

AN ANALYSIS OF EXPORT OF INDIAN AGRICULTURE COMMODITIES

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Abstract

The present work has attempted to examine the relationship between agricultural export and the effective factors influencing the same relationship in India. The review of literature has provided an overview of growth of agricultural exports across the countries and different methods used to calculate the export supply function of agricultural products. This study is based on the neoclassical trade theory which is evaluated in a neoclassical production function framework, incorporating an additional factor of production (exports) into the production function.

The study has attempted to analyze the long run and the short run relationship between agricultural exports as dependent variable and exchange rate, export price index, gross domestic product and domestic production of agricultural product as independent variables based on annual data during 1980- 2010. Also, World Trade Organization as a dummy variable has been taken as a determinant of India's agricultural exports.

The autoregressive distributed lag model and error correction model are used to determine the long run and short run relationship between the variables. Further, paired t-test is used to investigate the impact of WTO on growth of agricultural export in India. Dynamic econometric model is estimated to test for time series properties, unit root test and co-integration (ARDL procedure).

The results of co-integration test showed that the variables are co-integrated. The results of long-run estimated coefficients of export supply function showed that exchange rate had a statistically significant and negative impact on agricultural export. The long-run coefficient of domestic production of agricultural product and export price index have positive sign and are significant at 5% level respectively. The long-run coefficients of Gross Domestic Product (GDP) and WTO as dummy variable had positive and negative sign respectively but are insignificant. In brief, the coefficient of the ECM is very high at (-) 0.54 implying a fairly high speed of adjustment to the long-run disequilibrium after a shock. The Coefficient of the ECM term suggested that adjustment process was fast and 54% of the previous

year's disequilibrium in equity prices from its equilibrium path will be corrected in the current year. It is also observed that dummy variable is not significant in long run but it is statistically significant in short term.

Key words: *agricultural exports, production function, Gross Domestic Product, WTO*

Introduction

Agricultural development is critical to developing countries, especially to the least developed of them. Although agriculture still remains the largest employer, the largest source of exports and foreign exchange earnings for the most developing countries its contribution to GDP is declining gradually. About 75 percent of population below poverty line in the worldwide resides in rural areas and most of them are dependent on agriculture. While agriculture declines relative to the rest of a growing economy as incomes improves, its growth is absolutely critical in the early stages of development and it can often drive export-led growth. But whatever the stage of development is the socioeconomic stability of a nation is determined by prosperity of agriculture sector.

A vibrant agricultural sector is therefore crucial to reducing poverty through economic growth, as well as improving global food security and conserving natural resources. Agricultural trade reform, to better integrate this sector into global markets is equally crucial to developing countries for a number of reasons. Agriculture has the highest levels of trade distortions and therefore has the greatest potential for gains from reform. And domestic reforms are necessary to implement trade reforms to benefit developing countries more than developed countries.

In recent years, agricultural protection and its impact on developing countries have attracted growing attention. While manufacturing protection has declined worldwide following substantial reforms of trade policies, especially 2 in developing countries, most industrial and many developing countries still protect agriculture at high levels. Agricultural protection continues to be among the most contentious issues in global trade negotiations, with high protection in industrial countries.

India has a large and diverse agricultural forte and is one of the world's leading producers of agricultural product. It is also a major consumer, with a growing population to feed. For this reason and because of its agricultural and trade

policies, its presence in the world market has been modest in relation to the size of its agriculture. While it has been a small net agricultural exporter overall since 1990, in recent years there have been many changes in its agriculture and trade policies and significant changes in its net trade position for many individual products.

Of late, development of exports of non - oil products have become one of the main objectives of economic development in India. Exports of agricultural products are the main part of exporting non - oil products in India, so agricultural products play a crucial role. It is necessary to consider sustainable development of all the sectors in India. Promotion of export of agricultural products is important in creating jobs and is a source of: income in the agricultural sector. It also can bring in foreign exchange to add to the economy.

