The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
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1333

Implications of Price and Trade Policies of Rice On income and Poverty in Sri Lanka

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Abstract

This paper analyzes the income and poverty implications of price and trade policy distortions in rice using policy simulations. The results suggest that in general, the welfare of paddy farmers will get decline if both fertilizer subsidy and border protection are removed. However, among the paddy producers, poor households with smaller farm size (less than one acre) gain the benefits when both interventions are removed. Therefore, current protectionist policies in rice give fewer benefits to the small poor farmers. Meantime, the negative impacts get softened in the long run when supply and demand elasticities are incorporated. Especially the current fertilizer subsidy has a greater impact on paddy farmers' welfare. In contrast, the larger populations of consumers are favorably affected when interventions are removed. The larger proportion of benefits are received by the low income consumers, hence removal of such intervention in terms of tariffs and other taxes as well as fertilizer subsidy would be beneficial to the larger portion of consumers. In addition, simulations with transfer payments given to all households below the poverty line or paddy households only will reduce the negative implications on income and poverty of the households. The largest poverty reduction is reported for the estate sector consumers with poverty level reduce from 23 percent to 20 percent when both interventions are removed accompanying transfer given to all households below the poverty line. In addition, the overall poverty gap reduces from 5.38 to 4.12 by giving transfer payments only to all paddy households even though both interventions are removed. Finally, this study suggests that removal of distortions especially the elimination of trade protection will affect favorably for both consumers and poor small scale rice producers. Conversely, this will lead to some negative consequences on the national rice production in the country.

Keywords: rice, fertilizer subsidy, import tariff, poverty

Introduction

Paddy/rice plays a key role in the lives of poor as main consumption expenditure as well as a dominant livelihood in Sri Lanka like many other Asian countries in the world. Poverty is a dynamic issue which is not evenly distributed throughout the country and mainly concentrated in the rural areas where majority of people live. It is also believed to have a close relation with the main paddy producing regions in the country. Such dominance of poverty in rural areas and the importance of paddy sector as production and employment generation for poor people indicate a central role of dealing with poverty.

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The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1334

Many studies found that the growth and development of the agriculture sector has a strong impact on reducing poverty in the developing countries. In the meantime, contribution of trade to economic growth and resource efficiency has long been argued in FAO (The State of Food and Agriculture 2005). As recognized in the Rome Declaration and Plan of Action, trade is a key element for food security and also it permits the efficient transfer of food from surplus to deficit regions (Panitchpakdi, 2005). The government of Sri Lanka also seeks to enhance the food security in the country via self sufficiency by maintaining high border protection and granting subsidies to encourage the domestic production. Among the subsidies, fertilizer subsidy which accounts huge government budget plays a key role to reduce the cost of production of poor farmers. Although the policies are designed to generate higher income for paddy farmers' and alleviate poverty, achieving this target is still far behind the public expenditure incurred on the sector. In spite of protecting farming community, the larger segments of population who are net consumers of rice are adversely affected due to increase in rice prices and distortions introduced by such policies. Therefore, assessing the effects of recent trade and fertilizer subsidy policies of rice on income and poverty has growing interest in the agricultural policies in Sri Lanka.

Despite several attempts to study the poverty impacts of trade liberalization in whole agriculture sector, only few studies focus directly on poverty impact of eliminating distortions in the agriculture sector in Sri Lanka. Among them; Weerahewa (2004) and (2006), Jayanetti and Tilakaratna (2005), Seshan and Deininger (2006), Narampanawa, Bandara and Selvanathan (2011) and World Bank (2013) have emerged in the recent years. However, these studies too have not focused in detail on the income and poverty impacts of fertilizer subsidy and trade policy liberalization of rice.

The main objective of this paper therefore, is to conduct three main policy simulations in examining possible links between the current fertilizer and trade policy distortions on change in income and poverty of both paddy producing and non paddy producing households in Sri Lanka. The results of the simulations will help to address some of the policy issues such as: who benefits from the price and trade liberalization in rice sector and to what extent? What kind of effect is on the welfare of paddy farmers if the fertilizer subsidy removed? What will be the impact on poverty ratio and poverty gap? What role can targeted transfers play in reducing disparity between rich and poor and farmers and non farmers as a result of policy change?

In order to meet the above objectives and to address policy issues, the rest of this paper arranged as follows. Section two describes the methodology used in this chapter and Section three discusses the short run and long run effects of price and trade policy reforms using simulation results. The final section presents some policy recommendations and concluding remarks.

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1335

Methodology

Model

The methodology draws on the approach of Nicita, Olarreaga and Soloaga (2002) in their study of the impact of trade reform in Cambodia and the later used by McCulloch (2002).

As described by Nicita, Olarreaga and Soloaga (2002), income of a household is a sum of three components; own production, wage employment and net transfers. Income Y of household is given by:

$$Y = \left(\sum_j P_j^o q_j^o - \sum_k P_k^I q_k^I\right) + \sum_f w_f L_f + \sum_m \sum_n T_{mn} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where P_j^o is the price of output j; q_j^o is the quantity of output j; P_k^I is the input prices and q_k^I is the quantity of inputs. 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.

Short run consumption (C) of the household can be given by;

$$C = \sum_i P_i^C q_i^C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots\ldots.(2)$$

Where P_i^C is the buying price of good i and q_i^C is the quantity consumed of good i. q_i^C includes own consumption as well as goods purchased from the market.

Then we can simulate the impact on household income of price changes induced by structural reforms. Since we assume all quantities remain fixed in the short run, we can write the change in income as;

$$\Delta Y = \left(\sum_j \Delta P_j^o q_j^o - \sum_k \Delta P_k^I q_k^I\right) + \sum_f \Delta w_f L_f + \sum_m \sum_n \Delta T_{mn}\ldots\ldots\ldots\ldots\ldots\ldots.(3)$$

Similarly by assuming that quantities remains fixed in the short run the change in consumption can be written as:

$$\Delta C = \sum_i \Delta P_i^C q_i^C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots(4)$$

According to Chen and Ravallion (2002), first order approximation of the change in money metric utility resulting from a change in price of a commodity can be given by;

$$\Delta MMU = \Delta Y - \Delta C\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots (5)$$

From equations (1), (2), (3) and (4) we can write,

$$\frac{\Delta MMU}{Y} = \left(\sum_j BS_j^O \frac{\Delta P_j^O}{P_j^O} - \sum_k BS_k^I \frac{\Delta P_k^I}{P_k^I}\right) + \sum_f BS_f^W \frac{\Delta W_f}{W_f} + \frac{\sum_m \sum_n \Delta T_{mn}}{Y} - \sum_i BS_j^C \frac{\Delta P_j^C}{P_j^C} \ldots..(6)$$

Where BS_j^O indicates the budget or income share of the output revenue in total income, BS_k^I is the budget share of input costs, BS_f^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. Thus the first order percentage change in net income can approximated by the budget shares of income and expenditure on each item times the percentage change in prices experienced. Because the calculations are

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1336

limited to the household level impact of a single producer price (rice), on farm income, the product subscripts describe the rice only and impact of labor wage rate is assumed as fixed.

