

Has Trade Liberalization Improved Food Security? A Comparative Study on China and Sri Lanka

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Abstract

Trade liberalization is assumed to be the driving force of economic development of the developing countries. China and Sri Lanka have gradually opened their economies to foreign trade with the expectation of eliminating poverty which is the main cause of food insecurity. Though both countries possess some similar characteristics, they are different in size in the world market. Sri Lanka is regarded as a small economy while China is known as a large economy which has economic power to influence on world market. Hence, the main purpose of this study is to investigate whether trade liberalization has differently influenced on food security of China and Sri Lanka. The study employed time series multiple regression technique to investigate the effect of trade liberalization on food security of the two countries for the 1980 - 2009 period. The findings of the study support the statement that trade liberalization has not significantly influenced on food security of China. However, it is found a negative and weak relationship between trade liberalization and food security with regards to Sri Lanka. The key variable significantly influenced on the food security of two countries is the real GDP level and it shows a strong positive association with food security during the study period. The changes of imported food prices have been a key influential factor in determining food security of Sri Lanka but were not a significant factor to influence to the food security of China.

Keywords: Food Security, Trade Liberalization, Developing Countries, Poverty

1. Introduction

Trade liberalization is assumed to be a driving force of economic development in developing countries. After the Second World War, international trade has become most important instrument in building external economic links among world economies. Its role on economic development of those countries has deepened considerably (Svatoš & Smutka, 2010). Developing countries are inherited with low savings and investment due to lower income levels. Lower income again affects on savings and investment levels of these countries. As a result, these developing countries have been growing at a slower pace of economic growth. Low economic performance has been kept people in severe poverty level. In developing countries, sizeable portion of people are suffering from severe poverty by exposing them to food insecurity. It is reported that developing countries account for 98 % of the world undernourished people and have a prevalence of undernourishment of 16% (Grófová & Sranec, 2012). According to the World Food Summit held in 1996, food security is defined as “the existence of having all people at all times for sufficient, safe, nutritious food to maintain a healthy and active life” (World Health Organization, 2012). Mkandawire and Maltosa (1993) simply define that food security means absence of hunger and malnutrition.

China and Sri Lanka are two developing economies the Asia and have some similarities as well as dissimilarities in socioeconomic, political and geographic aspects. China has a total population of 1344 million and inherited to a total land area of 9327 thousand square kilo meters. China has gained rapid economic development during the last three decades and her average economic growth rate from 1980 to 2013 is almost 10 percent. The current per capita income level of China is about 5445 US\$ by 2011. By today, China is known as the world second largest economy in the world. With compared to China, Sri Lanka is considered as a small economy with a total population of just 21 million people and land area of approximately 63 thousands square kilometers. Sri Lanka has gained a 5 percent average economic growth rate from 1980 to 2013 period. The island has achieved such economic records with civil unrest and threat in terrorism prevailed until few years back. The current per capita income of Sri Lanka is 2835US\$ in 2011.

Since economic reforms initiated in the second half of 1970s, International Trade has being increased rapidly in China. Economic reforms have positively influenced on foreign trade and this has caused to exceed the growth of foreign trade than the economic growth rate of GDP during the reform era (Li, 2009). These economic reforms have made remarkable progress to reduce poverty of her people since late 1970. After independence in 1944 from British imperialism, Economic policies of Sri Lanka has being changed time to time based on the ruling political party (Lakshman, 1997). However after following strict closed economic policies during the 1970 - 1977 period, all governments came into power has been implementing open economic policies with the hope of accelerating economic growth to alleviate the poverty of the country. Sri Lanka has been able to achieve higher economic growth after the implementation of trade liberalization policies since 1978 (Herath, 2010).

Trade openness of both countries shows upward trends during the last three decades (Figure 2). Though both countries have been able to achieve higher economic performance with the increase of trade liberalization, they are still suffering from poverty and hunger which are the cause and consequence of food insecurity. Studies are still in seldom of investigating the impacts of trade liberalization on food security of countries in literature. Therefore, the main purpose of this study is to investigate whether trade liberalization has differently influenced on food security of China and Sri Lanka because of the relative size of two economies.

