. The markets selected for the study are Nizamabad as local market and Thailand as international market. The study is based on secondary data covering a period of 20 years from 1985-86 to 2004-05. The study period was divided into two *viz.*, pre WTO (1985-86 to 1994-95) and post WTO (1995-96 to 2004-2005).

The secondary data pertaining to area, yield and production of rice was collected from Directorate of Economics and Statistics (DES), Andhra Pradesh. International reference price of the crops under study were collected from various issues of FAO production year book. The maritime freight rates of rice were obtained from FAO trade year book (2003). Information on domestic prices and other agricultural statistics were compiled from various issues of Season and Crop report and Statistical abstract of A.P. published by DES, Hyderabad. Information on transportation costs, port clearance charges etc over the years were obtained

from Port Authority, Kakinada and South Central Railways, Hyderabad. Data on cost of cultivation of selected crops were obtained from Cost of Cultivation scheme, Government of India, Hyderabad.

Growth in area, production, productivity, quantity of export and imports are analyzed using exponential growth model, which is given as

$$Y = ab^t e_t \qquad (1)$$

Where,

Y = dependent variable for which growth rate is estimated.

a = intercept

b = regression coefficient

t = time variable

e = random error

Compound growth rate was obtained from the logarithmic form of the Equation (1).

$$\ln Y = \ln a + t \ln b + \ln(e) \qquad (2)$$

Per cent (%) compound growth rate (g) is obtained using the relationship

$$g = (\text{Antilog of } b - 1) * 100 \qquad (3)$$

Policy Analysis Matrix (PAM)

The PAM is essentially a double accounting technique that summarizes budgetary information for farm and post-farm activities [Yao (1997)]. While simple to use, it is theoretically rigorous and derived from social cost-benefit analysis and international trade theory in economics. The basic steps in using the PAM method are identifying the commodity system, assembling representative budgets for each activity in the system, calculating social values, aggregating the budgetary data into a matrix, analyzing the matrix and simulating policy changes. The method rests upon a familiar identity: Profit = Revenue – Costs. Costs are divided into those inputs that are traded on international markets (fertilizers, pesticides, hybrid seeds) and those domestic factors (labour, land and capital), which are not traded internationally. This gives us the following profit identity:

Revenue - Cost of tradable inputs - Costs of domestic factors = profit.

PAM is measured in two types of prices: private and social, which are defined clearly in the context of working with a PAM.

Private values are prices at which we observe

goods and services actually being exchanged and those which we have used in our budgets-the price of crop, the cost of seed, fertilizers, farm yard manures, pesticides and the wage rate. These are also called market or financial prices. Social values are the prices, which would prevail in the absence of any policy distortions (such as taxes or subsidies) or market failures (such as monopolies). They reflect the value to society as a whole rather than to private individuals and are the values used in economic analysis when the objective is to maximize national income. The determination of social values is one of the main tasks of economists, since these values offer the best indication of optimizing income and social welfare. For internationally traded goods, we use world prices [Free on Board (FOB) for exports and Cost Insurance Freight (CIF) for imports] and in case of domestic factors, which are not traded on international markets, figuring out social prices is difficult. For them, the social costs have been calculated using Value of Marginal Product approach, which uses factor share (S_i) of various inputs (X_i) together with the mean values of inputs (I) and outputs(Y) and prices (P_y). The computation of the social cost of input is as follows.

$$P_{xi} = [(S_i/X_i)*Y]P_y \qquad (4)$$

Once all private values have been matched with their social equivalents, we arrive at two identities:

Private revenue - Private cost of tradable inputs - Private cost of domestic factors = Private profit.

Social revenue - Social cost of tradable inputs - Social cost of domestic factors = Social profit.

Table 1 : Policy Analysis Matrix (PAM).

	Revenues	Cost of tradable inputs	Cost of domestic factors	Profits
Private values	A	B	C	D
Social values	E	F	G	H
Divergences	I	J	K	L

From the Table 1, we can obtain

Private profit (D) = A - B - C,

Social profit (H) = E - F - G,

Output transfers (I) = A - E,

Input transfers (J) = B - F,

Factor transfers (K) = C - G,

Net transfers (L) = D - H or I - J - K.

