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# Impact of Trade Liberalization on Poverty and Household Welfare in Sri Lanka



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September 2005

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## List of Acronyms

CBSL	Central Bank of Sri Lanka
CCPI	Colombo Consumers' Price Index
CEPA	Comprehensive Economic Partnership Agreement
CFSES	Consumer Finances and Socio-Economic Survey
COP	Cost of Production
CWE	Cooperative Wholesale Establishment
DCS	Department of Census and Statistics
ESAF	Enhanced Structural Adjustment Facility
GDP	Gross Domestic Product
GSP	Generalized System of Preferences
GST	Goods and Services Tax
GSTP	Global System of Trade Preferences
HARTI	Hector Kobbekaduwa Agrarian Research and Training Institute
HDI	Human Development Index
HDR	Human Development Report
HIES	Household Income and Expenditure Survey
HS	Harmonized System
ILBFTA	Indo Sri Lanka Bilateral Free Trade Agreement
IMF	International Monetary Fund
NSL	National Security Levy
NTB	Non-Tariff Barriers
PGCN	Potato Cyst Nematode
PMB	Paddy Marketing Board
QRs	Quantitative Restrictions
R&D	Research and Development
SAARC	South Asian Association for Regional Cooperation
SAFTA	South Asian Free Trade Agreement
SAPTA	South Asian Preferential Free Trade Arrangement
TT	Turnover Tax
VAT	Value Added Tax
WTO	World Trade Organization

## Abstract

It is argued that economic growth is a necessary condition for poverty alleviation while a liberal trade regime is a prerequisite for sustainable economic growth. However, trade liberalization affects consumers and producers differently. While tariff reduction on imports may bring welfare gains to consumers, there would be many producers who are adversely affected by such trade policy reforms. Hence, our attempt in this paper is to look at the impact of trade liberalization on poverty and welfare of households, with a special focus on the rice and potato sectors of Sri Lanka. Both a descriptive approach (for rice and potato sectors) and an analytical model (for rice sector) are used in this regard. The paper also analyses various trade policy reforms taken place during the last decade and, the extent and nature of poverty in Sri Lanka.

The descriptive analysis showed various trade policy reforms in rice and potato sectors during the last decade and their implications. The results of the analytical model showed an overall welfare improvement to the country (in the short run) from a tariff reduction on rice. Net welfare effect for all the income deciles is positive. However, the extent of gain for low-income deciles is higher compared to richer deciles. District level analysis showed welfare gains for all the districts except for two large-scale rice producing areas of Ampara and Polonnaruwa. Moreover, Estate sector households had the highest positive welfare effect while the urban sector had the lowest (positive) effect. The rural sector showed a mixed effect depending on whether the households in the area/district, in general, are net producers or net consumers of rice.

The paper stresses the need to eliminate ad hoc trade policies and move towards a low uniform ad valorem tariff rate for rice and potato. Moreover, it highlights the importance of having both the compensatory and the complementary policies to minimize the adverse effects of trade liberalization on households, particularly those effects on the poor.

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## 1. Introduction

It is widely accepted that rapid and sustainable economic growth is a precondition for poverty alleviation, and a liberal and transparent trade regime is a precondition for sustainable economic growth. Trade reforms have long been used as a tool for promoting economic efficiency, developing new markets and achieving growth. Although trade liberalization may help to raise the average standard of living of the people in the medium to long term, such policies, at least in the short term, may have adverse effects on some segments of society. Those who lose from trade reforms might even be the poorest groups, who have fewer assets to draw on to protect themselves during hard times, and hence, are less able to absorb adjustment costs, than others.

Sri Lanka has been engaged in market oriented economic reforms for over 25 years and has made considerable progress towards achieving a more liberal trade policy regime. Moreover, it has achieved a high level of human development due to the heavy investments in social infrastructure by successive governments. Despite such progress, Sri Lanka has continued to have a high incidence of poverty over the last decade, with about 20- 30 per cent of its population living in poverty. Insufficient economic growth and redistributive effects have largely contributed to this situation.

In this paper, an attempt is made to analyze the impact of trade liberalization on poverty and household welfare in Sri Lanka with special reference to the rice and potato sectors of the country. First, a descriptive approach is used to analyze the trade liberalization/ policy changes in these two sectors that took place during the last decade and their implication. Next, an analytical model (simulation exercise), is used to look at how a tariff reduction on rice would affect poverty and welfare of households in Sri Lanka.

The paper is organized as follows. Chapter 2 of the paper provides a conceptual framework for the link between trade liberalization and poverty. This is followed by a description on poverty situation and various trade policy reforms in the country in Chapter 3. A descriptive analysis on the impact of trade liberalization with reference to rice and potato sectors is provided in Chapter 4, while Chapter 5 analyzes the impact of rice trade liberalization on poverty and household welfare, using the analytical approach. The final Chapter provides some concluding remarks and policy implications.

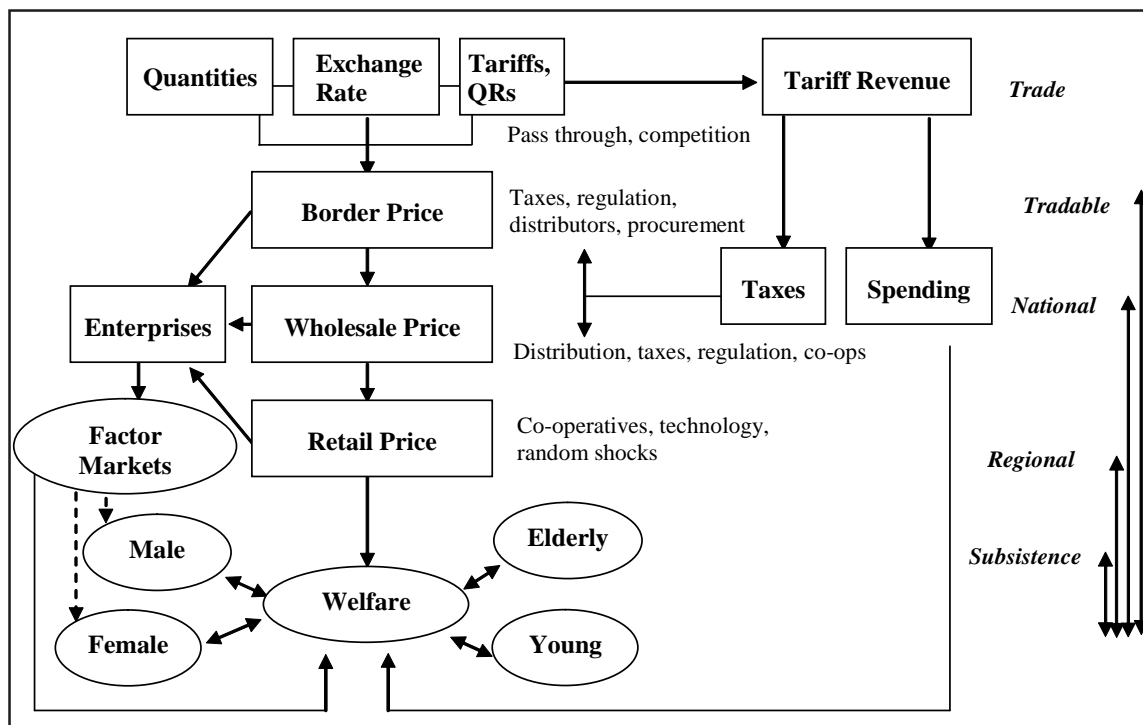
## 2. Trade Liberalization and Poverty: A Conceptual Framework

Trade liberalization and poverty cannot be measured easily, and the linkage between these two concepts is indirect and complex. Winters (2000a) has used the following analytical framework to describe the link between trade liberalization and poverty at the household level. This framework identifies three key channels through which trade policies affects households and individuals. They are namely: (i) Distribution, (ii) Enterprise, and (iii) Government. Using these three channels, the effects of trade liberalization on poverty and welfare of households can be described through:

- i) The transmission of prices from the border down to the household (Distribution Channel).
- ii) Its effects on profits, wages and employment (Enterprise Channel).
- iii) Its effects on government revenue and pro-poor expenditure (Government Channel).



Figure 1  
Trade Policy and Poverty: Casual Connection



Source: Winters, L.A. (2000a), Trade and Poverty: Is there a Connection?

The transmission mechanism of various trade policies through the three above-mentioned channels is depicted in Figure 1.

**The Distribution Channel:** Trade liberalization, i.e., reduction in tariffs<sup>1</sup> may affect the prices of goods consumed and produced by the households. The key issue here is how the changes in the taxes and the border prices are eventually transmitted in terms of effects on wholesale and retail prices, and thereby on household welfare. However, the effects on household welfare will not only depend on the price changes, but also on whether these households produce or consume the products concerned, and to what extent.

As shown in the Figure, the post-tariff border price of a good is determined by the combination of the exchange rate and tariffs it faces. To this border price, when the domestic taxes, transportation/distribution costs from the port to major distribution centres (and costs due to various regulations) are added, we get the wholesale price. Then we obtain the retail price by adding various other taxes, regulations and costs of transportation/distribution. At the retail level, the goods will be distributed to households and individuals.

**The Enterprise Channel:** The left-hand side of the Figure 1 shows the link between trade policy and poverty operating through factor markets and enterprises. “Enterprises” can include any unit that produces and sells output and employs labour from outside its own immediate household. Price changes resulting from trade liberalization may alter the production patterns of a firm, which in turn may affect its

<sup>1</sup> Assuming no non-tariff barriers (NTBs).

profits, employment and wages. This process would have an effect on the income and the welfare of the households. In general, rising prices would help the producers while falling prices would help the consumers. Nevertheless, when a rise in prices increases the production of the firm, it could bring a positive effect on wages, which in turn would lead to a welfare improvement of the households. However, the extent to which the household welfare would improve depends on both the initial wages and the magnitude of the increase.

**The Government Sector:** The right-hand side of the Figure illustrates the third major static link between trade policy and poverty: via taxes and government spending. This could have economy-wide implications and especially on social services or poverty-related programmes to support the poor households. However, revenue effects due to trade liberalization depend on the initial conditions. For example, removal of Non Tariff Barriers (NTBs) and/or moving towards a low uniform tariff rate would most likely increase revenue. Particularly, the developing country governments rely on indirect taxation, as it is the most convenient and easy method of collecting revenue.

From the three channels mentioned above, this paper will be mainly focusing on the Distribution Channel. In other words, it will look at how trade liberalization affects poverty and household welfare through the price changes of tradable goods. In order to do this, first, in the next chapter, it briefly looks at the current status of poverty in Sri Lanka and the trade liberalization efforts taken place during the recent decade.

