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LEVEL OF PROTECTION AND COMPETITIVENESS OF POTATO SECTOR IN SRI LANKA

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ABSTRACT

In Sri Lanka, potato (*Solanum tuberosum* L.) is one of the important crops extensively grown in Nuwara Eliya and Badulla districts. Simultaneously, a large proportion of annual potato requirement of the country is supplied through importation. This paper examines the influence of trade intervention policies on potato sector. Nominal and effective coefficients of protection and competitiveness coefficient were used in assessing relative incentives and efficiency and their importance in the economic environment. The results reveal that the local potato producers are protected by enjoying higher farm gate prices compared to border price. The reasons for the observed situation are high quality of local potatoes and effectiveness of trade policies. The effective protection coefficient is somewhat low due to subsidies on fertilizer. Domestic resource use efficiencies have been increased during past decade and it is significant in Nuwara Eliya district. It indicates that Sri Lanka has potential to improve resource use efficiencies in potato production. Therefore, concerted effort is necessary to increase local value addition. It can be achieved through improving productivity and reducing unit cost of production.

KEYWORDS: Competitiveness, Potato, Trade protection.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is the foremost tuber crop grown in Sri Lanka. At present potato is extensively cultivated in highlands of Nuwara Eliya district and midlands of Badulla district. These two districts consist of 98% of the total extent cultivated whilst relatively small extents are cultivated in Jaffna and Puttlum districts. Around 28,000 farmers are engaged in potato production in Sri Lanka. As the country still produces only 40% of the potato requirement, the government aims to be self-sufficient in local potatoes by 2016. Thus, although potato is not much important in terms of land use and labour force, economically it is important in Sri Lanka.

Potato is a popular crop of upcountry farmers due to its high net return. It shows highly seasonal and location specific production in the country. Annual per capita consumption of potato is around 4.8 kg/year. Local potato production is falling behind the national requirement, consequently resulting in increased imports. Trends in potato production, imports and availability of Sri Lanka from year 1998 to 2013 are presented in

Figure 1.The potato importation was below the national production only during the period from 2001 to 2007.

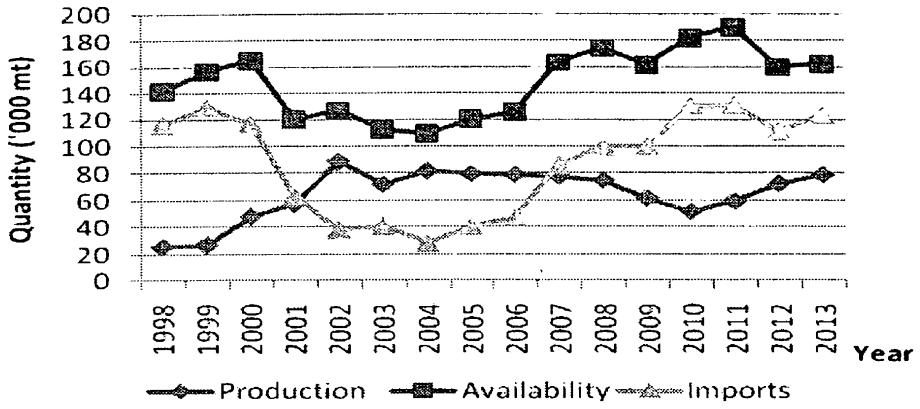

Figure1. Trends in potato production, imports and availability of Sri Lanka during 1998-2013.

Changes of quantity of potato import and the foreign exchange foregone for imports of potato in nominal and real values are shown in Figure 2. Generally the government revises the import levy on imported potatoes at the time of harvests being received to the market to assure a reasonable price for the products of local farmers engaged in potato cultivation. The degree of protection has varied in different periods. Protection for potato was increased sharply in the post-liberalized period, particularly in the 1990s. Although imports were briefly liberalized around 1996, potatoes have continued to enjoy a prominent position among protected crops. Table 1 represents detailed summary of aforesaid tax revisions during the period of 2002 to 2013.