Therefore, in this study the short term welfare effect of changes in rice prices is given by

$$\frac{\Delta MMU}{Y} = \left(\sum_j BS_j^O \frac{\Delta P_j^O}{P_j^O} - \sum_k BS_k^I \frac{\Delta P_k^I}{P_k^I} \right) + \frac{\sum_m \sum_n \Delta T_{mn}}{Y} - \sum_i BS_j^C \frac{\Delta P_j^C}{P_j^C} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots(7)$$

The second order or long term welfare effect is calculated using,

$$\frac{\Delta MMU^2}{Y} = \left(\sum_j BS_j^O \frac{\Delta P_j^O}{P_j^O} + \frac{1}{2}\left(\frac{\Delta P_j^O}{P_j^O}\right)^2 BS_j^O \varepsilon_r^S - \sum_k BS_k^I \frac{\Delta P_k^I}{P_k^I} \right) + \frac{\sum_m \sum_n \Delta T_{mn}}{Y} - \sum_i BS_j^C \frac{\Delta P_j^C}{P_j^C} -$$

$$\frac{1}{2}\left(\frac{\Delta P_j^C}{P_j^C}\right)^2 BS_j^C \varepsilon_r^d \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(8)$$

ε_r^S = the own price elasticity of rice supply and

ε_r^d = the own price elasticity of rice demand

If the elasticities are set to zero, this expression collapses to the welfare measure popularized by Deaton (1989, 1997) and is commonly referred to as the Net Benefit Ratio (NBR). This is short term welfare measure that assumes no quantity or dynamic responses by consumers and producers.

Therefore, the impacts of price and trade policies affecting the rice production and consumption are determined by the relative importance of rice, in the expenditure and income of the households. If a particular household depends more on paddy as an income source, there will be very high losses due to removal of trade and price interventions. Similarly, if a particular household spends a considerable share of expenditure on rice, there will be very high gains due to elimination of distortions. Therefore, relative difference between income share and expenditure share indicates whether the particular household gains or losses. In this chapter the real income effect in both short term and long term (after incorporate the response from producers and consumers) to the price change as a result of removal of trade protection and fertilizer subsidy is estimated for rice.

Data

In this section, individual household data from Household Income and Expenditure Survey (HIES) 2012/13 is used to estimate the impact of price and trade policy distortions on real income and poverty. The values of BS_j^O and BS_j^C are based on the HIES 2012/13 and the BS_k^I based on input cost data obtained from cost of cultivation of agricultural crops (Department of Agriculture) for the 2012. Since only the aggregate input cost data for each household is available in HIES, disaggregate tradable input cost of an every single household is estimated using the national budget shares given in Table 1 hence estimate the BS_k^I for each household. The supply and demand elasticities are based on an econometric analysis of time

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1337

series data by Weerahewa[1] (2004). The price change of farm gate rice price, retail price of rice and change in price of inputs use in rice due to removal of distortions are also calculated.

Three policy simulations are conducted to estimate welfare change in the short run and long run.

Simulation 1: Removal of border tax of importing rice and tradable inputs used in paddy production (while maintain the fertilizer subsidy)

Simulation 2: Removal of fertilizer subsidy only (while maintain the border taxes of imports of rice and inputs used in paddy production)

Simulation 3: Removal of both (border tax and fertilizer subsidy)

In 2012, the government share of fertilizer subsidy is considered as 0.9 (ratio between farm gate price and market price of fertilizer in 2012). We assume that the government considers giving transfer payments (which is the expenditure savings that is resulting from the removal of fertilizer subsidy) to households: either to all households who below the poverty line or only to the paddy producing households. These two cases also included in the policy simulation two and three.

In addition, poverty ratio and poverty gap index are also calculated before and after the policy changes using below equations.

Poverty ratio=number poor people in the population/total population

The number of poor households is calculated using the official poverty line of Rs. 3,624 per person per month in 2012/13 (Department of Census and Statistics, 2012/13).

Poverty gap index is given by; $(PG) = \frac{1}{N} \sum_{i=1}^{q} \left(1 - \frac{X}{Z} \right)$

$i = 1$ if $X_i < Z$ and $i = 0$ if $X_i \geq Z$

Where, N-population, q-poor population, Z-poverty line and X_i-real per capita income.

Results and Discussion

General Characteristics of Paddy Farmers

From the total sample of 20,409 households which represents all 25 districts in the country, 2,509 (12 percent) households engage in paddy cultivation in 2012 as part time or full time farmers. The remains of 88 percent households obtain their income from other agricultural (non paddy crops, livestock etc), or non-agricultural activities (paid employment, mining, construction etc) and cash receipts and ad-hoc gains other than paddy cultivation. There are wide variations in income earns from paddy farming and expenditure incurs on rice consumption across different households categorized by districts, income groups and farm size

[1] Obtained from the Table 12 of Weerahewa (2004).

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1338

etc. The average per capita consumption of rice in Sri Lanka is 113 kg though it widely varies across different sectors. As can be seen from Table 2 paddy farmers' per capita monthly income is Sri Lankan Rupees (Rs.)[1] 11,174 (lower than national average of Rs. 11,819) of which only 11 percent obtain from paddy farming. Meanwhile, the average per capita monthly expenditure on all goods for paddy farmer is Rs. 9,051 of which Rs. 630 spend on rice (with imputed home grown rice consumption). Paddy farmers' average household expenditure on all goods total Rs. 36,586 is nearly 12 percent lower than national average (Rs. 41,444).