This study proposes to use the regression model to analyze the growth of agricultural export in India by using time series data during the period 3 1980-2010. The most important factors of export supply of agricultural product are export prices index, exchange rate, quantity of domestic products, Gross Domestic Products (GDP) and dummy variables (WTO's Agreement on agriculture (AOA)). For this purpose, export supply functions were used to determine the relationship between export supply and independent variables, over the pre and post WTO period. Also, Trends in agricultural exports in India during 1980-2010 was considered. Finally, the empirical results of unit root tests and co-integration analysis for variables have been described, followed by a summary of the results and conclusions

Objectives of the Current Study are to:

1. Examine the agricultural export policy of the government during pre and post WTO.
2. Comparing the structure and growth of agricultural exports in India during pre and post WTO period.
3. Examine the determinants of agricultural export since WTO.
4. Estimate the export supply functions for agricultural products in India.

Hypothesis

To achieve the above objectives following hypotheses are formulated:

1. There is positive relationship between GDP and export supply of agricultural products in India.
2. Positive correlation exists between domestic production and export supply of agricultural products.
3. Exchange rate has no impact on export supply of agricultural products.
4. Export price index and export supply of agricultural products are positively related.
5. There is short run relationship between exchange rate, quantity of domestic production, export price index, GDP, dummy variable and agricultural export.
6. WTO has positive impact on export supply of agricultural products.

Research Methodology

The present research work is based on time series data from 1980 - 2010. The required data have been collected directly from Reserve Bank of India (<http://www.rbi.org.in>), Food and Agriculture Organization of the United Nation (<http://faostat.fao.org/>), World Bank (<http://worldbank.org>) and Central Farm Machinery Training and Testing Institute (<http://dacnet.nic.in/>) websites. The literature relating to the research work is taken from published articles, books and other Government reports. The literature relating to the research work has been taken from published articles, books and other Government reports.

In this study India's agricultural products Include Rice basmati and non-basmati, cashew, wheat, tea, sugar, spices, onions, coffee and tobacco.

This study has investigated the relationship between export prices index, exchange rates, and quantity of domestic products, Gross Domestic Products (GDP) and agricultural exports in India. Also World Trade Organization (WTO) as a dummy variable is taken as determinant of India's agricultural export. In this research work annual data are used in order to estimate the export supply function for India's agricultural products.

The aim of the research is to identify effective factors of export of agricultural products in India. Theoretical principles of export supply functions relying on the

techniques of econometrics, especially least linear square method, with the calculation of partial elasticity of export supply of agricultural product in India.

Collected data are analyzed for functions estimation mentioned using software packages such as Eviews, Microfit4, SPSS and Excel Software of MS Office. The model has utilized the following techniques to explain the objectives and to test the hypotheses.

- 1) Unit Root test
- 2) Co integration test
- 3) Autoregressive Distributed Lag mode
- 4) Error Correction Model
- 5) Paired t-test.

Findings and Suggestions

This work has employed various econometrics techniques to examine and explain the growth of agricultural export in India during pre and post WTO. Another purpose of this study was to examine the long run and short run relationship between export price index, quantity of domestic production of agricultural product, exchange rate, gross domestic product, WTO (as dummy variable) as independent variables and quantity of agricultural exports as dependant variable. The time series data for 31 years are applied for analyzing the growth of agricultural export and its determinant variables in India.

Drawing on various arguments given by the different authors such as Narayanan (1992), Nagoor (2009), Kathuria (1996), Nidugala (1999), Veeramacheneni (2008), Benerjee (2006), Karnool (2007), Ejaz (2009), Bashir (2003), Sanday (2002), Yang (2005), Cota (2005), Umar (2010), Aydin (2004), Doyle (2001), Zibae (2004), Muchapondwa (2009), Yousef (2007) and Sutijo (2009) regarding the agricultural export and the effective determinant factors, this thesis analyzes India's case. An attempt has been made to trace the effect of WTO on growth of agricultural export.

Findings

The main objective of this study was to examine the determinants of

agricultural export in India since WTO using annual data for the period 1980-2010. Time series techniques were used to estimate the export supply function for agricultural export in India. Four time series techniques were used: unit root test, cointegration test, autoregressive distributed lag model and error correction model. The result of unit root test indicated that all variables except GDP and export price index were stationary at first difference. Export price index was stationary at level and GDP became stationary when second difference was used.

