Profitability of Rice Production: with Special Reference to North Central Province in Sri Lanka

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INTRODUCTION AND RESEARCH PROBLEM

Rice production plays a crucial role in the domestic economy and food security of the country. Rice is the staple food of the 20 million people in Sri Lanka, and is the main source of calories in the Sri Lankan diet. The average per capita rice consumption is about 300 grams and, it provides around 1050 Kcal per day, with 45 percent of per capita protein requirements (Werahewa, 2004). Rice production provides livelihoods for about 1.8 million farmers,[1] while it absorbs directly and indirectly 30 % of the labour force. Note that 80 percent of Sri Lanka's people reside in rural areas and most of them are employed in agriculture, mainly, in paddy cultivation. It is worthwhile to note that a majority of paddy farmers, 82 percent, are small farmers with less than one hectare (Department of Census and Statistics, 2007). In reality, small holders are the backbone of Sri Lanka's economy, and they account for 85 percent of the production of the staple food of the country.

In the case of Sri Lanka, achieving self-sufficiency in rice for food security, through improving the income of paddy farmers, by increasing productivity, through technological development, and

[1] See Thiruchelvam, (2005).

ensuring availability and minimizing the cost of rice to the consumer were the major policy goals of the government policy reform. However, it seems that the matter of structural reforms in the agricultural sector, especially, rice production sector has been a controversial and much disputed subject over the past period. This study, more specifically, will focus on the impact of profitability and efficiency of rice production resulting from public policy reform through the available evidence from secondary sources.

This paper examines the private and social profitability of paddy farming in Sri Lanka using the two different tools: the policy analysis matrix (PAM) and domestic resource (DRC) ratio. The first systematic study of PAM was reported by Monke and Pearson (1989).The PAM has been widely used to estimate the impact of policy reforms on private and social profits of various farming systems (Masters and Winter-Nelson (1995); Reig-Martinez et al. (2008); Kanaka and Chinnadurai, 2013).

Despite the attempt to achieve self-sufficiency in rice production, currently Sri Lankan government imports rice and imposes tariff to protect paddy farmers. One of the most significant current discussion in rice production is high cost of production. The research question of this study is mainly related to the private and social profitability of rice production. In this context, the current study seeks to address the following research questions: (1) Is rice production in Sri Lanka profitable? (2) Does Sri Lanka have comparative advantage in rice production?

With the introduction of public policy reforms under the banner of liberalization policy , Sri Lanka abandoned price controls and began comprehensive price reforms to bring them more closely into line with what are seen as realistic market levels. In this context, it is worthy to explore how such reforms would affect profitability of rice sector. The current study mainly focuses on private and social profitability of irrigated paddy farming with special attention to cost factors in the Anuradapura and Polonnaruwa Districts. Also, the study aims to assess impact of policy reforms on comparative advantage of rice production in Sri Lanka.

METHODOLOGY

To date various methods have been developed and introduced to measure profitability of rice production. The most popular method in this area is the Frontier Method which was developed by Coelli (1994).[2] This study employed PAM[3] to evaluate the profitability and efficiency of rice production. The PAM measures profitability of a particular good in two ways: private prices and social prices. Private prices represent the actual prices of all inputs and outputs used in production while social prices denote the value which would prevail without distortions of government policies (such as taxes/subsidies) and market failure. Prices of outputs and inputs can be decomposed into two categories, tradable and domestic (Reig-Martinez et al. (2008) and Kanaka and Chinnadurai (2013). The PAM estimates mainly two measures: the first measure identifies the profitability of rice production, estimating the difference between actual prices of income and cost; the second identity measures the impact of distortions resulted from policy changes and market failure on income and cost. The PAM can be simplified as follows:

[2] Thiruchelwam (2005) estimated stochastic frontier production of Cobb-Douglas for Mahaweli System H and and Aruna Shantha et al. (2012) employed stochastic frontier production of Cobb-Douglas for the Trincomalee District.

[3] Pioneers of this method are Monte and Pearson (1989).

Table 1: Policy Analysis Matrix

Items	Income	Cost		Profit
		Tradable inputs	Domestic inputs	
Private prices	A	B	C	D
Social Prices	E	F	G	H
Divergences	I	J	K	L

Source: Monke and Pearson (1989).

The rows of the matrix can be defined as follows: private profits = D = A-B-C;

Social profits = H = E-F-G; and divergences represent net transfers (L) = D-H or I-J-K.

In order to measure the comparative advantage of the rice production Domestic Cost Ratio (DRC) is estimated.[4] The DRC can be defined as the value of domestic resources to the net foreign exchange earned by the rice production. This ratio indicates whether production of rice is efficient or not. In general, if the DRC is higher than unity the country does not have comparative advantage in rice production. The DRC can be estimated as follows:

$$DRC = \frac{\sum_{i=k+1}^{n} a_{ij} p_j}{p_i^b - \sum_{i=1}^{k} a_{ij} p_j^d}$$

Where, $a_{ij,}$ from k+ 1 to '*n*' refers domestic inputs, $a_{ij,}$ from 1 to '*k*' represents tradable inputs, p_j refers shadow prices and p_i^b and p_i^b and p_i^d represent border prices of output and input respectively.

[4] The DRC has been widely used to measure the comparative advantage of efficiency of rice production

The study was carried out in the Anuradapura and Polonnaruwa Districts. The North Central Province, which is based on the irrigated regime, is the one of the main rice growing provinces in the country[5].