### 3. Sri Lankan Economy during the Last Decade

Sri Lanka is an open economy with its total trade equivalent to over 65 per cent of the country's GDP. With an average GDP growth rate of over 5 per cent during the last decade, Sri Lanka's per capita income has reached around US\$ 950 in 2003. The dominant sector of the economy is the service sector which accounts for about 55 per cent of the GDP and 43 per cent of employment (2003). With a growth rate of around 7.7 per cent, it has contributed about 70 per cent to the economic growth in 2003.<sup>2</sup> Moreover, the Industrial sector<sup>3</sup> accounted for approximately 26 per cent of the GDP and 22 per cent of the employment in 2003. However, the relative importance of the agricultural sector has declined during the last decade, with a lower contribution to GDP (19 per cent in 2003) and the economic growth (only 5 per cent in 2003). The growth rate of this sector was also relatively low during the last decade (about 2.5 per cent).<sup>4</sup> Nevertheless, the share of employment in the agricultural sector is still high – accounting for nearly one third of the total employment in the country.

The country's labour force is estimated around 7 million while the labour force participation rate remains around 50 per cent. The unemployment rate, which is approximately 8.4 per cent (in 2003), has indicated a significant fall since late 1990s. Moreover, Sri Lanka has achieved a remarkable progress in human development. In 2002, Sri Lanka ranked 96 (among 177 countries) with a Human Development Index (HDI) of 0.740. This is considerably higher compared to the HDI for South Asia as a whole (0.584), reflecting Sri Lanka's outstanding performance in the region. Sri Lanka enjoys high levels of literacy rates (94.7 per cent for male and 89.6 per cent for female) and life expectancy at birth (69.8 years for male and 75.8 for female). Moreover, Infant mortality (17 per 1,000 live births) and maternal mortality rates (23.5 per 100,000 live births) have reduced to significantly low levels during the last couple of decades (HDR, 2004).

<sup>2</sup> The high growth momentum in trade, transport, telecommunication, tourism and financial sub-sectors has helped to achieve this high growth in the service sector.

<sup>3</sup> The industrial sector is defined to include mining and quarrying, Manufacturing, Construction and electricity, gas, water and sanitary services.

<sup>4</sup> Low growth in the Agricultural sector is largely due to the overly restrictive policy regime, frequent changes in agricultural trade policies, weak research and development (R&D) base, lack of adequate infrastructure in rural areas (roads, markets and rural electrification), adverse weather conditions (droughts, floods), etc.

### 3.1 Poverty in Sri Lanka

Despite the significant performance in terms of human development, Sri Lanka has continued to have a high incidence of poverty over the last few decades. As per the Official Poverty Line for Sri Lanka,<sup>5</sup> using the Household Income and Expenditure Survey (HIES) of the Department of Census & Statistics (DCS), approximately 22.7 per cent of the population is identified as poor in year 2002. Moreover, the figures show a decline in the aggregate poverty levels during the 1990-2002 period. However, it should be noted that the year 1995/96 indicated an increase in the poverty level (see Table 1). This is largely due to the severe drought and subsequent rise in food prices during 1995-96, which led to a fall in consumption during this period.

Sector-wise data using the Official Poverty Line shows that poverty incidence is highest in the estate sector (30.0 per cent), followed by 24.7 per cent in the rural sector and 7.9 per cent in the urban sector. Moreover, the estate sector recorded an increase in poverty levels from 20.5 per cent in 1990/91 to 30.0 per cent in 2002. On the contrary, urban and rural sectors have experienced a fall in poverty levels during 1990-2002 periods. Particularly in the urban sector, the percentage of poor has more than halved during the last decade. Improved infrastructure facilities, industrial and commercial activities in urban areas have largely contributed to this progress. Despite the fall in poverty incidence in the rural sector during 1990-2002 periods, this sector continues to have over 85 per cent of the poor in Sri Lanka. Moreover, breakdown of poverty data by occupation of the principal income earner of the household shows that the incidence of poverty is highest among the farmers and that farmers account for over 40 per cent of the poor in the country.<sup>6</sup>

**Table 1**  
**Incidence of Poverty (head count ratio) by Sector 1990 - 2002**

Sector	Survey period		
	1990-91 (%)	1995-96 (%)	2002 (%)
<b>Sri Lanka<sup>7</sup></b>	<b>26.1</b>	<b>28.8</b>	<b>22.7</b>
Urban	16.3	14.0	7.9
Rural	29.4	30.9	24.7
Estate	20.5	38.4	30.0

**Source:** Department of Census & Statistics (DCS); estimates based on HIES 1990/91, 1995/96 and 2002.

<sup>5</sup> The Official Poverty Line for Sri Lanka was introduced in June 2004. According to the Official Poverty Line, the persons living in the households whose real per capita monthly total consumption expenditure is below Rs. 1423 in the year 2002 in Sri Lanka are considered poor. It takes into account both the food and non-food consumption expenditure. The poverty line for 2002 has been adjusted by using the Colombo Consumer Price Index (CCPI) to obtain poverty lines for 1995/96 and 1990/91.

<sup>6</sup> Incidence of poverty among farmers varies between 35 per cent and 52 per cent depending on the poverty line used Gunawardena (2000).

<sup>7</sup> Household Income and Expenditure Surveys based on which the poverty levels have been estimated, have excluded the North and East (conflict areas) from their surveys. However, it is expected that exclusion of these areas have led to underestimation of the level of poverty in the country, considering that over 800,000 people have been internally displaced, and that the majority of the inhabitants in these areas and their properties have been affected by the civil war that lasted for nearly 20 years.

There are large disparities in poverty across districts. As shown in Table 2, incidence of poverty varied from 6 to 37 per cent in 2002. The districts of Badulla, Monaragala and Ratnapura indicated relatively higher incidence of poverty. Moreover, these districts have experienced an increase in poverty levels during 1990-2002 periods. On the contrary, the three districts comprising the Western Province of Sri Lanka (Colombo, Kalutara, Gampaha) and the district of Anuradhapura enjoyed lowest levels of poverty. In these districts, poverty levels have fallen substantially during the last decade.

**Table 2**  
**Incidence of Poverty (head count ratio) by District 1990-2002**

Districts	Survey period		
	1990-91 (%)	1995-96 (%)	2002 (%)
Colombo	16	12	6
Gampaha	15	14	11
Kalutara	32	29	20
Kandy	36	37	25
Matale	29	42	30
Nuwara Eliya	20	32	23
Galle	30	32	26
Matara	29	35	27
Hambantota	32	31	32
Kurunegala	27	26	25
Puttalam	22	31	31
Anuradhapura	24	27	20
Polonnaruwa	24	20	24
Badulla	31	41	37
Monaragala	34	56	37
Ratnapura	31	46	34
Kegalle	31	36	32
<b>Sri Lanka</b>	<b>26.1</b>	<b>28.8</b>	<b>22.7</b>

**Sources:** Department of Census & Statistics, estimates based on HIES 1990/91, 1995/96 and 2002.

There are a number of important causes for the persistence of poverty in Sri Lanka. Neither the economic growth rate nor its distributive effects have been sufficient to bring about a significant reduction in poverty level of the country. For instance, GDP growth averaged about 5 per cent while growth in per capita GDP averaged 3.9 per cent during 1990s. The Gini coefficient, which is a measure of income inequality, declined marginally for income receivers (from 0.52 to 0.5) and for spending units (0.46 to 0.45) indicating little or no improvement in the distribution of income during the period. Furthermore, the civil war that lasted for over 20 years has caused immense human suffering and deprivation. Low productivity in the agricultural sector and poor infrastructure facilities particularly in rural areas, are also major contributory factors to poverty. In addition, labour market distortions and problems of governance have also contributed to the persistence of poverty in Sri Lanka.

Successive governments of Sri Lanka have followed numerous strategies aimed at reducing poverty and improving the welfare of the people. These include, provision of free education and health care facilities and implementation of various transfer/subsidy programmes such as the Janasaviya Programme (1989-1994), Samurdhi Programme (since 1995) and Food Ration Schemes. Nevertheless, the last decade has seen a decline in the total government expenditure on these transfer/subsidy programmes to households. For example, the share of total government expenditure<sup>8</sup> on household transfers has fallen from about 16.5 in 1992 to about 13.4 by 2002. Particularly, the share of government expenditure spent on Samurdhi income transfer programme and food stamps/food subsidy has significantly come down since late 1990s. It is the severe fiscal constraints of the government resulting from rising expenses on defence and interest payments, and falling government revenue (due to sharp decline in tax revenue that resulted in inter-alia trade liberalization), which has resulted in cutting down on the expenditure on government transfers and subsidies to households.

### 3.2 Trade Liberalization

Trade liberalization was an essential component in the 1977 economic reform efforts in Sri Lanka.<sup>9</sup> The tariff rates varied from zero to 500 per cent with a significant number of Quantitative Restrictions (QRs) remaining. In 1985 a major revision of QRs took place with the removal of licence control on textiles. With the introduction of the Harmonized System (HS) of coding in 1989, there were 19 tariff bands. In 1990, the number of bands was reduced to 13 and again in 1991 a four-band tariff system<sup>10</sup> was put in place as recommended by the second Presidential Tariff Commission. The maximum tariff rate under the four-band system was reduced from 50 to 45 per cent in 1993. However, there were specific rates outside the four-band system for a few items such as rice, potato, tobacco, alcohol beverages, etc.

In the liberalization process, a major step was taken in March 1994, when Sri Lanka removed all restrictions on current account transactions and allowed free convertibility of the Sri Lankan Rupee, with the acceptance of the obligations under the Article VIII of the Articles of Agreement of the International Monetary Fund (IMF).

Another important change to import tariffs took place in 1995, where the maximum tariff rate was reduced from 45 to 35 per cent with three standard rates of 10, 20 and 35 per cent. Specific duties on agricultural products and surcharges were also removed. Moreover, in 1996, licences in the agricultural sector were removed. In 1998, the government further reduced the maximum rate to 30 per cent except for a few agricultural products. By this year, over 50 per cent of the tariff lines in Sri Lanka's tariff schedule carried tariff rates of 5 per cent or below while about 73 per cent of the tariff lines contained rates of 10 per cent or below. Moreover, almost one fifth of the tariff lines carried zero rates. Trade restrictions applied only in respect of health, security, phytosanitary, and environmental reasons. In 1999, the top tariff rate was further brought down to 25 per cent. However, towards the end of 2000 there were some setbacks to the tariff reform process as rice was brought under licensing and a specific duty was imposed on potatoes. Moreover, in order to overcome the fiscal constraints, in 2001<sup>11</sup>, the government introduced a 'temporary' surcharge of 40 per cent across the board (except for very few items in lieu of cost of living considerations).