Literature in International trade provides evidence on how trade liberalization positively influence on economic performance of economies which have liberalized trade to world economy (Herath, 2010; Leamer, 1988; Dollar, 1992; Sachs and Warner, 1995). Cervantes-Godoy & Dewbre's study (as cited in Dijk, 2011) shows that agricultural growth contributes more to poverty reduction in developing countries than manufacturing and services. Few explanations for this view are; a) most of the poor people are employed in agriculture as farmers or off-farm employees, b) agricultural expansion can lead to multiple growth effect on the rest of the economy because of the main source of raw materials for manufacturing sector comes from agricultural sector, c) agricultural sector is an important source for the demand of capital goods and services like transport, d) increased income of farmers can increase demand for locally produced goods and services.

Dorosh (2004) argued in his work titled *Food, Food Aid and Food Security* that trade liberalization which was specially implemented through giving permission to private sector to import rice and wheat has contributed largely to enhance national food security of Bangladesh. In this comprehensive study, Dorosh highlights that permitting private sector to involve with trade activities would enhance the level of available foods for domestic consumption during the domestic production shortfalls and stabilize market prices benefitting poor consumers. In *Impacts of regional trade agreements on food security*, Herath *et al* (2014) have attempted to capture the effects of trade liberalization on food security of South East Asian countries. The findings of the study support that discriminatory trade liberalization policies have positively influenced on food security of the south East Asian region. It is found that after the formation of the Association of South East Asian Nations' Free Trade Agreement (AFTA), the level of per-capita daily dietary energy supply of the member countries has been increased moderately over time.

Dijk (2011) explains about direct and indirect channels through which agricultural and food trade influence on enhancing food security. In the direct channel, Dijk explains that agricultural trade can result on increasing domestic food supply and thereby augmenting food availability. The increased domestic food supply pulls down food prices by increasing the food accessibility of people. Final outcome is the enhancement of food security through increase of food availability and accessibility. In the indirect channel, agricultural trade promotes economic growth which improves income of people and ensures food security by improving food accessibility. In his analysis, Dijk has selected the sample period from 2000 to 2009 and eight African countries. The findings of the study show that majority of the sample countries have made a progress in opening up of agricultural and food trade with members of Regional trade agreements. The study concludes that during the sample period agricultural and food trade has been increased marginally in regional trade. Dijk argues that main cause of this is the weak condition of soft and hard infrastructure rather than trade barriers. Finally he explains that still there are some opportunities to deepen preferential trade liberalization and expand agricultural and food trade which can create positive implications on food security.

In *Has trade liberalization improved food availability in developing countries? An Empirical Analysis*, Bezuneh and Yiheyis (2009) have attempted to investigate whether trade liberalization has improved food security of developing countries. The study has been carried out with a sample of 37 developing countries and applied multiple regression analysis for panel data. In their study, mainly food security has been defined according to the food availability and it is measured using Per Capita Daily Dietary Energy Supply of sample countries. According to the results of Bezuneh and Yiheyis's study, they found trade liberalization exerted a negative short run effect on food availability in the sample countries. The overall results fail to support the view that the medium to long run effect of trade liberalization on food availability is favorable. The results of their study provide evidence on the ambiguity of the impact of trade liberalization on food security.

In *Regional Integration and Food Security in Developing Countries*, Matthews (2003) describes that international trade influence on food security in general and agricultural trade in particular. In the former case, he explains intra-regional trade can foster economic growth and enhance level of employment by increasing the income-earning capacities of the poor enabling them to enhance access for food. In the latter case, Mathews argues that increased intra-regional agricultural trade can influence food security in two ways: first by augmenting domestic food supplies to meet consumption needs and second by reducing overall food supply variability.

2. Methodology

In identifying the impact of trade liberalization on food security in two countries, China and Sri Lanka, time series data is collected from 1980 to 2009 period. Data for real GDP, agricultural land area, imported food

prices, foreign reserves are collected from World Bank Development Indicators of the World Bank data base. Per capita daily dietary energy supply is based on the Food and Agriculture Organization of the United Nations Statistical Database (FAOSTAT). Political stability is measured by the Polity2 score which has been published in the Polity IV dataset project by Monty G. Marshall of the University of Maryland, College Park and Keith Jagers of Colorado State University in 2002. The scores of Polity2 variable are from -10 to +10. The score -10 refers to strongly autocratic political situation of a country while +10 refer to a strongly democratic country.

