Impact of Trade Policies on Sri Lankan Households' Food Consumption: A CGE Model Approach

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ABSTRACT

This study was carried out with the objectives of modeling and simulating the impacts of such policies on household food consumption in a Computable General Equilibrium (CGE) modelling framework. In examination of the impact of key policy tools hitherto employed by the government of Sri Lanka by CGE analysis reveals that there is a distributional issue of the negative impacts of these policy changes on rural and urban food consumption. The results reveal that import duties affects the rural sector more than the urban sector. Both sectors increase consumption when export duties are present for food products and vice versa. However, import duties are more severely felt in the urban than the rural sector.

KEYWORDS: CGE model, Food consumption, SAM, Trade policies

Introduction

Half of the incomes of the poor is spent on food consumption (Jayasuriya et al., 2013). An average Sri Lankan spends more than 33.2% of the income and 37.6% of total expenditure on purchasing food and drinks in a monthly basis (Department of Census and Statistics, 2015). However, almost half of the population (*i.e.* 50.7%) remains below the minimum level of energy consumption per day and the consumption patterns reflect the less affordability of some food items such as fruits, meat, poultry, fish, dry fish and dairy products (Rajapakse et al., 2011).

One major reason for food becoming less affordable is rising prices. High and volatile food prices are expected to be continued into a foreseeable future (Jayasuriya et al., 2013) and poses a threat to food security. Therefore, reasons for food price increase and its impact on poverty (Ivanic and Martin, 2008; De Janvry and Sadoulet, 2010) and food security (Korale-Gedara et al., 2012; Nirmali and Edirisinghe, 2012) has been an area of interest in recent past.

Understanding this impact of prices on consumption and its effect, the Sri Lankan government has implemented short term policies from time to time for the benefit of both the producers and consumers. These amount to price ceilings, floor prices, sales taxes, export taxes / cess and import duties.

There is no literature on how these policy shocks translate into the level of food consumption at rural and urban level and therefore, this research attempts to fill this gap.

We modeled the impact of such trade policies on household food consumption in a Computable General Equilibrium (CGE) modelling framework. CGE model was used because it provides platform to address a broad range of policy issues in a single framework and allows to evaluate distributive effects of those policies within the economy at different levels of disaggregation through inter-industry or multi-sector interlinkages. Further, CGE analysis, in comparison to other available techniques, possesses the ability to capture a wider set of economic impacts derived from a shock or the implementation of a specific policy reform (Inter-American Development Bank, 2014). Especially, it is useful when the expected effects of policy implementation are complex and materialize through different transmission channels. It has the dual advantage of being consistent with standard economic theory while allowing one to measure the effect(s) of a specific policy with real data (André and Cardenete, 2009a), and can be used in two ways: as a single-period model suitable for comparative-static analyses, and as a model for multi-period forecasting (Dixon and Parmenter, 1996). Further, it possesses the ability to measure the ultimate impact of a policy on aggregate welfare in a theoretically consistent way by quantifying the change in the income and consumption of the representative agent that results from the interactions and feedbacks among all the markets in the economy (Wing, 2004).

Methodology

Model Construction

The fundamental conceptual starting point for a CGE model is the circular flow of commodities in a closed economy (see, Figure 1). The main sectors in that circular flow are households and firms. Households are the owners of the factors of production and are the final consumers of produced commodities where firms rent the factors of production from the households for producing goods and services that the households then consume. In addition, government is also a major element although its role in the circular flow is often passive, i.e. to collect taxes and disburse these revenues to firms and households as subsidies and lump-sum transfers, subject to rules of budgetary balance that are specified by the analyst. The relationships between these main sectors are considered to be following major accounting rules that are the cornerstones of Walrasian General Equilibrium: market clearance, zero profit and income balance (Polaski, 2008).

The Social Accounting Matrix (SAM), which is the input of CGE model, describes input-output usage, factor market balance, income distribution, investment-saving balance, payments and receipts of taxes and transfers etc. (Hosoe, 2004). Typically, the structure of SAM contains six types of accounts: Goods and services (commodities); Production activities; Factors of production; Institution (divided into households, firms and government); Capital account, and Rest of the world (Wijerathna and Karunagoda, 2007). The SAM framework used in this analysis, which was developed based on the guidance provided by Huseyin (1996); Bandara and Kelegama (2008); Wijerathna and Karunagoda (2007) and Bellu (2012).