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<sup>8</sup> Transfers and subsidies to households include food stamps/food subsidies, Janasaviya/Samurdhi income transfer programmes, pensions for retired government servants and fertiliser subsidy. However, it is important to note that more than 50 per cent of this total government transfers to households comprises pension payments to retired government servants.

<sup>9</sup> Sri Lanka was the first South Asian country to liberalize its economy (1977).

<sup>10</sup> This satisfied a performance criterion under the first annual Enhanced Structural Adjustment Facility (ESAF).

<sup>11</sup> Year 2001 was considered a "bad" year for Sri Lanka with a negative economic growth for the first time in the history after its independence in 1948. The budget deficit (as a % of GDP) rose to a double-digit number (10.8%).

The new government (that came into power after the elections in end 2001), reduced the 'temporary' surcharge of 40 per cent to 20 per cent, effective from April 2002. But, the tariff system took a backward step when the government introduced new tariff bands of 2, 15 and 20 per cent (in addition to the bands of 5, 10, and 25 per cent that were already in place). The cascading tariff structure<sup>12</sup> was much more complicated and the liberalization process went through another setback when the government introduced specific duties (replacing ad valorem rates) for some agricultural items while certain goods such as motor vehicle spare parts and bicycles were brought under specific rates coupled with ad valorem rates. In this manner, in 2002 there were 6 tariff bands plus some items at specific rates and some at a combined specific plus ad valorem. Table 3 sets out the distribution of bands. In addition to these rates there is the remaining revenue surcharge of 20 per cent of the duty, which means that a gazetted duty of 25 per cent yields an actual duty of 30 per cent.

**Table 3: Distribution of Tariff Bands - 2002**

Rate %	Free	2	5	10	15	20	25	specific	ad valorem + specific	Others
<b>Number of items</b>	793	1522	820	1666	19	58	1260	46	31	10
<b>Percentage of total</b>	13	24	13	27	-	1	20	1	1	-

**Source:** Calculated from Government Gazette (2002).

Nevertheless, as shown in Figure 2, despite some policy reversals in the area of trade liberalization in recent years, Sri Lanka has achieved considerable progress in liberalizing its trade regime during the last couple of decades. The Figure clearly depicts how the tariff lines have moved towards lower tariff bands over the last decade. However, still the efforts are far from being impressive.

The total tax revenue declined from 17.2 per cent of GDP in 1994 to 14.0 per cent of GDP in 2002. One of the major contributions to this decline was the import duty, which reduced from 3.9 per cent of GDP in 1994 to 1.8 per cent in 2002.<sup>13</sup> Moreover, as a share of total tax revenue, import duty has fallen to about 12.8 per cent by 2002 from approximately 22.7 per cent in 1994. According to the Central Bank Annual Report 2002, this decline was largely due to the grant of various tax concessions, delays in implementing additional revenue generating measures, slow progress in improving tax administration, weak performance in public enterprises and an amnesty granted to tax evaders in 2002.

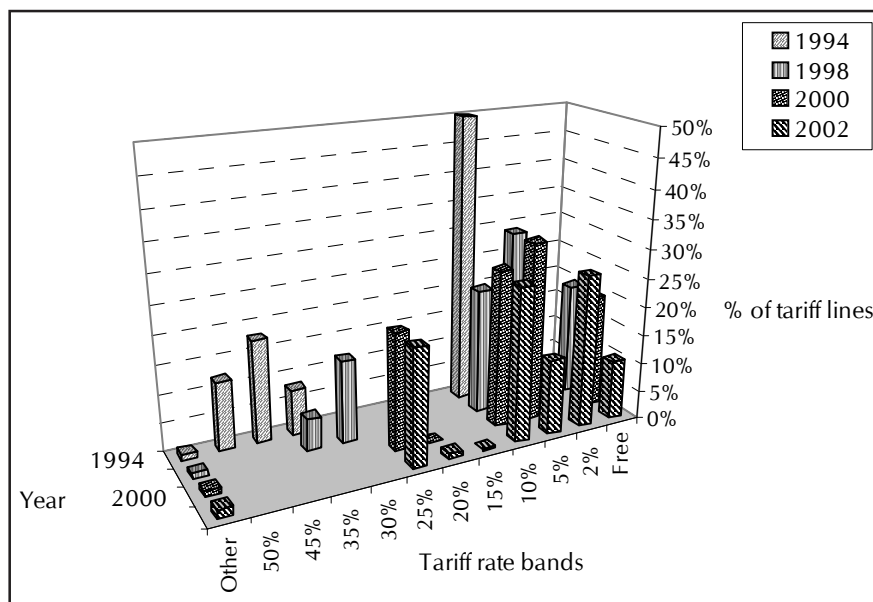
In the case of economic cooperation in the area of trade with the rest of the world, Sri Lanka is a signatory to the SAARC Preferential Trading Arrangement (SAPTA),<sup>14</sup> Framework Agreement on SAARC Free Trade Agreement (SAFTA), Bangkok Agreement, Generalized Scheme of Preferences (GSP), and Global System of Trade Preferences (GSTP). The progress of these trading arrangements has been less than satisfactory. The Indo-Sri Lanka Bilateral Free Trade Agreement (ILBFTA) was signed in December 1998, and came into effect from 1<sup>st</sup> of March 2000. In order to include the service sector as well, the framework agreement - Comprehensive Economic Partnership Agreement (CEPA) was signed between India and Sri Lanka in 2003. Sri Lanka is in the process of negotiating bilateral trade agreements with some other key trading partner countries.

<sup>12</sup> The tariff bands escalate through stages of production with raw materials and capital goods duties at lowest rates and final goods set at the top rate.

<sup>13</sup> Sri Lanka has eliminated export duties, but cesses on tea, coconuts and some other items still apply.

<sup>14</sup> Sri Lanka is a member of the South Asian Association for Regional Cooperation (SAARC).

**Figure 2**  
Changes in the Tariff Structure



Source: Various government gazettes and tariff advisory Council.

As discussed in this chapter, while Sri Lanka has made considerable progress in the area of trade liberalization, the process has been somewhat slow with some reversals at certain times. In order to understand this in detail, the paper looks at two specific commodities viz., rice and potatoes.<sup>15</sup> In the next Chapter, it looks at the changes in trade policy with respect to rice and potato sectors during the last decade, and their implications.

## 4. Impact of Trade Liberalization: A Descriptive Analysis

### 4.1 Rice Sector

Sri Lanka is one of the major rice consuming countries in the world where average per capita consumption of rice is over 100 Kg per annum. It is the staple food of Sri Lankans and provides the major calorie intake in the diet. Rice is produced mainly in the North Central, Eastern and Southern Provinces. Domestic production satisfies around 90 per cent of the consumption requirement in Sri Lanka. Contribution from the rice sector to Sri Lanka's agricultural GDP was over 20 per cent during the 1998-2000 period.

The rural economy in Sri Lanka largely revolves around paddy (*Oryza sativa*) cultivation. It is cultivated during two seasons, Yala and Maha.<sup>16</sup> Of the total extent cultivated under all crops, paddy accounts for over 30 per cent, which is the largest of any crop. Paddy is cultivated in all districts of the country at least in a small scale, while the districts of Ampara, Polonnaruwa, Kurunegala, Anuradhapura, and

<sup>15</sup> The reason for selecting these two commodities for the study is that, rice is the staple food of Sri Lanka and is cultivated in almost all the districts of the country, and Potato, currently carries the highest import duty among agricultural commodities, despite a number of liberalization efforts in the potato sector during mid to late 1990s.

<sup>16</sup> Maha season (65 per cent of the production) extends from September/October through March/April and Yala season (35 per cent of the production) extends from April/May through August/September.

Hambantota are the main granary areas. Due to good weather conditions and cessation of hostilities in the Northern and Eastern provinces, the paddy production during 2003 reached an all time high level of 3,071 MT surpassing the previous high in 2000. The gross paddy extent sown in 2003 was 983,000 Ha while the net paddy extent harvested was 817,000 Ha.<sup>17</sup>

During the last decade, several important changes in trade policy on the rice sector took place (see Table 4). In 1995, the government embarked on a trade liberalization program by imposing an ad valorem import duty on rice.<sup>18</sup> The government also intervened in the paddy sector through numerous programmes such as fertilizer subsidies, crop insurance schemes and guaranteed price schemes. In 1994, the government reintroduced the fertilizer subsidy<sup>19</sup> and this led to a substantial increase in the fertilizer usage during the 1994/95 period. The defaulted cultivation loans given by the state banks were also written off during this period. Moreover, The Paddy Marketing Board (PMB) purchased 282,000 MT of paddy during 1995 at a Guaranteed Price for paddy of Rs. 155 per Bushel while the market price was Rs. 136 per Bushel.<sup>20</sup>

The year 1996 recorded the lowest domestic rice production in Sri Lanka since 1979, due to adverse weather conditions (see Figure 3). The government waived (fully) import duty for the most part of the year to give relief to the consumers.<sup>21</sup> Consequently, the rice imports increased to amount 341,000 MT, the highest amount since 1977. Again, a full duty waiver was granted from end 1997 to early 1998 resulting in heavy influx of imports of rice. Another important government intervention took place during the last two months of 1999, when a partial duty waiver was granted for rice imports. As a result, rice imports amounted to 214,000 MT during 1999, when over two thirds were imported during the last two months. Due to this situation, farmers faced difficulties in marketing the paddy in 2000. The imports also adversely affected local millers and stockists of paddy. The effect of the partial waiver was felt throughout the year. Therefore the government had to intervene in the market through the Cooperative Wholesale Establishment (CWE)<sup>22</sup> and co-operative societies to stabilize paddy prices. The government directed the CWE to purchase paddy at Rs. 13 per Kg, as the farm gate price was well below the CWE purchasing price in the market. This led to the CWE incurring a loss of Rs. 75 million. Consequently, the government decided to impose a licensing requirement (QR) for the import of rice from July 2000. Rice imports plummeted to 14,900 MT in 2000 due to this reason.

