



# Effects of Trade Liberalization on Environmental Degradation and Pollution in Iran

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## ABSTRACT

This article aims at investigating the impact of trade liberalization on pollution and environmental degradation in Iran. Results indicate that pollution is positively related to trade liberalization and real Gross Domestic Product (GDP) per square kilometer and with increased in trade liberalization, GDP will increase. In addition, strong evidence suggests that trade liberalization, real GDP per square kilometer and Gross National Product (GNP) are positively related to environmental degradation. Therefore with increased in GDP and GNP, environmental degradation will increase. In total, result showed that effects of trade liberalization is harmful to the environment.

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## 1. Introduction

Trade liberalization has been hailed for its beneficial effects on productivity, the adoption and use of better technology and investment promotion which are channels for stimulating economic growth. In addition, liberalization has been advocated as a necessary condition for poverty reduction. Other positive effects include increased mobility of capital, increased ease of movement of goods and services (and information) across national borders as well as the diffusion of global norms and values, the spread of democracy and international environmental and human rights agreements. Over the years, attention has been given to the advantages of trade liberalization and globalization to the detriment of the disadvantages. The major disadvantage that is always swept under the rug is the environmental problem. The new dynamics of trade have increasingly created global and unfettered markets for trade and investment which have significantly increased the destructive impact of economic activity upon the earth.. This study focuses on the pollution effects and environmental degradation of the trade liberalization in Iran. It seeks to determine the extent of these effects and how they can be minimized in the case of Iran's trade policies.

## 2- Literature Review

### 2-1-Theoretical Issues and Research Background

One school of thought considers free trade as highly relevant for economic development because it maximizes the output of social product. The counter argument about free trade contends the derivable benefits of free trade are laudable, but only under conditions of full employment, full allocation of resources and free competition in the economy. For example, Singh (1985) has argued that the value of free trade is limited for most developing countries since a vast segment of their productive resources are still unexploited and they generally have massive unemployment. A free trade regime therefore compounds their problems by weakening the domestic industries, especially those with inadequate competitive powers.

The linkages between trade and the environment can be explained via the impact of economic growth on the environment. One approach is to look at the impact of economic growth on the environment in terms of what is called the 'Environmental Kuznets Curve.' Grossman and Krueger (1993) were the first economists to publish a study based on this concept which indicated environmental conditions deteriorate initially as per capita income rises, but then improve as per capita income increases beyond a certain turning point. Their study is the most widely cited of several studies that purport to provide empirical evidence of the inverted 'U' relationship depicted as which the well-known economist Simon Kuznets (1955, 1966) postulated existed between economic growth and inequality. The application of the Kuznets Curve to the relationship between economic development and environmental pollution postulates environmental conditions deteriorate in the early stages of development (especially with industrialization) and they improve as countries reach the middle-income level of development, and improve greatly as countries graduate into the higher income bracket of development. Many countries like Iran are living through the part of the Environmental Kuznets curve in which environmental conditions are deteriorating with economic growth. Grossman and Krueger (1993) analyzed emission changes for hazardous waste under the North American Free Trade Agreement (NAFTA) as a result of investment liberalization in Canada, the United States and Mexico.

Beghin and Poirier (1995) analyzed the impacts of trade liberalization with better terms of trade (TOT) with the US, Canada and Mexico on various pollutants and was able to find that making trade openness beneficial for the environment. Strutt and Anderson (1999) modeled the impact of trade reform on various pollutants in Indonesia they concluded that the total effect of liberalization on the environment is positive. Antweiler et al. (2001) have an explicit explanation of the effects of

economic growth, trade liberalization and foreign direct investment on the environment. According to their studies when wealth increases and trade expands access to better technologies and environmental 'best practices'. Also they investigated how openness to international goods markets affects pollution concentrations. They concluded that freer international trade creates relatively small changes in sulfur dioxide concentrations when it alters the composition and hence the pollution intensity of national output.

Mehrabi bashar abadi and et al. (2010) showed that Liberalization of international markets affects level of pollution in developing countries more than in developed countries. Therefore the impact of trade liberalization on environmental pollution is a challenge for policy makers. Their results indicate that pollution is negatively related to trade liberalization, while capital to labor ratio and Gross Domestic Product (GDP) are positively related to pollution. Results also show that trade liberalization in the long run can solve environmental problems. Our study incorporates this aspect of the problem by analyzing the impact of trade liberalization on pollution and environmental degradation.

### 3-Data and Methodology

The neoclassical factor endowment model known as the Hecksher-Ohlin theory of trade postulates that trade arises because of the differences in labor productivity which they assume to be fixed – for different commodities in different countries. According to this theory, the basis for trade arises not because of inherent technological differences in labor productivity for different commodities between different countries but because countries are endowed with different factor supplies. What this theory suggests is nothing short of free trade which was equally elicited in the Hecksher-Ohlin-Samuelson (H-O-S) model, which is a development of the H-O principle.