The results of co integration test showed that the F statistic was 5.1071 and was higher than the upper bound at 1% and 5% level of significance, thus the variables were co integrated. So there was a long run relationship among the variables, namely export price index, gross domestic product, exchange rate and domestic production which determined agricultural exports.

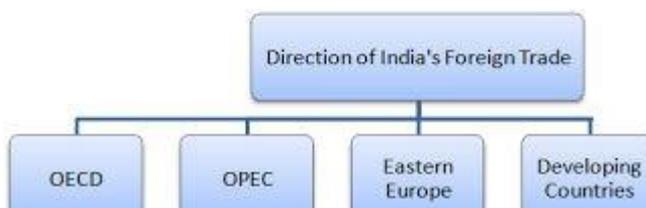
The value of determination coefficient was 0.99 which indicated that the 99 percent of agricultural exports explained changes of dependent variables such as export price index, gross domestic product, exchange rate and domestic production. F statistic was also significant at 1% which indicated overall goodness of fit.

The results of long-run estimated coefficients of export supply function showed that exchange rate (ER) had a statistically significant and negative impact on agricultural export i.e., one percent increase in exchange rate can lead to 0.79 percent decrease in agricultural export. The long-run coefficient of domestic production of agricultural product (QP) and export price index (PI) have positive sign and are significant at 5% level i.e., one percent increase (decrease) in domestic production of agricultural product and export price index can lead to 0.71 and 1.84 percent increase (decrease) in agricultural export respectively. The long-run coefficients of Gross Domestic Product (GDP) and WTO as dummy variable (D1) have positive and negative sign respectively but are insignificant. On the other hand, for the export supply of agricultural product, with the exception of Gross Domestic Product (GDP) and dummy variables, all other variables are significant and the coefficients are consistent with a priori expectations too.

The results of Granger causality test showed that there is no significant relationship between growth of agricultural exports and GDP growth rate in the pre WTO period. In Other words, both the variables do not cause each other in either direction. While there is significant relationship between growth of agricultural exports and GDP growth rate in the post WTO period. In the post period, Export growth does Granger cause GDP growth but GDP growth does not Granger cause growth of agricultural exports.

The results of long-run estimated coefficients of export supply function showed that the coefficient of the ECM is very high at (-) 0.54 implying a fairly high speed of adjustment to the long-run disequilibrium after a shock. The Coefficient of the ECM term suggests that adjustment process was fast and 54% of the previous year's disequilibrium in equity prices from its equilibrium path will be corrected in the current year. It is also observed that dummy variable is not significant in long term but it is statistically significant in short run.

The results of deceptive statistic of India's direction of trade showed that India's agricultural exports are broadly divided into following four groups.



The group of countries to which India agricultural exports are:-

1. Organisation for Economic Co-operation & Development (OECD) comprising of USA, Canada, European Union (EU).
2. Organisation of Petroleum Exporting Countries (OPEC) which includes Iran, Iraq, Saudi Arabia and others.
3. Eastern Europe which includes Russia and others.
4. Developing Nations which includes Singapore and others.

Direction of India's agricultural Exports:

Countries	(1990-1991) % of total	(2000-01) % of total	(2009-2010) % of total
OECD	17.24	42.71	34.47
OPEC	20.80	34.72	54.82
EASTERN EUROPE	60.44	15.37	7.24
Developing countries	1.52	7	3.47
Total	100	100	100

Sources: Directorate General of Commercial Intelligence & Statistics

Table reveals following changes in India's agricultural exports:-

1. The share of OECD was 17.24 % in 1990-91 and 34.47 % in 2009-10. About 46.53

% of these exports have been to European Union (EU) countries.

2. The share of OPEC which was 20.80 % in 1990-91.

3. In 2009-10 it has increased to 54.82 %

4. There was a rapid decrease in the share of Eastern Europe particularly U.S.S.R. Due to political problems and disintegration of the U.S.S.R, the share of Eastern Europe decreased from 60.44 % in 1990-91 to 7.24 % in 2009-10.