Paddy production decreased in 2001 due to adverse weather conditions. In addition, licensing requirements imposed on imported rice helped the farmers to dispose their paddy at remunerative prices. Since the prices increased at the retail level, the government decided to allow a limited quantity of rice to be imported free of import duty and, later at 50 per cent of the import duty. Overall, 51,900 MT of rice was imported in 2001. Import duty on rice was changed from the ad valorem duty of 35 per cent to a specific duty of Rs. 7 per Kg<sup>23</sup> in January 2002, followed by the removal of the licensing requirement. Removal of the licensing requirement at a time when the stock position was low (due to the drop in output in 2001) led to an increase in rice imports. In August 2003, the duty was increased to Rs. 9 per Kg.

<sup>17</sup> Total gross extent sown is also known as the 'asweddumized area'. The net extent harvested is the difference between the gross extent sown and the cultivated extent abandoned due to various reasons such as pests, floods, and droughts.

<sup>18</sup> Earlier, an ad valorem or specific duty (35 per cent or Rs. 7/Kg), whichever was higher was in effect.

<sup>19</sup> This was after a lapse of five years.

<sup>20</sup> Wheat flour subsidy was partially removed during the latter part of 1995 which helped to ease somewhat the depressed paddy price. But the heavily subsidized wheat flour prices increased the demand for wheat flour at the expense of rice.

<sup>21</sup> In lieu of cost of living considerations, duty waivers were granted by the government for importers in order to stabilize prices in the local market.

<sup>22</sup> The CWE is the principal state-trading agency involved in buying and selling of major agricultural commodities today. The main objective of the CWE is to stabilize food prices and assure food security. The CWE has over 40 wholesale depots and 120-retail Outlets Island wide.

<sup>23</sup> According to the government this was done due to under-invoicing by the importers.

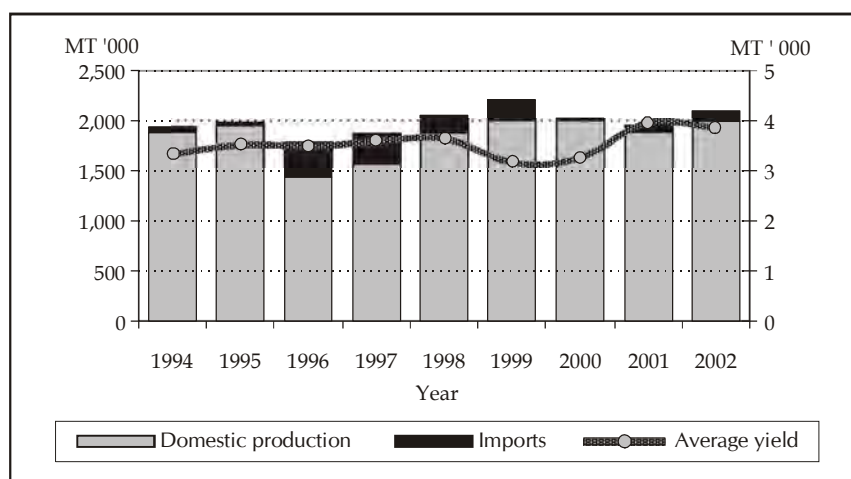


**Table 4**  
**Tariff Changes on Rice during the period 1995 – 2004**

Period	Customs Duty				TT/GST VAT (%)	DL/ NSL	Total Tax Incidence
	Import Duty	Duty Waiver	Effective Import Duty	Surcharge			
Jan 1, 1995- Feb 7, 1995	35% or Rs 7/ Kg	0	55	0	Ex	4.5	65.7**
Feb 8, 1995- April 14, 1996	35	0	35	0	Ex	4.5	44.6
April 15, 1996 – Jan 30, 1997	35	35	0	0	Ex	4.5	7.6
Jan 31, 1997 – Nov 20, 1997	35	0	35	0	Ex	4.5	44.6
Nov 21, 1997 - Jan 31, 1998	35	35	0	0	Ex	4.5	7.6
Feb 1, 1998 – Nov 5, 1998	35	0	35	0	Ex	4.5	44.6
Nov 6, 1998 – Oct 23, 1999	35	0	35	0	Ex	5.5	46.3
Oct 24, 1999 – Dec 31, 1999	35	25	10	0	Ex	6.5	20.9
Jan 1, 2000 – May 10, 2000	35	0	35	0	Ex	6.5	48.0
May 11, 2000 – July 16, 2000	35	0	35	0	Ex	6.5	48.0
Jul 17, 2000 – Feb 19, 2001	35+QR	0	35+QR	0	Ex	6.5	48.0*
Feb 20, 2001 – Mar 31, 2001	35+QR	0	35+QR	40	Ex	6.5	60.0*
Apr 01, 2001 – Sep 11, 2001	35+QR	0	35+QR	40	Ex	7.5	61.7*
Sep 12, 2001 – Nov 21, 2001	35+QR	0	35+QR	40	Ex	6.5	60.0*
Nov 22, 2001 – 8 Dec, 2001	35+QR	35	0+QR	40	Ex	6.5	8.1*
9 Dec 2001 – 1 Jan 2002	35+QR	17.5	17.5+QR	40	Ex	6.5	34.1*
1 Jan 2002 – 20 Jan 2002	35+QR	0	35+QR	40	Ex	6.5	60.0*
Jan 21, 2002 – Jul 31, 2002	Rs 7/Kg	0	Rs 7/Kg	0	Ex	6.5	55.6**
Aug 1, 2002 – Nov 5 2002	Rs 7/Kg	0	Rs 7/Kg	0	10	*	36.6**
Nov 6, 2002 – Mar 4 2003	Rs 5/Kg	0	Rs 5/Kg	0	10	*	27.4**
Mar 5, 2003 – Aug 18 2003	Rs 7/Kg	0	Rs 7/Kg	0	10	*	36.4**
Aug 19, 2003 – 2004	Rs 9/Kg	0	Rs 9/Kg	0	10	*	-

**Note:** \*Total Tax incidence should not be looked at in isolation when QRs are present.  
\*\*Specific duties were converted into its ad-valorem equivalent using average CIF prices.  
**Source:** Various issues of Gazette Notifications of the Government of Sri Lanka.

**Figure 3:**  
**Rice Production, Imports and Yield, 1994 to 2002**



**Source:** Department of Customs and HARTI.

## 4.2 Potato Sector

Potatoes are widely grown in Nuwara Eliya, Badulla, Puttalam and Jaffna districts of Sri Lanka during the Maha season.<sup>24</sup> The production of potatoes is location specific where the variety differs from one location to another. The three major locally grown varieties available in the market are identified by the place of production, viz., Nuwara Eliya potatoes, Badulla (Welimada) potatoes and Jaffna potatoes.

While the Nuwara Eliya potatoes are known to be of the highest quality<sup>25</sup>, the prices of these varieties vary from one to another. Potato prices in Sri Lanka are subject to high price fluctuations *inter alia* weather, scale of production, availability of seed, perishability, lack of infrastructure facilities including water and high post harvest losses. Per year production is more or less equally divided between the two seasons, i.e., Maha and Yala. Seasonal fluctuation is seen in terms of production in the two main districts (Nuwara Eliya and Badulla/Welimada) as planting and harvesting seasons also vary even within the same cultivation seasons, on the basis of location-specific climatic conditions, among the two districts.<sup>26</sup>

The total production, extent and the average yield of potatoes varied significantly due to various reasons such as government policy, lack of good extension services, diseases (e.g., Potato Cyst Nematode (PGCN)) and non-availability of seed potatoes. The growth rates for the last three decades in the areas of potato production, extent, and the average yields are given in Table 5.

	<b>1970s</b>	<b>1980s</b>	<b>1990s</b>
Extent	37	74	-54
Production	61	71	-44
Average yield	17	-2	20

**Source:** Department of Census and Statistics.

The above Table shows that both extent and production grew during the decades of the 1970s and 1980s while there was a decrease in the yield by the end of the 1980s. During this period, potato imports were under licence and an import ban was operative in certain years. Protectionism caused growth in extent and production while the average yield declined due to inefficiencies in production. Potatoes were under QRs from 1968 until 1996. Despite potato becoming a very remunerative crop during this period the farmers did not adhere to proper agricultural practices.<sup>27</sup> With liberalization coming into effect by 1996, only the efficient producers remained in potato cultivation. Consequently, the growth rate of average yield recorded an increase while both the growth rates in extent and production declined. According to the Central Bank Annual Report of 1998, due to the heavy protection accorded to potato during the 1968 to 1996 period potato cultivation became very inefficient and the yield levels dropped by around 40 per cent.<sup>28</sup> This led to high cost of production (COP) at around Rs. 26 per Kg which is extremely high

<sup>24</sup> At present, the cultivation is mainly concentrated in Nuwara Eliya and Badulla (Welimada area) districts. Maha season extends from September/October through March/April.

<sup>25</sup> Nuwara Eliya potatoes are generally considered high in quality and taste compared with most of the imported potatoes.

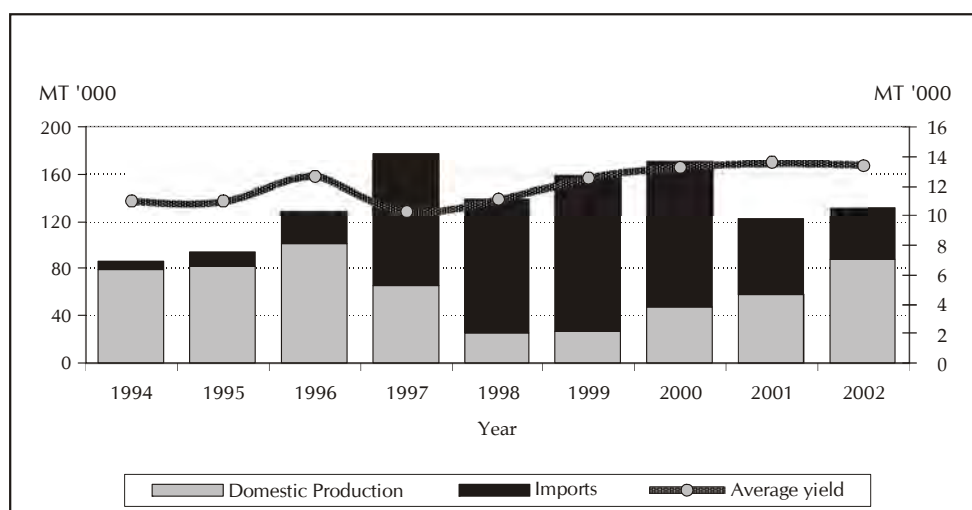
<sup>26</sup> In Nuwara Eliya the cultivating and harvesting period for Yala and Maha is between February- June, and September-January, respectively and for Badulla it is between June - October, and November - March, respectively.

<sup>27</sup> For example, farmers neglected crop rotation practices and instead kept on cultivating potato in the same field which led to soil borne diseases and subsequently low yields.

