DETERMINANTS OF MARKETED SURPLUS - A CASE OF SEED COTTON GROWERS IN DISTRICT KHANEWAL

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ABSTRACT

A study was conducted at the Institute of Business Management Sciences, University of Agriculture, Faisalabad, Pakistan during the year 2010 to examine impact of major factors affecting marketed surplus of seed cotton in district Khanewal. For this purpose primary source of data was used. A representative sample of 40 cotton farmers was selected using stratified random sampling technique. In this study double log form of regression analysis was employed. The results revealed that value of adjusted R^2 was 0.64 whereas F-value was 10.81. The variables of farming experience (0.511), education (0.743), area under cotton cultivation (0.318) and distance of farm from wholesale market (0.306) significantly affected marketed surplus of seed cotton whereas marketing cost (0.012) and sale price of seed cotton (0.092) were insignificant variables. The study suggested to improve prevalent marketing practices and control prices of marketing services to increase volume of marketed surplus of cotton in district Khanewal.

KEYWORDS: Seed cotton; marketed surplus; double log regression analysis; Pakistan.

INTRODUCTION

Cotton (*Gossypium hirsutum* L.), known as white gold, is an important cash crop of Pakistan. It accounts for 1.6 percent to GDP and contributes 55 percent to foreign exchange earnings. Cotton industry in Pakistan comprises over 400 textile mills, 1000 ginneries and 300 oil expellers, providing livelihood to millions of farmers and other stakeholders. Pakistan is the fourth largest producer of cotton in the world after China, India and USA and the third largest consumer of cotton. Textile exports lions share (60%) of Pakistan's total exports. Thus success of cotton crop has a direct impact on Pakistan's annual GDP growth (5). The cotton crop was grown on an area of 3.07 million hectares during 2009-10 to fulfill the domestic demand of 12.1 million bales annually. The most important cotton growing districts in Punjab

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are located in southern Punjab (Multan, Khanewal, Vehari, Lodhran, Muzzafargarh, Layyah, D.G.Khan, Rahim Yar Khan, Sahiwal and Pakpattan) and interior Sindh (Sanghar, Dadu, Khairpur, Sukkur, Ghotki and Nawab Shah). It is a natural fibre that is used in many products ranging from clothing to home furnishings and medical products. It is the basic raw material for the textile industry (4). Sixteen cotton growing districts of Punjab account for about 80 percent of national area under cotton, whereas Sindh province dominates in remaining area for its cultivation (3).

Marketed surplus has generally been defined as that portion of production which actually enters the market. Marketed surplus is the amount left with the farmer after meeting his family consumption, payment in kind, gifts and on farm wastage (16). Distress sales, where grain is sold soon after harvest in order to satisfy prior obligations and then repurchased or replaced later on, are included in some definitions of marketed surplus, but subtracted out of marketable surplus. In such case, marketed surplus would be a gross term and marketable surplus is the net amount after repurchases. The response of farmers to price changes can provide the direction for suitable agricultural price policy that, in turn, may act as stimulant for increasing agricultural production (14). An understanding of the behaviour and factors affecting marketed surplus can be of major importance in the development of sound policies with respect to agricultural marketing and prices, imports and exports, national reserves and overall rural and national development objectives (11, 12). In non-market subsistence agriculture, production in excess of consumption can be distributed as gifts and in kind transfers and left over product is available for sale in market (20). The behaviour of marketed surplus to changes in prices and non-price factors is important for forecasting the supply of cotton to the non-farming population. Dhindsa and Singh (13) investigated pattern of marketed surplus of food grains by farm size and concluded that small and medium farmers held a large percentage of their production of food grains for family needs. Large farmers sold relatively a large percentage of their marketed surplus of wheat during the post-harvest period compared to small farmers. Later, Behrman (9) made a comparison of plausible ranges of price elasticity for wheat in Punjab, generated by the Krishna (19) model. It was found that while the models converged when most of production was marketed, they could actually differ in sign, as well as magnitude, when less than 50 percent of output was marketed. However, when marketed surplus was measured as a proportion of output, there was some empirical evidence that the proportion marketed was greatest for very small and very large farms, with medium sized farms marketing a smaller proportion. Khadse and Pawar (18) studied the marketable surplus of kharif red gram in Vidarbha region of Maharashtra and

