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Food Security and International Trade: An Application of Kuznet Curve in the Most Populous South Asian Countries

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ABSTRACT

Food security has become a major challenge for developing countries. Main objectives of this study are to check the relationship between international trade and food security for the most populous Asian countries like India and Bangladesh. Then this study traces kuznet curve between international trade and food security for the most populous south Asian countries (Pakistan, India and Bangladesh) taken together. Simple Ordinary least square is used for Pakistan while fixed and random effects are used for three countries. Results showed that trade openness hasa positive impact on food security, but square of trade openness has negative impact on food security of Pakistan. The findings of the study showed that international trade improves food security after that specific point. Major findings of this study are an inverted U shaped relationship between international trade and the state food security at national and international level, which suggests that policy makers should pay attention on agricultural productivity and try to make countries self-sufficient.

KEYWORDS: International trade, food security, kuznet curve, Pakistan, India and Bangladesh

INTRODUCTION

Being most important sector 20% share of GDP and 80% exports are based on agro products (IFAD, RPR, 2012). 795 million people of the world still far away from their basic food in 2014-16 undernourished people' s share is decreased from 18.6 to 10.9 percent in 1990-92 to 2014-15 (SOFI, 2015). 2015 is the monitoring year of two internationally agreed targets millennium development goal and world food summit goal for the reduction of poverty and hunger in all agreed countries (SOFI, 2015). India and China played an important role to reduce the poverty and hunger, volatility in commodity prices are overall higher the food prices which leads to higher the energy prices and raise the unemployment at country level (SOFI, 2015). Hunger, poverty, unemployment and production of food for growing population is the main critical issues of lower developed countries & 70% population of LDC's are employed by agriculture sector (Kang, 2015). Food security is a situation when all of the people have physical, social and economic access to adequate quantity of, safe, nutritious and healthy food at all time that meets the dietary needs of an active and healthy life (World Food Summit, 1996). Provision of food is a fundamental human right. One of the nine people all over the world (805 million) goes hungry every day due to an insufficient quantity of food (FAO, IFAD& WFP, 2014). Gross domestic product (GDP) growth in agriculture sector is most important and effective weapon to reduce poverty & hunger (IFAD). Half of the population is engaged with agriculture sector and most of them are food insecure and living in rural areas in LDCs. Critical issues of LDCs are land degradation and water scarcity due to rise in population that's why the productivity of the agriculture sector is lower in these countries and a small part of the budget is spent by the government in agriculture sector. Up to 90% imports of LDCs are based on Agrochemicals like fertilizers, pesticides & insecticides. The exchange of goods and services, capital, and ideas across international borders are known as international trade. Imports and exports are two main components or dimensions of trade that interlinked the several nations or states of the world on one channel. A product that is sold to the global market is export. A product that is bought from global market is import (Ishaq et al. 2015).

Comparative advantage is a way to exchange things with one expert nation in specific field to another expert nation. Imports and exports are based on comparative advantage while there is a major difference between world market prices or domestic market prices without trade. If this difference is large then the countries aim to gain from trade, but if there is a small difference between world market prices or domestic

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market prices then gain from trade is also small. Another most beneficial side of trade is that it promotes new technologies & innovations, Productivity improved by innovative ideas and competition from Japan inthe United States. 24 developing countries of the world became more integrated from 1980s to 1990s, and their income, economic growth and life expectancy increased (World Bank). Export plus imports, which showed the share of trade that increased from 33.8% to 48.9% in developing countries from 1990 to 2001.