<sup>28</sup> From 16 MT per hectare to around 10 MT hectare.

compared to other countries. In addition to poor yield the other main contributors to the high COP were cost of seed potato, which is over 50 per cent of the total COP and high wage rates. The highest production recorded was in 1996 with 100,755 MT (see Figure 4) notably the highest extent of 7,925 ha was also recorded in the same year.

**Figure 4**  
**Potato Production, Imports and Yield, 1994 to 2002**



Source: HARTI.

In addition to QRs, a 100 per cent duty prevailed in early 1980s, which came down to 60 per cent by 1989. While QRs continued, in 1994 the duty was fixed at 35 per cent or Rs. 12 per Kg, whichever was higher. In early 1995, duty on potatoes was changed to an ad valorem rate of 35 per cent (with QRs remaining). In 1996, with the removal of QRs, a major trade liberalization effort was launched by the government. As a result, potato imports started to increase significantly from 1997. Moreover, the government granted duty waivers for potato imports during the festival seasons (December-January) in some years like 1997 and 1998, in order to reduce prices paid by the consumers. This led to a reduction in domestic production during 1997 and subsequent years (see Table 6). However, in mid 2000, due to high lobbying of potato farmers, government imposed a surcharge of 40 per cent on potato on top of the already existing duty of 35 per cent. Furthermore, by December 2000, the 35 per cent import duty was changed to a specific duty of Rs. 20 per Kg<sup>29</sup>, resulting in a much higher total tax incidence on potato.

Trade policy changes since 1996 has led to some adverse implications for consumers and producers. However, the problem arose not due to trade liberalization but mainly due to ad-hoc tariff changes, as shown in the above Table. Wholesale and retail prices for potatoes also varied during 1994 to 2002 period. Prices started falling after the liberalization in 1996, increased marginally in 1998 and decreased again until the year 2000. With the introduction of high specific duty, both the wholesale and retail price in Nuwara Eliya and Welimada increased. The per capita consumption of potatoes has fluctuated with income levels as well as price levels. Following the imposition of high tariffs in mid 2000 and then by even higher protection provided in the form of a specific duty in December 2000, the increase of prices led to lower consumption levels. As shown in the Table, the total tax incidence on potatoes has been around 200 per cent during the recent years.<sup>30</sup>

<sup>29</sup> This was done to prevent under-invoicing by the importers.

<sup>30</sup> Ad valorem equivalent of the specific duty for a specific CIF value.

**Table 6**  
**Tariff Changes on Potato during the period 1995 – 2004**

Period	Import Duty	Customs Duty		TT/GST/ Sur-charge	VAT (%)	DL/NSL	Total Tax Incidence *
		Duty Waiver	Effective Import Duty				
Jan 1, 1995- Feb 7, 1995	35% orRs 12 kg +QR	0	89	0	20	4.5	148.9
Feb 8, 1995- July 1996	35 +QR	0	35	0	6	4.5	54.7
July 1996 - Dec 3, 1996	35	0	35	0	Ex	4.5	44.6
Dec 4, 1996 - Jan 31, 1997	35	15	20	0	Ex	4.5	28.8
Feb 1, 1997 – Nov 27, 1997	35	0	35	0	Ex	4.5	44.6
Nov 28, 1997 - Jan 31, 1998	35	15	20	0	Ex	4.5	28.8
Feb 1, 1998 – Nov 5, 1998	35	0	35	0	Ex	4.5	44.6
Nov 6, 1998 – May 10, 2000	35	0	35	0	Ex	5.5	46.3
May 11, 2000 – Nov 29, 2000	35	0	35	0	Ex	6.5	48.0
Nov 30, 2000 – Dec 7, 2000	35	0	35	40	Ex	6.5	60.0
Dec 8, 2000 – Feb 19, 2001	Rs 20/Kg	0	152.2	0	Ex	6.5	172.7*
Feb 20, 2001 – Mar 31, 2001	Rs 20/Kg	0	145.5	40	Ex	6.5	223.6*
Apr 01, 2001 – Sep 11, 2001	Rs 20/Kg	0	156.1	40	Ex	7.5	242.6*
Sep 12, 2001 – Mar 31, 2002	Rs 20/Kg	0	139.7	40	Ex	6.5	215.0*
Apr 1, 2002 – Jul 31, 2002	Rs 20/Kg	0	130.0	0	Ex	6.5	148.6*
Aug 1, 2002 – to date	Rs 20/Kg	0	168.5	0	10	-	195.3*

**Note:** GST + NSL determined the 10% VAT rate. Specific duties were converted into its ad valorem equivalent using average CIF prices.

\*it is important to note that the effective duty rate alone does not show the full picture of the import duty structure as in the case of rice. This makes the calculation of the effective total tax incidence all the more important.

**Source:** Various issues of Gazette Notifications of the Government of Sri Lanka.

The descriptive analysis in this Chapter showed that successive governments during the recent decade have carried out numerous trade liberalization measures in rice and potato sectors. However, the ad-hoc policy changes and reversals in certain periods have undermined the liberalization process and have led to some adverse implications on consumers as well as the producers. In the next Chapter, using an analytical approach, the paper looks at how trade liberalization (reduction of tariff) in the rice sector would affect poverty and welfare of households in the country.

## 5. Trade Liberalization and Effects on Households: An Analytical Approach

This Chapter of the paper analyzes how trade liberalization (e.g., reduction in tariffs) would affect poverty and welfare of households, using an analytical approach. In other words, it looks at the impact of trade liberalization on poverty and household welfare through the price changes of tradable goods - the Distribution Channel explained in Chapter 2. The following model is used in this regard.

### 5.1 The Model

In analyzing the price effects (as a result of trade liberalization) on poverty and household welfare, a simple practical model is used that has been adapted from McCulloch (2003) who draws on the approach of Nicita *et al.*, (2002) in their study of the impact of trade reforms in Cambodia.

The model assumes that the household is the unit of analysis. The total income of the household is taken as the sum of own production, wage employment and net transfers. The income from own production and wage employment can be identified as the product of a set of prices and a set of quantities. This model assumes that in the short run, households cannot change their activities in response to changes in prices. Therefore, a first approximation to the change in their income resulting from a price shock can be given by the sum of the price changes times the original quantities produced. Similarly, it is assumed that the quantities of goods consumed by the household do not change in the short run. Therefore, a first approximation of the change in the costs associated with a price change can be given by the change in prices times the quantity of the good originally consumed. When both the production and the consumption effects are put together we obtain the welfare change of a household in the short run (due to price change of a good), approximated as the change in income minus the change in consumption.<sup>31</sup> If we express the welfare change as a percentage, dividing it by the original level of welfare (given by the initial level of income) we get:

$$\frac{\Delta W}{W} = \left( \sum_j IS_j^o \left( \frac{\Delta P_j^o}{P_j^o} \right) - \sum_k BS_k^I \left( \frac{\Delta P_k^I}{P_k^I} \right) \right) + \sum_f IS_f^w \left( \frac{\Delta w_f}{w_f} \right) - \sum_j BS_j^c \left( \frac{\Delta p_j^c}{P_j^c} \right) \quad (1)$$

Where  $W$  is the measure of welfare.  $IS_j^o$  is the value of output  $j$  as a share of total household income,  $\left( \frac{\Delta P_j^o}{P_j^o} \right)$  is the percentage change in the price of output  $j$ ,  $BS_k^I$  is the budget share of input costs,  $\left( \frac{\Delta P_k^I}{P_k^I} \right)$  is the percentage change in the price of input  $k$ ,  $IS_f^w$  is the income share of net factor income from factor  $f$  (in most cases equal to the income share of wages), and  $BS_j^c$  is the budget share of good  $j$  in consumption,  $\left( \frac{\Delta p_j^c}{P_j^c} \right)$  is the percentage change in the price of consumption good  $j$ . Moreover, here we assume there is no change in transfer income of the household.<sup>32</sup>

In the next section, this model is applied to the rice sector of Sri Lanka using the *Consumer Finances and Socio Economic Survey of Sri Lanka (CFSES) - 1996/97*<sup>33</sup> data of the Central Bank of Sri Lanka. The reason for not applying this model to the potato sector (the other commodity studied in this paper) is the limitations of the CFSES survey data. That is, the survey data did not facilitate to arrive at the share of household income from potato production. Thus, in the next section, this model is used to analyze how trade liberalization (reduction of tariff) in the rice sector would impact on poverty and household welfare in Sri Lanka. However, this model is not without its limitations. For example, it can only analyze the *short-term* price effects due to trade liberalization on household welfare; it does not allow for substitution in consumption or production. Despite such few weaknesses, this is a simple model with relatively low data requirements, which could be used to analyze the impact of trade policy changes on poverty and welfare of households.

<sup>31</sup> This makes intuitive sense as an increase in the price of a good which is both consumed and produced will increase income and also increase the cost of achieving the original level of consumption – the difference between these two is therefore an approximation to the welfare change.

<sup>32</sup> See Annex 1 for the derivation of this model (with transfer income).

<sup>33</sup> CFSES covered 8663 households covering all the districts, except North and East of Sri Lanka.

## 5.2 Application of the Model to the Rice Sector

According to the model, the impact of a price change of a particular good on welfare of the household will depend on the relative importance of the good concerned as a source of income to the household and its importance in the household consumption basket (see equation 1). For example, if the price of a good (e.g., rice) increases, then the net producers of rice will benefit while net consumers will lose, however, the extent of gain or loss due to price increase of rice will depend on how much income depends upon the production of rice and how important rice is in the household's consumption basket. To analyze this, first, we have to look at the contribution to household income from different income sources and the household expenditure shares for different consumption items. Table 7 provides a breakdown of household income by sources of income for different income deciles.

Paddy (rice) cultivation is an important source of income in Sri Lanka, particularly among the lower income groups. On average, income from paddy accounts for about 2.1 per cent of the total household income and over 15 per cent of the total income from agriculture and fishing. Importance of paddy as a source of income is relatively higher among poorer income deciles as compared to the richer deciles. For example, the poorest deciles receive approximately 4-5 per cent of their income from paddy cultivation, while for the richest decile this is only about 0.5 per cent of their total household income. Similarly, the total income share from agriculture related activities are almost 30 per cent for the poorest deciles while only about 5 per cent for the richest decile.