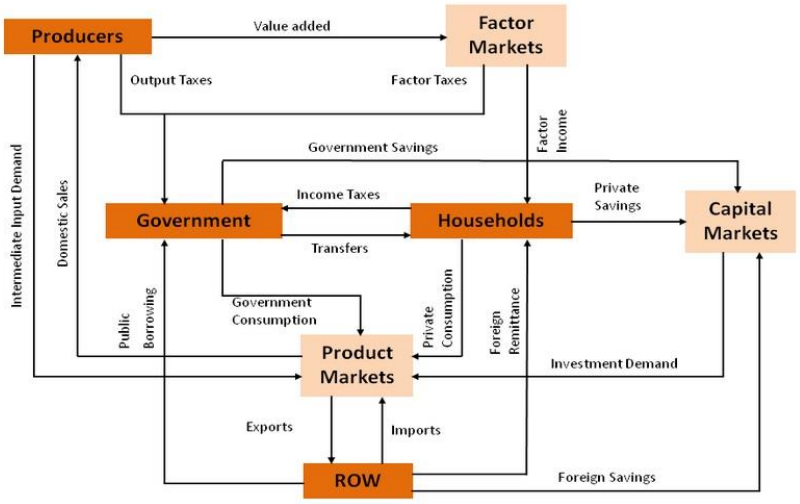

Figure 1: The Structure of CGE Model
Sources: Inter-American Development Bank (2014)

It is assumed that a given household tries to maximize its utility subject to the income constrains. The algebra of household utility can be presented as a Cobb-Douglas type function as in (1) and (2) below:

$$Maximise \quad U = \prod_i X_i^{d\,\alpha_i} \qquad [1]$$

Subjected to;

$$\sum_i P_i^d X_i^d = \sum_h r_h F_h \qquad [2]$$

Where, *i* denotes commodities, *h* is index of primary factors (labor and capital), *U* is utility, X_i^d is the amount of consumption of the ith commodity ($X_i^d \geq 0$) by the households (superscript *d* is used to indicate household/domestic), F_h is the amount of endowments of the hth primary factor (exogenous), P_i^d is consumer price of the i^{th} commodity ($P_i^d \geq 0$), r_h is factor price of hth factor ($r_h \geq 0$), and α_i is the share parameter in the utility function ($0 \leq \alpha_i \leq 1$, $\sum_i \alpha_i = 1$). By solving this maximization problem, demand function for each commodity can be obtained as in equation (3)

$$X_i^d = \frac{\alpha_i}{P_i^d} \sum_h r_h F_h . \forall\, i \qquad [3]$$

Firms are also supposed to have a Cobb-Douglas type production function where each firm maximizes its profits subject to the production technology it possesses. Equation (4) represents the jth firms profit to be maximized. The first term in the right-hand side of this equation is sales of its outputs, while the second is factor costs for production.

$$Maximise\ \pi_j = P_j^s Z_j - \sum_h r_h\ F_{hj} \quad [4]$$

Subject to;

$$Z_j = b_j \prod_h F_{hj}^{\beta_{hj}} \quad [5]$$

Where πj is profit of the j^{th} firm, $Z\,j$ is output by the j^{th} firm ($Z\,j \geq 0$), Fhj is input of the h^{th} factor by the j^{th} firm ($Fhj \geq 0$), p_j^s is supply price (superscript s denotes supply) of the j^{th} commodity ($p_j^s \geq 0$), β_{hj} is share parameter in production functions ($0 \leq \beta_{hj} \leq 1$, $\Sigma_h\ \beta_{hj} = 1$), and b_j is scaling parameter in production function.

Setting a Lagrangian and solving it, the factor demand function can be obtained (equation 6):

$$F_{hj} = \frac{\beta_{hj}}{r_h} p_j^s\ Z_j.\ \forall\ h, j \quad [6]$$

The equation (1), (3) and (5) are the building blocks from which a CGE model is constructed. The general equilibrium conditions are what bind these elements together. The algebras of market clearance, zero profit and income balance are the mathematical form of these general equilibrium conditions.

The general algebra for commodity market clearance can be expressed as in (7):

$$\overline{y_\iota} = \sum_{j=1}^{N} \overline{x_{\iota J}}\ + \sum_{d=1}^{D} \overline{g_{\iota d}} \quad [7]$$

Where i is the set of commodities {1, ..., N}, j is the set of industry sectors {1, ..., N}, f is the set of primary factors {1, ..., F}, d is the set of final demands {1, ..., D}, X is an $N * N$ input-output matrix of industries' uses of commodities as intermediate inputs, V is an $F*N$ matrix of primary factor inputs to industries, G is N $*D$ matrix of commodity uses by final demand activities and $\overline{y_\iota}$ is the value of gross output of industry i, which is the value of the aggregate supply of the i^{th} commodity.

The equation for factor market clearance is given in (8):

$$\overline{V_f} = \sum_{i=1}^{N} \overline{V_{fJ}} \quad [8]$$

Where, $\overline{V_f}$ is the endowment of a particular factor.