The present study completely depends on secondary data gathered from the Department of Agriculture, Central Bank and Department of Census and Statistics. Social values for tradable, outputs (E) and inputs (F), world prices[6] were used, and for domestic resources, which are not traded, shadow prices were used. Cost of land was estimated as 25% of gross income. The current study estimates social cost of irrigation since it has been identified as a most crucial factor in determining the productivity of rice (Kikuch et al., 2002). Social cost of irrigation was estimated based on both operation and maintenance cost. Capital covers the cost of use of both farm owned and hired machinery and equipment. For constructing PAM cost and income are calculated per acre.

The PAM estimated for both agricultural seasons Maha and Yala. The results of PAM show that paddy farming in central province was profitable given technology, prices for inputs and outputs and policy (see table 1 and 2). It is worth noting that profits are being made both at private and social prices. However, in terms of social prices, paddy farming was not profitable due to the low world prices of rice until 2011. The border price of rice increased from Rs., 53 per kg in 2010 to Rs. 73 in 2011 and Rs. 85 in 2012 respectively (Central Bank of Sri Lanka, 2013). Rafeek and Samaratunga (2000) argue that because of high cost of production and low productivity Sri Lanka's rice production is characterised by low competitiveness.

[5] This province covered 26% of total paddy cultivated area in the country in 2009/10 (Department of Census and Statistics, Sri Lanka, 2010).

[6] Cost Insurance and Freight (CIF) were used for world prices.

RESULTS AND FINDINGS

Table: 2 Policy Analysis Matrix for Maha Season (Average of 2008 – 2012) (in Rupees)

	Income	Tradable inputs	Domestic Resources					Profit
			Labour	Seed	Capital	Land	Irrigation	
Private	69284	4070	16781	2262	10258	-	-	26913
Social	88675	12601	16781	2262	10258	15071	359	31344
Divergence	-28391	-8531	-	-	-	-15071	-359	-4430

Table: 3 Policy Analysis Matrix for Yala Season (Average of 2008 – 2012) (in Rupees)

	Income	Tradable inputs	Domestic Resources					Profit
			Labour	Seed	Capital	Land	Irrigation	
Private	62299	4310	17928	2535	10403	-	-	27123
Social	89095	12866	17928	2535	10403	15574	603	29186
Divergence	-26796	-8556	-	-	-	-15574	-603	-2063

As revealed by the results, social profits are less than the private profits. It can be seen from the results that the social cost of paddy farming is higher than the private cost with the elimination of subsidies (in particular fertilizer subsidy) and considering social cost of irrigation and land. Positive Private Profitability (Rs. 26913 and Rs. 27123 per acre for both seasons) indicates that farmers in central province have an incentive to paddy farming. Also, positive sign on social profit shows that paddy farming has a comparative advantage in this province (see Table 2 and Table 3).

The negative value of income transfers (the difference private and social income) indicates that the government protection policies negatively influenced to producer incentives. At the same time, negative value of input transfers shows that the input prices faced by farmers are less than world prices. Also, negative value for the difference between private and social profit indicates that farmers can earn higher profits without government interference.

The DRC ratio for both agricultural seasons are less than unity (DRC for Maha and Yala 0.59 and 0.62 respectively). It means that the value of domestic resource used for per acre in North Central province is less than cost of rice imports. Accordingly, this province has a comparative advantage in rice production.

CONCLUSIONS AND IMPLICATIONS

This study has shown that paddy farming in the North Central Province is profitable both at private and social prices. The second major finding to emerge from this study is that the province has a comparative advantage in rice production. This finding suggests that the government interference in the rice sector through increasing tariff to protect paddy farmers is unnecessary. The most obvious finding to emerge from this study is that subsidized policies of the government are unnecessary as farmers are achieving substantial positive social profits. An implication of this finding is that the government can implement policies directly aimed at increasing productivity mainly through research and development.

REFERENCES

Aruna Shantha, A., Asan Ali, B.G.H., and Bandara, R.A.G. (2012). Efficiency and Managerial Ability of Paddy Farming under Minor Irrigation Conditions: A Frontior Production Function Approach, *The Journal of Agricultural Science*, &93):145-158.

Central Bank of Sri Lanka (2013), Annual Report. Colombo.

Coelli, T. (1994). A guide to Fron tier Verson 4.1: *A Computer Program for Stochastic Fron tier Production and Cost Function Estimation.* Australia: University of New England

DCS (2007). Census of Agriculture 2002: Small Holding Sector. Department of Census and Statistics, Colombo.

Masters, W.A. and Winter-Nelson, A. (1995). Measuring the Comparative Advantage of Agricultural Activities: Domestic Resource Cost and Social Benefit Ratio. *American Journal of Agricultural Economics* 77: 243-250.

Monke, E.A. and Pearson, S.R. (1989). *The Policy Analysis Matrix for Agricultural Development.* Cornel University Press, Ithaka.

Raffk, M.I.M. and Samaratunga, P.A. (2000). Trade Liberalization and its Impact on the Rice Sector of Sri Lanka. *Sri Lanka Journal of Agricultural Economics*, 3(1): 143-154.

Reig-MartineZ, E., Picazo-Tadeo, A.J., and Estruch, V. (2008). The policy Analysis MatriX with Profit-efficient Data: Evaluating Profitability in Rice Cultivation. *Spanish Journal of Agricultural Research*, 6(3): 309-319.

Thiruchelvam, S. (2005). Efficiency of Rice Production and Issues Related to Cost of Production in the Districts of Anuradapura and Polonnaruwa. *Journal of National Science Foundation* 2005 33 (4):247-256.

Weerahewa, J. (2004). *Impact of Trade Liberalisatin and Market Reforms on the Paddy/Rice Sector in Sri Lanka.* MTID Discussion paper 70. International Food Plicy Research Institute, Washington D.C.