As observed in the Table 3, mean household income from rice cultivation is equivalent to 15 percent, and household's budget share of rice consumption is 11 percent. The highest rice income share of 16 percent is recorded in the rural sector and the estate sector receives the lowest income share from rice (three percent). At the sectoral level, urban and rural paddy farmers are net producers though estate sector is net consumers of rice.

Among the regions, the importance of rice in household income is highest in Northern Province (28 percent), Eastern Province (22 percent) and North Central Province (20 percent) while it lowest in the Western Province (three percent). Meanwhile, the budget share of rice consumption ranges from seven percent in Western province to 14 percent in Uva Province. As observed from Table 4, the difference between budget share of rice income and expenditure is negative in the Western, Central and Sabaragamuwa Provinces indicate that these provinces are net rice consumers.

Furthermore, as seen in the Table 5, poor paddy households depend twice larger on rice income than non poor households. Among the income deciles, income share of paddy for household who below the poverty line is 27 percent while richest farmers depends only six percent on rice income. Therefore, it is observed that, as a proportion of income, rice is the important income source for poor farmers. In addition, farmers in the lowest income group spend notably larger proportion of their income (around 30 percent) on consumption of rice and it is only two percent for the highest income paddy households. The gap is negative for the paddy farmers in the lowest income decile indicates that they are net rice consumers.

As is evident from Table 6, the majority of paddy farmers (54 percent) cultivate less than one acre of paddy lands and totally 73 percent of households cultivate less than two acres. It is also observed that households with larger farm size depends more on rice income relative to small farm households. Results further show households with less than one acre of paddy lands earn eight percent of their income from paddy while households with more than 10 acres of paddy lands derive 40 percent of income from paddy farming.

In addition, among the rice farmers 44 percent of rural households are net rice producers and overall, more than 75 percent of Sri Lankan households are net rice consumers who would get more benefits from lower rice prices.

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[1] Exchange rate of 1US$ = Sri Lankan Rupees. 127.60 (in 2012)

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1339

On an average, budget share of tradable inputs including machinery, fertilizer, weedicide and pesticide are 5.29 percent, 0.46 percent, 1.14 percent and 0.46 percent respectively.

Poverty Ratio

As is evident from Table 7, poverty is predominantly an estate sector phenomenon in Sri Lanka while lowest poverty is recorded in the urban sector. However, when consider among the paddy households, poverty is mainly observed in the rural sector and it is nearly the two folds of urban poverty (8.85 percent). On an average, paddy farmers' poverty ratio is larger than the national figures.

Among the provinces, Northern, Eastern and Uva province show the high incidence of poverty. In general it is observed that, poverty level is high in the regions where majority of paddy farmers reside.

Poverty Gap Index

Poverty gap index is an indication to measure the depth of poverty based on aggregate poverty shortfall of the poor relative to the poverty line. As can be seen from Table 8, the national poverty gap index in Sri Lanka is 5.38 percent in 2012/13 and the highest poverty gap is observed in the rural sector (4.03 percent).

Effects of Price and Trade and Policies: Simulation Results

Short Run and Long Run Impacts on Households' Income and Welfare

Three simulations were conducted to identify the direction and magnitude of short run and long run impacts of removal of distortions on households' income and poverty. The welfare change of a particular household due to drop in farm gate rice prices or, change in input costs and retail prices, can be determined by considering the net effect of reduction in net paddy income (change in paddy output value – change in cost of tradable inputs) and savings (change in rice consumption) as a result of removing distortions.

The simulation results indicate that welfare change of different simulation scenarios are varied widely between regions, farm size and income categories both in the short and long runs.

Simulation 1: Remove Border Protection only

Removing the border protection would cause a decline in the farm gate rice price by 6.9 percent and decrease in tradable input cost by seven percent in 2012. Therefore, net paddy income decrease by 1.60 percent in the short run and 1.64 percent in the long run. However, since government fixed the fertilizer price at Rs. seven per kg with whatever the imported fertilizer price, exclusion of border protection does not affect the farm gate price of fertilizer. Therefore, only the other tradable input cost (machinery, weedicide, pesticide) and producer price would change. In addition, removal of border protection results in consumer rice price decrease by 35.6 percent, which cause drop of rice consumption expenditure by 3.84 percent in the short run and 4.46 percent in the long run. Moreover, this would increase welfare for paddy producers by 2.24 percent and 2.82 percent respectively in the short run and long run. In addition, non rice farmers' welfare increases by 3.66 percent in the long run (Table 9).

The results suggest that removal of border protection has larger impact on consumption expenditure savings than on the net output value change. Therefore, paddy producers in rural sector who depend largely on rice consumption, would receive the largest welfare gain with the removal of border protection while considering for all consumers (including paddy famers), estate sector gain the most (Table 10).

Further, the simulation results indicate that the welfare is declined with the farm size increases. The change in welfare is positive for the households with small paddy lands while welfare loss for the households who cultivate more than 10 acres of paddy lands in the long run when border protection is removed (Table 11). This is due to income share of paddy is significantly large for the larger paddy holdings and they receive huge losses when border protection remove, though for the smaller paddy holdings their income loss is compensated by the savings in consumption expenditure due to drop in rice prices.

In addition, poor households including poor paddy producers receive larger welfare gain as a result of removal of border protection while rich households receive smaller gain (Table 12). Hence removal of distortions due to border protection is important for the poor household categories. Meanwhile, paddy producers in Central and Uva provinces incur the largest welfare increase and if all consumers (including paddy households) take in to account, Eastern and Uva province incur the highest benefits with the removal of border protection (Table 13).

Simulation 2: Remove Fertilizer Subsidy only

Removing fertilizer subsidy of 90 percent while continuing the border protection would increase the farm gate price of fertilizer by 900 percent and total tradable input cost by 54 percent. This would reduce the welfare by 4.1 percent (the highest welfare loss among the three simulations) for the rice producers. However, there is inequality in welfare loss among the regions, income groups and farm size with the removal of subsidy as a result of its relative importance among the different categories. As seen in the long run results of Table 11, welfare

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1341

reduce in all categories of farm size with the marked reduction for farmers of large paddy holdings. For smaller farm households would have small negative effect on welfare.