Private cost ratio (PCR):C/(A-B). Domestic resource ratio (DRC) : Nominal protection coefficient (NPC) on tradable outputs(NPCO): A/E, Nominal protection coefficient on tradable inputs(NPCI) : B/F, Effective protection coefficient (EPC): (A–B)/(E–F), Profitability coefficient (PC): (A-B-C)/(E-F-G) of D/H, Subsidy ratio to producers (SRP): L/E or (D – H)/E.

An important thing to keep in mind is that for a given commodity system, the costs and profits represent an aggregate for all activities from farm to wholesale. For revenues, A is the whole price, and E is the world price of the comparable product in the comparable location.

From this table, several useful values appear. Private profit (D) is the aggregate measure of net returns for all activities in the system and a high value would suggest a system that is competitive from a financial point of view. In other words, profits being generated for the participants in that system. A negative value would be a strong indication that the system is unsustainable, since there are no incentives for individual farmers to continue cultivation of the crop.

In contrast, social profit (H) represents the foreign exchange saved by reducing imports or earned by expanding exports of a unit of this commodity. A positive value means that production is adding to national income, while a negative value suggests that the country as a whole would be better off in terms of national growth by not producing this commodity. As such, it is an indication of international competitive advantage.

Cell L is the difference between D and H, thus describes the value of the resources going in to (if positive) or coming out of (if negative) the commodity system from the economy as a whole.

Nominal Protection Coefficient (NPC) is a straightforward measure of competitiveness. It is calculated as a ratio between the domestic prices to the international price of a comparable grade of commodity, adjusted for all the transfer costs such as freight, insurance, handling costs, margins, losses etc. A decision criterion is if NPC is less than one, then the commodity is competitive (under importable hypothesis it is considered a good import substitute and under exportable hypothesis, it is worth exporting). If NPC is greater than one, the commodity is not competitive (not a good import substitute or not worth exporting).

EPC is an indicator for measuring trade price and

exchange rate related distortions through tradable input and output prices of the value added of a particular product. The EPC captures transfers due to distortions in input as well as output prices on the product's value addition that is output price (gross value) less specified (usually variable) traded input costs. The EPC for commodity is defined as

$$EPC_i = (VA_i^d/VA_i^b) \qquad (5)$$

Where, VA_i^d is the value added output I at domestic prices and VA_i^b is the value-added output I at border prices. The EPC can be positive, negative or zero. A positive EPC indicates that the value added at domestic prices is higher than value added at border prices, and hence the output is effectively protected through the combination of domestic output and input price policy. In contrast, a negative EPC implies overall producer of the commodity taxed; domestic value added is effectively taxed. When EPC is zero, the output is neither taxed nor subsidised, and value added at domestic price is equal to the value added at border prices.

Domestic Protection Coefficient (DRC) ratio also measures the efficiency of domestic production in terms of its international cost competitiveness. The DRC coefficient compares the opportunity costs of using domestic primary resources- land, labour and capital and of traded inputs in domestic production to the value added by that production at border prices

$$DRC = a_{ij} v_j/(P_i^b - a_{ij} P_i^b) \qquad (6)$$

Where, a_{ij} (j = K + 1 to n) is the technical coefficient (input use per unit of output) for domestic resource (non-trade intermediary input) j in the production of output i and v_j is the shadow price of such an input. When DRC ratio is lower than one, domestic production is efficient and internationally competitive because the opportunity cost of spent domestic resources is smaller than the net foreign exchange gained in export or saved by substituting for imports. A DRC ratio of less than one is thus taken as an indicator of long run comparative advantage. The opposite is true when DRC ratio is larger than 1 [Yao (1977)].

Partial equilibrium analysis

Price distortions on domestic as well as international market and domestic agricultural policies will have an impact on incomes of producers, consumers and government revenues. These distortions are created on account of protectionist policies followed by the governments. With liberalization, these policy distortions will change. In the current study, the extent of price discrepancies were computed. Partial equilibrium methods can readily be used to evaluate the impact of the price changes on demand, supply and welfare. The basic analytical structures of the partial equilibrium models are summarized as follows. The following formulae are applied for different prices affecting producers and consumers.