The study employs time series regression analysis to investigate the impacts of trade liberalization on food security. In achieving the major objective of the study dependent variable, Per Capita Dietary Energy Supply, is adopted to measure the food availability which is an approximate to food security of a country or a region in national level. The multiple regression analysis is employed to capture the trade effect on food security. A set of independent variables which influence on the per capita daily dietary energy supply is included in the time series regression model. The influence of trade liberalization on food security of both countries is captured by adopting degree of trade liberalization which is measured by total trade as a percentage of GDP. The economic, political and geographic factors which can influence on per capita dietary energy supply are represented by the control variables of the regression analysis.

2.1 Specifications of Empirical Model

The empirical model has identified a set of various independent variables which can influence on the degree of food security of a country or a particular region. Based on the literature, it is assumed that national food security can be measured in terms of overall food availability of an economy. Food availability is represented by per capita daily dietary energy supply. The empirical model considers number of control variables which are significant in determining the degree of food security in national level in addition to trade liberalization variable. Real GDP, agricultural land area, imported food prices, amount of foreign reserves available and political stability are the major key variables identified in literature which can influence on the level of food security of a country or a region. By taking in to account of these entire determinants, empirical model is constructed and presented in equation 1.

$$\text{LogPDES}_t = \alpha_0 + \alpha_1 \text{LogY}_t + \alpha_2 \text{LogAL}_t + \alpha_3 \text{MFP}_{t-1} + \alpha_4 \text{LogFRM}_{t-1} + \alpha_5 \text{PS}_t + \alpha_6 \text{LIB}_t + \varepsilon_t, \dots \dots (1)$$

In the equation 1, PDES is Per capita daily dietary energy supply, Y is real GDP, AL is agricultural land area, MFP is the price of imported food, FRM is foreign reserves in months of imports, PS is political stability, LIB is degree of trade liberalization and ε is the error term of the time series regression model.

3. Results

In estimating effects of trade liberalization on food security of two countries, China and Sri Lanka, multiple-regression technique employed for time series data. The model is estimated by using the STATA statistical software and summarizes the regression results in table 1 and 2. For correcting heteroskedasticity and autocorrelation presented in the initial regression estimates, Cochrane – Orcutt AR (1) regression method is used. Table 1 summarizes the regression results for China and Sri Lanka for the empirical model. The independent variables employed in both regressions are jointly significant at 1 percent level of significant. With regard to China, 81 percent of the variation in the dependent variable is explained by independent variables of the regression equation. Since the values of polity2 variable are constant over the sample time period in China, the variable which measures political stability (PS) was omitted when estimating the empirical regression model for China. Our key variable, trade openness, which is used to capture the trade liberalization effect on food availability, is not statistically significant to impact on food availability of China. The only independent variable among the control variables, real GDP has been the key determinant of food availability of China.

With compared to the situation of China, most of the independent variables included in the empirical model are found to be statistically significant and 40 percent of the variation of the depend variable is explained by the independent variables included in the empirical regression model which was estimated for Sri Lanka. Trade liberalization variable is statistically significant at 1 per cent level of significance and however its coefficient bears a negative sign indicating that trade openness has negatively influenced on food availability of Sri Lanka. Among the control variables, real GDP level, agricultural land area and imported food prices are the key statistically significant variables of determining national food security of Sri Lanka. These three variables are statistically significant at 5 percent level of significance and are having expected signs for their coefficients. Real GDP and agricultural land area of Sri Lanka has positively influenced to enhance the food availability of the country. As expected, imported food prices is an influential factor for Sri Lanka in determining food availability. Increase of imported food prices has affected to decrease food availability and vice versa.

Table 2 summarizes the estimates for only statistically significant variables of the empirical regression model. In selecting the significant independent variables which influence on per capita daily dietary energy supply, backward elimination methods is used. Among the several key determinants of national food security identified in the empirical model, real GDP has been playing major role to enhance the food availability of China. The

higher t-statistic of GDP coefficient indicates that the variable is statistically significant at 1 percent level of significance. The higher coefficient of determination indicates that 78 percent of the variation of dependent variable is explained by the real GDP variable. The food availability of Sri Lanka is significantly influenced by three key variables which were identified in the empirical regression model. The three statistically significant independent variables explain almost 35 percent of total variation of the dependent variable. Hence, Real GDP, imported food prices and trade liberalization variables were included in the regression estimates and found that results are more consistent with the output of table 1 regarding Sri Lanka.