As can be observed in the Table 14, poor paddy producers in the lower income categories suffer larger losses with the removal of fertilizer subsidy because this category depends largely on rice income. With the subsidy cut their cost of production increase significantly. This results in net income loss for poor farmers than non poor farmers. Conversely, results further show that in general, removal of fertilizer subsidy would have a relatively small negative effect for poor paddy farmers with small farm size, than the poor farmers who cultivate large farm size. Moreover, among the provinces, paddy households in Northern, Eastern and North Central (where major paddy production comes and households depend largely on paddy income) incur larger welfare losses (Table 15).

Complete removal of fertilizer subsidy might eventually cause adverse impact not only on the paddy farmers' net income but also on the countries' paddy production and self sufficiency in rice.

Simulation 3: Remove Border Protection and Fertilizer subsidy

This would cause a reduction of farm gate paddy price and rice price by 6.9 percent and 35.6 percent respectively while total input cost increase by 44 percent. The main contributing factor is the increase in cost of production as a result of high fertilizer price. Simulation 3 revealed that it would cause relatively larger net paddy income loss (5.5 percent in the long run) for paddy producers than the rice expenditure savings (4.5 percent in the long run) in 2012. Hence, net impact is the drop of paddy farmers' welfare by 1.6 percent and one percent respectively in the short run and long run. In contrast, non rice farmers (consumers) would benefit as a result of drop in purchasing price of rice.

Further, the simulation tends to reduce welfare in the urban and rural rice producers, while, welfare increase for rice farmers in the estate sector (Table 16). The main reason for this difference is the estate sector farmers are net consumers of rice who depend largely on non paddy income rather than paddy income. It further reveals that, welfare gain for consumers belong to all the sectors in 2012 due to drop of purchasing rice price. Results further suggest that the negative welfare effect of the paddy producers' will get mild in the long run if incorporate the larger producer and consumer elasticites.

In addition, elimination of distortions in the rice sector would result in the farmers in the lowest income group suffer larger income losses (14 percent both in the short run and long run) relative to the consumption expenditure savings (11 percent and 13 percent in short run and long run respectively). Therefore we can see in general, farmers below the poverty line suffer larger welfare losses than the non poor farmers in the short run (Table 16). In contrast long run effect of simulation 3 result in small welfare loss for the poor farmers than the non poor farmers. Meanwhile, removal of distortions benefited all the consumers, particularly consumers belonging to low income groups gain the larger portion of benefits. As seen in the Figure 1, the main adverse effect is received by non poor farmers with large farm size. Further,

it is observed that poor farmers with less than one acre of paddy lands incur welfare gain while their negative loss increases when they cultivate large farm size.

Simulations with Transfer Payments

Removing the fertilizer subsidy rate of 90 percent, cut the public expenditure incurs on fertilizer imports. The government can use this savings as transfer payments to reduce the negative welfare incur on paddy households and low income households which result from removal of distortions. Therefore, this section is focused on analyzing the results of simulation scenarios of 2 and 3 with transfer payments granted to the households. It can be assumed that savings due to removal of subsidy can be transferred either to all the households below the poverty line or only to all the paddy producing households. First, it is assumed that the expenditure savings is transferred directly to all households who are below the poverty line in equal amount (Rs. 853.11). Otherwise government can transfer the amount only to the paddy producing households (Rs. 1,063 per farmer) if the government purpose is to increase the welfare of only the paddy farmers in order to reduce their income disparity.

As can be seen from Table 17, the long run results of simulation 2 with transfer revealed welfare gain for poor households' compared to the without transfers. It further shows marked increase in welfare of all consumers if transfer payment is given to households below poverty line. In addition, if the transfer made only to the paddy producers, poor farmers' welfare increases by 3.4 percent while non poor farmers too receive moderately high benefits.

The simulation 3 with transfer to households below poverty line revealed significant welfare gain for all poor households in the long run. Moreover, if the transfer is made only to the paddy households, both poor and non poor groups receive welfare gain.

Impacts of Price and Trade Policy Liberalizations on Poverty

Poverty Ratio

In this section, simulation impacts on the base line poverty head count index (Rs. 3,624/person/month) and poverty gap index are estimated.

As can be seen from the Table 18 and 19, on an average poverty ratios would rise slightly for paddy farmers in all simulations without transfer. When compared the poverty ratio by sectors, poverty decline for the paddy households in the urban sector with the removal of distortions. However, poverty ratio increased slightly for the rural paddy farmers. This is because that negative effect on rice income is more prominent for rural farmers as they depend largely on rice income compared to the urban sector farmers. Moreover, total households get the benefits of low rice price hence their poverty ratios slightly get lowered. The largest poverty reduction for rural households (including paddy farmers) is observed when the transfer payment is made only to the all paddy household under simulation 3. However, the highest poverty reduction for the rural farmers' is reported with simulation 2 if the transfer payment

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1343

given only to the paddy farmers. Besides, the small group of paddy producers in the estate sector does not affect and their poverty ratio remains the same in all the cases.

As presented in Figure 2, average poverty ratios decrease slightly for all consumers including paddy producers, in all cases except simulation 2 without transfer scenario. This confirms the importance of fertilizer subsidy in the rice sector in the country than the impact of trade policy. In addition, the largest poverty reduction is observed for the estate sector consumers with poverty reduction from 23 percent to 19.5 percent by giving transfer payment to all paddy households even though both distortions are eliminated. Therefore, it is observed that consumers belong to estate sector are the strongly vulnerable group to increase in rice prices. In addition, in the short run, consumers in the rural sector get the substantial poverty reduction if both interventions are removed with transfer payments given to paddy households below the poverty line. However, in the long run the largest poverty reduction for rural consumers is observed with the transfer given to all paddy households if both interventions are removed. Further, the results revealed that the long run poverty ratios are relatively smaller than the poverty ratios in the short run though the difference is small as a result of relatively inelastic demand and supply of rice.

The policy changes without transfers would adversely affects farmers in general, particularly in the regions where large contribution is made to the national economy while households of net rice consumers benefited.

Poverty Gap Index

As seen from the Table 20, The highest poverty reduction can be seen in the rural sector which declined from 4.03 to 3.11 in the simulation 3 with transfer given to paddy households. The overall poverty gap has declined from 5.38 to 4.32 if transfer payments are given to the households below the poverty line when both interventions are removed. This further reduced to 4.12 if payments given only to paddy households. In all the simulations, poverty gap index values are relatively small in the long run compared to the short run when elasticities are incorporated.