International trade is based on allocation of economic or social resources among the countries of the world such type of allocation is done by the trade in world markets under free trade. The world's best products are produced in competitive markets and the benefits of trade from efficient production of food best quality and lower prices of the goods are available everywhere in the world. No country is independent in the world without the international trade even the richest population's need raw material from poorest populations of the world. International trade is that type of trade that gives rise to the economies of the world where the demand and supply of goods are affected by the global events or circumstances. Developing countries produce those products, which are labor extensive due to higher rate of population like textiles, clothing, etc. such type of exports earns heavy revenue and plays an important role in economic growth of those countries. Economic growth depends on the productivity enhancing techniques. International trade is important for all sectors of a country and use as an engine for economic growth in developing countries. 2030, 60% of the world nation's food was exchanged internationally. Trade benefits for developing nations include increased production with the exchange of new and innovative ideas. International trade enhances the economic atmosphere which is necessary for the purpose of achieving the big goals at the national level like hunger reduction, poverty reduction, employment, food security health and to remove all disparities among the people of the world.

International trade is also necessary for the availability of food to ensure the state of food security in Pakistan. Agriculture sector is strongly depending on trade of raw materials and pesticides, which are bought from global markets. The dimension of food availability quite depends on trade, which plays a significant role in increasing the role of economic growth of Pakistan.

During 2007-2008, there is a wave of food price inflation move all over the world which higher the prices of food and increased level of hunger and poverty theses effects also worsen the condition of food security in Pakistan. Pakistan focus on the problems that are main hurdles in the way of progress there is a dry land of agriculture adequate supply of water supplies and balanced used of fertilizers are important in a part of food security. Consumption of food is still increasing, but the supply of food is not increasing at the same pace of demanded due to difference in efficiencies of agriculture sector so there is need of higher research and development in agriculture sector to fulfill the current need of food require by the population of Pakistan. Due to floods, land erosion is increasing so in the way Pakistan depends on other countries. India is having the second largest population of the world while the Govt. of India distributes subsidized food to the population to fulfill the target of First millennium development goal. India also gives some cash to the population this policy is also the part of to ensure the food security act of India. The food security crisis is totally depending on trade there is a need for investment in agriculture sector in developing nations and restricted trade is significant for developing nations, there must be some rules and regulations or negotiations on which are used or implemented by the Govt of the country. After the Doha round, some policies were introduced which depends on cash aid to the small farmers for increasing their production and for becoming independent. In Pakistan major natural resources are land and water where the demand of food, clothes and shelter is increasing due to continuous increase in population and the natural resources are being polluted at high rate due to excess use in the use of fibers or fossil fuels.

More than 90% of rice and 43% of wheat in the world are produced in Asia and also consumed in Asia, but after that there is no little improvement in rural poverty in Pakistan. 35 million of rural people were remains poor infant mortality per 1000 live births in 82 in Pakistan, but only 62 in India and 56 in Bangladesh and just 12 in Sri Lanka. Food insecurity in Pakistan is interlinked with poverty and adequate availability of food 1987 to 2007 decades shows that one third of the households were living below the food poverty line and they did not meet the requirements of foods (agriculture and food security in Pakistan).

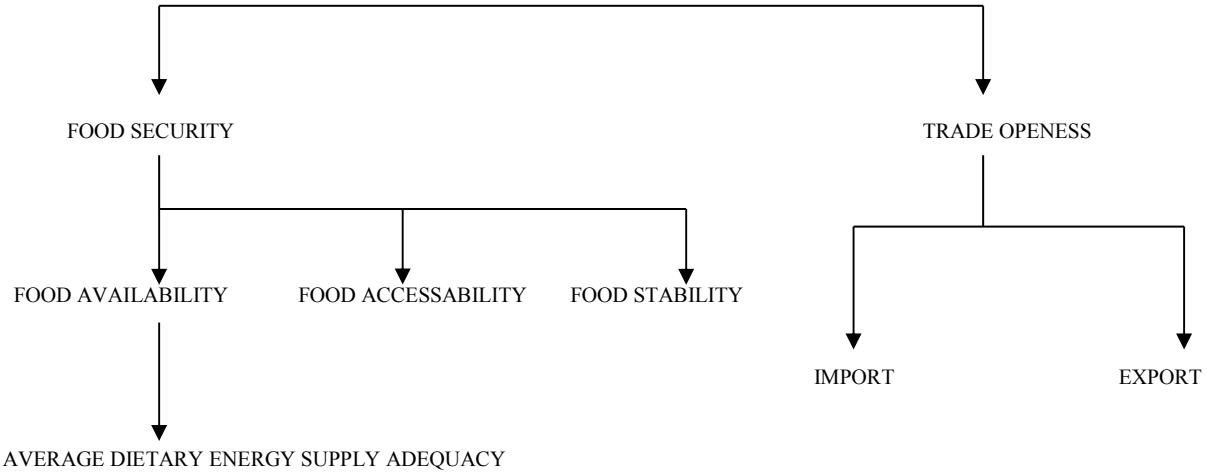
According to theory, food insecurity increases at early stages of international trade due to imported products, which are available at higher prices but after that stage at some level international trade improved the food security of individuals at national level. At first Trade has negative impact on food security which is described by industries of the importing country may shrink due to availability of cheaper quality imports and the production sector has also negative impact on food security after some threshold level trade expansion may improve food security in other words when participating in world markets through international trade on the base of comparative advantage improved the food security in countries markets (Kang 2015).