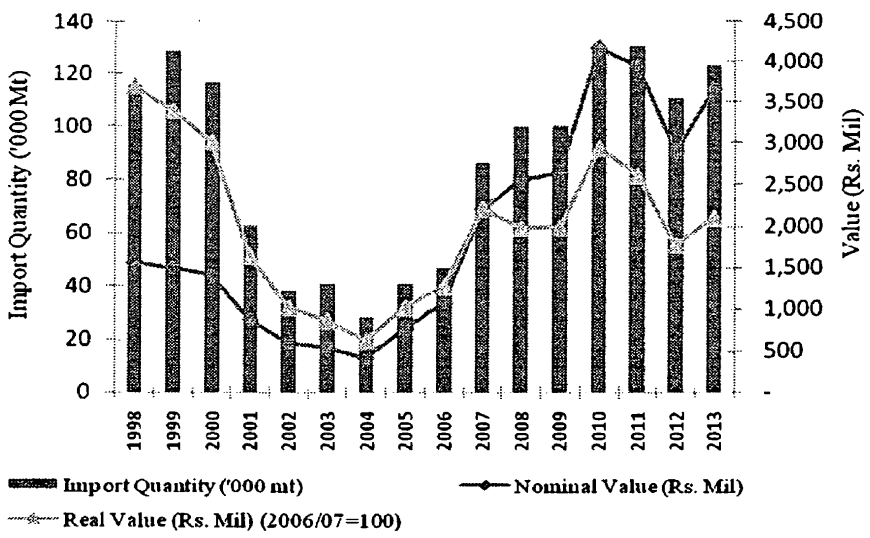

Figure 2. Trends in potato import quantity and value of imports from 1998 to 2013.

Table 1. Tariff changes on imports of consumption potato over the period of 2002-2013.

Effective Date	Policy measures
22 March 2002	Specific duty of Rs. 30/kg imposed.
01 February 2004	Duty waiver of Rs. 1.50/kg (Rs. 20/kg) granted.
04 December 2006	Duty waiver increased from Rs. 1.50/kg to Rs. 20/kg as full duty waiver until 31 January 2007.
29 March 2007	Duty waiver of Rs. 5/kg granted until 30 April 2007.
01 June 2007	Duty waiver of Rs. 5/kg granted.
20 August 2007	Duty waiver of Rs. 5/kg granted until 31 October 2007.
09 January 2008	Special Commodity Levy (SCL) introduced instead of customs duty, Value Added Tax (VAT), Ports and Airport Development Levy (PAL), Social Responsibility Levy (SRL) and other charges applicable at the Customs.
16 September 2008	SCL increased from Rs. 15/kg to Rs. 20/kg.
04 February 2009	SCL increased from Rs. 20/kg to Rs. 25/kg.
10 November 2009	SCL reduced from Rs. 25/kg to Rs. 10/kg.
27 August 2010	A surcharge of Rs. 20/kg imposed until 09 September 2010.
10 September 2010	SCL increased from Rs. 10/kg to Rs. 30/kg.
30 October 2010	SCL reduced from Rs. 30/kg to Rs. 10/kg.
20 February 2011	SCL increased from Rs. 10/kg to Rs. 20/kg.
03 May 2011	SCL increased from Rs. 20/kg to Rs. 30/kg.
10 August 2011	SCL increased from Rs. 30/kg to Rs. 35/kg.
10 December 2011	SCL reduced to Rs. 20/kg from Rs. 35/kg.
02 March 2012	SCL increased from Rs. 20/kg to Rs. 30/kg.
14 July 2012	SCL reduced from Rs. 30/kg to Rs. 10/kg.
13 August 2012	SCL increased from Rs. 10/kg to Rs. 30/kg.
10 September 2012	SCL increased from Rs. 30/kg to Rs. 50/kg.
08 December 2012	SCL reduced from Rs. 50/kg to Rs. 15/kg.
03 May 2013	SCL increased from Rs. 15/kg to Rs. 25/kg.
23 August 2013	SCL increased from Rs. 25/kg to Rs. 40/kg.
17 November 2013	SCL reduced from Rs. 40/kg to Rs. 10/kg.

Source: CBSL, 2002-2013.