The equilibrium of the concept zero profit which implies that the value of gross output of the j^{th} sector, $\bar{y}_j$, must equal the sum of the benchmark values of inputs of the i intermediate goods $\overline{x_{\iota J}}$ and f primary factors $\bar{v}_{ft}$ that the industry employs in its production is illustrated in (9).

$$\bar{y}_j = \sum_{i=1}^{N} \overline{x_{\iota J}}\ + \sum_{i=1}^{F} \overline{V_{fJ}} \quad [9]$$

Equation (10) is the algebraic equation of income balance where $\overline{m}$ is the representative agent's income.

$$\overline{m} = \sum_{f=1}^{F} \overline{V_f} = \sum_{i=1}^{N} \sum_{d=1}^{D} \overline{g_{id}} \quad [10]$$

The CGE model in this analysis includes four types of institutions: households, firms, the government and the rest of the world. Production sectors categorized into two sectors as food and non-food. The government collects taxes (income taxes and tariffs), purchases goods and services, and provides transfers to household groups or firms. The economy is also involved in transactions with the rest of the world: exporting or importing goods and services, receiving or sending transfers and grants. Households own the capital and labor.

Two sector models are, however, with an unavoidable limitation. It is obligated to be one sector as non-tradable in the international market while the other sector is tradable (Devarajan et al., 1998). On this understanding, assessing of the impact of trade policies were carried out under the two scenarios. First, where the output of food sector is internationally non-tradable while non-foods are tradable and food is imported and non-foods are exported. Second, where the output of non-food sector is internationally non-tradable while foods are tradable and non-foods are imported and foods are exported. In the Sri Lankan economy, there are both tradable and non-tradable foods and non-foods. However, it was assumed that there are neither foods nor non-foods which are imported and exported as well. When analyzing the impact of policies on imports under the first scenario, therefore, only the imported foods and non-foods response and ultimately effect to household consumption considered and the same happens when analyzing export policies by second scenario. When analyzing the internal policies (sales taxes) both scenarios were considered, because the actual behavior of the internal Sri Lankan economy is in between the above two scenarios.

Data and Calibration of the Model

Unit of the values of SAM should be same. Thus, the monetary value (in million rupees) was used. In addition, following Harberger (1962) (as in Heckman and Leamer, 2001), the 'units convention' was adopted. It emphasizes that the goods have a price of unity in the base year. For model calibration, pre-calculated elasticity of substitution between domestic goods and imports (CES) and elasticity of transformation between domestic sales and exports (CET) were obtained from the 1-2-3 CGE Model for Sri Lanka, 1991 which was developed by Devarajan et al., (1998).

The major limitation of employing a general equilibrium analysis is obtaining of accurate national level data. Data sources used are the Central Bank Annual Report 2012, Economic and Social Statistics of Sri Lanka 2012, Performance Report of the Commissioner General of Inland Revenue 2012, Sri Lanka Customs, Annual Survey of Industries 2012, Household Income and Expenditure Survey 2012/13, Department of Census and Statistics, Annual Report 2012 of Ministry of Finance and Planning, and Migration Profile Sri Lanka 2013 of Ministry of Foreign Employment Promotion and Welfare.

Three major assumptions were made with regard to use of data in the present analysis, including: (1) total raw materials used for food production are only food.

Similarly, the non-foods are produced only by non-food raw materials (this is because only the total raw material consumption of food and non-food production is available and not the breakdown of the raw material cost); (2) savings and investments and sales taxes of food and non-food sectors are proportionate to their production, and (3) transfers from rest of the world to urban and rural households are proportionate to their total income of capital and labor (because a higher portion of windfall income received by households is provided by the government, the total windfall income was considered to be the government transfers).

The methods elaborated in Sanchez (2004) was used to calibrate the CGE model in GAMS (General Algebraic Modelling System) Distribution 24.4.1 framework. Following Rosenthal (2015), it was confirmed that the results of the CGE analysis are reliable and optimum.

Results and Discussion

This study was aimed at assessing the impacts of various trade policies on household food consumption. The initial optimum value of household food consumption is, therefore, of special interest (Table 1). The 'quantity consumed by households' is the optimum level of consumption, while the 'marginal values' represent the change in food consumption when the explanatory variable of food consumption increases by 1 unit at the aggregate level.

Table 1: Optimum Level of Household Consumption

Commodity	Household	Scenario 1*		Scenario 2*	
		Quantity Consumed by Households	Marginal Value	Quantity Consumed by Households	Marginal Value
Food	Urban	-1.950×10^5	1.5021×10^6	-4.042×10^5	7.1370×10^5
Food	Rural	1.4190×10^6	2.9465×10^6	1.6824×10^6	2.0986×10^6
Non-food	Urban	-3.695×10^5	5.2424×10^6	-5.861×10^5	5.5173×10^6
Non-food	Rural	1.9114×10^6	4.2388×10^6	1.7339×10^6	1.4961×10^6

**Scenario 1: the output of food sector is internationally non-tradable while non-foods are tradable (food is imported and non-foods are exported)*

**Scenario 2: the output of non-food sector is internationally non-tradable while foods are tradable (non-foods are imported and foods are exported)*

According to the results, the total aggregate consumption (both food and non-food consumption) of urban sector in Sri Lanka is lower than the rural sector. Expenditure on non-food consumption is significantly higher than for food in both rural and urban sectors.