Trade liberalization can increase the availability of food at country level (Bishwambher et al 2006), secondly trade reduced poverty and generate income for the people. New techniques and rules for achieving standards of international trade play a positive role to improve the condition of food security at country level (Tjaart, 2003).
Globalization mayhurt the poor after threshold level globalization reduces poverty in developing countries & Agénor used non-linear functional form which showed that there is an inverted u-shaped relation between globalization and poverty. Trade liberalization in agriculture sector is necessary to improve the situation of food security and trade problems badly affect the food availability and food security. (Arild et al, 2015). So, this study aims to check the relationship between food security and international trade for the most populous South Asian country's (Pakistan, India, Bangladesh). It aims to check the presence of kuznet curve for Pakistan and South Asian countries.

MATERIALS AND METHODS

Availability is an important or a major dimension of food security, supplying enough food to the entire population is a necessary condition to ensure the individuals adequate access to safe and nutritious food. The availability dimension depends on many other indicators of food security first is Average Dietary Energy Supply Adequacy that is the percentage of average energy supply requirements of the population. ADESA requirements increased from 114 to 120 at globally during last 20 years. In most countries or region's availability of food is interlinked with low prevalence of undernourishment & high food availability does not ensure the high food security in a certain country or region. Average dietary energy supply adequacy is a new approach to measure the state of food security at national level and Average dietary energy supply adequacy is in percentage form.
Pigka-Balanika analyzed the impact of trade openness on economic growth; trade openness is measured by various other ways: first is trade share measure which is explained by import plus exports divided by GDP (M+X/GDP). It is the most commonly used in large no. of studies. In this study, trade openness is representing by (M+X/GDP) as an independent variable. Empirical analysis is done for Pakistan in first part and for the most populous south Asian countries like Pakistan, India and Bangladesh.

ADESA= f (TRADE, TRADE^2)



International trade and Average dietary energy supply adequacy data is collected from 1990 to 2014 on annual bases.

RESULTS

Trade openness (Trade), square of Trade openness ($\boldsymbol{Trade^2}$)and Average dietary energy supply adequacy (ADESA) are stationary at level so ordinary least square (OLS) method can be used to estimate the coefficients. The relationship between these variables can be written as (Kang, 2015):

$$ADESA = \beta_0 + \beta_1(Trade) + \beta_2(Trade^2) + \mu \quad (1)$$

Where TRADE shows the sum of imports and exports divided by GDP and $TRADE^2$ shows the square of the TRADE variable.