5. The share of developing nations increased from 1.52 % in 1990-91 to 3.47 % in 2009-10. Among the Asian countries the major export destinations have been Hong Kong, Singapore and Thailand.

The results of deceptive statistic also revealed that the average of Agricultural exports growth was 2.41 percent in pre WTO which increased to 13.78 percent in the post WTO regime. The global agriculture trade regime under the World Trade Organisation (WTO) has led to an increase in the import of farm products into India rather than boosting exports. This favourable trend in the initial years of the WTO did not last long and the next three years witnessed a whopping rise in imports and a slight decline in exports. The study attributes the slow-down on agro-exports and sharp rise in imports to the decline in global prices of almost all major agriculture commodities after 1997. This crash was due partly to the cyclical nature of international prices and partly due to increased global competition in agro-export because of liberalising trade. The situation was aggravated by an increase in the already high farm subsidies in the developed countries.

Result of hypotheses testing

The Autoregressive Distributed Lag Model (ARDL) developed by Pesaran (1996, 2001) was taken as the theoretical framework for undertaking empirical work on the estimation of export supply function in India. In the empirical investigation of the supply function of agricultural export in India, cointegration, error correction approaches have been applied. The results of regression model are summarized in table.

Table: The result of hypothesis testing						
Hypothesis	Hypotheses	Methodology			Result	
		Statistical model	coefficient t	t-ratio		
I	Export price index and export supply of agricultural products are positively related.	Autoregressive distributed lag model	0.71009	2.8110	Accepted	
II	Positive correlation exists between domestic Production and export supply of agricultural products.	Autoregressive distributed lag model	1.8427	2.5769	Accepted	
III	Exchange rate has no impact on export supply of agricultural products.	Autoregressive distributed lag model	-0.78922	-5.2471	Rejected	
IV	There is positive relationship between GDP of India and export supply of agricultural	Autoregressive distributed lag model	0.37233	0.75505	Accepted	
V	There is short-run relationship between exchange rate, quantity of	Error correction model	-0.53554	-5.6031	Accepted	
VI	WTO has positive impact on export supply of agricultural products.	Autoregressive distributed lag model	Long run	-0.15053	-1.063	Rejected
			Short run	0.342	3.68	Accepted
		Paired t-test	-5.294		Accepted	

Source: Research findings

The six hypotheses have been examined to present the relationship between India's agricultural export and macroeconomic variables. According to table (7.2), the result of ARDL model shows that the first hypothesis has accepted so the export price index and export supply of agricultural products are positively related. Also based on this model, the second hypothesis proves that Positive correlation exists between domestic production and export supply of agricultural products. The third hypothesis shows that there is negative relationship between exchange rate and quantity

of agricultural export in India. The fourth hypothesis shows that there is positive relationship between GDP of India and export supply of agricultural products. Based on error correction model, the fifth hypothesis has accepted, therefore there is short-time relationship between exchange rate, quantity of domestic production, export price index, GDP, dummy variable and agricultural export. Finally, the six hypothesis shows that WTO has positive impact on export supply of agricultural products in India.

Policy Suggestions

Developing countries have no alternative but to agree with this new arrangement of trade. Though WTO has given special status to the developing countries by giving concessions and extra time to full fills their commitments, yet the global economic scenario is not in favour of them. Most of the developing countries are not keen on fresh negotiations as they feel that the WTO agreement has not given them the benefits that were promised to them. The use of collective bargaining power by the developing countries is the only way out to protect their interest at WTO. The exports of India can benefit only in this way.

