

STUDY OF DOMINO EFFECT OF INTERNATIONAL TRADE, ECONOMIC GROWTH AND ENVIRONMENTAL QUALITY WITH REFERENCE TO INDIA

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Abstract

One of the most debatable issues surrounding globalisation is the concern that trade hurts the environment, both locally and globally. Economists argue that expanding trade from domestic market to international market not only increases market share of each country but also rising competition among the nations and improve efficiency of utilising scarce resources because each country produces those goods in which she has comparative advantages. Openness to trade and investment can provide a country with the incentive to adopt, and improve access to new environmental technologies. But on the other hand, environmental economists have opposed global trade and argue that the costs of spreading trade to international markets are depleting natural resources and rising pollution emissions that ultimately deteriorates environmental quality. India accounted for 1.7% of the global trade in goods with the major export of Gems and Jewellery, Textiles, Rice, Leather, Electronic goods, Petroleum products etc. and major import of Petroleum oil and lubricants, Pearls, Precious stones, Organic chemical, Fertilizers etc. This paper investigates the multiple effect of trade liberalisation on the environment namely; scale effect, composition effect and trade effect by using simultaneous equation and Johanson-Juselius co-integration technique, run on different trade, economic and environmental variables. Further, the study results strongly evident that trade liberalisation have multiple effects on emission growth. First, improvement in the relative price of export to imports does appear to cause increased emission growth. Hence, the composition effect of trade liberalisation appear detrimental to environmental quality. This study also indicates that increased openness significantly raises the growth of income, which leads to a reduction in emissions growth. Second, the technique effect of income growth, generated by trade liberalisation, appears beneficial to the environment. In continuation, this study suggested that freer trade aggravates environmental damage via terms of trade, but mitigate it via income growth so implementation of Govt. Policy and timely follow up for the same must be done.

Key Words- Emission Growth, Trade Liberalisation, Environmental Pollution, Natural Resources.

INTRODUCTION

One of the most debatable issues surrounding globalisation is the concern that trade hurts the environment, both locally and globally. Economists argue that expanding trade from domestic market to international market not only increases market share of each country but also rising competition among the nations and improve efficiency of utilising scarce resources because each country produces those goods in which it has comparative advantages. But on the other hand, environmental economists have opposed global trade and argue that the costs of spreading trade to international markets are continuously depleting natural resources and rising pollution emissions, ultimately deteriorates environmental quality. There is a conflict among economists, as environmental economists argue that pollution control and natural resource management issues are neglected in trade policy. Further, new scenario of economy raises competition among the nations and they encourage export led growth, privatisation, deregulation of industries and free trade. All these factors played important role while determining social structure. It has led to the collapse of social systems, increased social inequities, conflicts, displaced populations and

increased migration. It has shaped a development model of production and consumption with far reaching impacts on the physical environment worldwide [Bhagwati (1999)].

On the other hand, some economists claim that trade can be beneficial for environment because trade raises competition by fewer trade barriers the level of income increase among the partner countries resulting in more demand of cleaner technologies , improved quality of product and implementation of environmental regulations. Further, trade led growth improves standard of living of the developing countries as well as environmental quality. In this endless debate environmentalists argued that trade liberalization is bad for the environment, as it has led to countries with lax environmental standards, in some instances, having a comparative advantage in the global marketplace. This argument is linked to the pollution-haven hypothesis, which suggests that trade liberalization allows firms to take advantage of cross-country differences on environmental regulations, and that falling trade barriers induces pollution-intensive industries to relocate to countries with weaker environmental regulations.

In India population growth and impressive GDP growth have put pressure on the country's natural resource base and significantly increased the level of pollution. Trade liberalisation was done in 1991 under the recommendation of then finance minister Dr. Manmohan Singh. India's trade policy has also been moving towards more openness; fewer controls and steadily the tariff rates have tumbled down. Rapid expansion in industrial production and urbanisation have led to increased levels of waste water pollution, solid waste, and vehicle emissions that have resulted in serious health problems in many areas of the country.

The theoretical researches indicate trade liberalisation can affect pollution in three ways technique effects, composition effects and scale effects [Antweiler, et. al. (2001)]. In the case of the latter, pollution or emissions are the by-product of production and consumption, and increases in the scale of economic activity may definitely affect pollution. Technique or method effects involve the use of different methods of production that have different environmental impacts due to the possibility of substitution between different inputs. Composition effects arisen from the fact that each good has its own polluting tendency. The composition of traded goods therefore can determine the extent of pollution in any given society.

This paper is divided into two sections. Section I, discussed the theoretical Issues of trade liberalisation and the issues of green environment. Further, section II, deals with analysis, empirical results with conclusion and suggestions.