Interestingly, a negative value was observed for both food and non-food consumption in urban sector. Following Cottrell (2010), this may indicate the selling rather than buying consumer goods.

Another possible explanation is that the negative value for consumption is equal to saving (Amos and Amos, 2000). Delgado et al., (2011) stated that there is no sensible way to avoid negative values when the income in a period is low. The major income sources of households are considered to be employment as labor and capital. The savings of urban households are identified as less than 25% of their income while the expenditure is more than 90% of income. In light of all these elucidations, the more plausible explanation in the present context would be that the negative value for consumption of urban households is due to higher expenditure compared to income rather than savings. The results reveal that expenditure of urban households in relation to their income is higher than that in the rural households. This may due to higher prices of commodities in urban areas compared to the rural areas.

The Marginal Value in Table 1 reflects the increase of consumption when the explanatory variables related to consumption increase aggregately by 1 unit derived from the household demand function specified in equation (11) below:

$$QH(C,H) = \beta(C,H) * \big(1 - MPS(H)\big) * \big(1 - ty(H)\big) * YH(H)/PQ(C) \qquad [11]$$

Where, C is commodity (Food, Non-food); H is household (urban, Rural); QH(C,H) is quantity consumed of commodity C by household H; β(C,H) is share of household spending on commodity C; MPS(H) is marginal (and average) propensity to save by household H; ty(H) is rate of income tax for household H; YH(H) is income of household H, and PQ(C) is composite commodity price for C.

Marginal values of food consumption explain that, rural people tend to spend more than urban if the resources supporting for expenditure increases. Conversely, urban people tend to spend more on non-food than rural when the factors of expenditure are favorable. Further, when the supportive factors on expenditure increases both urban and rural households tend to spend collectively more on non-food commodities than food except the rural people in the second scenario, where the output of non-food sector is internationally non-tradable while foods are tradable.

Policy Simulation 1: Aggregate Import Duties/Subsidies for Food when Food is Imported and Non-Foods are Exported (First Scenario)

Prices of some imported goods differ from the world price due to import duties. For example, when the milk powder imports to Sri Lanka are considered, a surcharge of 40 percent imposed on the import duty on milk powder was removed with the objective of bringing down cost of living the (Central Bank Annual Report, 2002). In 2008, the government has increased import duty, and at the same time, a price ceiling was imposed on domestic milk powder price to prevent uplifting (Central Bank Annual Report, 2008). Wodon and Zaman (2010) pointed out that the benefits from reducing import tariffs on staple food are likely to accrue largely to the non-poor. Rural people are more engaged in agricultural activities (food production). When the import duties get lower, the competition of imported foods with domestic production of that food also increases.

This situation adversely affects to the demand of local production, and ultimately, the income of rural households. This also decreases the purchasing power of those food producing households. This criterion is most relevant to the rural households that produce the same commodities imported and the severity highly increases when decreasing the import duties at the time of harvesting of domestic agricultural production (Taylor et al., 2010). Martin and Anderson (2011) explains that the reduction of import duties /increase of import subsidies leads to a reduction in the rise in domestic prices of respective commodities. All above suggest that import duty is one of the major trade policies that can have various impacts on an economy. In light of this, it was selected for simulation to see its effect under different scenarios.

The simulation impacts on the behavior of Sri Lankan households are presented in Table 2. The simulation was carried out by gradually increasing and decreasing the prices. In Table 2, price is increased and reduced by 2, 5, 10 and 20 percent. These simulations reflect an increase and decrease of import duties, and consequently, the impact of such changes in the external policy can be observed.

Table 2: Simulation of Variation of Import Price of Food

	Household	% Change According to Price Simulation							
		Increase by				Reduced by			
		2%	**5%**	**10%**	**20%**	**2%**	**5%**	**10%**	**20%**
Food consumption	Urban	-0.49	-1.21	-2.35	-4.53	0.49	1.26	2.6	5.42
	Rural	-0.52	-1.27	-2.5	-4.82	0.52	1.33	2.71	5.67
Non-food consumption	Urban	0.07	0.19	0.38	0.77	-0.09	-0.19	-0.38	-0.75
	Rural	0.05	0.12	0.24	0.48	-0.05	-0.13	-0.25	-0.51
Import Quantity	Food	-1.64	-3.98	-7.63	1.7	1.7	4.37	9.18	20.46
Domestic sales	Food	-0.35	-0.86	-1.69	0.35	0.35	0.89	1.82	3.8
	Non-food	0.02	0.04	0.07	-0.01	-0.01	-0.04	-0.08	-0.17
Domestic price	Food	0.37	0.99	1.99	-0.37	-0.37	-0.99	-2.11	-4.22
	Non-food	-0.16	-0.41	-0.82	0.16	0.16	0.41	0.82	1.64