The growth of agricultural exports has shown that it has long run and short run relationship with its major determinants of the export price index, gross domestic product, exchange rate and domestic production of agricultural products in India. Therefore, the process of agricultural exports development in the country will be based on the nature and stability of all macroeconomic variables that are considered in this research and the policy suggestions for them are as follows:

I) Regression analysis shows that there is positive relationship between GDP and export supply of agricultural products in India. So, any increase in real GDP would have a positive impact on the growth of agricultural exports in the long run. Therefore, India provides the evidence of growth-driven exports over the sample period. The Government of India and other policy-planning bodies should devise prudential norms and policies to make the macroeconomic fundamentals of the country strong enough to absorb the external shocks thereby achieving a fast growth of real economic variables to ensure a noticeable surge in the country's exports. In this direction, increasing domestic and foreign investments in key areas and ensuring price, interest rate and political stabilities would go a long way.

II) Positive correlation exists between domestic production and export

supply of agricultural products. Thus there is need for the Government to continue promoting manufacturing. Furthermore India has large potential in improving its agriculture sector as well as export sector. As the country has considered agriculture as the back bone of its economy, major policies are required for the agriculture sector to contribute more in the economic growth including agricultural experts. The government should support farmers through training agriculture. Extension services, hard and soft infrastructure, subsidies, agricultural inputs and etc. Proper execution and governance of agri- development policies and etc. go a long way in increasing of productivity as well as exports.

III) Regression analysis shows that the exchange rate has a negative impact on export supply of agricultural products. In fact, in the era of devaluation, the authority in India used to place export as one of the foremost reasons of devaluing local currency against US\$. For India's agricultural export to be price elastic, policies that help increase the share of domestic goods in exportable commodities by the expansion of production base and that help diversification of the pattern of the export items should be prioritized. For improving the export earnings, India should adopt policies with the aim to maintain a stable competitive real exchange rate. In this direction, need is to establish a transparent exchange rate system under which the stability of the real exchange rate is achieved and maintained, and 'getting the exchange rate right' should be the essential part of the overall trade and economic growth strategy.

IV) Regression analysis also shows that the Export price index and export supply of agricultural products are positively related. An examination of the coefficient of variation in the domestic and world prices shows that the domestic prices are more fluctuating than world prices. Hence there is no fear of volatility being transmitted to the domestic prices in opening up of trade. As it is seen that price policy has not been effectively implemented and that there has been an increase in trade volume of those commodities which showed a decline in the coefficient of variation in domestic prices. The external trade is more useful in reducing price instability in the domestic agricultural markets in India. Therefore a comprehensive domestic agricultural price policy and proper implementation can reinforce the positive externalities of agricultural exports in the post liberalisation era.

V) Regression analysis shows that WTO has no significant effect on export supply of agricultural products in the long run in India. But t-test proves

there is significant difference with regard to effect of WTO on growth of agricultural export during pre and post WTO regime. Its reason being, the big standard deviation of agricultural exports growth before WTO than after WTO. So, the policy maker should find out the linkage of the export of different commodities in the domestic economy for stability situation on export strategy till it has positive effect on agricultural export and trade in the Indian economy.

VI) The result of error correction model shows that WTO has positive impact on export supply of agricultural products in short run. So, this research has revealed that the government should continue the World Trade Organization policy focusing on trade, market access, export subsidies and domestic support to earn more benefits of trade with other countries.

The changing scenario of Global agriculture, especially agricultural trade in the post-WTO regime is much challenging for developing countries like India. The Indian agriculture sector as well as world agriculture are in the midst of tumultuous changes brought about by a number of internal and external factors.

Limitations

The first limitation of the study is when the unit root tests were conducted, some variables were tested as being non-stationary in levels, but they became stationary after they were transformed into First and second-differenced data. Moreover, because there was a mixture of $I(1)$, $I(0)$ and $I(2)$ variables, using panel cointegration analysis may not be possible because it is required that all variables have the same level of integration. Data limitations do exist on agricultural exports in FAO website especially before 1994.

Conclusions

This research work has analyzed the growth of agricultural exports in India during pre and post-world trade organization. The review of literature has provided an overview of growth of agricultural exports across the countries and different methods used to calculate the export supply function of agricultural products. The regression model of this work has been estimated based on neo-classical trade theory. The econometrics techniques such as autoregressive distributed lag model

and error correction model has been used to determine the relationship between India's agricultural exports and macroeconomic variables.