(1) Net social loss in production (NSLp)

$$NSLp = \frac{1}{2} (Q_w-Q) (P_w-P_p)$$
$$= \frac{1}{2} t^2 p^n s^v$$

(2) Net social loss in consumption (NSL$_c$)

$$NSLc = 1/2 (C_w-C)(P_w-P_c)$$
$$= \frac{1}{2} t^2 c^n d^w$$

(3) Total net social loss (NSL)

$$NSL = NSL_p - NSL_c$$

(4) Welfare gain of producers (G$_p$)

$$G_p = Q(P_p-P_w) - NSL_p$$

(5) Welfare gain of consumers (G$_c$)

$$G_c = Q(P_w-P_c) - NSLc$$

(6) Net effect of liberalization on welfare in the State (NELWS)

$$Q(P_p-P_w) - Q(P_w-P_c)$$

(7) Change in government revenue (dG)

$$dG = (NSL_p + NSL_c) - G_p - G_c$$

Where,

Q_w = Production at world prices

Q = Production at domestic prices

P_w = Border prices

P_p = Price faced by domestic producers

P_c = Price faced by domestic consumer

C_w = Consumption at world prices

C = Consumption at domestic prices

W = Value of consumption at Pc

V = Value of production at Pp

N_s = Elasticity of domestic supply

N_d = Elasticity of domestic demand

T_c, t_p = proportion of tariff in domestic price at the consumer (t_c) or at the producer (t_p) level.

Table 2 : Growth rates and instability index of area, production and yield of Rice in Andhra Pradesh.

Description	Growth Rate (%)	Instability Index (%)
Pre-WTO period	Rice	Rice
Area (Lakh ha)	0.72	7.98
Production (Lakh tonnes)	3.4	10.76
Yield (Kg/ha)	2.64	5.31
Post-WTO period		
Area (Lakh ha)	-1.93	12.79
Production (Lakh tonnes)	0.11	0.94
Yield (Kg/ha)	1.81	4.61
Overall period		
Area (Lakh ha)	-0.23	11.26
Production (Lakh tonnes)	1.55	8.45
Yield (Kg/ha)	1.66	9.75

Table 3 : Results of policy analysis matrix (PAM) of rice.

Year	NPC	NPC1	EPC	DRC	SRP	PC
TE 1989	0.79	0.33	1.08	0.89	0.40	1.74
TE 1992	0.65	0.37	0.79	0.67	0.13	1.46
TE 1995	0.70	0.33	0.86	0.78	0.28	1.76
Pre-WTO period	0.71	0.34	0.90	0.78	0.26	1.65
TE 1998	0.50	0.28	0.50	0.37	-0.26	0.49
TE 2001	0.54	0.36	0.62	0.44	-0.14	0.65
TE 2004	0.69	0.38	0.82	0.64	0.05	1.26
Post-WTO	0.57	0.34	0.64	0.48	-0.11	0.79

Table 4 : Effect of liberalization on agricultural trade.

Increase in price (%)	Increase in supply (lakh tonnes)	Decrease in demand (lakh tonnes)
45	4.32	0.87

The basic parameters needed in this evaluation are the elasticities of supply and demand. The evidence on agricultural supply elasticity is unfortunately weak and diverse. In the present study, the supply and demand elasticities were taken from Reddy (1997) and Raghavendra (2004). For calculation of production values, the wholesale price of commodities was used, whereas, for consumption values, the retail prices of commodities were used. The world reference prices were derived from the international price, adjusted for transport and marketing and trading margins in order to make the domestic commodity comparable with the internationally traded commodity. For the purpose of easier conceptualization, it has been presented in Fig. 1. An illustration of effects of price distortions, S'
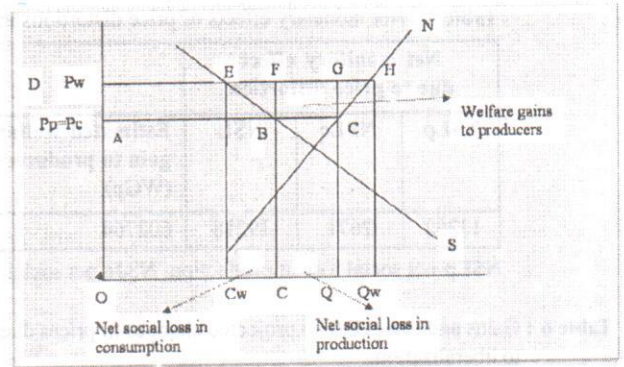

Fig. 1 : Production values.

represent the domestic supply function and N' is the domestic demand schedule. The world market price is OD and domestic price is OA. For reasons of simplicity no distinction is made between producer and consumer price. AD represents the increase in export tax. At the bottom of figure, the welfare gains and losses determined in equations (A) – (F) are related to the corresponding areas in figure.