Antweiler et al. (2001) made a much clearer extrapolation of the original HO model of trade. They decomposed the full impact of openness or trade liberalization on environment into composition, scale and technique effects. Their approach involves both mathematical and geometrical illustrations. In their geometrical exposition, they derived the condition under which trade liberalization for a dirty good leads to less pollution, if the technique effect (which for them is always beneficial to the environment) can overwhelm the combined scale and composition effects (which for them are always harmful to the environment). In this model, trade liberalization (or reduction in trade barriers) produces the three trade-induced effects which interact to determine the environmental effects of trade. In light of these issues, the present study investigates the impact of trade liberalization on pollution and environmental degradation in Iran.

#### 3-1- Model Explanation

The model to be employed in this analysis is similar to the one utilized by Antweiler et al. (2001). Trade liberalization or 'openness' is considered to be equal to imports plus exports in year  $t$  divided by GDP in year  $t$  (Antweiler et al., 2001), thus:

$$IMP_t + EXP_t / GDP_t = \text{Trade liberalization} \quad (1)$$

The composition effect is captured by  $K_t / L_t$  where  $K_t$  is capital in year  $t$  and  $L_t$  is labor in year  $t$ . Capital is measured as the fixed capital formation, while labor is derived as the product of total labor force and the deflated average minimum wage for all sectors of the Iran economy between 2000 and 2008. This approach is similar to the one utilized by Fabayo (1987) in

which labor is derived as both production and non-production workers. Scale of economic activity is measured in terms of real gross domestic product per square kilometer (i.e. real GDP/km<sup>2</sup>). we measure the technique effect by the real gross national product (real GNP). Our models are specified as:

$$POL_t = \alpha + \theta(IMP_t + EXP_t / GDP_t) + \Psi_t(K_t / L_t) + \delta(RGDP_t / K_t) + \lambda(RGNP_t) + \mu_t \quad (2)$$

$$ENVGD_t = \alpha + \theta(IMP_t + EXP_t / GDP_t) + \Psi_t(K_t / L_t) + \delta(RGDP_t / K_t) + \lambda(RGNP_t) + \mu_t \quad (3)$$

Where pollution  $POL_t$  is the yearly quantity of carbon dioxide emission in Iran,  $ENVGD_t$  is the level of deforestation in hectares in year in Iran. The data series for estimating models 1 and 2 were obtained as follows: the GDP, Import Export, fixed capital formation, GNP, price indexes and Iran's land were taken from the Central Bank of Iran and World Bank and Statistical Yearbook of Iran. We utilized ordinary least squares (OLS) and generalized least squares (GLS) in this analysis.

### 4- Experimental Results

#### 4-1-The model estimates 1 and 2 with the use of OLS, GLS

The OLS regression for model:

$$POL_t = 0.623881 + 8.00E - 07(IMP_t + EXP_t / GDP_t) - 0.000937(K_t / L_t) + 4.33E - 06(RGDP_t / K_t) - 1.97E - 07(RGNP_t) + \mu_t \quad (4)$$

The GLS regression for model:

$$POL_t = -204546.6 + 0.5175658 - 07(IMP_t + EXP_t / GDP_t) - 3893.945(K_t / L_t) + 1.996340 - 06(RGDP_t / K_t) + 0.068798 - 07(RGNP_t) + \mu_t \quad (5)$$

The OLS regression for mode2:

$$ENVGD_t = -0.0325 + 0.025543(IMP_t + EXP_t / GDP_t) - 0.008793(K_t / L_t) + 5.334567(RGDP_t / K_t) + 1.508798(RGNP_t) + \mu_t \quad (6)$$

The GLS regression for mode2:

$$ENVGD_t = -255445 + 0.2556785(IMP_t + EXP_t / GDP_t) - 11224.3(K_t / L_t) - 9.98765(RGDP_t / K_t) + 1.65(RGNP_t) + \mu_t \quad (7)$$

### 5-Analysis of experimental results and Suggestion

The OLS regression for model 1 indicates that pollution is positively related to trade liberalization and real GDP per square kilometer, but the capital to labor ratio and GNP are negatively related to pollution thus making the scale effect of trade liberalization negatively related to environmental pollution. Only trade liberalization is significantly related to pollution. The model 2 results indicate that trade liberalization, real GDP per square kilometer and the GNP are positively related to environmental degradation, thus indicating that the technique, scale and total effects of liberalization are detrimental to the environment. The composition effects of trade liberalization on natural resource utilization are however beneficial. Trade liberalization and the technique effects of liberalization do however significantly explain resource utilization.

The signs of our independent variables however showed that the composition and the scale effects of trade liberalization are beneficial to natural resource utilization. On the other hand, the technique effects of trade more than offset the joint benefit of the scale and composition effects thus making freer trade detrimental to natural resource utilization and hence detrimental to the environment. Comparing our results for model 2 using OLS (Table 1) and GLS (Table 2), we found that apart from higher  $R$ -squared. Adjusted  $R$ -squared and  $F$ -statistics, the Akaike information and Schwarz criteria confirmed that estimates of model 2 using GLS was more robust than model 2 estimates utilizing OLS. The technique effect of trade liberalization is small but negative on the environment (a confirmation of the pollution haven hypothesis) as against the theoretical anticipation of a stereotyped positive impact on the environment.