This research work has analyzed the growth of agricultural exports in India during pre and post-world trade organization. The review of literature has provided an overview of growth of agricultural exports across the countries and different methods used to calculate the export supply function of agricultural products. The regression model of this work has been estimated based on neo- classical trade theory. The econometrics techniques such as autoregressive distributed lag model and error correction model has been used to determine the relationship between India's agricultural exports and macroeconomic variables.

Considering quantity of agricultural export as dependent variable and macroeconomic variables such as exchange rate, gross domestic product, export price index, quantity of domestic production of agricultural products and world trade organization (dummy variable) as independent variables, an attempt has been made to analyze the growth of agricultural export in India. The results show that there exists a long-run and short-run relation between agricultural exports and its determinants and also WTO does not have a positive effect on agricultural exports in the long run but it has positive effect on it in the short run, also paired t-test has confirmed that WTO has positive effect on growth of agricultural exports in India.

Agricultural exports policy of the government should be accompanied by such policies by which it would reinforce the spread effects and neutralize the backwash effects. This calls for a synergetic approach, integrating and coordinating the policies pertaining to macroeconomic variables towards maximizing the benefit of world trade organization. Such empirical studies would provide the most needed base for policy direction.

BIBLIOGRAPHY

1-"Agricultural Statistics at a Glance", Directorate of Economics and Statistics, Department of Agriculture and cooperation, Ministry of Agriculture, Government of India, New Delhi, (2011).

2-Ahmad, J., & Hanhirun, S. (1996) Cointegration and Causality between Exports and Economic Growth: Evidence from ASEAN Countries, *The Canadian Journal of Economics*, Vol. 29, S413 - S416.

3-Abolagba, E.O., Onyekwere, N.C, Agbonkolor, B.N. and Umar, H.Y (2010), determinants of agricultural exports, *J Hum Ecol*, 29(3): 181-184 (2010).

4-Anderson, K., Huang, J. and Janchovichina, E. (2003), Long-run Impact of China's WTO Accession on Farm Non-farm Income Inequality and Rural Poverty. Policy Reserve Working Paper 3052, Economic Policy Division, World Bank, Washington, D.C.

5-Bashir, Z. and M.-u. Din (2003). "The Impacts of Economic Reforms and Trade Liberalisation on Agricultural Export Performance in Pakistan [with Comments]." *The Pakistan Development Review*, 42(4): 941-960.

6-Bhalla, G.S. (2004), "Globalisation and Indian Agriculture", Academic Foundation Publication, New Delhi.

7-Brodjol, S. (2009) cointegration approach on estimation model of export and import agricultural product, Sepuluh Nopember Institute of Technology, brodjol_su@statistika.its.ac.id.

8-Bustman, A. and Jayanthakumaran, K. (2006), The impact of exchange rate volatility on Indonesia's exports to the USA: An Application of ARDL Bounds 175 Testing Procedure. Working Paper in Economics and Development Studies, 4 (5): 1-34.

9-Chand, R. (2006), International Trade, Food Security and the Response to the WTO in South Asian countries. Research Paper No. 124.

10-Chand, R. (2005), "India's Agro Export Performance and Competitiveness in Changed International Scenario" in Hanumantha Rao, C.H. Bhattacharya B.B. and Siddharthian N. S. (Editors), *Indian Economy and Societ*, Academic Foundation Publication, New Delhi.

11-Chand, R. (2004). "Impact of trade liberalization and related reforms on India's agricultural sector, rural food security, income and poverty." *Global Development Network*.

12-Chakrabarty, P. (2006), "Agriculture Sector: Trend in Export and Import", in *Beyond the Transition Phase of WTO: An Indian Perspective on Emerging Issues*, (editors) Dipankar Sengupta, Debashis Chakraborty and Pritam Banerjee, Academic Foundation Publication, New Delhi, pp.129-137.

13-Dass, S. R. (1991), "Economic Aspects Of International trade in coffee", Indian journal of Agricultural Economics, Vol. 46(2):142-151.

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