Eq. (A) NSL_p = CHG

Eq. (B) NSL_c = BFE

Eq. (C) NSL = CHG + BFE

Eq (D) WG_p = ACHD

Eq. (E) WG_c = ABED

Eq (F) Net effect of liberalization of welfare in the State = CwCFE + Q QwHG.

3. Results and Discussion

Rice production in Andhra Pradesh is growing at faster rate since green revolution (Fig. 2). It is also important to note from the Fig. 3 that even though, there is stagnation in the production in the recent years, there is a surplus production of rice in the State, which needs to find market either in some other States within India or abroad. To export domestic production, there is a need to increase competitiveness of rice/rice production in Andhra Pradesh State.

Compound growth rates in area, yield and production of rice were worked out for the State and presented in Table 2. The growth rates were worked out for two sub periods, namely, pre-WTO period (1985-86 to 1994-95) and post-WTO period (1995-96 to 2005-2006) as well as for the entire study period. The results of growth analysis are presented below.

In Andhra Pradesh, area under rice crop had increased from 34.52 lakh hectares in 1985-86 to 39.82

Table 5 : Net monetary effects of price distortions in rice.

Net monitory effect due to price distortion			Net effect of liberalization on welfare		
NSLp	NSLc	NSL	Estimated welfare gain to producers (WGp)	Estimated welfare loss to consumers (WCc)	Net effect of liberalization on the welfare in the state (Rs. In lakhs)
13262	2671	19218	602764	587138	15626

NSLp-net social loss in production, NSJc-net social loss in consumption, NSL-total net social loss.

Table 6 : Gains and losses due to projected changes in prices due to liberalization.

Value of production at PP(v)	Percentage of WGp to value of production	Value of consumption at PC(w)	Percentage of WGc to value of consumption
13,15,337	46	18,89,562	-38

Fig. 2 : Rice production in Andhra Pradesh (Million tonnes).

Fig. 3 : Trends in rice production and consumption in Andhra Pradesh.

lakh hectares in 2005-06. For the same period production increased from 76.13 lakh tones to 117.04 lakh tones at a compound growth rate of 1.66 per cent with instability of 9.75 per cent. Whereas yield had increased at the rate of 1.55 per cent. In the pre-WTO period, the growth in area was positive (0.72% per annum) with slightly lower instability of 7.98 per cent. Whereas in post-WTO period, there was a negative growth rate in area with a very high degree of instability. In pre-WTO period, the growth rates in yield and production were higher, when compared to the post-WTO period. It shows overall, the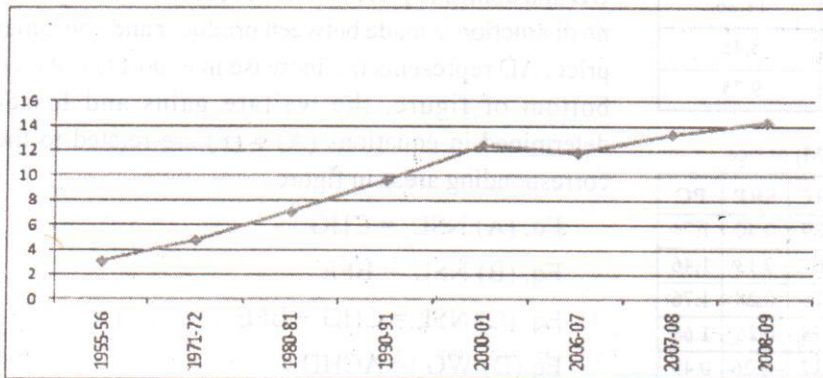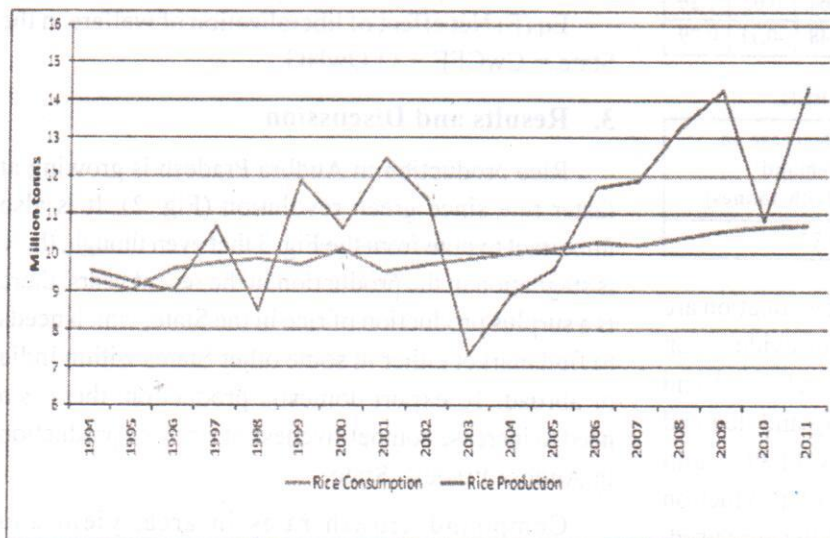re is some stagnation in the post-WTO period in all aspects of rice cultivation. In the post-WTO era, there is a need for adequate rice production not only for the domestic market but also for exports. Hence, it is necessary to augment exportable surplus of good quality rice at competitive prices. This increase in production has necessarily to come from increased efficiency in productivity in order to meet the demands of sustainability and preservation of environment quality.

