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INFLUENCE OF TRADE AND INVESTMENT ON ENVIRONMENTAL PERFORMANCE OF COUNTRIES

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INTRODUCTION

Can Global Trade liberalization have adverse Environmental Repercussions? Does International Trade weaken Environmental Policy? Have the developing countries engulfed themselves into an ***Environmental Race to the Bottom***? These questions are recurring whenever global debate on Climate Change take place and hence warrant a deeper examination of the interrelationship between openness indicators (trade and investment) and environmental performance of a country. While managing the balance between environmental constraints and economic impacts has been an ongoing dilemma across nations, emerging economies seem to be more inclined towards seeking better growth opportunities as opposed to seeking environmental sustainability. The developed countries however tip in the favour of environmental sustainability, relatively more than emerging economies, in the environment – opportunity trade off. As nations develop, their willingness to favour environmental preservation improves (Kuznets Environmental Curve) but developing countries rarely shy away from using their lax regulatory standards (viz-a-viz pollution abatement) as a means of attracting Investments and making their exports relatively more competitive. To what extent could trade and investment, therefore, influence/compromise the Environmental Performance of the country? The paper examines this question with an empirical analysis.

LITERATURE REVIEW

There is an extensive economic literature that points towards the ***potential use of Environmental Regulations as Disguised Trade Barriers.*** According to Ederington & Minier (2003), as countries ratify agreements constraining their ability to pursue trade goals through trade policy, there will be unilateral incentives for governments to distort domestic policies as a secondary means of protection (***Second Best Argument***). One of the ways of decreasing imports within an industry is to relax Domestic Environmental Standards pertaining to that industry.

The early empirical evidence regarding these second-best arguments (i.e. empirical studies of environmental regulations and trade) however, has been unconvincing. If stringent environmental regulations are a major source of comparative disadvantage, then the most regulated industries should also have the highest levels of import penetration. There is little empirical support for this proposition. Thus, 'second-best' arguments for cooperation over environmental regulation were often dismissed as being of little practical importance.

But these earlier models estimated only a small effect of environmental regulations on trade flows because these studies treated the level of environmental regulation as exogenously determined, ignoring the possibility that trade considerations may itself play a role in the setting of environmental policy (Ederington & Minier 2003).

However, the recent empirical work on the second-best hypothesis argue that environmental regulations are set endogenously, and there exists anecdotal evidence, suggesting that concern with international competition has played a role in setting environmental regulation. There have been several instances from the US wherein special committees and Task Forces have been constituted with the stated goal of relaxing domestic regulations that adversely affected U.S. trade competitiveness.

Ederington & Minier (2003) estimated the impact of environmental regulations on net import levels while controlling for simultaneity between net imports and environmental policy. They found statistically significant results to support the proposition that countries actually distort levels of environmental regulation as a secondary trade barrier and hence, a means of providing protection to domestic industries when environmental policy is modelled endogenously. By modelling environmental policy endogenously, they also found that environmental policy has a much stronger impact on net import levels than had previously been reported.

Copeland and Taylor (2004) via a hypothesized model concluded that pollution rises in the country with weak pollution policy (often low-income countries), and falls in the country with strict pollution policy (often high-income countries). Trade induced by pollution policy differences creates a pollution haven in the country with weaker policy. The welfare effects of such trade depend on the stringency of pollution policy. If pollution policy is too weak, high-income country must gain from trade, both because of an increase in purchasing power and because of the fall in pollution. Low-income country, however, may lose. Its income rises, but so does pollution. And if externalities are not fully internalized, the increase in pollution is harmful to the low-income country.

Mani and Wheeler (1997) examined the production and consumption of dirty goods for several developing-country regions plus Europe, North America, and Japan over the 1965-95 period and found a pattern of evidence which does seem consistent with the pollution haven story. Pollution-intensive output as a percentage of total manufacturing has fallen consistently in the OECD and risen steadily in the developing world. Moreover, the periods of rapid increase in net exports of pollution-intensive products from developing countries coincided with periods of rapid increase in the cost of pollution abatement in the OECD economies.