The protection given to the potato industry has costs on consumers as relatively high prices of potato. With taxation the government earns revenue. Relaxation of trade protection will adversely affect the producers in cultivating areas (Badulla and Nuwara Eliya) while rest of the areas will have positive welfare effects by having the chance to enjoy relatively lower prices. Trend of cultivation extent of potato from 1998 to 2013 is presented in Figure 3. The highest area under cultivation was recorded on year 2002.

A major policy measure taken by the government in recent past is introducing guaranteed price scheme for potatoes to boost local producers. Currently the guaranteed producer price has been established at Rs. 80 for one kg of potato. In view of the above

situation, this study attempts to investigate the effect of protectionist policies on potato industry in Sri Lanka during year 2000 to 2010 with the following specific objectives:

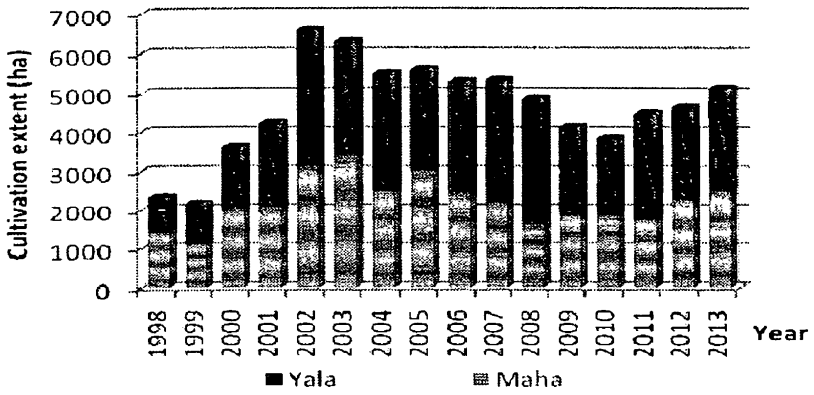

Figure 3. Trend of potato cultivation extent from 1998 to 2013.

a) to estimate the level of protection to potato producers
b) to measure competitiveness of potato production

MATERIAL AND METHODS

Degree of protection

Nominal Protection Coefficient (NPC) and Effective Protection Coefficient (EPC) which are known as coefficients of protection are generally used to measure the incentive structure. To the degree that domestic prices deviate from border prices due to interventions, they would generate incentives for production and consumption. The NPC is defined as ratio between the domestic price and the border price of a commodity;

$$NPR = 100(NPC - 1)$$

$$Where, NPC = \frac{Pd}{Pb}$$

Where P_d is the domestic price of the commodity and P_b is the border price of the commodity.

NPC captures only the trade distortions on the output side, while EPC includes taxes and subsidies on both the output and inputs. A NPC greater than one would indicate positive protection to producers at the expense of consumers who have to pay a higher domestic price. The EPC is the ratio of actual value added by the domestic resources to the value added in a market that is free of distortions (eg. World market).

$$EPC = \frac{Pd - \sum_{j=1}^{K} aijPdj}{Pb - \sum_{j-1}^{K} aijPbj}$$

$$EPR = 100(EPC - 1)$$

Where a_{ij} is the quantity of the j^{th} traded input (j= 1,2,....k) used to produce one unit of output, P_{dj} is the domestic price of input j, and P_{bj} is the border price of input j.P_d and P_b are as defined above.

Traded inputs in the EPC formula refer to inputs that are traded across borders or inputs that have the potential to be traded across borders (Tweetan, 1989).

Competitiveness

Competitiveness is measured by the competitiveness coefficient (CC), shows the resource use efficiency of local potato production. CC is defined as the reciprocal of the Domestic Resource Cost (DRC). DRC compares the opportunity cost of domestic production to the value added that it generates in assessing the comparative advantage of a commodity (Tsakok, 1990). It evaluates the social opportunity cost of domestic production of a particular commodity relative to the value added by the product (Pearson and Monke, 1989). In a policy dialogue, DRC is a useful criterion in deciding whether a commodity should be produced domestically or to be imported.