**Table 1**  
**Results of OLS regression for model 1 and 2**

Variables	1	2
Constant	0.623881	-204546.6
Trade intensity	8.00E-07	0.5175658
Capital-labor ratio (composition effect)	-0.000937	-3893.945
Real GDP/km2 (Scale effect)	4.33 E-06	1.996340
Gross National Product (Technique effect)	-1.97E-07	0.068798
<i>N</i>	10	10
<i>R</i> -squared	0.755980	0.578056
Adjusted <i>R</i> -squared	0.560764	0.240501
<i>F</i> -value	0.085007	0.282775
DW	2.066165	2.798228

**Table 2**  
**Results of GLS regression for model 1 and 2**

Variables	1	2
Constant	-.0325	-255445
Trade intensity	0.025543	0.2556785
Capital-labor ratio (composition effect)	-0.008793	-11224.3
Real GDP/km2 (Scale effect)	5.334567	-9.98765
Gross National Product (Technique effect)	1.50 8798	1.65
<i>N</i>	9	9
<i>R</i> -squared	0.94 8056	0.985980
Adjusted <i>R</i> -squared	0.64 0501	0.750764
<i>F</i> -value	6.346789	14.987654
DW	3.66165	4.798240
Rho	1.07	-0.29
Stationarity status	Non stationary	stationary
Akaike info criterion	23.53	23.05
Schwarz criterion	23.78	23.35

We also recommend the Iran government must conduct a natural resource census to ascertain their inventories and enhance the effective management of these resources, for compiling this type of census will influence tree harvesting to be done responsibly and sustainably, with minimal damage to the forest and wildlife. In addition, we believe there is an urgent need for partnerships between citizens, governments and businesses. For instance, in the area of agriculture, organic agriculture should be encouraged through switching to organic practices. It has been shown that the most important factors that modify the environment in Iran are agricultural practices, urbanization, hydrological development, fuel-wood cutting, the intensification of land use, habitat fragmentation and desertification. Government's major role in this respect should be to implement conservation measures that include conservation education directed at both the main resource users and the wider community. There is also an urgent need in Iran for the involvement of all stakeholders in the design, implementation, monitoring and evaluation of projects and programs that are bound to affect their lives and the environment. Moreover, since environmental degradation has a significant impact on agriculture particularly the soil and water that are essential for food production and export – food security will be severely affected if the environment is not protected.

Iran should engage in a selective and strategic integration with the world market, and should decide on the extent to which it wants to open up its economy, the timing and sequence of opening it up, the form of cooperation and competition it wants between its local firms and foreign firms, the particular sectors it wants to liberalize and those sectors that need some protection

for the good of the country. Above all, Iran must ensure that before going farther with trade liberalization, it has the right and space to review periodically the impact of globalization on the society and its environment.

#### References

- Singh, M.P. (1985) Import Policy for a Developing Economy. Allahabad, India: Chugh Publications.
- Grossman, G.M. and Krueger, A.B. (1995) 'Economic Growth and the Environment', *Quarterly Journal of Economics* CX(2): 353–77.
- Grossman, G.M. and Krueger, A.B. (1993) 'Environmental Impacts of a North American Free-Trade Agreement', in P.M. Garber (ed.) *The Mexico–US Free Trade Agreement*, Cambridge, MA: MIT Press, 13–56
- Kuznets, S. (1955) 'Economic Growth and Income Inequality', *Annual Economic Review* (49): 1–28.
- Kuznets, S. (1966) *Modern Economic Growth: Rate, Structure, and Spread*. New Haven, CT: Yale University Press.
- Beghin, J. and Poitier, M. (1995) 'Trade Liberalization and the Environment in the Pacific Basin: Coordinated Approaches to Mexican Trade and Environment Policy', *American Journal of Agricultural Economics* 77: 778–85.
- Strutt, A. and Anderson, K. (1999) 'Will Trade Liberalization Harm the Environment? The Case of Indonesia to 2020', presented at *World Bank Conference on Globalization Policy and Environment*, Washington, DC.
- Antweiler, W., Copeland, R.B. and Taylor, M.S. (2001) 'Is Free Trade Good for the Environment?', *The American Economic Review* 4(2): 877–908.

Mehrabi bashar abadi , H. jalaei esfand abadi , A. baghestani, A. sherafatmand, H.(2010)" Impact of Trade Liberalization on Environment Pollution in Iran", *Iranian Journal of Agricultural Economics and Development Research* , (1) 2-41.

Fabayo, A. (1987) 'On the Scope for, and Direction of Capital-Labor Substitution in Nigerian Manufacturing Industries', *West African Economic Journal* 2(2): 78.  
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