METHODOLOGY

Research Question – Do Trade and Investment impact the Environmental Performance of a country? An empirical analysis.

Data Source -HDI Score Data for the year 2018 was taken from UNDP. Data for Net Exports as a % of GDP for the year 2018 was taken from UNCTAD Statistics. Data for Net Inflow of FDI as a % of GDP for the year 2018 was also taken from UNCTAD Statistics. The above-mentioned research question is a Cross-Sectional Regression analysis based on data from 133 countries for the year 2018.

Dependent Variable - **Environmental Protection Index (2018) Score** is taken as the dependent variable. It serves as an as an indicator of the country's environmental performance. It's a biennial Index conceptualized and composed by Yale Center for Environmental Law and Policy and Columbia University Center for International Earth Science Information Network in collaboration with the World Economic Forum. EPI Index is "a data-driven summary of the state of sustainability around the world. Using 32 performance indicators across 11 issue categories, the EPI ranks 180 countries on environmental health and ecosystem vitality. These indicators provide a gauge at a national scale of how close countries are to established environmental policy targets." (EPI)

Independent Variables - (and the theoretical justification for including them in the regression analysis)

1) **HDI (2018) Score** -. HDI "is a summary measure of average achievement of various countries in key dimensions of human development" (UNDP). The inclusion of HDI score as an explanatory variable in our regression analysis derives its theoretical justification from the "**Environmental Kuznets Curve**". EKC exhibits an Inverse-U-shaped relationship between a country's per-capita income and its level of environmental quality. An increase in income is associated with increase in pollution in poor countries, but a decline in pollution in rich countries. Because, an important component of HDI measure is the performance of countries with respect to "Standard of Living" proxied by GNI (Gross National Income) per capita of respective countries, it serves as a plausible explanatory factor in a country's environmental performance. A more liberal interpretation of EKC also shines light on a plausible theoretical interlinkage between overall levels of development of a nation and its corresponding environmental performance. In other words, socio-economic factors like human development, also significantly influence environmental performance of a country.

2) **Net Exports as a % of GDP** –
3) **Net Inflow of FDI as a % of GDP** -
Theoretical reasoning for including both, Net Exports as well as FDI, as explanatory variables in the regression analysis is derived from the **"Pollution Haven Hypothesis"** and the **"Pollution Haven Effect"**.
The PHH asserts that because of the strict environmental regulations at home and lax environmental policies abroad, developed countries relocate their environmentally hazardous industries to less developed countries. Resultantly, the developing economiesbecome pollution havens where the developed economies relocate their dirty industries. Additionally, developing countries relax their environmental standards to attract foreign capital, which then accelerates economic growth and creates employment opportunities in these countries; however, at considerable environmental costs. The pollution haven hypothesis predicts that countries with relatively weak environmental policy will specialize in production of goods that are more polluting in nature (i.e dirty-industry production).

The underlying reason why Pollution Haven Hypothesis arises is because of the difference in the nature of environmental regulations that each country exercises. While there can be several ecological reasons for differential environmental regulations globally, one crucial economic reason is that **Environmental policies are often used as substitutes for Trade policies**. Governments invariably weaken environmental regulations to help domestic firms compete with their foreign rivals. Consequently, free trade may harm the environment because of an endogenous weakening of environmental policy. Copeland and Taylor (2004) refer to this motive as "Tariff Substitution", as environmental policy is substituting for the lack of available trade-policy instruments, typically because tariffs and quotas are constrained by trade agreements.

Copeland and Taylor (2004) pointed out the existence of a trade-off between two different objectives: closing loopholes in trade agreements by constraining the use of domestic policy instruments in an effort to prevent tariff substitution; and allowing governments flexibility to respond to local changes in local conditions and preferences with respect to their environmental policy.