reported the marketable surplus of 37.05 percent in small category, 43.96 percent in medium category, and 55.52 percent in large category of farm sizes and 49.38 percent as overall average. The study further concluded that the production of red gram, marketable surplus and marketed surplus had positive relationship with the size of holdings.

Among other studies, Medani (21) highlighted the importance of knowledge of the magnitude and sign of elasticity of marketable surplus in the formulation of specific policies on agriculture and overall growth. Askari and Cummings (6) considered variables affecting marketed surplus, discussion was divided along the lines of price and income effects, and interactions between the two. Acharya (1) stated that agricultural marketing scenario in India has undergone conspicuous changes during the last 50 years, owing to the increased marketed surplus; increased urbanization and income levels and consequent changes in the pattern of demand for marketing services; increase in linkages with distant and overseas markets; and changes in the form and degree of government intervention. Svetlana (28) conducted an analysis and observed that emphasis on variety attributes as determinants of the size of marketed surpluses disaggregated across varieties. Amarender (2) estimated elasticities of marketed surplus ratios and found that marketed surplus ratio (M/QP) was large for commercial crops like groundnut (0.89), nigerseed (0.94) and jute (0.95).

Marketing of agricultural produce in our country is a difficult task due to problems viz. lack of infrastructural facilities, mainly of well-developed markets, poor market-intelligence system and exploitation of farmers by market players. The marketing of agricultural produce in southern Punjab is more complicated as a majority of the growers are marginal and small, largely illiterate, unorganized and scattered. They do not have time, knowledge regarding sale prices, skills and proper access to marketing of their produce. Further, they do not have strong bargaining strength due to their poor financial conditions and they are forced to sell their marketable surpluses immediately after the harvest at low prices. There is a shortage of marketing facilities in most parts of the country.

The present study was planned to identify factors affecting marketed surplus of cotton growers in district Khanewal.

MATERIALS AND METHODS

This study was conducted at the Institute of Business Management Sciences, University of Agriculture, Faisalabad during the year 2010. It is based on primary data collected from 40 cotton growers of Khanewal

district. This district has major share in production and area under cotton in the Punjab province. A stratified random sampling technique (equal allocation) was used to select the sample. At first stage, two tehsils of district Khanewal (Khanewal city and Kabirwala) were selected randomly. At the second stage, four villages from tehsil Kabirwala (Chah Jamalwala, Chah Meharanwala, Mouza Baraywala and Mouza Pulbagar) and four villages from tehsil Khanewal (Nanakpur, 168/10R, 120/10R and 170/10R) were selected randomly from the list of total villages obtained from Extension Wing of Agriculture Department, Government of Punjab. Then at third stage, 40 cotton growers (20 growers from each tehsil including five from each village) were selected randomly. Double log form of regression analysis was used to analyse the impact of major factors affecting marketed surplus of seed cotton growers, using SPSS (Statistical Package for Social Scientist) Version 17.

The relationship between dependent and independent variables is given as;

$$Y = f(Xi). \ldots\ldots\ldots\ldots\ldots \quad (1)$$

Y = Marketed surplus (40 kg)

X_i = Vector of quantitative variables i = 6

In more specific form, equation1 can be written as;

$$Y_i = \beta o\, X_i^{\beta i}\, e^{\mu} \ldots\ldots\ldots\ldots\ldots \quad (2)$$

The equation 2 can be further explained as;

$$Y = \beta o\, X_1^{\beta 1}\, X_2^{\beta 2}\, X_3^{\beta 3}\, X_4^{\beta 4}\, X_5^{\beta 5}\, X_6^{\beta 6}\, e^{\mu} \ldots\ldots\ldots\ldots \quad (3)$$