If DRC is more than unity or CC is less than unity, economy loses foreign exchange through domestic production, hence the importation is profitable. If DRC is less than unity and above zero or CC is more than unity, domestic production is efficient and cost is less than the opportunity cost. Having comparative advantage thus represents efficient use of resource, since the costs of production are less than the benefits.

$$DRC = \frac{\text{Cost of domestic resources used to produce one unit of a commodity}}{\text{Value of produce} - \text{Cost of tradable input}}$$

DRC can also be defined as;

$$DRC = \frac{\sum_{j=K+1}^{n} A_{ij} V_j}{P_i^b - \sum_{j=1}^{k} A_{ij} P_j^b}$$

$$CC = 1/DRC$$

Where A_{ij}, 1 to k are coefficients for traded inputs, A_{ij}, k+1 to n are coefficients for domestic resources and non-traded intermediary input, V_j is the shadow price of domestic resource or non-traded input, P^b_j is the border price of traded input and P^b_i is the border price of output.

The weight of impact by each factor of production on the value of DRC can be grasped by the sensitivity analysis. Here the percentage change in DRC is assessed at one percent cost reduction in one factor at a time while keeping costs of all other inputs remain constant. Nominal Protection Coefficient (NPC) and Effective Protection Coefficient (EPC) have been used to measure the protective measures given to the domestic production in several studies. Out of them, Agalawatte and Abeygunawardena (1993) and Epaarachchi *et al.* (2001) have measured the coefficients of protection for local potato cultivation. Domestic Resource Cost has been used as a proxy for comparative advantage by many authors (Abeyratna *et al.*, 1990; Tsakok, 1990; Shilpi, 1995; Rafeek and Samaratunga, 2000; Weerahewa *et al.*, 2003). But none of them have calculated DRC for potato. The core of the studies is summarized in Table 2.

Data and Data Sources

Secondary data from various sources for the period of 2000 to 2010 were used to conduct this study. The input data were derived using the cost of cultivation surveys conducted by Socio Economics and Planning Centre of the Department of Agriculture. All inputs were classified as non-tradable and tradable using conversion factors. Some non-traded items in fact involve substantial import content and are thus indirectly traded. In such items domestic content was valued as a non-traded item but the import component was valued as a traded item (Gittinger, 1982). Based on Shilpi (1995) fertilizer, pesticides, weedicides, two wheel tractor and transport were considered as 98%, 55%, 45%, 53% and 67% tradable, respectively.

For tax calculation annual custom duty rates and all other tax rates applicable at the customs were gathered form tariff guides (various issues) of Sri Lanka Customs. The total tax incidence was computed using the equation; Total tax incidence = Customs duty + NSL (National Security Levy) + VAT (Value Added Tax) + PAL (Ports and Airport Development Levy) + SRL (Social Responsibility Levy) as used by Epaarachchi (2001). Computation of DRCs requires economic/shadow pricing of non-traded inputs. In the context of Sri Lanka, there are three main non-traded inputs whose market price may not reflect their social values. These are labour, land and credit. In this study, the market wage rate is assumed to represent shadow wage rate also (Shilpi, 1995). When deriving

the shadow costs, Shadow cost of fertilizer was adjusted for 32% subsidy and market prices for agrochemicals were adjusted for 10% tariff rate.

Table 2: Past studies related to the calculation of NPC, EPC and DRC.

Study	Result	Conclusions/ Recommendations
Policy incentive, diversification and comparative advantage of non plantation crops in Sri Lanka (Shilpi, 1995)	Average NPC, 1985 - 89 = 1.6 1990 - 93 = 1.6 for potato	Among the crops considered (rice, potato, big onion, chilli) next to big onion, potato remained as one of the most protected crop.
Impact of the protectionist policies on the potato industry in Sri Lanka (Agalawatte and Abygunawardena, 1993)	For the period of 1971 - 1992, Average NPC = 1.8 Average EPC = 1.4	Intervention policies have; · increased domestic prices · protected the domestic producer from external competition
The level and the structure of trade protection in the domestic agricultural sector of Sri Lanka, 1995 - 2000 (Epparachchi *et al.*, 2001)	For the period of 1995 – 2000, Average NPC=2.38 Average EPC= 2.78 for potato	Out of rice, potato, big onion and chilli, potato was the most protected crop
Efficiency of rice production and issues relating to protection (Abeyratna *et al.*, 1990)	Average RCR (Resource cost ratio)=0.88 RCR<1 for major irrigated RCR>1 for rainfed	· Efficient resource use under irrigated conditions · Research efforts to be increased to shift the production
Trade liberalization and its impact on the rice sector of Sri Lanka (Rafeek and Samarathunga, 2000)	DRC>1 Competitiveness coefficient= 0.56	Comparative disadvantage at national aggregate level, but comparative advantage with high production level
Comparative advantage of rice production in Sri Lanka with special reference to irrigation costs (Kikuchi *et al.*, 2001)	Year RCR 1980 0.59 1985 0.91 1990 1.00 1995 0.97	· After 1980, comparative advantage is decreasing · Still Sri Lanka have comparative advantage in 1995
Future of paddy farming in Sri Lanka: Comparative advantage, scale and rural poverty (Weerahewa *et al.*, 2002)	Land scale DRC <2 ac >1 >2 ac <1	· Paddy farming is economically efficient when it is done at appropriate scale (medium to large scale)