It is therefore imperative that both Trade as well as Investment are part of the regression model attempting to explain a larger proportion of differences in the Environmental Performance of various countries.

REGRESSION ANALYSIS

Regression Equation - *EPI (score) = a + b1 HDI (score) + b2 Net-Exports + b3 FDI + e*
Estimated Regression Equation – *EPI = -4.45 + 83.1HDI -0.1NetExport -.00019FDI +e*
A Cross- Sectional Data for 133 countries was taken for the year 2018 for all the variables. A multivariate OLS regression was conducted (using gretl statistical package) on the above-mentioned cross-sectional data. The OLS regression results are mentioned in Table 1.

STATISTICAL TESTS

To test for the presence of **Heteroscedasticity**, ***BREUSCH – PAGAN Test*** for Heteroscedasticity was conducted, based on which we did Not Reject the Null Hypothesis suggesting that there does not exist evidence of Heteroscedasticity in the model (Table 2)
To test for the presence of **Multicollinearity** among one or more dependent variables, the **Coefficient-Correlation Matrix** was obtained. It shows that none of the dependent variables are plagued by the presence of multicollinearity. **Variance Inflation Factor** (VIF) for all explanatory variables also does not reflect any presence of multicollinearity. (Table 3 and Table 4)

TABLE 1 – REGRESSION RESULTS

```
Model 1: OLS, using observations 1-133
Dependent variable: EPIScore

                coefficient    std. error    t-ratio    p-value
  ------------------------------------------------------------
  const          -4.45025       3.35941      -1.325    0.1876
  HDIScore       83.1175        4.36912      19.02     2.98e-039 ***
  NetExports     -0.108997      0.0405746    -2.686    0.0082    ***
  NetFDIInflow   -1.96636e-05   1.57270e-05  -1.879    0.0715    *

Mean dependent var   57.64669   S.D. dependent var   12.97119
Sum squared resid    5378.203   S.E. of regression   6.456895
R-squared            0.757839   Adjusted R-squared   0.752208
F(3, 129)            134.5680   P-value(F)           1.50e-39
Log-likelihood      -434.7529   Akaike criterion     877.5058
Schwarz criterion    889.0672   Hannan-Quinn         882.2039

Excluding the constant, p-value was highest for variable 9 (NetFDIInflow)
```

TABLE 2 – TEST FOR HETETOSKEFASTICITY

```
Breusch-Pagan test for heteroskedasticity
OLS, using observations 1-133
Dependent variable: scaled uhat^2

                 coefficient    std. error    t-ratio   p-value
  ---------------------------------------------------------------
  const           1.68978       0.792070      2.133    0.0348  **
  HDIScore       -0.842459      1.03014      -0.8178   0.4150
  NetExports      0.0125477     0.00956653    1.312    0.1920
  NetFDIInflow   -3.06267e-06   3.70805e-06  -0.8260   0.4104

  Explained sum of squares = 6.09303

Test statistic: LM = 3.046517,
with p-value = P(Chi-square(3) > 3.046517) = 0.384509
```

TABLE 3 – TEST FOR MULTICOLLINEARITY

```
Correlation Coefficients, using the observations 1 - 133
5% critical value (two-tailed) = 0.1703 for n = 133

      HDIScore     NetExports    NetFDIInflow
        1.0000         0.4413          0.1016 HDIScore
                       1.0000          0.0057 NetExports
                                       1.0000 NetFDIInflow
```

TABLE 4 – VARIANCE INFLATION FACTOR

```
Variance Inflation Factors
Minimum possible value = 1.0
Values > 10.0 may indicate a collinearity problem

    HDIScore    1.257
  NetExports    1.244
NetFDIInflow    1.012

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient
between variable j and the other independent variables
```

OBSERVTIONS FROM REGRESSION ANALYSIS

The coefficients of explanatory variables – HDI and Net Exports are statistically significant at 1 % level of significance, while that of FDI is significant at 10% level of significance. The statistical relationship between the dependent variable and all the explanatory variables is in accordance with the economic expectations. While the model exhibits a positive and statistically significant relationship between HDI and Environmental Performance, it exhibits an inverse and statistically significant relationship of Net Exports and FDI with Environmental Performance.