When the import prices increase due to increase in import duties, the food consumption of a household, in general, decreases. For instance, an addition of 2 percent import duty to import price of food decreases the urban food consumption by 0.49 percent from the optimum level obtained through the calibrated CGE model based on actual economic data in 2012. Apart from food consumption, it is important to study the changes in the import quantities and the domestic supply of food and non-food due to changes in the policy on import duties. It is clear from the results that increasing and decreasing of import price (using the policy tool, import duties) have an impact on import quantities, domestically sold quantities and also on domestic prices.

For example, an increase of import prices due to 2 percent increase in import duty decreases import quantity by 1.64 percent from the optimum level that was generated by the CGE, decreases domestically sold food quantity by 0.35 percent and increases domestic food prices by 0.37 percent.

The results reveal that when the import duties on food increase, food consumption in the urban as well as rural sector declines. The rural households is affected more than urban households. The reason for the decrease of overall consumption is the increasing import price and the domestic price coupled with the decreasing import quantities.

A similar behavior to this situation, was reported by Cockburn (2001) on Nepalese households. Cockburn (2001) defines urban households are the big winners as agricultural sectors' (major food production sector) initial tariffs were highest. It is, however, because of their CGE model has revealed a supportive impact on increasing income of urban areas with the increase of import duty for agricultural sector. However, in the present context, not the urban areas but rural areas are expected to experience an increase of income as most of the beneficiaries of increase in domestic price: the producers, are rural people. This scenario is supported by the findings of Bauticta and Thomas (1997). It is evident from Bauticta and Thomas (1997) that reduction is import tariffs leads to a larger GDP in Philippine. Moreover, that study argues reduction of import duties and liberating trade yields larger income benefits to small-farm and "other rural" households relative to the more affluent Metro Manila whose average income is the highest, other urban, and large-farm households. In the Sri Lankan context, Korale-Gedara et al., (2012) report that if the in the absence of income increases, the food price inflation would rapidly increase undernourished population in the country. The present CGE model does not reveal a kind of benefit to rural households in terms of income increases. This can be because the rural households' consumption, as a whole, is considerably higher than the income from food production.

Policy Simulation 2: Aggregate Export Duty/Subsidies for Food when Non-Foods are Imported and Foods are Exported (Second Scenario)

The second simulation was carried out to assess the impact of relaxing and imposing export duty such as a 'cess' duty. Usually cess duty is imposed to collect funds for the improvement of the sector which it is collected from and they are primarily used for research and development. A major export duty imposed on Sri Lankan food sector for decades is cess duty on tea exports. The governments from time to time increased and reduced cess duties to collect revenue for research and development and for export promotions.

Majority of previous studies regarding the impact of duty are based on finding the impact on importing countries economy, as duty directly leads to increasing the price of the commodity (Delgado et al., 2011, and Martin and Anderson, 2011). But, in Gilbert (2011) a study on Vietnam and Thailand rice exports show that those countries have successfully used variable export taxes to shield domestic consumers from movements in world prices over a number of decades.

When the world price is higher, exporters tend to export more to get the benefit of the higher price margin. Leading to the lower supply of that commodity to local market which inflates the domestic price and adversely affect domestic consumers. In Vietnam and Thailand, therefore, the export taxes are acting as a shield to protect domestic consumers by regulating the relationship of world price, local price and export price as export taxes reduces exporters' margin.

If an export duty is in place, the amount of trade (exports) will reduce (in a small country such as Sri Lanka whom is a price taker in the export market) as in Figure 2 and the export price should also reduce. This will lead to a positive welfare gain by consumers (areas A and B) and a welfare loss to producers amounting to the area ABCDE. To simulate the effect of export tax, the export price in the CGE model has, therefore, to be reduced. To see the effect of a reduction of export duty, an increased export price has to be simulated in the CGE model. Therefore, to see the effect of increased export duty (cess) a price reduction was simulated by reducing the price by 2, 5, 10 and 20 percent. To see the impact of a revision of the duty downward, another simulation was carried out by increasing the price by 2, 5, 10 and 20 percent (Table 3).