Conclusions and Policy Implications

This chapter examines impacts of liberalization of price and trade policy interventions in rice sector in terms of income and poverty. The analysis of general characteristics of paddy farmers' show that, out of total sample 12 percent of households engage in paddy cultivation in 2012 and they obtain 15 percent of their income from rice cultivation. The majority of paddy farmers in the country are rural small scale poor households. In addition, the importance of rice in household income is highest in Northern (28 percent), Eastern (22 percent) and North Central (20 percent) provinces where the highest contribution of national production comes while it lowest in the Western Province (three percent).

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1344

The simulation results show that the welfare of paddy farmers' has declined if the current levels of price and trade interventions are removed. Especially the fertilizer subsidy has considerable impact on paddy farmers' welfare than the import trade protection policy. In contrast, all consumers who are non rice farmers would favorably gain from the price and trade policy liberalization. Moreover, the analysis gives an impression that in general, the majority of paddy producers in the rural sector are adversely affected if the interventions are removed, hence the policy should be implemented very vigilantly. However, poor paddy producers who cultivate smaller farms are benefited when both distortions eliminate while large scale farmers are negatively affected because they receive larger income losses especially due to removal of fertilizer subsidy. Nevertheless, the impacts change significantly with the transfer payments granted to households. As example, if transfer payment is given to all poor households who below the poverty line, their welfare increases drastically compared the simulations without transfer cases. If the transfer payments are given only to all paddy households, poor farmers' welfare increases by 3.4 percent while non poor farmers also receive moderate benefits. Besides, larger proportions of consumers and poor small farm households favorably affect due to removal of distortions. Moreover, results of simulations with transfer payments result in highest poverty reduction for the estate sector consumers and rural sector producers. Therefore, overall this study suggest that the exclusion of current level of incentives given to rice sector will favorably affect to the majority of consumers thought it hurt to some rice producers.

Since removal of current incentives in rice sector cause decrease in producer price of rice which would have negative consequences on paddy farmers' net income as well as spread the poverty among the farmers, liberalization policies should carefully be implemented. In addition, drop in producer price of rice will lead inefficient high cost farmers who cannot survive to leave the rice farming. As majority of rice producers in the country are small scale poor farmers it will have undesirable impacts on their welfare as well as on the national economy. Therefore, it needs to make policy measures such as reduce cost of production and increase yield in order to increase the efficiency of small scale farming, while encourage poor inefficient farmers to easily switch from rice to high value commercial crops. It is also necessary to absorb the unemployed laborers who leave their jobs to other sectors because they cannot survive as incentives removed in the rice sector. So, creating new job opportunities in the fast growing service and industrial sectors are necessary. Meanwhile, it is better to provide them the good quality training before they join to the new sectors because most of them are rural unskilled workers who do not have proper knowledge. Besides, it is necessary to set up new technologies to produce high quality specific rice varieties and use organic fertilizer in rice cultivation because such varieties have high demand at present. Meantime, in order to encourage diversification in food crop sector it is required to amend the legal structure in the country regarding paddy lands currently which is not allowed converting the paddy lands to non paddy lands.

Results further shows that incorporating high elasticities for supply and demand will enhance the welfare of households. Therefore, it is important to increase the demand and supply elasticities of rice. If there are more close substitutes with rice it is easy to switch between

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1345

products that will enhance the elasticity of demand. Also, cost of switching between products should be minimized. Therefore, cultivate more organic rice and traditional rice varieties which have high demand are important. In addition, in Sri Lanka still we do not produce large number of value added products using rice. Consequently, growing specific rice varieties and increasing the number of value added products in rice will help to enhance farmer income and reduce poverty. Further, availability of substitutes leads factors of production to more easily transfer between crops. Supply will be inelastic with high production cost. Therefore, reduction of production cost will be benefited and also will increase the supply elasticity. In addition, if productions can quickly response to the price changes, such crop can be easily adjusted to the market supply. Hence, using new technology and investing in rice research to produce short term varieties will lead to obtain higher income and welfare increase for farmers. As suggest from the results, removal of incentives may increase the poverty among the rural paddy producers. Hence, the use of targeted transfer payments will reduce the income disparity as well as that would easy to reimburse the income loss of the rice producers. Therefore, implementing such policies would have favorable impacts on paddy households.

Although, this study assumed full price transmission from border to local markets, extent of price transmission can vary widely and poor infrastructures as well as high transaction cost unfavorably influence rural consumers. In addition, simulations do not take consider the effects of low farm gate prices due to removal of interventions on the demand for labor and wage rates which would affect households' net income. Since rice farming is still labor intensive in Sri Lanka, reduction of farm gate rice price would adversely affect the labor wages. This would further increase the poverty among paddy farmers while their welfare affect negatively. However, in Sri Lanka family labor accounts more than 50% in most districts. Therefore, the effect of rice prices on income via wage rates is considered to be smaller in the model. Further, in this model, wage rate is considered as exogenous because wage rate is considered to be determined by the supply and demand in nonfarm sector. However, if wage rate is included in the model the adverse impact will get rather worse than the current results.

Table 1   Cost Share of Tradable Inputs Use in Paddy Cultivation, 2012

Tradable Inputs	Average Cost Share
Machinery	26.37
Fertilizer	2.15
Weedicide	5.15
Pesticide	1.87

Source: Cost of Cultivations, Department of Agriculture

Note: Exchange rate of 1US$ = Sri Lankan Rupees. 127.60 (in 2012)

Table 2   Per capita Rice Income and Consumption of Paddy Farming Households by Sector

Sector	Per capita Monthly Income				Per capita Monthly Expenditure		
	No.	Net Paddy Income (Rs.)	Total (Rs.)	Income Share of Rice	Rice (Rs.)	Total (Rs.)	Expenditure Share on Rice cons.
Urban	105	1,280	21,482	6.0	551	13,041	4.2
Rural	2,376	1,191	10,692	11.1	634	9,051	7.0
Estate	28	411	13,446	3.1	556	14,101	3.9
Total	2,509	1,186	11,174	10.6	630	9,051	7.0

Source: Author's Calculations from HIES 2012/13, Department of Census and Statistics

Note: Exchange Rate 1US$=Rs. 126.60 (in 2012)