By taking natural log on both sides, equation 3 can be written as;

$$\ln Y = \beta o + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \mu \quad (4)$$

X_1= Education of farmers (Years of schooling)

X_2= Farming experience of cotton growers (Years)

X_3= Area under cotton cultivation (Acres)

X_4 = Marketing cost (Rs. per 40 kg)

X_5 = Sale price (Rs. per 40 kg)

X_6 = Distance from wholesale market (km)

βo is the intercept, βs are the elasticities, and μ is the random error while ln = Natural log

RESULTS AND DISCUSSION

Descriptive statistics (minimum, maximum, mean and standard deviation) were used to describe the data of dependent variable and independent variables (Table 1 and Table 2).

Table 1. Summarised statistics of data used for model estimation.

Variables	Minimum	Maximum	Mean	Std. deviation
Marketed surplus (40 kg)	20	2685	330.88	493.217
Education of cotton farmers (years of schooling)	0	16	7.83	4.893
Experience of farmers (years)	4	60	22.35	15.133
Area under cotton crop (acres)	2	60	12.09	13.728
Marketing cost (Rs./ 40 kg)	10	20	14.10	3.334
Sale price (Rs. / 40 kg)	1200	2000	1675.00	161.325
Distance from market (km)	1	12	5.50	2.699

Table 2. Collinearity statistics of variables.

Variables	Tolerance	Variance inflation factor (VIF)
Education of farmer (years of schooling)	.854	1.171
Experience of farmers (years)	.700	1.428
Area under cotton crop (acres)	.699	1.431
Marketing costs (Rs./ 40 kg)	.817	1.224
Sale price (Rs./ 40 kg)	.815	1.228
Distance from wholesale market (km)	.782	1.279

Collinearity (or multicollinearity) is the undesirable situation where the correlations among independent variables are strong. Tolerance is a statistic used to determine how much the independent variables are linearly related to one another (multicollinear). Variance inflation factor (VIF) is the reciprocal of tolerance. As VIF increases, so does the variance of regression coefficient, making it an unstable estimate. Large VIF values are indicator of multicollinearity. If value of VIF is greater than 10 then there exists problem of multicollinearity (15). The values of VIF of estimated variables are less than 10 showing absence of multicollinearity in data set (Table 2). The value of adjusted R^2 in our analysis was 0.64 (Table 3) which stated that all independent variables jointly explained 64 percent change in dependent variable i.e. marketed surplus of seed cotton, keeping all other factors constant. This value also explained that rest of 36 percent change in dependent variable was caused by some other variables, effect of which could not be explained by given model. F-value implies whether all independent variables taken together are significant or insignificant in terms of causing variation in dependent variable. The significant F-value in present analysis (10.81, $P<0.05$), explained the overall appropriateness of model (Table 3). The coefficient of education, (0.743, $P<0.05$) showed positive and significant impact on marketed surplus of seed cotton. This coefficient

explained that for every one percent increase in education (schooling year), there might be an increase of 0.743 percent in marketed surplus of seed cotton, keeping all other factors constant (Table 3). These results are also supported by Shah (26) and Bardhan *et al*. (8). Farming experience is another important variable because it is supposed that more experienced farmers have better and old trading relations with market intermediaries. As such, experienced farmers have the ability to sell the seed cotton (marketed surplus) at higher prices than less experienced farmers. The coefficient of farming experience 0.511 ($P<0.05$) explained that for every one percent increase in farming experience, there might be an increase of 0.511 percent in marketed surplus of seed cotton, keeping all other factors constant (Table 3).

Table 3. Estimated model of marketed surplus for seed cotton.