4. Discussion

In achieving the major objective of the study, multiple regression analysis is employed to capture the trade effect on food security of China and Sri Lanka. According to the definition of food security, it is based on three major pillars, food availability, food accessibility and food stability. However, the study considers food availability aspect in quantifying food security in national level of the two economies. When estimating the empirical model on China, political stability variable is omitted because of the constant value of the variable during the study period. The trade liberalization variable which is the key independent variable in the study found to be statistically insignificant on influencing the food availability of China indicating that trade liberalization does not significantly contribute to enhance the food security of the country. As a large economy, China possesses a vast area which has been allocated for agrifood production and her large amount of food production for self sufficiency could be a major reason for the less importance of the international trade in determining the food security of China. This is further confirmed by being insignificant of the imported food prices and foreign reserves variables in determining food availability of the country. Also, the study considers one aspect to quantify the food security and this could be another reason to have a less importance of trade liberalization on determining food security in China. However, it is found that real GDP level has been significantly contributed to decrease the extent of food insecurity of the country.

With compared to China, it is found that several key explanatory variables have significantly influenced on the extent of food security of Sri Lanka. The trade liberalization is statistically significant and has negatively affected on the level of food security of the country. However, the smaller value of the coefficient implies that the unfavorable impact of trade liberalization on food security is in marginal level during the study period. Although, trade openness of the country has been widened during the last three decades, Sri Lanka has implemented some trade restriction policies time to time on agrifood commodities to protect the local farmers by cheap agrifood imports. This could be one of the reasons for the weak negative impact of trade liberalization on food availability of Sri Lanka. Imported food price is found to be a significant determinant to influence the level of food availability of Sri Lanka and its negative sign is as expected with the theoretical explanation. Among the other control variables, real GDP significantly influence on determining the food availability of Sri Lanka. This is the only explanatory variable which is statistically significant in both countries. Agricultural land area is assumed to be a major factor which can influence on food security of both countries. However, it was found to be an insignificant determinant in the modified multiple regression model. In literature, agricultural irrigated land area has been taken as a key determinant which can influence on food security. However, the study used only agricultural land area of both countries since non availability of the data for the former variable for the total time period and this could be a reason for being insignificant of the variable.

5. Conclusion and Policy Implications

The study was carried out with a main objective of investigating the impact of trade liberalization on food security of China and Sri Lanka. Since the two sample countries possess some similarities as well as dissimilarities in socioeconomic, political and geographical areas, study focused to identify how trade liberalization influence on food security of both countries when they possess also different identities simultaneously. In assessing the association between trade liberalization and food security, multiple regression analysis has been employed. Per capita daily dietary energy supply is taken as an approximate to measure the food security of the two countries. The dependent variable is regressed with several explanatory variables which represent socioeconomic, geographic and political factors. The study used the total trade as a percentage of GDP of respective countries to measure their degree of trade openness. Based on the literature survey, key independent control variables identified and included in the empirical model were real GDP, agricultural land area, amount of foreign reserves, imported food prices and political stability. The findings of the study are deviated according to the country. Accordingly, it is found no evidence to support the statement that trade liberalization and food security is linked in China. In Sri Lankan context, the study found a negative and weak relationship between trade liberalization and food security during the study time period. The key variable significantly influences on the food security of two countries was the real GDP level and it shows a strong positive association. Imported food price is has been a key influential factor in determining food availability of Sri Lanka and is not a significant factor in China.

Findings of the study have several policy implications. The results of the study reveal that effects of trade liberalization on food security can be varied according to the key characteristics of countries. Hence, trade policies need to be formulated by considering the specific characteristics in targeting to strength the food security of countries. The trade liberalization has not been a significant factor to influence on food security of China and this could be due to the self sufficiency of a large country. However, such an argument needs to be validated by further research. The study further revealed that agricultural land area has not positively influenced on food availability though agrifood is relatively land intensive commodity. This implies that further actions need to be taken to increase the productivity of agricultural land to get significant impact on food availability. Finally, the findings of the study confirm that food security is more sensitive on changes of international trade environment with special reference to world food prices and degree of trade openness. Hence closer look need to be given on the changes of foreign trade environment to ensure the food stability.