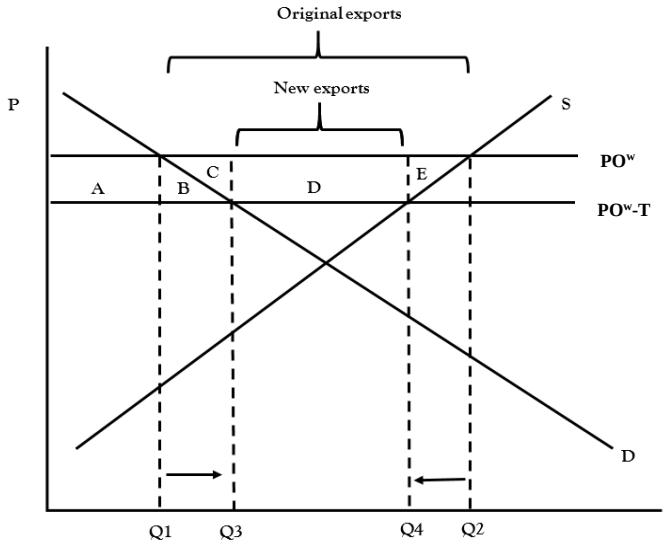

Figure 2: Partial Equilibrium Effects of Export Tax

The behavior of export quantities, and domestic trade are shown in Table 3. According to that, when export duty increases, the quantity exported show an increase contrary to expectations. However, the export prices show a decline as expected. Theoretically, the domestic supply should decline because of the lower prices due to the tax. The results show that there is a slight positive increase up to 10 percent reduction in prices (i.e. increase in taxes) against expectations but the supply declines considerably at 20 percent increase in taxes. The effect on domestic price is accurately predicted by the model, where it shows a decline due to lower exports as shown in Figure 2. Therefore, a 20 percent increase in tax would reduce the domestic price by 2.31 percent.

Table 3: Behavior of Exports and Domestic Trade with Price Fluctuations

	Household	Behavior According to Price Simulation							
		Increase by				Reduced by			
		2%	5%	10%	20%	2%	5%	10%	20%
Export Quantity	Food	-0.41	-1.00	-1.95	-3.70	0.42	1.07	2.19	4.69
Export Price	Food	0.18	0.36	0.64	1.00	-0.09	-0.36	-0.82	-1.91
Domestically sold quantity	Non-food	-0.01	-0.03	-0.08	-0.19	0.01	0.02	0.02	-0.05
Domestic price	Food	0.15	0.37	0.72	1.38	-0.15	-0.38	-0.78	-1.63
	Non-food	0.78	2.00	3.77	7.21	-0.78	-2.11	-4.32	-9.20

Note: A reduction of export price is used to simulate an increase in export duty while an increase in export price is used to simulate a reduction in export duty

According to Table 4, when the export duty decrease, domestic food consumption increase as expected. For instance, if the export price decrease by 2% (because of increase of export duty), the food consumption of urban households increases by 4.10%.

When the export prices decrease as a result of increasing export duty, the domestic food consumption increases. In the same manner, when the export prices increase as duty decreases by 2 percent, the urban household food consumption decrease by 3.95 percent.

Table 4: Simulation of Food and Non-Food Consumption When Export Duty is Changes (A Change in Export Price of Food)

Commodity	Household	% Change in Consumption According to Price Simulation							
		↑ 2%	↑ 5%	↑ 10%	↑ 20%	↓ 2%	↓ 5%	↓ 10%	↓ 20%
Food	Urban	-3.95	-9.64	-18.36	-33.64	4.10	10.67	22.51	50.87
Food	Rural	-0.42	-1.03	-1.97	-3.65	0.44	1.13	2.37	5.29
Non-food	Urban	-2.79	-6.90	-13.56	-26.09	2.84	7.20	14.72	30.83
Non-food	Rural	0.78	1.94	3.80	7.31	-0.80	-2.03	-4.15	-8.73

Policy Simulation 3 under Both Scenarios: Aggregate Sales Tax

Generally, own price elasticity is negative for most food products. Imposing a sales tax has an obvious direct and strong impact on increasing price which leads to a decrease in demand. Nirmali and Edirisinghe (2012) also report that own price elasticities were negative and inelastic for all the food items they have considered in their study of urban households in Sri Lanka. Andreyeva et al., (2010) argues that although demand for food is relatively inelastic, the remaining little responsiveness should not be under estimated as their effects accumulate across a population. Caraher and Cowburn (2005) suggests that small taxes with the clear purpose of promoting the health of key groups, (e.g. children) are more likely to receive public support. In addition, taxing food (and subsidies) can influence food behavior.

The simulations of the effect of aggregate sales tax was undertaken for the two scenarios that has been discussed thus far. The impact of aggregate sales tax for food was calculated in a situation where food is imported and non-foods are exported (Scenario 1) and the impact of aggregate export duty/subsidies for food was observed when non-foods are imported and foods are exported (Scenario 2) and are given in Tables 5 and 6.