Variables	Coefficient	Standard error	T-value	Significance (P-value)
(Constant)	1.667	.964	1.730	.095
Education of farmer (years of schooling)	0.743	.264	2.818	.009 *
Experience of farmers (years)	0.511	.161	3.182	.004 *
Area under cotton crop (acres)	0.318	.139	2.286	.030 *
Marketing costs (Rs./ 40 kg)	-0.012	.089	-.132	.89^{NS}
Sale price (Rs./ 40 kg)	0.092	.082	1.119	.273 ^{NS}
Distance from the wholesale market (km)	-0.306	0.132	-2.321	.028 *
R^2			0.70	
Adjusted R^2			0.64	
F- Value			10.81	

*Significant at 95% level of confidence, **Significant at 90% level of confidence,
NS = Non-significant

Area under cotton cultivation is supposed to be positively related with its production, if other factors are under control. The larger farmers with respect to area under cultivation are likely to be more interested in cash by selling their produce in the market and less interested in keeping the produce at homes for consumption (10).The coefficient of area (0.318 $p<0.05$) explained that for every one percent increase in area under cotton crop, there might be an increase of 0.318 percent in marketed surplus of cotton, keeping all other factors constant (Table 3). These results confirm the findings of Quasem (24), Hariss (20) and Raquibuzzaman (25). Distance from wholesale market affects the decision of farmers to sale the produce in given market. The coefficient of distance from wholesale market (0.306 $p<0.05$) explained that for every one percent decrease in distance from market, there might be an increase of 0.306 percent in marketed surplus of cotton, keeping all other factors constant (Table 3).

CONCLUSION

The study concluded that marketed surplus of cotton is significantly affected by experience of farmers, education of farmers, area under cotton crop and distance from wholesale market whereas the variables (marketing cost and sale price) showed insignificant impact. Fluctuation in prices of seed cotton may be one of the reasons for insignificant impact of sale price on marketed surplus. At the same time irrational and increasing cost of marketing may also be important considerations. As such, improving pricing policies and economising marketing cost may be good options for policy makers. In addition, exploitation of farmers by market players is another area discouraging farmers to bring more produce in market. In this context, undue deductions and commission charged by agents in market need to be rationalized.

REFERENCES

1. Acharya, S. S. 2004. Agricultural Marketing and Rural Credit: Status, Issues and Reform Agenda, Volume 17, p.372-399, Millennium Study of Indian Farmers, Government of India, Academic Foundation, New Delhi.
2. Amarender, R. 2009. Research Report on Factor Productivity and Marketed Surplus of Major Crops in India: Analysis of Orissa State (Final Report May, 2009). Submitted to Planning Commission, Government of India by Administrative Staff College of India Bella Vista: Hyderabad - 500 082.
3. Anon. 2006. Cotton Production, Marketing and Export. Publication No. 04/2006. Agriculture Marketing Information Service (AMIS). Directorate of Agriculture (Marketing & Economics), Punjab 21-DavisRoad, Lahore. Material downloaded from http:// www.punjabagmarket.info on 5 March, 2010.
4. Anon. 2009. Agricultural Statistics of Pakistan. Ministry of Food, Agriculture and Livestock, Government of Pakistan, Islamabad, Pakistan.
5. Anon. 2010. Economic Survey of Pakistan 2009-10, Economic Advisor's Wing, Finance Division, Government of Pakistan. Islamabad Pakistan.
6. Askari, H. and J. T. Cummings. 2000. Agricultural Supply Response: A Survey of the Econometric Evidence. New York: Praeger Publishers. p-74-91.