OBJECTIVES OF THE STUDY

- To find out the pollution effects like scale, composition and techniques effects of trade liberalisation with reference to India.
- To examine the linkages between economics and environmental variable namely; trade liberalisation, economic growth and environment.
- To investigate the impact of trade liberalisation on Green environment since 1991.
- To suggest some economic measures to reduce the pressure of trade on green environment.

SECTION-I

THEORETICAL ISSUES OF TRADE LIBERALISATION AND THE ENVIRONMENT

Hecksher-Ohlin theory of trade postulates that trade arises because of the differences in productivity of labour and capital. The basis for trade arises because countries are endowed with different factor supplies. Factor prices will differ so do domestic commodity price ratios and factor combination. So this theory is explaining why LDCs are into the production and export of labour- intensive commodities.

Hecksher-Ohline Samuelson model shows how an increase in price of a commodity can raise the income of the factors of production which are used more intensively in its production. Samuelson's factor price equalisation theorem postulates, free trade offers a substitute for the free mobility of factors of production leading to the movement of factor of production from place of excess to relative scarcity, movement of polluting industries from their home countries to developing where environmental standard are lax (pollution heaven hypothesis).

Antweiler, et. al. (2001) decomposes the full impact of trade liberalisation on composition, scale and technique effect. These 3 effects interact to determine the environmental effects of trade. As per the H-O-S Model when domestic price approaches the world price and production is increased as it moves to a point where revenue increase and real income raises as a result of this production technologies will changes. If the technique effect can overwhelm the combined scale and composition effects the trade liberalisation for a dirty good leads to less pollution. The present study investigates the impact of trade openness on pollution.

COLLECTION OF DATA AND RESEARCH METHODOLOGY

Trade intensity or openness is considered to be equal to trade as percentage of GDP in year t. The composition effect is defined by Kt/Lt . Kt represents Gross capital formation in year t as a percentage of GDP and Lt is labour force participation rate as a percentage of total population. Real gross domestic product per square kilometre (Real GDP/Area) defines the scale of economic activity and technique effect is measured by real GNP.

This model is specified as:

$$AP_t = \beta_1 + \beta_2 OT + \beta_3 CE + \beta_4 SE + \beta_5 TE + \mu_t$$

OT = trade intensity or trade openness

CE = K/L (Composition Effect)

SE = $RGDP/Area$ (Scale Effect)

TE = $RGNP$ (Technique Effect)

AP = Carbon dioxide emission (kt) (Air Pollution).

All the data are collected from World Bank Data series and RBI handbook of India.

ECONOMETRIC MODELLING AND PROCEDURE

This paper describes the impact of trade liberalisation on environment degradation in following ways:

1. To examine wheater a time series have a unite root, this paper has used Augmented Dickey-Fuller (ADF) unit root test.
2. Johanson's multiple co- integration tests have applied to find out the long run relationship.
3. Once the variables are found cointegrated, that is long run equilibrium relation between them, in short run there may be incremental fluctuations. Therefore we estimated, to determine the performance of nation in collected time series data with respect to pre set variable study use compound annual growth rate model.

Johansen procedure, can find multiple co-integration vectors. We have to estimate an unrestricted vector auto regression (VAR) of the form:

Let X_t be an I (1) vector representing the n-series of interest, A VAR of length ρ (rho) for X_t would then be of the form.

$$X_t = \sum_{j=1}^{\rho} \Pi_j X_{t-j} + \mu + \varepsilon$$

$t = 1, 2, 3, \dots, T$

Where the Π_j are matrices of constant coefficient, μ is an intercept; ε is a Gaussian error term and T the total number of observations. If rank (Π)= r ($r < n$) then cointegration is indicated (with r cointegrating vectors present) and further, in this case Π may be factored as $\Pi = \alpha\beta$, with the matrix β comprising the r cointegrating vectors. The matrix Π contains the information on long run relationship between variables. If the rank of $\Pi=0$, the variables are not cointegrated. On the other hand if rank is equal to one there exist one cointegrating vector and if $1 < r < n$ there are multiple cointegrating vectors. There are two tests for cointegration, namely trace test and maximum Eigen value test.