Table 3   Budget Share of Net Rice Income and Consumption of Paddy Farming Households by Sector

Sector	No.	BS of Net Paddy Income	BS of Rice Expenditure	(BS of Net Income) - (BS of Expenditure)
Urban	105	13.08	6.78	6.30
Rural	2,376	15.50	11.02	4.48
Estate	28	3.26	5.92	-2.66
Total	2,509	15.26	10.78	4.48

Source: Author's calculations from HIES 2012/13, Department of Census and Statistics

Note: 'BS' is budget share

Table 4   Share of Net Rice Income and Consumption of Paddy Farming Households by Province

Province	No.	BS of Net Paddy Income	BS of Rice Expenditure	(BS of Net Income) – (BS of Expenditure)
Western	199	2.90	7.02	-4.12
Central	219	8.91	12.64	-3.73
Southern	348	11.85	9.04	2.81
Northern	228	28.43	11.66	16.77
Eastern	234	22.12	11.28	10.84
North Western	325	11.23	10.07	1.16
North Central	553	20.15	11.06	9.09
Uva	301	15.37	13.77	1.61
Sabaragamuwa	102	5.51	8.95	-3.43

Source: Author's calculations from HIES 2012/13, Department of Census and Statistics

Note: 'BS' is budget share

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1347

Table 5 : Share of Net Rice Income and Consumption of Paddy Farming Households by
Poverty Status and Income Group

Household category	Status	No.	BS of Net Paddy Income	BS of Rice Expenditure	(BS of Net Income) - (BS of expenditure)
Poverty status	Poor	409	26.79	26.60	0.19
	Non poor	2,100	13.02	7.70	5.32
Income deciles	<10,836	254	29.69	30.51	-0.82
	10,836-<=16,531	248	21.51	17.46	4.05
	16,532-<=21,286	258	18.95	12.54	6.40
	21,287-<=25,903	249	15.67	10.37	5.30
	25,904-<=30,814	255	13.85	9.65	4.19
	30,815-<=36,758	263	13.56	7.76	5.81
	36,759-<=45,000	263	12.84	6.77	6.08
	45,001-<=57,495	242	10.61	5.58	5.03
	57,496-<=83,815	244	8.57	4.14	4.43
	>83,815	233	6.41	2.21	4.20

Source: Author's calculations from HIES 2012/13, Department of Census and Statistics
Note: 'BS' is budget share and Exchange Rate of 1US$ = Rs. 127.60 (in 2012)

Table 6   Share of Net Rice Income and Consumption of Paddy Farming Households by
Farm Size

Farm size (acres)	No.	BS of Net Paddy Income	BS of Rice Expenditure	(BS of Net Income) – (BS of expenditure)
<= 1	1,349	8.24	11.11	-2.87
>1-<=2	494	16.74	10.62	6.12
>2-<=3	284	27.20	10.70	16.49
>3-<=4	116	29.73	10.36	19.37
>4-<=5	136	28.73	11.02	17.72
>5-<=10	104	26.75	6.62	20.13
>10	26	40.10	8.76	31.34

Source: Author's calculations from HIES 2012/13, Department of Census and Statistics
Note: 'BS' is budget share

Table 7   Baseline Poverty Ratios by Sector in 2012/13

Household Category	Baseline Poverty Ratio	
	Rice Farmers	Total Sample
Average	**16.30**	**15.32**
Urban	8.57	8.85
Rural	16.79	16.73
Estate	3.57	23.00

Source: Author's calculations from HIES 2012/13, Department of Census and Statistics

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1348

Table 8   Poverty Gap Index by Sector

Sector	Poverty Gap Index (%)
Urban	0.70
Rural	4.03
Estate	0.65
Sri Lanka	5.38

Source: Author's calculations from HIES 2012/13, Department of Census and Statistics

Table 9   Impacts of Removing Border Protection on Rice and Non-rice Farmers (without transfer)

Simulation Scenario	Household Category	Change in welfare	
		Short run	Long run
Simulation 1	Rice farmers	2.24	2.82
	Non rice farmers	3.15	3.66
	Average	3.04	3.55
Simulation 2	Rice farmers	-4.10	-4.10
	Non rice farmers	0.00	0.00
	Average	-0.50	-0.50
Simulation 3	Rice farmers	-1.64	-1.06
	Non rice farmers	3.15	3.66
	Average	2.56	3.08

Source: Author's calculations

Table 10 Simulations Results on Household Welfare in the Long Run by Sector

Household Category	Simulation 1		Simulation 2		Simulation 3	
	Paddy Producers	Total Households	Paddy Producers	Total Households	Paddy Producers	Total Households
Urban	1.33	2.53	-4.03	-0.08	-2.49	2.45
Rural	2.89	3.73	-4.14	-0.73	-1.02	3.04
Estate	2.06	5.12	-1.18	-0.02	0.94	5.10
Total	2.82	3.55	**-4.10**	**-0.50**	**-1.06**	**3.08**

Source: Author's calculations

Table 11: Simulations Results in the Long Run by Farm Size

Farm Size	Simulation 1	Simulation 2	Simulation 3
<= 1acre	3.78	-1.71	2.16
>1-<=2	2.68	-3.85	-0.97
>2-<=3	1.49	-7.37	-5.48
>3-<=4	0.96	-8.88	-7.44
>4-<=5	1.19	-9.76	-8.05
>5-<=10	0.09	-11.93	-11.20
>10	-2.07	-14.40	-15.70

Source: Author's calculations

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1349

Table 12 Impacts of Remove Border Protection by Poverty Status and Income Category

Household Category		Welfare Change			
		Short run		Long run	
		Paddy Producers	Total Households	Paddy Producers	Total Households
Poverty status	Poor	6.44	8.30	7.88	9.70
	Non poor	1.42	2.08	1.83	2.44
Income deciles	<10,836	7.31	9.33	8.97	10.89
	10,836-<=16,531	4.00	4.43	4.95	5.18
	16,532-<=21,286	2.54	3.44	3.21	4.04
	21,287-<=25,903	2.12	2.94	2.68	3.44
	25,904-<=30,814	1.96	2.59	2.47	3.03
	30,815-<=36,758	1.43	2.18	1.85	2.56
	36,759-<=45,000	1.10	1.85	1.45	2.17
	45,001-<=57,495	0.95	1.53	1.25	1.80
	57,496-<=83,815	0.64	1.15	0.86	1.35
	>83,815	0.17	0.61	0.28	0.71