Table 8 shows the contribution to household income from different sources by sector.<sup>34</sup> Estate sector has the highest share of income from agriculture and fishing (about 72 per cent). However, this is mainly due to income from the tea plantations (included under other agricultural and fishing in the Table). Share of household income from paddy cultivation is highest in the rural sector (2.8 per cent), while it is insignificant both in the urban (0.01 per cent) and estate (0.2 per cent) sectors, implying that paddy is mainly cultivated in rural areas of Sri Lanka. In the rural sector, approximately 14.4 per cent of household income comes from agriculture and fishing, of which almost 20 per cent is from cultivation of paddy. Income received from the manufacturing and wholesale, retail trade and restaurant seems to be significant, particularly in urban and rural sectors. Moreover, Community, social and personal services and other sources of income such as income from property and transfers, account for a significant share of household income in these sectors.

Next, the study looks at the expenditure shares of households in Sri Lanka. This is given in Table 9 where expenditure shares are provided for each income group (decile). It can be seen that the poorest deciles (e.g., decile 1&2) spend over 68 per cent of their total consumption expenditure on food while the corresponding figure for the richest decile is about 31 per cent. Moreover, on average a household spends about 10 per cent of the total expenditure on rice consumption. However, this figure varies largely across income deciles. For example, the poorest decile spends over 17 per cent of the total consumption expenditure on rice while it is only about 4 per cent for the richest decile. On the contrary, the households in higher income deciles spend relatively higher shares of their total expenditure on non-food consumption items (such as housing, transport and communication) and consumer durables.

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<sup>34</sup> Urban Sector consists of households in the Municipal and Urban Council areas. Estate Sector consists of the households in Tea, Rubber, and Coconut estates with 20 or more acres and with 10 or more resident workers. Rural Sector consists of all the households not included in the Urban or Estate Sectors.

Table 7  
Contribution to Household Income from Different Sources by Deciles (%)<sup>35</sup>

Source of Income	Deciles										Total
	1	2	3	4	5	6	7	8	9	10	
Agriculture, Hunting, Forestry and Fishing	29.1	30.4	27.4	27.4	22.8	19.7	16.9	13.1	10.9	5.1	14.1
Agriculture & fishing	28.3	29.6	26.2	25.3	21.0	18.7	15.1	12.2	9.8	4.6	13.1
Paddy (rice) cultivation	4.2	5.0	4.7	4.1	3.2	3.1	2.4	2.0	1.8	0.5	2.1
Other field grains	1.2	0.7	0.6	0.8	0.4	0.2	0.1	0.2	0.1	0.0	0.2
Vegetable & fruit gardening	2.9	2.9	2.7	2.4	2.2	1.6	1.0	0.8	1.0	0.2	1.1
Coconut cultivation	1.5	2.2	1.3	1.1	0.8	0.7	0.9	0.2	0.7	0.4	0.7
Cultivation of other crops	4.8	4.3	2.8	2.9	2.3	2.2	1.6	1.5	0.7	0.5	1.5
Livestock production	0.3	0.3	0.8	0.6	0.8	0.7	0.8	0.5	0.7	0.7	0.7
Other agricultural and fishing	13.5	14.4	12.2	13.5	11.3	10.1	8.3	6.9	4.8	2.2	6.8
Other agri, hunting, forestry, & fishing	0.8	0.5	1.2	2.0	1.9	1.0	1.9	0.9	1.1	0.6	1.0
Mining and Quarrying	0.9	1.0	1.3	0.8	1.0	0.5	0.9	0.3	0.4	0.6	0.6
Manufacturing	5.4	8.7	9.7	10.5	10.5	12.0	11.8	13.0	10.9	12.8	11.6
Electricity	0.2	0.1	0.2	0.5	0.3	0.4	0.8	1.0	1.6	0.8	0.8
Construction	4.0	6.3	7.3	8.6	7.7	7.4	6.6	4.4	2.9	2.0	4.5
Wholesale, Retail trade and Restaurant	4.2	4.9	7.1	7.6	7.8	10.7	10.8	10.6	11.6	15.8	11.6
Transport, Storage and communication	0.9	1.5	2.2	3.1	5.0	4.8	6.9	6.1	7.0	6.8	5.7
Finance, Insurance, Real Estate & Business	0.1	0.6	0.3	0.3	0.8	0.9	0.9	1.9	3.6	6.5	3.2
Community, Social and Personal Services	3.6	5.0	4.8	5.2	8.3	9.2	11.0	14.3	16.0	14.6	12.0
Other sources of income**	51.8	41.5	39.7	36.2	35.8	34.5	33.3	35.3	35.0	35.0	35.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Note:** \*\* Other Sources of income to household include income from property (e.g., rent from movable and immovable property, interest, dividends), windfall income (e.g., from gambling and lotteries), transfers (e.g., food stamps, Samurdhi, other government transfers, transfers from relatives and friends) and income from other activities not adequately defined.

**Source:** Calculated using Consumer Finances & Socio-Economic Survey 1996/97.

<sup>35</sup> Note that the contributions to household income from different sources given in this Table are not strictly comparable to their contribution to GDP as the household income here includes various transfers (government and private) to households.

**Table 8**  
**Contribution to Household Income from Different Sources by Sector (%)**

Source of Income	Sectors			Total
	Urban	Rural	Estate	
Agriculture, Hunting, Forestry and Fishing	1.6	15.5	72.1	14.1
Agriculture & fishing	0.8	14.4	71.9	13.1
Paddy (rice) cultivation	0.0	2.8	0.2	2.1
Other field grains	0.0	0.3	0.0	0.2
Vegetable & fruit gardening	0.0	1.4	1.8	1.1
Coconut cultivation	0.1	0.9	0.5	0.7
Cultivation of other crops	0.0	2.0	1.0	1.5
Livestock production	0.1	0.8	1.1	0.6
Other agricultural and fishing	0.6	6.2	67.4	6.8
Other agriculture, hunting, forestry, & fishing	0.8	1.1	0.2	1.0
Mining and Quarrying	0.2	0.8	0.6	0.6
Manufacturing	14.3	11.2	2.3	11.6
Electricity, gas, and water	1.0	0.8	0.0	0.8
Construction	2.5	5.1	1.7	4.5
Wholesale, Retail trade and Restaurant	14.4	11.1	4.5	11.6
Transport, Storage and communication	6.9	5.6	0.5	5.7
Finance, Insurance, Real Estate and Business	6.4	2.3	0.0	3.2
Community, Social and Personal Services	13.9	11.8	2.4	12.0
Other sources of income **	38.8	35.8	15.8	35.8
Total	100.0	100.0	100.0	100.0

**Note:** \*\* Other Sources of income to household include income from property (e.g., rent from movable and immovable property, interest, dividends), windfall income (e.g., from gambling and lotteries), transfers (e.g., food stamps, Samurdhi, other government transfers, transfers from relatives and friends) and income from other activities not adequately defined.

**Source:** Calculated using Consumer Finances & Socio-Economic Survey 1996/97.

In addition, as shown in Table 10, households in the Estate and Rural sectors spend about 68 per cent and 52 per cent respectively of their total consumption expenditure on food. Moreover, Estate sector households spend the highest share of their total consumption expenditure on rice (15 per cent) followed by rural (11.2 per cent) and urban (5.2 per cent) households. It is noteworthy that the urban sector has the lowest expenditure share on rice consumption and the lowest contribution to household income from paddy/ rice cultivation, indicating the relatively less importance of rice in urban areas. On the contrary, household expenditure share on rice consumption as well as the share of income from rice production, both, indicates significantly higher importance among the rural households. In the Estate sector, despite the relatively lower importance of rice as a source of household income, the share of expenditure spent on rice consumption is the highest, in comparison to other sectors.

Tables 7 to 10 showed the contribution of rice production to total household income and the share of rice in total consumption expenditure of households, for different income deciles and sectors. With this information, it is possible to analyze how rice trade liberalization (reduction of tariffs on rice), through the price changes, would affect poverty and welfare of the households, using the simple model explained earlier (equation 1). A simulation of 20 per cent reduction in tariff on rice<sup>36</sup> is used for this purpose. Here it is assumed that the percentage change in tariff leads to a proportional percentage change in price

<sup>36</sup> At the time of the study, the top tariff band was 30 per cent (including surcharge). In order to bring down the import duty on rice (which was subject to specific duty as shown in Table 4) to this top band level, the import duty on rice had to be reduced by around 20 per cent. This is the reason for using a 20 per cent tariff reduction in the simulation of this study.



of rice that is produced and/or consumed by the households.<sup>37</sup> It is further assumed that in the short run, the input costs of rice production do not change.

**Table 9**  
Expenditure Shares of Households, by Income Deciles (%)

Consumption Item	Deciles										Total
	1	2	3	4	5	6	7	8	9	10	
(1) Food	68.7	68.1	64.1	62.7	61.4	58.2	55.2	49.8	45.7	31.1	49.4
Rice, all varieties	17.4	17.4	16.1	14.9	14.6	13.1	11.5	9.4	8.0	4.3	10.1
Fish & fish products	5.1	5.8	6.1	6.2	6.0	6.3	6.3	6.0	5.7	4.2	5.5
Other food items	46.2	44.9	41.9	41.6	40.8	38.8	37.4	34.4	32	22.6	33.8
(2) Non food	30.4	30.2	32.9	34.4	35.0	37.6	37.5	43.2	47.3	56.5	43.6
Housing	6.3	6.0	6.6	6.8	7.9	9.0	9.8	10.7	12.3	15.7	11.0
Fuel & light	5.8	5.3	4.9	4.6	4.6	4.3	4.1	3.7	3.7	3.0	3.9
Transport & communication	2.5	2.3	2.4	3.5	2.9	3.5	4.2	4.8	5.9	9.1	5.4
Clothing & apparel	4.5	5.3	5.6	5.6	5.6	5.8	6.1	7.0	6.7	7.3	6.4
Other non food items	11.3	11.3	13.4	13.9	14.0	15.0	13.3	17.0	18.7	21.4	16.9
(3) Consumer durables	0.4	1.3	2.5	2.5	2.8	3.4	6.1	5.4	5.2	8.8	5.3
(4) Interest on Debt	0.5	0.3	0.4	0.4	0.9	0.9	1.2	1.5	1.7	3.6	1.8
Total = (1) + (2) + (3) + (4)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Calculated using Consumer Finances & Socio-Economic Survey 1996/97.