RESULTS AND DISCUSSION

Protection of potato sector

With respect to the incentive structure, the analysis indicates that local potato producers have received positive protection (Table 3). The average NPR of 141% for Nuwara Eliya potato is higher than the average NPR of 103% for Badulla potato. The NPR for potato at national level averages 112% for the entire 2000 to 2010 period. This indicates that on average, the barriers for potato imports held the domestic price at 112% above the import price. This high figure for NPR may be due to vast input subsidies such as fertilizer and seed potato.

Table 3: Nominal Protection Coefficient (NPC) and NPR.

Year	Badulla		Nuwara Eliya		Sri Lanka*	
	NPC	NPR (%)	NPC	NPR (%)	NPC	NPR (%)
2000	1.97	97.25	2.36	135.56	2.02	101.65
2001	2.82	182.34	3.13	213.19	2.86	185.66
2002	2.13	113.05	2.39	139.01	2.20	120.47
2003	2.39	138.81	2.80	180.50	2.49	149.14
2004	2.35	134.69	2.75	174.62	2.48	147.98
2005	2.17	117.49	2.47	147.28	2.26	125.98
2006	1.79	78.89	2.03	103.39	1.87	86.51
2007	1.65	65.09	2.01	101.18	1.73	72.60
2008	1.69	68.76	2.03	102.86	1.79	78.76
2009	1.83	82.85	2.36	136.46	1.94	93.55
2010	1.58	58.17	2.17	116.57	1.71	70.89

Note: * Weighted average of Badulla and Nuwara Eliya districts.

In all cases for all years, both NPC and EPC estimates are greater than unity implying that there has been trade protection in both output and input market (Table 4). However, EPR is the main relevant indicator of protection because it considers a multitude of interventions. The average EPR of 85% for Nuwara Eliya potato is higher than the average EPR of 49% for Badulla potato.

According to the results, the EPR figures indicate the amount by which producer returns were higher than what they would have received under free market conditions. For example, EPR for potato at national level was 58% for the period 2000 to 2010. This shows that the producers are being protected and they received returns 58% greater than

what they would have received under free market conditions. The EPC and NPC of potato for two districts follow the same pattern, which is illustrated in Figures 4 and 5.

Table 4: Effective Protection Coefficient (EPC).

Year	Badulla		Nuwara Eliya		Sri Lanka*	
	EPC	EPR (%)	EPC	EPR (%)	EPC	EPR (%)
2000	1.36	35.81	1.59	58.82	1.38	38.45
2001	2.07	107.38	2.41	141.28	2.11	111.02
2002	1.62	62.14	1.97	97.15	1.72	72.15
2003	1.84	83.92	2.39	139.23	1.98	97.62
2004	1.88	88.09	2.29	128.74	2.02	101.62
2005	1.52	51.87	1.93	93.16	1.64	63.65
2006	1.19	19.23	1.47	47.42	1.28	28.00
2007	1.16	16.14	1.38	38.40	1.21	20.77
2008	1.21	20.60	1.42	42.21	1.27	26.94
2009	1.23	23.17	1.81	81.21	1.35	34.75
2010	1.33	33.33	1.65	64.87	1.40	40.20

Note: *Weighted average of Badulla & Nuwara Eliya districts.