Trade competitiveness of rice

Results of policy analysis matrix (PAM) for rice are presented in Table 3. It is interesting to observe that rice, which is the major crop in the State had been largely competitive on an importable basis with their NPC values being below unity during the reference period. EPC estimates showed that out of twenty years reference period, for two years (1986-87 and 1987-88), it was more than one, which showed that the State had protected the crop in these years. However, for the reference period the average EPC showed that Andhra Pradesh is an efficient producer of rice. Over the years, EPC had declined which implies that increasing rate of competitiveness of rice. This could be due to emergence of efficient production technology and impact of WTO in the country.

The estimates of DRC for the reference period revealed that the State had comparative advantage in the rice production (DRC is below one). The level of DRC shows that the value of domestic resources used in producing a unit value of rice in Andhra Pradesh was less than what it could cost to import. The DRC level decreased in the post-WTO period, which shows that comparative advantage in rice production has improved in this period. Subsidy Ratio to Producer Coefficient (SRP) was computed to analyze the degree of State protection to rice. Results presented in Table 3 revealed that the average SRP for the State in post-WTO is -0.11 and in pre-WTO period, it was 0.26. This implies that the State had not protected the rice production in post-WTO period, but moderately protected the rice production in pre-WTO period. It shows, the levels of incentives provided to farmers in post-WTO period reduced significantly in post-WTO period. And incentives are meager as compared to magnitude of protection in the developed countries even during pre-WTO period.

In case of NPC under exportable hypothesis, the results were different. It implies that the State had protected rice prices as revealed by NPC values (above one in all the years). The higher NPC implies that domestic prices received by farmers were higher than the international prices for the crop. Nominal Protection Coefficient of Input transfer (NPCI) was less than one in both the periods. It was 0.34 in both the periods which implies that the average market prices of these inputs are only 34 per cent of world prices. The results are in contradiction with the results of Gill and Brar (1996) and might be due to the higher irrigation and electricity subsidies in SAT India.

Impact of economic liberalization on trade and welfare

A wide range of economic policy changes covering trade, subsidies, technological improvement affects agricultural production. Using standard partial equilibrium methods proposed by Lutz and Scandizzo (1980) and the NPC coefficients obtained above, an attempt has been made in the paper to investigate the impact of price distortions on output of each major crop produced and their consequences on the incomes of the producers, consumers and government revenues. The major objectives of price intervention policies for agricultural products are price stability, affordability to consumers and remunerative and stable price to farmers and food security to vulnerable sections of the society. International prices appear to capture the opportunities open to the country through trade even though distortions from international prices are not easy to measure, since even relatively homogeneous commodities often show a large variation in international prices. These prices may be widely fluctuating and may themselves be affected by domestic distortions. Thus, while world markets are the natural forum to appraise the value of tradable commodities, care has to be exercised in selecting a system of border prices that would meaningfully apply to a specific commodity of the region.

In the present study, the partial equilibrium methods and formulae shown under the methodology section were applied to evaluate the real and monetary effects of price intervention for rice produced in Andhra Pradesh. In order to assess the impact of liberalization of trade in agriculture on producers and consumers, an analysis was carried out for the year 2004-05. These are based on the elasticities and the estimated nominal protection coefficients. The empirical estimates of welfare impact of liberalization are depicted in Tables 4, 5, 6 and 7.