Source: Author's calculations

Note: Income categories are based on the income figures of the Department of Census and
Statistics (values are in Sri Lankan Rupees)Exchange Rate of 1US$ = Rs. 127.60 (in
2012)

Table 13 Impacts of Removing Border Protection by Province

Province	Welfare Change			
	Short run		Long run	
	Paddy Producers	Total Households	Paddy Producers	Total Households
Western	2.19	2.02	2.59	2.35
Central	3.61	3.47	4.32	4.05
Southern	1.99	2.75	2.48	3.21
Northern	1.11	3.19	1.70	3.76
Eastern	1.64	4.37	2.22	5.12
North Western	2.50	3.17	3.05	3.72
North Central	1.69	2.54	2.26	3.08
Uva	3.49	4.49	4.25	5.27
Sabaragamuwa	2.63	3.68	3.13	4.28

Source: Author's calculations

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1350

Table 14 Impacts of Removing Fertilizer Subsidy on Poverty Status and Income Categories

Household Category		Welfare Change	
		Paddy Producers	Total Households
Poverty status	Poor	-8.95	-1.17
	Non Poor	-3.15	-0.38
Income deciles	<10,836	-11.33	-1.36
	10,836-<=16,531	-5.48	-0.66
	16,532-<=21,286	-4.68	-0.58
	21,287-<=25,903	-3.69	-0.44
	25,904-<=30,814	-3.94	-0.50
	30,815-<=36,758	-2.94	-0.39
	36,759-<=45,000	-3.21	-0.42
	45,001-<=57,495	-2.27	-0.28
	57,496-<=83,815	-1.82	-0.22
	>83,815	-1.31	-0.15

Source: Author's calculations

Note: Income categories are based on the income figures of the Department of Census and Statistics (values are in Sri Lankan Rupees) Exchange Rate of 1US$ = Rs. 127.60 (in 2012)

Table 15 Impacts of Removing Fertilizer Subsidy by Province

Province	Change in Welfare	
	Paddy Farmers	Total Households
Western	-0.80	-0.03
Central	-2.04	-0.19
Southern	-3.07	-0.34
Northern	-8.13	-1.03
Eastern	-6.44	-0.78
North Western	-2.31	-0.42
North Central	-6.45	-2.82
Uva	-2.64	-0.62
Sabaragamuwa	-1.29	-0.09

Source: Author's calculations

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1351

Table 16 Impacts of Removing Border Protection and Fertilizer Subsidy by Poverty Status
and Income Category

Household Category		Welfare change			
		Short run		Long run	
		Paddy Producers	Total Households	Paddy Producers	Total Households
Poverty status	Poor	-2.03	7.19	-0.59	8.59
	Non poor	-1.56	1.72	-1.15	2.08
Income deciles	<10,836	-3.41	8.04	-1.76	9.61
	10,836-<=16,531	-1.19	3.81	-0.24	4.56
	16,532-<=21,286	-1.89	2.89	-1.22	3.48
	21,287-<=25,903	-1.37	2.52	-0.81	3.02
	25,904-<=30,814	-1.77	2.11	-1.25	2.56
	30,815-<=36,758	-1.35	1.82	-0.94	2.20
	36,759-<=45,000	-1.94	1.45	-1.59	1.78
	45,001-<=57,495	-1.19	1.27	-0.90	1.54
	57,496-<=83,815	-1.08	0.95	-0.86	1.15
	>83,815	-1.07	0.46	-0.96	0.57

Source: Author's calculations

Note: Income categories are based on the income figures of the Department of Census and
Statistics (values are in Sri Lankan Rupees) Exchange Rate of 1US$ = Rs. 127.60
(in 2012)

Table 17 Long Run Impacts of Simulations with Transfer Payments

Poverty Status	Simulation 2		Simulation 3	
	Paddy producers	Total Households	Paddy Producers	Total Households
Transfer payment only to the households below the poverty line				
Poor	0.96	11.88	9.32	21.71
Non poor	-3.15	-0.38	-1.15	2.08
Transfer payments only to all paddy households				
Poor	3.39	0.44	11.76	10.21
Non poor	0.28	0.03	2.29	2.50

Source: Author's calculations

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1352

Table 18 Impact of Different Simulations Scenarios on Poverty Level (Short run)

Household Category	Baseline	Simulation 1	Simulation 2			Simulation 3		
			WOT	WT1	WT2	WOT	WT1	WT2
Rice farmers	**16.30**	**16.38**	**16.70**	**14.95**	**14.43**	**16.70**	**16.50**	**14.35**
Urban	8.57	7.62	7.62	6.67	6.67	7.62	6.67	6.67
Rural	16.79	16.92	17.26	15.45	14.90	17.26	15.11	14.81
Estate	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57
Total sample	**15.32**	**15.15**	**15.41**	**13.82**	**15.14**	**15.18**	**14.91**	**14.90**
Urban	8.85	8.73	8.87	7.95	8.85	8.73	7.76	8.71
Rural	16.73	16.58	16.87	15.14	16.46	16.64	14.78	16.21
Estate	23.00	22.46	22.95	20.45	22.95	22.46	20.07	22.46

Source: Author's calculations

Note: WOT- without transfer, WT1-trasfer to households below the poverty line, WT2-transfer only to all paddy producers

Table 19 Impact of Different Simulations Scenarios on Poverty Level (Long run)

Household Category	Simulation 1	Simulation 2			Simulation 3		
		WOT	WT1	WT2	WOT	WT1	WT2
Rice farmers	**16.30**	**16.70**	**14.95**	**13.95**	**16.66**	**14.63**	**14.31**
Urban	7.62	7.62	6.67	6.67	7.62	6.67	6.67
Rural	16.84	17.26	15.45	14.39	17.21	15.11	14.77
Estate	3.57	3.57	3.57	3.57	3.57	3.57	3.57
Total sample	**15.11**	**15.37**	**13.75**	**15.03**	**15.15**	**13.47**	**13.07**
Urban	8.73	8.83	7.91	8.81	8.73	7.76	7.56
Rural	16.54	16.81	15.05	16.30	16.61	14.76	14.30
Estate	22.35	23.00	20.45	23.00	22.35	20.01	19.47