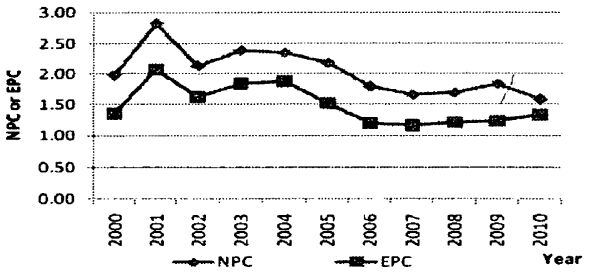

Figure 4. Changes of NPC and EPC of Badulla potato over time

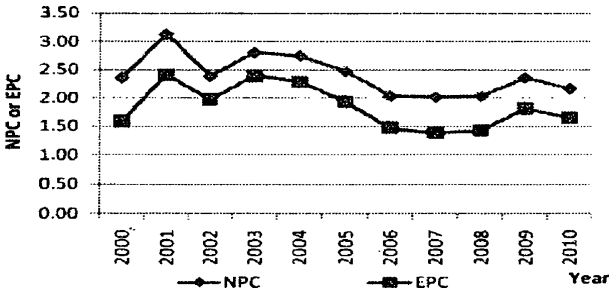

Figure 5. Changes of NPC and EPC of Nuwara Eliya potato over time

The estimated domestic resource cost (DRC) and Competitiveness Coefficient (CC) are presented in Table 5 by districts and national level. It is estimated that the DRC for potato production in the districts and the national level is greater than unity throughout the period which implies that the cost of domestic resources used to produce one unit of potato is larger than the local value addition.

In the above results substantially higher DRC values can be noticed in 2003 and 2004 years compared to other years in both districts. The reasons observed for such a situation is combined effect of lower world market prices and higher unit cost of production during those years. The cost of domestic resources can be divided into its major components as shown in Table 6.

Table 5. Domestic resource cost (DRC) and competitiveness coefficient (CC).

Year	Badulla		Nuwara Eliya		Sri Lanka*	
	DRC	CC	DRC	CC	DRC	CC
2000	3.04	0.33	3.69	0.27	3.11	0.32
2001	2.51	0.40	2.72	0.37	2.54	0.39
2002	3.32	0.30	3.44	0.29	3.35	0.30
2003	5.96	0.17	4.68	0.21	5.64	0.18
2004	6.25	0.16	5.71	0.18	6.07	0.17
2005	2.65	0.38	2.71	0.37	2.67	0.37
2006	2.16	0.46	1.90	0.53	2.08	0.48
2007	3.10	0.33	1.84	0.54	2.77	0.38
2008	4.08	0.25	2.39	0.42	3.58	0.30
2009	4.50	0.22	2.19	0.46	4.04	0.27
2010	2.19	0.46	1.76	0.57	2.10	0.48

Note: *Weighted average of Badulla & Nuwara Eliya districts.

Table 6. Major cost components of costs of domestic resources.

Year	Components of Cost of Domestic Resources (%)							
	Badulla				Nuwara Eliya			
	Labour	Input	Land	Machinery	Labour	Input	Land	Machinery
2000	39	48	12	0	30	53	17	1.1
2001	36	52	11	0	29	52	16	2.3
2002	37	53	10	0	29	54	14	2.2
2003	39	51	10	0	35	48	14	2.6
2004	37	53	10	0	34	49	14	2.4
2005	32	57	10	0.7	35	49	13	2.0
2006	40	49	9	1.7	36	48	14	2.1
2007	40	48	9	2.2	35	49	13	3.1
2008	40	50	9	2.1	36	47	12	4.1
2009	42	47	9	2.5	36	47	12	4.8
2010	41	49	8	2.0	38	46	12	4.2

The above figures show that labour is a prominent component of cost of domestic resources. Generally the usage of family labour is high in both the districts. In this analysis, the family labour is valued at the market rates of labour which is higher than the actual opportunity cost. The DRC can be recalculated assuming that the opportunity cost of family labour is zero since they will not work as hired labour in elsewhere due to

social norms and conditions. The results with zero opportunity cost of family labour show substantial decrease in DRC compared to including family labour (Table 7). Concurrently, the contribution of labour for cost of domestic resources can be reduced through substituting labour by machinery for certain extent.