Gross real effects of the price distortions are often sizable, since production and consumption are opposite. They are additive with respect to trade effects. For Andhra Pradesh the liberalization of agriculture would result in change in production due to changes in prices. The international price adjusted for transfer cost is higher by 45 per cent compared to the domestic prices of rice during the post-liberalization period (2004-05). These higher world prices would result in incremental increase in domestic production to the extent of 4.32 lakh tones of rice. Consequently, higher international prices will have negative impact on the consumption levels, which would result in a decrease in the consumption of rice by 0.87 lakh tonnes.

The net social losses in production and consumption critically depend on the extent of production and on the elasticities. The state incur substantial welfare loss due to price distortions in rice (Rs. 587138 lakhs). Thus, the net effect of liberalization on the welfare in the state was substantial amounting to Rs. 15626 lakhs in rice during the period 2004-05.

Further, the distortions in domestic prices would result in a change in revenue to producers and

Table 7 : Calculations of Nominal protection Coefficient.

Particulars	Unit	TE 1988	TE 1991	TE 1994	TE 1997	TE 2000	TE 2003	TE 2005
Wholesale price in A.P	Rs/Qtl	324.7	430.6	689.6	1024.8	1204.8	1325.5	1403.9
Transport cost to Chennai	Rs/Qtl	28.6	29.8	31.8	33.0	33.9	34.5	35.6
Marketing margins @ 5%	Rs/Qtl	16.2	21.5	34.5	51.2	60.2	66.3	70.2
C&F Handling charges	Rs/Qtl	14.2	16.3	20.6	25.3	28.5	30.5	32.4
Warehouse charges	Rs/Qtl	3.4	4.3	5.8	6.3	7.1	7.5	8.1
Service charges	Rs/Qtl	2.1	2.6	3.0	3.5	3.9	4.1	4.4
Service Tax	Rs/Qtl	0.2	0.2	0.2	0.3	0.3	0.3	0.4
Equals FOB price	Rs/Qtl	389.4	505.3	785.4	1144.2	1338.7	1468.7	1554.9
Plus Freight from India to Bangkok	Rs/Qtl	8.2	11.8	18.9	29.4	28.7	28.1	28.0
Plus Insurance @ 1%of price	Rs/Qtl	3.2	4.3	6.9	10.2	12.0	13.3	14.0
Equals landed price	Rs/Qtl	400.8	521.4	811.2	1183.9	1379.5	1510.0	1596.9
FoB price at Bangkok	$/Qtl	21.9	28.9	27.7	31.0	28.5	19.0	22.3
Exchange rate	1$=Rs	12.3	14.7	23.8	32.1	38.2	45.5	47.9
FoB price at Bangkok	Rs/Qtl	269.7	424.3	648.7	994.8	1082.3	864.9	1065.6
Nominal protection coefficients		1.5	1.2	1.2	1.2	1.3	1.7	1.5

consumers. The welfare gains were much larger than the respective welfare losses with the liberalization. The liberalization of agriculture will have a positive impact on producers of rice, which command higher international price. In the case of consumers, increase in price of commodity necessitates them to pay more, which is considered as a loss. The welfare gain will be very high in the case of rice at 46.

Policy implications

Based on the study, following policy recommendations are made. There is a vast scope for augmenting exports of superfine quality rice (non-basmati), particularly to the countries where Indian ethnic groups are in large numbers. However, the Indian exports are bogged down by quality problems and inadequate efforts to clear doubts about the quality of Indian superfine rice. Further, efforts may be directed to reduce cost of production through System of Rice Intensification (SRI) method of rice cultivation and resource saving technology to increase competitiveness of the crop. Further, Andhra Pradesh has export competitiveness in rice. Hence, all efforts should be made to increase the production and productivity of rice. State should encourage enhancing the exports of these commodities through establishment of export facilitating centre for farmers at State level. Further, specific action points comes out from the study are:

(i) Reduced cost of production by education the farmers on improved crop management practices like INM, IPM, Post harvest technology, Water management, Polambadi.

(ii) Ensuring supply of quality inputs. Replacement of low potential/pest susceptible old varieties by new high yielding varieties with high yield potential. Encourage hybrid rice cultivation in suitable areas by conducting demonstrations and making seed available to the farmers.

(iii) Providing Farm implements and farm machinery for improving efficiency in farm operations and cost of cultivation.

(iv) Keep exports and Imports free. Only use tariffs as an adjusting instrument (IFPRI)

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