This analysis is done for Pakistan and data is taken only for Pakistan. The results are shown in table 1.1 and are given in form of equation as:

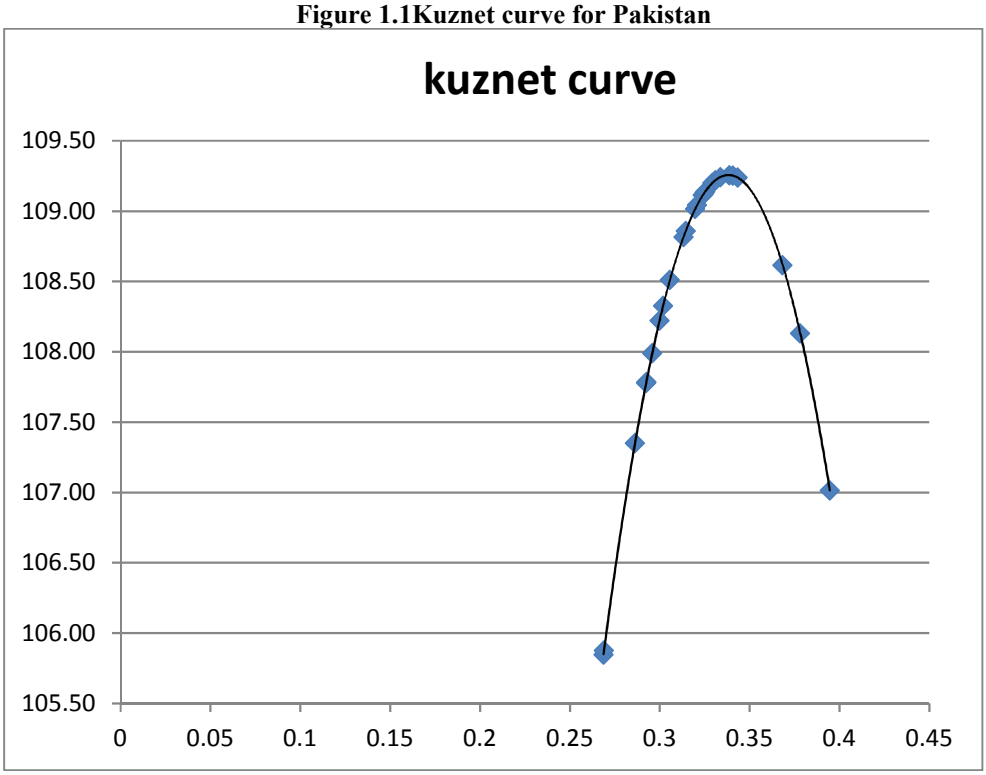
$$ADESA = \beta_0 + \beta_1(476.93) + \beta_2(-705.07) + \mu$$

The results in table 1.1 show if there is 1-unit increase in TRADE variable, then there will be 476.93 unit increases in Average dietary energy supply adequacy. It means that TRADE is positively related to ADESA. If there is 1-unit increase in $TRADE^2$ then there are705.07 unit decreases in ADES. It means that $TRADE^2$ is negatively related to ADES. Key findings of this study are $\beta 1>0$ and $\beta_2<0$ which indicates that there is an inverted u-shaped relationship between international trade and food security. R^2 is 0.213%, which showed that 21% variation in ADESA variable is explained by the TRADE & $TRADE^2$ variables. R^2 showed the goodness of fit of the model. Adjusted R^2 is less than the unadjusted R2, 0.1422<0.2137. Durbin Watson stat value is 0.499.

Table 1.1

Variable	Coefficients	Std. Error	T-statistic	Prob
C	28.60398	34.45075	0.830286	0.4153
Trade	476.9360	210.6320	2.264309	0.0338
(Trade) ^{2}	-705.0792	320.2944	-2.201347	0.0385
R-squared	0.212731	Mean dependent var	108.4000	
Adjusted R-squared	0.142252	S.D. Dependent var	2.160247	

Figure 1.1Kuznet curve for Pakistan



Above Kuznet curve is drawn from equation (1). There is an inverted u-shaped relation between international trade and food security that shows that at the initial stage, trade and food security increases, but after some breakeven point, international trade worsens the food security. As international trade starts, the state of food

security is improved in Pakistan so food security increases with the increase of trade and shows that there is a positive relation between international trade and food security till some breakeven point. However, after the break point, international trade worsens the food security that shows there is a negative relation between international trade and food security.