Table 7. Domestic resource cost (DRC) with zero opportunity cost of family labour.

Year	Domestic Resource Cost (DRC)	
	Badulla	Nuwara Eliya
2000	2.54	3.37
2001	2.15	2.40
2002	2.68	3.05
2003	4.82	4.17
2004	5.12	5.20
2005	2.50	2.50
2006	1.77	1.70
2007	2.41	1.65
2008	3.27	2.05
2009	3.42	1.88
2010	1.77	1.44

For calculating the value addition world market price for potato has used. But the world market price is not compatible with the local potato as local potato and imported potato are not perfect substitutes. The Table 8 depicts the percentage change in DRC for one percent reduction in factor costs.

Table 8. Results of sensitivity analysis.

Year	Analysis of change (%) of DRC due to 1% change in resource costs							
	Fertilizer cost		Seed cost		Pesticide cost		Land cost	
	Badulla	Nuwara Eliya	Badulla	Nuwara Eliya	Badulla	Nuwara Eliya	Badulla	Nuwara Eliya
2000	0.47	0.54	1.36	1.33	0.30	0.26	0.12	0.17
2001	0.45	0.46	1.36	1.12	0.19	0.17	0.11	0.16
2002	0.64	0.46	1.69	1.37	0.18	0.17	0.10	0.14
2003	1.14	0.69	2.54	1.50	0.29	0.19	0.10	0.14
2004	1.29	0.98	2.76	1.74	0.27	0.25	0.10	0.14
2005	0.60	0.35	1.54	1.08	0.18	0.13	0.10	0.13
2006	0.46	0.23	1.17	0.86	0.15	0.10	0.09	0.14
2007	0.80	0.23	1.41	0.85	0.18	0.10	0.09	0.13
2008	1.45	0.34	1.78	0.93	0.20	0.12	0.09	0.12
2009	1.85	0.23	1.81	0.88	0.23	0.10	0.09	0.12
2010	0.66	0.27	1.19	0.77	0.13	0.09	0.08	0.12

Note: Each column indicates changes in DRC due to 1% cost reduction of respective resource cost.

According to the results seed cost has highest impact among the factors of production. The results reveal that 1% reduction in seed cost would result more than 1% reduction in DRC in Badulla district throughout the considered period while same can be observed in Nuwara Eliya district only for 2000 to 2005. Therefore, by increasing the usage of local seed potato instead of high priced imported seed potato the DRC can be decreased. The pre-basic (G_0) seed production programme conducted by the Department of Agriculture proved to be very effective and it would provide considerable contribution for improvement of resource use efficiency. The sensitivity analysis indicates wide variation of outcome due to regional and different cost components. Therefore, a general approach to improve resource use efficiencies may not be suitable but a specific and resource based approach would be more appropriate to improve resource use efficiency in Nuwara Eliya and Badulla districts. Some caveats are necessarily interpreting the results of this analysis. Potato cultivation is a part of the farming system where vegetable-potato and vegetable-potato-rice are cultivated. The isolation of potato from those systems may not represent the real local resource costs. Though the analysis compared local and world market prices, they are not perfect substitutes. The local produce fetches higher price than imported potatoes due to perceived differences of quality of local produce by consumers. Sri Lanka imports potato mainly from India and Pakistan and distortions of price of potatoes in those markets are not taken into consideration.

CONCLUSIONS

The potato trade policy provides effective protection to domestic producers in Nuwara Eliya and Badulla districts. The relative protection levels enjoyed by potato farmers in Nuwara Eliya are higher than that of farmers in Badulla. The differences in protection levels stem from quality of produce and use of produce for seed potatoes. The situation demands interventions to improve competitiveness of potato farmers in Badulla district. When compared with the local resource cost, the local value addition has been improving and as a result the efficiency of resource use in local potato production has improved. The efficiency improvement is particularly significant for farmers in Nuwara Eliya district. The use of high quality local potato seeds and associated decline in unit cost of production may have provided this efficiency gain. The value of local value addition could further be improved in Badulla and Nuwara Eliya by promoting high yielding quality seeds. Concurrently improving technical coefficients of fertilizer, seeds and agrochemicals would help to increase the local value addition.

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