SECTION -II EMPIRICAL RESULTS AND ANALYSIS

The johansen co-integration method has been used in order to examine the long run dynamics of system. Augmented Dickey Fuller (ADF) was carried out on time series level and difference forms to establish the order of integration presented. Results are given below in table 1 which shows, all the variables have a unit root in their level and are stationary in their first difference. Thus all variables (OT, SE, CE, TE, AP) are cointegrated of order one I (1);

Table-1

TEST OF UNIT ROOT HYPOTHESIS				
VARIABLE	LEVEL		FIRST DIFFERENCE	
	t-stats	K	t-stats	k
OT	-1.98	3	-5.77	2
AP	-2.82	1	-3.12	1
CE	-1.30	2	3.00	1
SE	-1.00	1	3.96	1
TE	-2.02	2	-5.06	1

For presence of cointegration the data series are further check using Johansen maximum likelihood cointegration test of variables. Results are given below in table 2. Starting with the null hypothesis of no cointegration ($r = 0$) among the variables, the trace statistics is 118.8 exceeds the 99 per cent critical value the λ trace statistics (critical value is 96.6), it is possible to reject the null hypothesis ($r=0$) of no cointegration vector, in the favour of the general alternative $r \geq 1$. The null hypothesis of $r \leq 1$ $r \leq 2$, cannot be rejected at 5 percent of level of significance. Consequently, there is one cointegration relationship involving given variables of AP, OT, SE, CE, and TE.

On the other hand, λ max statistics reject the null hypothesis of no cointegration vector ($r=0$) against the alternative ($r=1$) as the calculated value $\lambda_{max} (01) = 59.10$ exceeds the 99 per cent critical value (42.4). Thus on the basis of λ_{max} statistic there are also only one cointegration vector. Both λ trace statistic and λ_{max} statistic show that there are also only one cointegration vector. The presence of cointegration vector shows that there exists a long run relationship among the variables.

Table -2

Johansen's Test for Multiple Cointegration Vectors Cointegration Test among (AP, OT, SE, CE, TE)

H0:	H1:	t-stats	95% Critical Value	99% Critical Value
λ_{trace}	λ_{trace}			
$r=0$	$r>0$	118.8	87.3	96.6
$r\leq 1$	$r>1$	59.89	62.9	70.1
$r\leq 2$	$r>2$	30.98	42.2	48.5
$r\leq 3$	$r>3$	8.51	25.3	30.5
$r\leq 4$	$r>4$	2.47	12.3	16.3
λ_{max} values	λ_{max} values			
$r=0$	$r=1$	59.10	37.5	42.4
$r=1$	$r=2$	28.90	31.5	36.7
$r=2$	$r=3$	22.47	25.5	30.3
$r=3$	$r=4$	6.03	18.9	23.7
$r=4$	$r=5$	2.47	12.3	16.3

We estimated separately the Compound Annual Growth Rate (CAGR) model for response variable AP, to determine the 27 year of performance of a nation towards green environment. The result diagnosed that since 1991 the trade intensity increased by CAGR of 2.717 which means that the value of trade of a nation increased during a span of 27 year.

On the other side the composition effect i.e. K/L increased by CAGR of 9.26 % which shows the trade practice shifts towards capital intensity. During these 27 years, CO₂ increased with 5.14 % scale effect negatively related to environment pollution and since 1991 the value of Scale effect increased by CAGR 1.89. This study calculated that the trade intensity, composition effect and scale effect are negatively related to pollution. So that the study analysed the trade intensity, composition effect, scale effect, technique effect and total effects of liberalisation are detrimental to the environment.

Further this study suggested that whether the trade practice have coupling growth with environment pollution but by using modified technology, proper utilization of natural resources can decouple the relationship with them. The study analysed the same by technique effect. The value of Technique effect since 1991 is 12.885 which show that nation moves towards curing green economy with trade practice.

CONCLUSION

This paper used Johanson-Juselius cointegration technique for analysed the long run relationship among the economic and environment variables by using the time series data of India, over the period 1991-2017. The paper found the existence of a cointegrating vector, indicating a valid long run relationship among the trade liberalisation and environmental indicators, suggesting that in long run trade liberalisation causes to increase air pollution. The emission of greenhouse gases are increasing with alarming rates, especially carbon dioxide which is the cause of many diseases and adversely affecting the health of people. Environment friendly innovations, which will contribute to sustainable development is highly desirable.

SUGGESTION

- To protect the domestic environment and poor segment of society, which are directly dependent on environment for their livelihood International emission standard must be followed.

- Government should examine the challenges, opportunities and constraints they will face in participating in any further trade liberalisation. Government needs to design appropriate economic policies to protect environment.
- These policies are to be based on sound micro and macroeconomic management couple with good governance aimed at law to protect environment.
- In addition, government should ensure that any trade agreement does not contain provision that jeopardise its environment.
- It is important to recognise that even if the composition effect is held constant, the scale effect induced by growth implies an increase in output and an increase in total industrial pollution. To maximise the gains from trade liberalisation, and to achieve a sustainable and high quality growth path, India must minimise the environmental cost associated with its industrial development.

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