Source: Author's calculations

Note: WOT- without transfer, WT1-trasfer to households below the poverty line,WT2-transfer only to all paddy producers

Table 20 Impact of Different Simulations on Poverty Gap Index by Sector (Long run)

Sector	Simulation 1	Simulation 2			Simulation 3		
		PGWOT	PGWT1	PGWT2	PGWOT	PGWT1	PGWT2
Urban	0.67	0.70	0.58	0.70	0.67	0.55	0.53
Rural	3.88	4.06	3.39	3.90	3.91	3.26	3.11
Estate	0.62	0.66	0.55	0.66	0.62	0.51	0.48
Sri Lanka	**5.17**	**5.42**	**4.52**	**5.25**	**5.20**	**4.32**	**4.12**

Source: Author's calculations

Note: PGWOT-poverty gap without transfer

PGWT1-poverty gap with transfer payments to households below poverty line

PGW2-poverty gap with transfer payments only to all paddy households

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
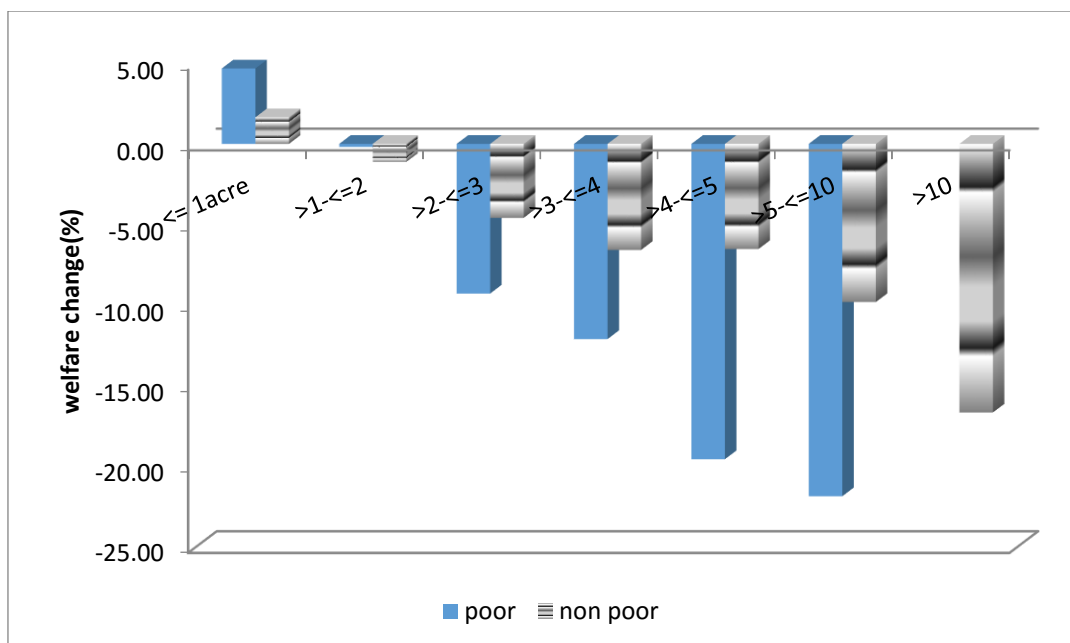11-13 January 2017 Bangkok, Thailand

1353

Figure 1   Welfare Change for Paddy Farmers by Poverty and Farm Size

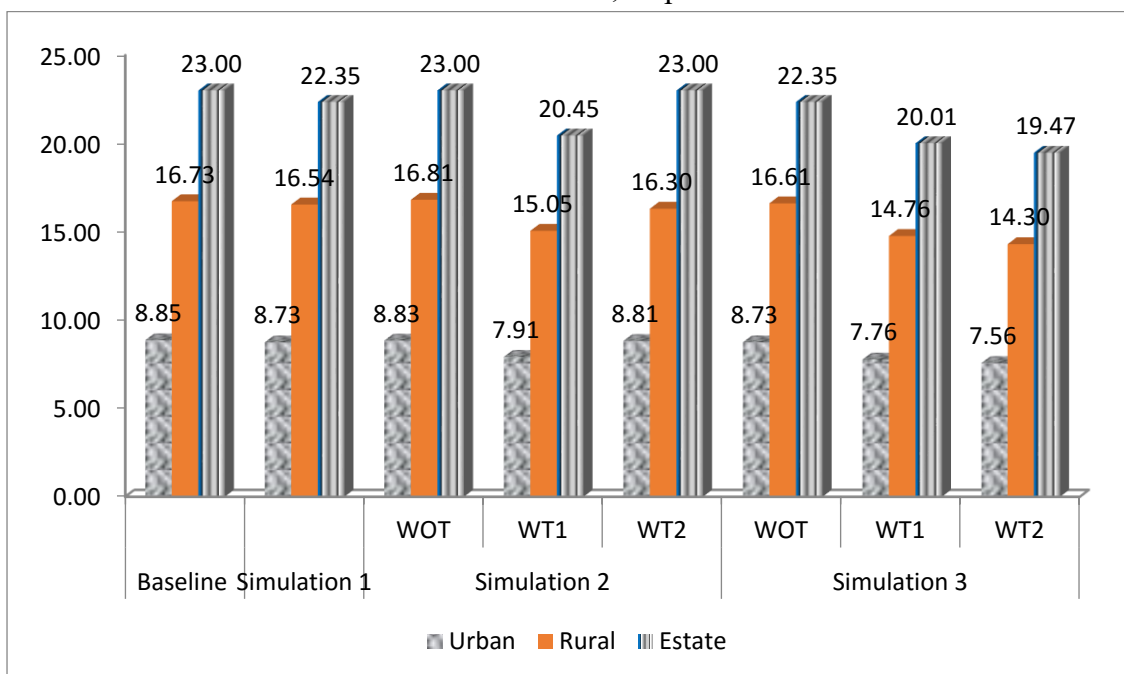Source: Author's calculations from HIES 2012/13, Department of Census and Statistics

Figure 2: Changes in Poverty Head Count Index for All Households in Sri Lanka by Sector
(Long run)

Source: Author's calculations

Note: WOT- without transfer, WT1-trasfer to households below the poverty line, WT2-
transfer only to all paddy producers

The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1354

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The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia
11-13 January 2017 Bangkok, Thailand

1355

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