Table 5 shows the results of the simulation of food and non-food consumption when sales tax of food is increased in both the two scenarios that had been dealt with earlier in the paper. For instance, when the domestic price increases as a result of 2 percent increase of sales tax, food consumption of urban areas declines by 0.3 percent in scenario 1 (Aggregate import duties/subsidies for food when food is imported and non-foods are exported). Table 6 which shows the behavior of domestically sold quantities and prices with price fluctuations which helps to understand the reason behind the decrease of urban food consumption. According to Table 6, when the sales tax of food increases, the domestic food prices increases while non-food prices decrease. Although, the food prices increase with sales tax, the domestically sold quantity of food decreases. This is because the benefit of higher price doesn't go to the suppliers, they are not motivated to supply more. In addition, with higher prices the demand for food decreases in both urban and rural sectors.

Table 5: Simulation of Food and Non-Food Consumption When Sales Tax of Food is increased

			Food		Non-Food	
			Urban	**Rural**	**Urban**	**Rural**
Increase in sales tax	Scenario 1	2%	-0.3	-0.16	-0.15	0.01
		5%	-0.77	-0.4	-0.36	0.01
		10%	-1.53	-0.8	-0.72	0.03
		20%	-3.02	-1.58	-1.42	0.06
	Scenario 2	2%	-0.51	-0.16	-0.41	-0.03
		5%	-1.33	-0.38	-1	-0.06
		10%	-2.62	-0.77	-1.98	-0.13
		20%	-5.18	-1.52	-3.92	-0.26
Decrease in sales tax	Scenario 1	2%	0.32	0.16	0.14	-0.01
		5%	0.79	0.4	0.36	-0.02
		10%	1.56	0.81	0.72	-0.03
		20%	3.17	1.63	1.45	-0.06
	Scenario 2	2%	0.51	0.16	0.41	0.03
		5%	1.33	0.39	1	0.06
		10%	2.67	0.78	2	0.13
		20%	5.38	1.57	4.03	0.26

Rural communities seem to be responding to the decreased non-food price in the general way while urban consumers decrease their consumption even though the non-food prices decrease. This may be due to the fact that urban households are more vulnerable to increased food prices than rural families. When the food prices increase, urban families may tend to spend more on food although the overall urban food consumption decreases. But there are alternative ways of acquiring food in rural areas than urban areas. Thus, rural households show a less sensitivity for increased food prices than urban households.

The behavior of household food consumption when sales taxes are reduced (Table 6) is opposite to the behavior under increasing sales taxes. When the domestic prices decrease due to the decrease of sales tax by 2 percent, the urban household food consumption increases by 0.32 percent.

Table 6: Behaviour of Domestically Sold Quantities and Prices with Price Fluctuations

Simulation Scenario		Domestically Sold Quantity		Domestic Price	
	Increasing Sales Tax (%)	**Food**	**Non-Food**	**Food**	**Non-Food**
Scenario 1	2	-0.1	0.03	0.12	-0.08
	5	-0.24	0.06	0.37	-0.08
	10	-0.47	0.12	0.62	-0.25
	20	-0.93	0.24	1.24	-0.49
Scenario 2	2	-0.06	0.03	0.1	0
	5	-0.15	0.07	0.21	-0.09
	10	-0.3	0.14	0.41	-0.18
	20	-0.6	0.27	0.82	-0.45
	Decrease in Sales Tax (%)	**Food**	**Non-Food**	**Food**	**Non-Food**
Scenario 1	2	0.1	-0.02	-0.12	0.08
	5	0.23	-0.06	-0.25	0.08
	10	0.47	-0.12	-0.62	0.25
	20	0.95	-0.24	-1.12	0.49
Scenario 2	2	0.06	-0.03	-0.1	0.09
	5	0.15	-0.07	-0.21	0.09
	10	0.31	-0.14	-0.41	0.27
	20	0.61	-0.28	-0.82	0.45

The domestic food prices decrease and the non-food prices increase when the sales taxes of foods decline. With the decrease of food prices, the domestically sold food quantity increases as the food consumption of both urban and rural sectors increases.

It is also evident that when while food prices are increasing with the sales tax, prices of non-foods decrease by a small quantity. In relation to the domestic prices, domestically sold food quantity also decreases while non-foods increase slightly. This slight increase leads to reduce rural non-food consumption in a little quantity. However, it seems that the uplift of non-foods has not impacted urban households. With the decreased prices of food, urban household seems to be having more opportunity to spend on non-food which increase their non-food consumption even though non-food sector experiences a slight increase of prices. This response confirms that rural households are more sensitive to non-food prices than urban sector.

Households do not respond to increases and decreases of export and import duties in a similar manner. Both urban and rural households' change (decrease) of food consumption when increasing import duties, is lower than the change (increase) of food consumption when import duties are higher. In the case of export duties also, the change (increase) of food consumption when the export duties are decreased, is higher than the (decreasing) effect on food consumption due to increase in export duties. But, there is no major visible difference in the impact of increasing and decreasing sales taxes. The (increasing) effect on food consumption due to declines of sales taxes is only slightly higher than the (decreasing) effect of increased sales taxes.