1) **HDI** – positive and statistically significant relationship between HDI and Environmental performance is in conformity with the theoretical expectation of the Environmental Kuznets Curve (inverted U hypothesis). The results imply that socio-economic factors like human development, significantly influence environmental performance of a country. For instance, increased awareness about health concerns through growing literacy might lower the possibility of degrading the environment through increased import of hazardous items.
2) **Net Exports** - negative and statistically significant relationship between Net Exports as a % of GDP and Environmental performance of a country is in conformity with the theoretical expectation of the Pollution Haven Hypothesis. The result indicates that with rise in export orientation of a country, its environmental quality deteriorates.
3) **FDI** – negative and statistically significant relationship between Net Inflow of FDI as a % of GDP and Environmental performance of a country is in conformity with the theoretical expectation of the Pollution Haven Effect. The results indicate that FDI inflow might cause environmental degradation, unless necessary policies are adopted by a country.

The regression results explore the interrelationship between openness indicators (trade and investment) and environmental performance of a country.

The most direct means of affecting trade flows is through trade policy. However, when countries are constrained in their ability to set trade policy freely (e.g., by an international trade agreement), domestic policies act as a potential means of trade protection measure (Second-Best Arguments). A free trade agreement that restricts only a subset of instruments is an incomplete contract that can be undermined as governments substitute towards unconstrained instruments. In this context, the option of manipulating environmental policy to improve the terms of trade creates a loop- hole in the trade agreement. Lax Environmental standards provide an unfair comparative advantage to domestic countries, which distorts the level playing field.

While there are legitimate reasons for diversity in environmental regulations across countries (e.g., differences in preferences, natural endowments, or population density), Copeland (1990) however justifies expanding international trade agreements to cover domestic policies on Environmental Regulation, as such domestic policies often act as Secondary means of Protection. By implementing lax environmental regulations, countries offer competitive advantage to its domestic goods being exported. The same lax environmental regulations also become an attractive cost advantage for inherently polluting firms to relocate and continue production in a cost-effective manner. It helps such firms save a good deal of investment on pollution abatement technologies. Countries with such lenient pollution regulations then become Pollution Havens, specializing in export of commodities that are “dirty” in characteristic. Countries are willing to accept short term environmental degradation as a trade-off against

increased Export earnings, improved employment opportunities, technology transfer and increased Investment (FDI) Inflows. It is therefore expected that countries wishing to improve their Export Performance and Investment Inflows often compromise with their Environmental Performances. However, as countries journey their way towards becoming more developed, and their socio-economic as well as socio-political indicators improve, their preferences tilt more towards Environmental Sustainability in the Environmental Preservation vs Economic Growth trade off.

Our model exhibits precisely the same result. It shows that with increasing HDI performance, countries will prefer to invest resources in environmental sustainability (case in point – Developed countries). But the emerging nations looking to expand domestic markets, increase export competitiveness, attract foreign investment are more willing to compromise on their Environmental regulatory frameworks.

CONCLUSION

There exists an unambiguous interrelationship between Trade, Investment and Environment. By the use of Environmental Regulations as a Secondary means of inhibiting Free Trade among nations, it is the emerging economies that deemed more susceptible to environmental problems. It further gives rise to the problem of transboundary environmental issues, wherein inflow of FDI can prove to be detrimental to the host countries overall environmental quality, especially since the source of FDI is often developed countries and the destination invariably would be an emerging economy.

Climate change and trade policies are not entirely unrelated. Trade-Investment nexus can potentially cause environmental repercussions in a country

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