Table 1.2: Fixed Effect Model

ADES	Coef.	Std. Err	T-stat	P>|t|	95% confidence interval
TRADE	41.9872	5.3160	7.90	0.000	31.38452.589
$TRADE^2$	-55.464	12.3043	-4.51	0.000	80.00 -30.924
_Cons	96.8067	1.1661	83.01	0.000	94.48099.132
Sigma_u	5.8202				
Sigma_e	2.4546				
Rho	0.8489				

Corr (u_i, Xb) = -0.7459

Table 1.2 shows the results of fixed effect model for the most populous south Asian countries (Pakistan, India and Bangladesh). Coefficients of dependent and independent variables show that if 1 unit changes in TRADE then there are41.98 units positive change in Average dietary energy supply adequacy variable so there is positive relationship between TRADE and ADESA (see table 1.2). If there is 1-unit change in Trade square variable, then there will be 55.46-unitdecrease in dependent variable (ADESA) so there is negative relationship between TRADE square and ADESA. The P-value of all coefficients are less than 0.05 so, the TRADE and TRADE SQUARE variables have a significant impact of ADESA. At 95% confidence, t statistic is must be greater than 1.96 for the significance of TRADE & $TRADE^2$ variable. Rho value is.8488992, which showed that 84.8% variance, is due to characteristics across countries. $\alpha_1>0$ and $\alpha_2<0$.Which explains that there is an inverted u-shape relationship exists between international trade and food security.

HAUSMAN TEST.

To decide between fixed effect and random effect, the hausman test is needed to run. In hausman test, null hypothesis is that random is a preferred model and the alternative hypothesis is that fixed effect model is preferred. This test is used to checking that unique error terms (μ_i) are correlated with repressors with the entity and country or not. In our hausman test analysis **Prob>chi2 = 0.0000,**then we reject the null hypothesis random effect is preferred. In our results, fixed effect is preferred (see table 1.3).

Table 1.3 Hausman fixed random

	(b)	(B)	(b-B)	$TRADE^2$ (diag(v_b-v_B))
	Fixed	Random	Difference	S.E
TRADE	41.9872	14.3876	27.5996	2.20259
$TRADE^2$	-55.464	27.6201	-83.0850	9.7983

Conclusion

This study checked the effect of international trade on food security and constructed an inverted u-shaped relationship between trade openness and the state of food security. To test the relationship between international trade and the state of food security for Pakistan, ordinary least square method and fixed effect model are used for Pakistan and the most populous south Asian countries respectively. The results have the same trend for Pakistan as well as for the most populous south Asian countries. The findings showed that at the early stages, trade and food security increases till the thresh hold level after that trade negatively affect the food security due to trade expansion domestic industries are shrinking and the supply of food is not enough the feeding the entire populations of a country. There is an Inverted U-shaped relation between international trade and the state of food security for Pakistan. Results are same in both time series and panel data analysis. $\beta_1>0$ and $\beta_2<0$ which implies that the value of β_1 is greater than zero and the value of β_2 is less than zero, it can be negative that shows the relationship between international trade and the state of food security. International trade is not directly affecting the food security, but here is a chain of variables which affected by the trade openness. The major findings of this study are to develop the inverted U-shaped relation between international trade and the state of food security in Pakistan. Availability of food is a major dimension of food security and food availability at country level is affected by the trade openness.

Policy Recommendations

Some policy recommendations can be taken in the light of results based on the econometric analysis of the data for international trade and state of food security in Pakistan.

- Policy makers should pay attention on agricultural productivity and try to make countries self-sufficient by increasing the investment in agriculture sector.
- Increased agricultural production can control the volatility in food prices and improves the welfare of the farmers and consumers of the country.
- Trade should be restricted by the Govt. of Pakistan, which is adversely affecting the food security after the expansion of trade openness.
- The Government should give subsidies or special offers to the domestic industries of the country.
- Availability of food is also a major component of food security, which must be directed by the Govt.

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