According to the results, the urban households are highly sensitive to fluctuations of export duties on food than import duties on food. The sales taxes of food also seem to have an effect nearly similar to import duties. But, the rural households do not show a clearly visible difference in responding to import and export duties. However, the sensitivity of rural households on sales taxes is resulted as lesser than that on import and export duties (Figure 3).

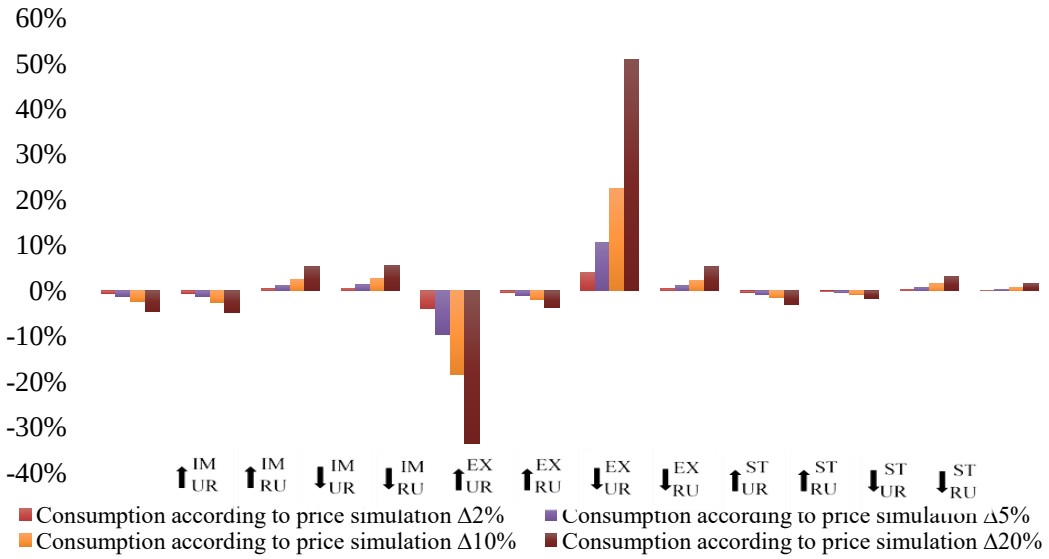

Figure 3: Summary Consumption Effects of Increases and Decreases in Trade Policy Tools

Note: IM – Import duty, EX – Export duty, ST – Sales Tax, UR- Urban, RU - Rural

Conclusion and Policy Implications

According to the results, in relation to the total aggregate consumption, the food and non-food consumption of urban sector is lower than rural households due to higher rural population. In both rural and urban sectors expenditure on non-food consumption is significantly higher than for food. Further, expenditure of urban households compared to their income is higher than the same in rural households. This may be due to higher prices of commodities in urban areas compared to rural. The results reveal that when the import duties on food increase both urban and rural food consumptions decrease. Rural households seem to be more sensitive to import duties than urban households. In the case of non-food consumption behavior, urban households are more sensitive than rural. Thus, there is a distributional impact of policy changes. Therefore, because of the magnitude of the rural population, the government should make such changes with care because the impacts may be felt strongly on a larger section of the society.

When the export duty decreases, domestic food consumption increase and vice versa as expected. But, when export duty increases, the export quantity showed an increase with contrary to expectations. However, the domestic price is correctly predicted by the model as to decrease when the export duties increase. Increase in sales taxes of foods results in decrease of both food and non-food consumption of urban households. Although, the sales tax adversely affect rural food consumption, it is less than the effect on urban households. It is also evident that when food prices are increasing with the sales tax, prices of non-foods decrease by a small quantity. In relation to the domestic prices, domestically sold food quantity also decreases while non-foods increase slightly.

Overall, the urban households are highly sensitive to fluctuations of export duties on food than import duties on food. The sales taxes of food also seem to have an effect similar to import duties. But rural households don't show a clear visible difference in responding to import and export duties. However, the sensitivity of rural households on sales taxes show a lesser impact than that of import and export duties.

In the view of local producers, import duties should be imposed in the harvesting periods for them to get a good price by decreasing domestic prices with world prices. However, the higher domestic supply of food in harvesting period will decrease the selling prices of food which is favorable for the consumers on the other end who affects by increases of import duties. Increase of export duties on foods is favorable for domestic households' food consumption. The negative impact of exports duties on producers can be decreased by investing the collected duties to develop that particular sector which duty is collected. Sales taxes has a low but unavoidable impact on household food consumption. Maintaining sales taxes for food in the optimum minimum level is favorable for households because, most of the Sri Lankans are not consuming adequate amount of food quantity.

The major limitation of the study was the unavailability of data, mainly breakdown of costs of materials. We suggest that future researches can be developed to study to breakdown in to several food and non-food types instead of using them aggregately. Also, assessing the impact of quantity based trade policies such as quotas would also be important.

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