PROCEEDINGS ICE 2017 P96 – P109
ISBN 978-967-0521-99-2

THE POLLUTION HAVEN HYPOTHESIS: AN ANALYSIS OF ASEAN AND OECD COUNTRIES

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ABSTRACT

The pollution haven hypothesis emphasizes the role that environmental regulation plays in shaping a country's comparative advantage. This may lead to the fear of dirty industries relocating from developed countries with stringent environmental regulations to developing countries which have lax or weaker environmental regulations. This paper contributes to the empirical literature on the effects of environmental regulation on trade openness and foreign direct investment. The study focuses on firms in the Association of South East Asian Nations or ASEAN, and the Organisation for Economic Co-operation and Development or OECD, for the years from 2000 and to 2010. Our finding based on panel data analysis indicates that there is statistically significant evidence to support the existence of a strong relationship between environmental regulation and trade openness. On the other hand, there is no evidence to suggest a relationship between environmental regulation and foreign direct investment. Thus, our findings may not be consistent with the pollution haven hypothesis for the countries in our study.

Keywords: Pollution haven hypothesis, panel data analysis, trade openness, foreign direct investment, OECD, ASEAN

1.0 Introduction

The implementation of environmental regulation in ASEAN and OECD countries is vastly different due to the size of firms, population and other factors. It affects cost to a firm when demand for environmental protection grows. Typically, it may affect the firm's production to become more expensive and capital intensive in technology; firms tend to focus on capital intensive production rather than labour intensive production (Louis Hottie and Stanley L. Winner, 2012). Eventually, this cost may deteriorate the competitiveness of the industries affected. In essence, environmental policies deal with three core issues which are, threats to public and occupational health, biodiversity issues and the overuse of natural

resources (Gaye Tuncer Teksoz, 2011). In this regard, environmental regulation would be expected to have a positive effect on trade openness compared to foreign direct investment (André Martens, 2008).

This study analyses the relationship of environmental regulation with both trade openness and foreign direct investment. In this case, environmental regulation is measured by a firm's performance-index in which it acts as an exogenous variable.

The paper is organized into several remaining sections as follows. In Section 2, the paper briefly reviews the related literature. Section 3 presents the methodology and derives on the empirical equation. Section 4 provides analysis on data and variables used in the study. Finally, Section 5 presents discussion of findings and the conclusion.

2.0 Previous Empirical Research: An Overview

2.1 Trade Openness and Environmental Regulation

In previous studies, there have been discussions, both theoretical and empirical views, relating to the relationship between trade openness and environmental regulation where they have been shown to present mixed results. The studies employ diverse data, time periods, methodology and case studies. In hindsight, these studies illustrate two conclusions from the relationship mentioned.

First, there is no evidence that suggests environmental regulation stimulates trade openness (international competitiveness). Several studies would expect a negative relationship between trade openness and environmental regulation. According to Jaffe *et al.*(1995), trade openness is not stimulated by innovation and international competitiveness. By using a dynamic model where the authors examined six criteria of air pollution based on data from 1970 to 1991, the perspective of comparative advantage was examined. Previous studies also used industrial competitiveness of developed countries (Tobey, 1990; Van Beers and Van den Bergh, 1997; Jänicke *et al.,* 1997). The environmental outcome of trade is determined by income in which GDP is used as proxy for income per capita of country (McCarney,and Adamowicz, 2006). Pollution control among individuals with high income may decrease if trade proved to be more polluting to the environment compared to the autarky case (Louis Hotte and Stanley L. winner, 2012).