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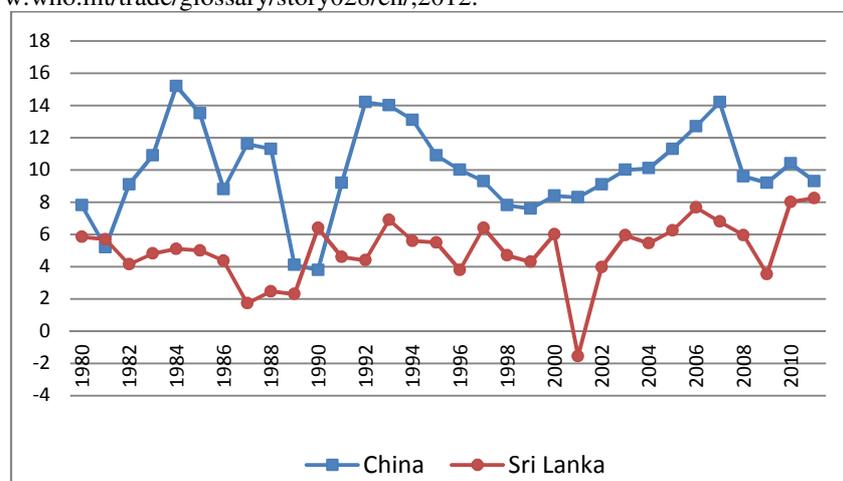


Figure 1: Economic Growth Rates of China and Sri Lanka

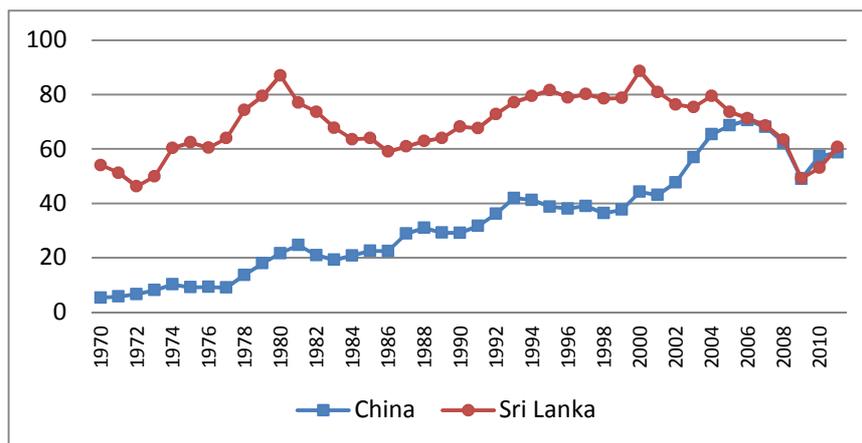


Figure 2: Trade Openness (trade as a % of GDP)

Table 1: Estimates of Multiple Regression Models

Dependent Variable: lnPDES

Independent Variables	China		Sri Lanka	
	Coefficient	t-statistic	Coefficient	t-statistic
Cons	.8414469	0.16	4.400774	5.28***
lnY	.0971770	4.19***	.1042508	2.60**
lnAL	.3351471	0.83	.1387903	2.39**
lnFRM _{t-1}	-.0136528	1.19	.0229687	1.14
MFP _{t-1}	.0002093	1.11	-.0007534	2.28**
PS	-	-	.0078524	0.72
LIB	-.0001422	0.29	-.0023713	3.15***
R-squared	0.81		0.40	
DW Statistic	2.21		2.39	

Note: 1. The t-statistics are absolute values of t-ratios. Single, double and triple asterisks denote significance of coefficients at the 10 %, 5% and 1 % level, respectively.

2. Each model is tested for overall model significance and statistically significant at any standard significant level.

3. Estimates are heteroskedastic corrected robust estimates.

Table 2: Regression Estimates with Statistically significant Independent Variables

Dependent Variable: lnPDES

Independent Variables	China		Sri Lanka	
	Coefficient	t-statistic	Coefficient	t-statistic
Cons	5.261849	17.33***	4.624716	5.92***
lnY	.0963499	8.89***	.1443806	4.10***
MFP _{t-1}	-	-	-.0009619	2.73**
LIB	-	-	-.00241	3.24***
R-squared	0.78		0.35	
DW Statistic	1.92		2.54	

Note: 1. The t-statistics are absolute values of t-ratios. Single, double and triple asterisks denote significance of coefficients at the 10 %, 5% and 1 % level, respectively.

2. Each model is tested for overall model significance and statistically significant at any standard significant level.

3. Estimates are heteroskedastic corrected robust estimates.