**Table 10**  
Expenditure Shares of Households, by Sector (%)

Consumption item	Sectors			Total
	Urban	Rural	Estate	
(1) Food	37.3	51.7	67.6	49.4
Rice, all varieties	5.2	11.2	15.0	10.1
Fish & fish products	5.0	5.7	3.6	5.5
Other food items	27.1	34.8	49.0	33.8
(2) Non food	54.5	41.2	30.5	43.6
Housing	19.7	9.0	2.3	11.0
Fuel & light	3.7	4.0	4.6	3.9
Transport & communication	7.1	5.1	2.5	5.4
Clothing & apparel	5.3	6.6	9.0	6.4
Other non food items	18.7	16.5	12.1	16.9
(3) Consumer durables	5.4	5.5	1.5	5.3
(4) Interest on Debt	2.8	1.6	0.5	1.8
Total = (1) + (2) + (3) + (4)	100.0	100.0	100.0	100.0

Source: Calculated using Consumer Finances & Socio-Economic Survey 1996/97.

<sup>37</sup> According to McCulloch (2003), it can be mathematically proved that a percentage change in tariff will lead to a proportional percentage change in prices. However, as this proportional percentage is difficult to calculate, here we assume perfect price transformation.

Based on the above assumptions and the income and expenditure shares obtained earlier, we look at how a 20 per cent reduction in tariff on rice would affect the net welfare of households in different income deciles. As per the results shown in Table 11, a 20 per cent tariff reduction on rice would have an overall positive welfare effect on households in Sri Lanka (in the short run). Net welfare change for all the income deciles would be positive. However, the results show that the households in the lowest income deciles gain the most. This is because the poorer households spend a relatively higher proportion of their expenditure on rice consumption; hence a reduction in rice prices would benefit them largely. In contrast, the welfare gains for the higher income deciles are relatively small (but positive), as the expenditure share of rice (and also the contribution of rice to total income) is relatively low among rich households.

Moreover, Table 12 below shows how the 20 per cent tariff reduction on rice would affect households in different sectors. As shown in Column 4 of the Table, (with freezing input prices) a 20 per cent tariff reduction on rice would lead to an overall welfare gain for all the three sectors, however, the extent of gain differs from one sector to another. For example, the estate sector households, with highest expenditure share on rice consumption and relatively low income share from paddy/rice cultivation, would have the highest welfare gain. On the contrary, the urban sector, with relatively lower importance of rice –both as a source of household income and in terms of its share in total household expenditure- has the lowest net welfare gain. The extent of net welfare gain to rural sector households, on average, is somewhere between that of the estate and urban sectors.

**Table 11**  
Effect of Reduction in Tariff (20%) on Welfare of Households  
by Income Deciles (with freezing input prices)

Income Deciles	Income Share (%)	Expenditure Share (%)	Welfare Changes (%)
1	4.2	17.3	2.6
2	5.0	17.4	2.5
3	4.7	16.1	2.3
4	4.1	14.9	2.2
5	3.2	14.6	2.3
6	3.1	13.1	2.0
7	2.4	11.5	1.8
8	2.0	9.4	1.5
9	1.8	8.0	1.2
10	0.5	4.3	0.7
Total	2.1	10.1	1.6

Source: Simulated using Consumer Finances & Socio-Economic Survey 1996/97

**Table 12**  
Effect of Reduction in Tariff (20%) on Welfare of Households  
by Sector (with freezing input prices)

Sector (1)	Income Share % (2)	Expenditure Share % (3)	Net Welfare Change % (4)
Urban	0.0	5.2	1.0
Rural	2.8	11.2	1.7
Estate	0.2	15.0	3.0
Total	2.1	10.1	1.6

Source: Simulated using Consumer Finances & Socio-Economic Survey 1996/97.

**Table 13**  
**Effect of Tariff Reduction (20%) on Welfare of Households by District and Sector**

District (1)	Sector (2)	Expenditure Share (on rice) -% (3)	Income Share (from Paddy) % (4)	Net Welfare Change (freezing input prices) % (5)	Net Welfare Change (with input prices) % (6)
Colombo	Urban	4.5	0.0	0.9	0.9
	Rural	6.5	0.2	1.3	3.7
	Estate	13.7	0.0	2.7	2.7
Gampaha	Urban	5.8	0.0	1.2	1.2
	Rural	7.6	0.4	1.4	3.9
Kalutara	Urban	8.2	0.0	1.6	1.6
	Rural	9.7	1.0	1.7	4.2
	Estate	15.4	0.0	3.1	3.1
Galle	Urban	6.2	0.0	1.2	1.2
	Rural	10.9	0.8	2.0	4.5
	Estate	12.2	0.0	2.4	2.4
Matara	Urban	6.5	0.0	1.3	1.3
	Rural	13.2	2.1	2.2	4.7
	Estate	17.8	0.0	3.6	3.6
Hambantota	Urban	7.7	0.0	1.5	1.5
	Rural	15.0	11.4	0.7	3.2
Moneragala	Rural	16.4	6.1	2.1	4.5
Ampara	Rural	21.6	61.0	-7.9	-5.4
Polonnaruwa	Rural	15.1	25.8	-2.1	0.3
Anuradhapura	Urban	7.0	0.0	1.4	1.4
	Rural	14.0	6.6	1.5	4.0
Puttalam	Urban	6.5	0.0	1.3	1.3
	Rural	11.6	2.3	1.9	4.4
Kandy	Urban	5.4	0.0	1.1	1.1
	Rural	11.8	1.9	2.0	4.5
	Estate	14.6	0.0	2.9	2.9
Matale	Urban	4.2	0.5	0.8	3.2
	Rural	12.8	8.3	0.9	3.4
	Estate	15.8	0.0	3.2	3.2
Nuwara-Eliya	Rural	13.9	1.9	2.4	4.9
	Estate	14.6	0.2	2.9	5.4
Badulla	Urban	7.9	0.0	1.6	1.6
	Rural	14.1	2.3	2.3	4.8
	Estate	14.3	0.0	2.9	2.9
Ratnapura	Urban	9.1	0.0	1.8	1.8
	Rural	15.5	2.7	2.6	5.0
	Estate	16.6	0.8	3.2	5.7
Kegalle	Rural	10.5	1.0	1.9	4.4
	Estate	17.0	0.6	3.3	5.8
Kurunegala	Rural	13.5	3.7	2.0	4.4
	Estate	13.4	0.0	2.7	2.7
All	Average	10.1	2.1	1.6	4.1

Source: Simulated using Consumer Finances & Socio-Economic Survey 1996/97.

Next, the study analyzes the rice trade liberalization impact on household welfare at a more disaggregated level. Here, the simulation of 20 per cent tariff reduction (with freezing input prices) to each of the 18 districts covered in the CFSES survey is used, and within each district, to different sectors (urban, rural and estate). The simulation results are given in Table 13, where the income and expenditure shares are given in Columns 3 & 4 while the net welfare change due to tariff reduction (freezing input prices) is provided in Column 5. The results show that for the majority of districts the net welfare effect of rice trade liberalization is positive, implying that households in these districts in general, are net consumers of rice rather than net producers of rice.

Nevertheless, Ampara and Polonnaruwa are two districts in the country, which would be adversely affected by tariff reduction on rice (see Column 5). The results show a significantly high welfare loss in these two districts, -7.9 and -2.1, respectively. As already mentioned in the descriptive analysis in Chapter 4, Ampara and Polonnaruwa are two large-scale rice growing areas, where majority of the households are engaged in agriculture, particularly in paddy production. Households in these two districts in general are net producers of rice. This can be clearly seen from the significantly higher share of income they receive from rice production. For example, in Ampara and Polonnaruwa districts, share of household income received from rice/paddy cultivation is about 61 per cent and 26 per cent respectively (as against 2.1 per cent average for the whole country). The average share of household expenditure spent on rice consumption in these two districts is much lower compared to the respective income shares.

Furthermore, it is interesting to note that within each district, the urban households have the lowest effect of rice trade liberalization. This is shown by relatively lower (positive) net welfare change in urban sectors compared to rural and estate sectors. As already mentioned earlier, the reason for this situation is relatively lower expenditure shares on rice and almost no income from rice production among urban households. On the contrary, the results show that in all the districts, the welfare gains are highest among the Estate Sector households. This is because the estate population is clearly net consumers of rice and on average, spends around 15 per cent of their total expenditure on rice. Hence a fall in price of rice due to tariff reduction would lead to large welfare gains to these households.

The simulation carried out until now, assumed that the input prices of rice production remain unchanged. Now, we attempt to analyze the impact of rice trade liberalization on household welfare, when taking into account the changes in input prices of the rice sector. The Cost of Production data of the Department of Agriculture shows that during the 1990-2002 period, the average annual growth rate (real) of labour costs and material costs are negative, while that of power costs is positive.<sup>38</sup> Based on these actual figures during 1990-2002 period, the model assumes, that the percentage changes in labour costs, material costs and power costs are -3, -6 and 1 respectively. Moreover, it is assumed that the budget shares (cost of production) of these inputs- labour, material and power - are 52 per cent, 24 per cent and 24 per cent respectively.<sup>39</sup> All the other things in the model are assumed to be same as in the previous simulation. Taking into account the input price changes and the budget share of input costs as explained<sup>40</sup>, a simulation of 20 per cent tariff reduction on rice is now used to see the impact of rice trade liberalization on poverty and welfare of the households in Sri Lanka.

<sup>38</sup> Colombo Consumer Price Index was used as a deflator to convert the nominal costs to real costs.

<sup>39</sup> This is based on the Department of Agriculture actual budget shares of input costs for rice production in 2002.

<sup>40</sup> This data is used in  $BS'_k$  in the model shown by the equation (1) where  $\Delta p_k$  is the percentage Change in the price of input  $k$  and  $BS'_k$  is the budget share of input costs. Note that the changes of input prices are independent of trade liberalization.

The results of the new simulation (with input price changes) by income deciles are given in Table 14. It is clear that when the input price changes are taken into account, the overall welfare change is higher, 4.1 per cent as against 1.6 per cent in the previous simulation (with constant input prices). Moreover, it is seen that for all the income deciles, the welfare effects are positive and relatively higher in this new simulation. However, as in the previous simulation, the extent of welfare gains is relatively higher in the lower income deciles as compared to higher deciles.

**Table 14**  
**Effect of Reduction in Tariff (rice) (20%) on Welfare of Households**  
**by Income Deciles (with input price changes)**

Income Deciles	Income Share (%)	Expenditure Share (%)	Welfare Changes (%)
1	4.2	17.3	5.1
2	5.0	17.4	5.0
3	4.7	16.1	4.8
4	4.1	14.9	4.7
5	3.2	14.6	4.8
6	3.1	13.1	4.5
7	2.4	11.5	4.3
8	2.0	9.4	4.0
9	1.8	8.0	3.7
10	0.5	4.3	3.2
Total	2.1	10.1	4.1

**Source:** Simulated using Consumer Finances & Socio-Economic Survey 1996/97.

The new results by district and by sector are given in Column 6 of Table 13. It is observed that when input price changes are considered, the welfare effects of rice trade liberalization become significantly higher in the rural sector - the main rice-producing sector of the country. Even Ampara and Polonnaruwa- two large-scale rice producing (rural) areas- which had a negative welfare effect in the previous simulation, show a lesser negative effect (or a welfare gain) in the new simulation. For example, in Ampara, the net welfare effect is -5.4 per cent (compared to -7.9 in the previous simulation) while in Polonnaruwa, the negative welfare effect (-2.1 per cent) has turned to a welfare gain (0.3 per cent), when the input price changes are taken in to account.