7. Bardhan, L. and P. Kumar. 1995. Marketed Surplus of Milk. A Case Study of Jalgaon and Kolhapur Districts of Maharashtra." Economic and Political Weekly (July): p-103-110.
8. Bardhan, D., M. L. Sharma and R. Saxena. 2012. Market participation behaviour of smallholder dairy farmers in Uttarakhand: A disaggregated analysis. Agricultural Economics Research Review. Vol. 25 (2): 243-254.
9. Behrman, R. 1991. Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand. Amsterdam: North-Holland Publishing Company. p-34-53.
10. Behrman, J. B. 1966. Price Elasticity of the Marketed Surplus of a Subsistence Crop. J. Farm Econ., 48(4):875-893.
11. Bhatia, G. R. 2002. Marketable Surplus and Post Harvest Losses of Red Gram in India. Additional Agricultural Marketing Adviser, Government of India, Ministry Agriculture, Department of Agriculture and Cooperation, Directorate of Marketing and Inspection, Branch Head Office, Nagpur – 440001.
12. Chatha, I. S. and J. Singh. 1997. Estimates of Marketable Surplus of wheat in Punjab. JAgric. Market. XXX(3):7-10.
13. Dhindsa, K. S. and J. Singh. 1983. Marketed surplus of wheat and paddy by farm size in Punjab: A Case Study. Margin: Quarterly Journal of NCAER (National Council of Applied Economic Research), 15(2):81-88.
14. Goyal, G. P. and W. Berg. 2004. Acreage and Yield Response for Major crops in the Pre- and Post-Reform Periods in India: A Dynamic Panel Data Approach. Indira Gandhi Institute of Development Research, Mumbai. Report prepared for United States Department of Agriculture (USDA) Project: Agricultural Markets and Policy.
15. Gujrati, D. N. 2003. Basic Econometrics. 4th Ed., McGraw-Hill, New York.
16. Gupta, S. P. and V. P. S. Arora. 2000. Factors Affecting the Marketed Surplus of Soybean in Nainital District of Uttar Pradesh. Encyclopedia of Agricultural Marketing, Vol-7. p.323-329. Mittal Publications, New Delhi, India.
17. Kapde, M. V. 2001. Marketed Surplus of Wheat. Southern Economic Review, Controller of Publications, Government of India. p. 173-201.
18. Khadse, S. Z. and N. D. Pawar. 1997. Marketable Surplus and Factors influencing marketable surplus of Tur (Red Gram) in Amravati Distt. of Viderbha region of Maharashtra State. Agricultural Marketing, Oct-Dec 2001, p. 18-19.

19. Krishna, R. 2001. A note on the elasticity of the marketable surplus of a subsistence crop. Indian J. Agric. Econ. 17: 79-84.
20. Hariss, B. 1982. The marketed surplus of paddy in North Arcot District, Tamil Nadu: A micro level causal model Indian J. Agric. Econ.37 (2):145-158.
21. Medani, A. I. 1997. Elasticity of Marketable Surplus of a Subsistence Crop at Various Stages of Development. Paper Presented in a Seminar on Agriculture Surplus Management, Cornell University, Ithaca, New York, February. p. 25-27.
22. Nosheen, M. and J. Iqbal. 2008. Acreage response of major crops in Pakistan (1970-71 to 2006-07). ARPN J. Agric. Biolo. Sci. 3(5-6).
23. Parthasarathy, G. and B. V. S. Rao. 1994. Dilemmas of Marketable Surplus: The Indian Case. Business and Economics, Andhra University Press. Pp.97.
24. Quasem, M. A. 1987. Farmers' Participation in the Paddy Markets, Their Marketed Surplus and Factors affecting it in Bangladesh. The Bangladesh Development Studies. 15(1). p:83-104.
25. Raquibuzzaman, M. 1966. Marketed surplus function of major agricultural commodities in Pakistan. Pak. Dev. Rev. 6(3):376-394.
26. Shah, D. 2007. Impact of Milk Cooperatives on Marketed Surplus of Milk Gokhale Institute of Politics and Economics. MPRA Paper No. 3855, posted 07. November 2007 / 03:30.
27. Streeten, P. and S. J. Burki. 1977. Marketable Surplus in Agriculture in Underdeveloped Countries. Economic Review. 13 (April). Policy Planning and Program Review Department, World Bank, Washington, D.C.
28. Svetlana, E. 2006. Varieties, Attributes and Marketed Surplus of a Subsistence Crop: Bananas in Uganda. Postdoctoral Fellow, Environment and Production Technology Division (EPTD). International Food Policy Research Institute (IFPRI), Presented at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006.