A comparison between the results of the two simulations (Columns 5 & 6 of Table 13) shows that there is no difference in welfare effects in the urban sector (except in Matale district). This is because no rice cultivation has taken place in the urban areas of the majority of districts and hence there is no impact of input price changes on urban households. The Estate sector also showed no significant difference in welfare effects between the two cases, except in very few districts. For example, the estate sectors of Nuwara-Eliya, Ratnapura and Kegalle, where paddy cultivation has taken place on a small scale, showed relatively larger welfare effect of rice trade liberalization, when input price changes are considered.

It is important to look at how the welfare effects of rice trade liberalization become higher (positive) in rice growing areas, when the changes in input prices are taken into account. As mentioned previously, the average annual growth rates (real) of material and labour costs (during 1990-2002) used in this model are negative (-3 per cent and -6 per cent respectively), while that of power is 1 per cent implying an overall negative growth rate of the input costs/prices for rice production. Such negative growth rate (real) of input costs could largely be a result of mechanization and technological advancement of the rice sector in the country, which has led to an increase in the input use efficiency. The results show that the gains from such productivity improvements in the rice sector could add to the welfare effects of rice trade

liberalization and offset some of the negative effects of trade liberalization on rice producing households/sectors. This is why one could expect higher welfare effects (or lesser welfare losses) particularly in the rural sector, when the input price changes are taken into account in the model.

## 6. Conclusions and Policy Implications

It is generally believed that sustainable economic growth is a vital condition for achieving sustainable poverty alleviation in a country, and a liberal and transparent trade regime is a precondition for sustainable economic growth. However, trade policies affect consumers and producers differently and it is important to take a holistic view in judging their effectiveness. Economists often spend a great deal of effort trying to measure the impacts of these policies, but trade policies have no particular meaning in isolation. This is because they have an impact on the behaviour and welfare of consumers and producers, and hence can have a significant effect on the economy.

In this paper, an attempt was made to analyze the impact of trade liberalization on poverty and household welfare, with special reference to the rice and potato sectors of Sri Lanka. The results of the analytical model used to look at the effect of rice trade liberalization, showed an overall welfare improvement in the country (in the short run), with households of all the income deciles having positive welfare effects. The extent of welfare gain from tariff reduction on rice was found higher among the low-income (poor) groups, compared to high-income (rich) groups. This is because the poorer households spend a relatively larger share of their expenditure on rice consumption (compared to richer households), hence, a price reduction in rice would bring larger benefits to poor groups. Moreover, the (overall) *positive* welfare effect for the poor groups (like for the other income groups) implies that there are more net consumers of rice than net producers of rice in low income groups and, therefore, a tariff reduction on rice, by improving the welfare of poor households, could contribute to poverty alleviation in the country.

Furthermore, the results showed that a tariff reduction on rice would bring the highest welfare gains to the households in the estate sector, where the incidence of poverty continues to be highest, with increasing poverty trends over the last decade. On the contrary, the urban sector with the lowest and declining poverty incidence during the last decade, showed the lowest (positive) effect of rice trade liberalization, implying relatively less importance of rice among urban households. However, the rural sector, which is the main rice producing sector of the country, showed somewhat a mixed effect. While many rural areas would have positive effects, large-scale rice producing districts such as Ampara and Polonnaruwa, where the majority of the households are engaged in paddy cultivation, would have significant welfare losses due to tariff reductions on rice.

Nevertheless, it is important to understand that, even if the *overall welfare effects* tend to be *positive* for all the income deciles, sectors and for the majority of districts, at least in the short run, there would be considerable number of rice producing households in many of these income groups, sectors and districts, who would be adversely affected by tariff reductions on rice. However, the survey data used in this study, does not allow capturing these effects taken place at a more disaggregated level (beyond the district level). Such an analysis would require undertaking field research at the grass-root level (e.g., village level).

The paper also analyzed various trade liberalization measures that have taken place in the rice and potato sectors of the country during the last decade. Moreover, it looked at the ad hoc and frequent changes of trade policies by successive governments of Sri Lanka, with the dual objective of protecting both the consumers and producers. However, such ad-hoc policy changes and reversals often undermine the liberalization process and lead to adverse effects on consumers as well as producers. Moreover, the expected benefits of ad hoc policies are generally not received by consumers or producers, but largely captured by the middle men. Therefore, it is important that the government eliminate all forms of

quantitative restrictions and ad hoc changes to tariff rates, and maintain a low uniform ad valorem tariff rate for rice and potato with a total tax incidence of 50 per cent or less.<sup>41</sup>

Furthermore, it is crucial that the government takes necessary action or adopts policies/programmes to mitigate the adverse effects of trade liberalization on certain segments of the society, particularly any negative effects on the low-income households. One of the most important policies to look after the poor and the vulnerable groups is having a sound and efficient social safety net programme. It is argued that safety net programmes can generally be better targeted than many other policies and that they are less distortionary of the market forces (Hoekman *et al.*, 2001 & 2002). As discussed earlier in the paper, there have been various safety net programmes in Sri Lanka since its independence, ranging from food ration schemes to numerous income support programmes. However, it is important that the government takes necessary action to improve these existing programmes for better targeting and better functioning, and to improve their coverage (where necessary) to include those who are being adversely affected by various policy reforms such as trade liberalization.

Nevertheless, it should be noted that Safety net programmes are not the only response to the negative impacts of trade liberalization, but they are an important part of the response package. In addition, there are a number of complementary policies that the government needs to follow to increase productivity of the agricultural (rice) sector, reduce inefficiencies and, improve market conditions, infrastructure facilities and institutions. These policies would help the producers to reduce their costs and improve the quality of their products, which would in turn help them to better cope with various shocks and policy reforms.

The results of the model also showed that a productivity improvement/ an increase in input use efficiency (due to a technological advancement) in the rice sector could help to enhance the positive welfare effects of trade liberalization, while offsetting any adverse effects on rice producing households. Some policies that could help improving productivity and reduce inefficiencies in the rice sector include, promoting R&D and agricultural extension services, improving irrigation and market facilities, modernizing rice mills and, improving storage and transportation facilities. Moreover, promoting crop diversification and shifting from paddy to other productive and profitable cash crops (particularly among the marginal farmers in wet zone of Sri Lanka), are important. Furthermore, programmes such as the Forward Sales Contract Scheme of the Central Bank of Sri Lanka (CBSL) and various agricultural credit schemes by the CBSL, government and Non-governmental organizations, would help the producers to better cope with any uncertainties caused by trade policy reforms and to improve efficiency in the agricultural sector in the country.

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<sup>41</sup> This rate complies with the existing WTO rules because Sri Lanka has bound tariffs on almost all agricultural products at 50 per cent.

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## Annex 1

### A Methodology to Analyze the Impact of Trade Liberalization on Households<sup>42</sup>

McCulloch (2002) who draws on the approach of Nicita *et al.*, (2002) in their study of the impact of trade reform in Cambodia as the basic methodology proposes the following framework. When the income  $Y$  of a household be given by:

(1)

where  $p_j^O$  is the price of output  $j$ ;  $q_j^O$  is the quantity of output  $j$ ;  $p_k^I$  and  $q_k^I$  are the corresponding input prices and quantities;  $w_f$  is the wage rate for factor  $f$ ;  $L_f$  is the net sale of factor  $f$  by the household; and  $T_{mn}$  is the net transfer received by household member  $n$  from source  $m$ .

Note that the first term in equation (1) is the value added of all production (whether from farming or non-farming enterprises). This includes both marketed production and own consumption. The second term is the value of net factor sales by the household—in the case of most poor households this simply means net labour sales (i.e., employment income minus payments for hired labour) since the only factor which most poor households can sell is their own labour. The final term represents the net transfers received by

the household.  

$$= \left( \sum_j p_j^O q_j^O - \sum_k p_k^I q_k^I \right) + \sum_f w_f L_f + \sum_m \sum_n T_{mn}$$
 Similarly we can write the consumption of the household as:

$$C = \sum_i p_i^C q_i^C \quad (2)$$

where  $p_i^C$  is the buying price of good  $i$  and  $q_i^C$  is the quantity consumed of good  $i$ . Note that  $q_i^C$  includes own consumption as well as goods purchased from the market.

It is then possible to simulate the impact on household income of price changes induced by structural reforms. In the short run we can assume that all quantities remain fixed so that:

$$\Delta Y = \left( \sum_j \Delta p_j^O q_j^O - \sum_k \Delta p_k^I q_k^I \right) + \sum_f \Delta w_f L_f + \sum_m \sum_n \Delta T_{mn} \quad (3)$$

Similarly the change in consumption assuming that quantities remain fixed is

$$\Delta C = \sum_i \Delta p_i^C q_i^C \quad (4)$$

<sup>42</sup> McCulloch (2003), "The Impact of Structural Reforms on Poverty: a simple methodology with extensions", World Bank Policy Research Working Paper 3124, The World Bank, August 2003.

It is possible to show that a first order approximation of the change in money metric utility resulting from a change in the price of a commodity can be given by<sup>43</sup>

$$\Delta MMU = \Delta Y - \Delta C \quad (5)$$

This makes intuitive sense: an increase (say) in the price of a good which is both produced and consumed will increase income and also increase the cost of achieving the original level of consumption. The difference between these is therefore an approximation to the welfare change.

Note that we can combine equations (1), (2), (3) and (4) to write equation (6):

where  $BS_j^O$  indicates the budget (or income) share of output revenue in total income,  $BS_j^I$  is the budget share of input costs,  $BS_j^W$  is the income share of net factor income from factor  $f$ , and  $BS_j^C$  is the budget share of good  $j$  in consumption. The first order percentage change in net income can approximate by the budget shares of income and expenditure on each item times the percentage changes in prices experienced.<sup>44</sup>

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<sup>43</sup> See Chen and Ravallion (2002) for an exposition of the theory.

<sup>44</sup> See Minot and Goletti (2000) appendix 2 for a full derivation.