Second, Mani and Wheeler (1998) found that there is a temporary pollution haven effect in their examination of import-export ratios for dirty industry in OECD countries, developing Asia, and Latin America. It is also found that endogeneity between trade and regulations needs to be controlled for (Fontagne *et al.,* 2001; Keller and Levinson, 2002). In this instance, trade policy is assumed as exogenous while lobbying is assumed as a proxy to pollution tax rate (Damania *et al.,* 2003). These above mentioned studies point out that when government corruptibility is relatively high, trade openness becomes greater and leads to stricter environmental policies. On the other hand, when government corruptibility is relatively low, trade openness becomes smaller and leads to weak environmental policies. Determining whether environmental regulation is endogenous and exogenous, one must refer to the prices of several factors and the national income (Arik Levinson and M. Scott Taylor, 2008). A polluter is willing to sell part of the rights to victims and reduce their output, and pollution, if the price received reflects the value of forgone output; thus polluters are willing to buy part of these rights at a price that reflects the value of the resulting increase in output if victims receive the rights to a clean environment (Coase, 1960).

Finally, the Porter Hypothesis states that the implementation of regulation brings cost and may reduce innovation. The Porter Hypothesis is examined in several studies which found that there is a positive link between regulatory stringency and exports (Arik Levinson and M. Scott Taylor, 2008). By re-examining the relationship between trade flows and abatement costs, the estimates found show that increasing

pollution abatement costs will induce net export from Mexico, thereby decreasing the net export while increasing the net import of Canada. Trade may induce a strengthening of environmental regulation compared to poor demand where it was referring to the regulated production possibility frontier (RPPF) model (Louis Hottie and Stanley L. Winner, 2012).

2.2 Foreign Direct Investment and Environmental Regulation

In this study, the relationship between foreign direct investment and environmental regulation is categorized into two relationships; the first relationship shows evidence that foreign direct investment and environmental regulation have a positive relationship, while the second proposes that foreign direct investment and environmental regulation have a negative relationship.

In the first relationship, pollution and foreign direct investment are shown to have a positive relationship where the focus is on the differences in various countries of the impact on capital is predicted (Baumol and Oates, 1988; Markusen *et al.,* 1993; Chichilnisky, 1994; Motta and Thisse; 1994). Baumol and Oates (1988) found that income will rise in parallel with increasing demand for environmental quality. Markusen *et al.* (1993) discover that market size will increase from relocation from higher to lower environmental regulation areas due to a rise in taxes. Chichilnisky (1994) employed property rights to analyse the positive relationship with environmental regulation. Motta and Thisse (1994) found that the environmental policy is exogenous in nature. It is noted that the excessively lax environmental regulation can be generated endogenously in an open market through lobbying of agents (Oates and Schwab, 1988; Hillman and Ursprung, 1992 and 1993; Rauscher, 1995; Fredriksson, 1997 and 1999; Cole *et al.,* 2006). In contrast, when policy is treated as exogenous, it showed positive and significant effect towards patent protection on trade flows and foreign direct investment (Maskus and Penubarti, 1995). Lucas *et al.* (1992), Birdsall and Wheeler (1993) claim that the growth in developing countries was highest in periods when environmental regulation is strengthened. Further, research by Keller and Levinson (1999) using different measures has shown that there is a large effect from stringent of environmental standards where it lowers a state's share of receiving foreign direct investment. According to Sanna-Randaccio and Setini (2012), more stringent environmental regulation does induce firms to relocate.

On the second relationship between foreign direct investment and environmental regulation, it is indicated that there is no evidence of a pollution haven affecting foreign direct investment (Levinson, 1996; List and Co, 2000; Keller and Levinson, 2002; Xing and Kolstad, 2002; Fredriksson *et al.,* 2003; Eskeland and Harrison, 2003; Copeland and Taylor, 2004; Smarzynska-Javorcik and Wei, 2004, Ederington *et al*., 2005). Foreign direct investment is linked to environmental regulation in three ways, namely, technology, investment and international cooperation (OECD, 1997). McConnell and Schwab (1990) use a logit model and find ambiguous results on the effect of environmental regulation on location decisions for new plants based on data from the year 1973 to 1982. Furthermore, by using the averting expenditure approach (AEM), location decision of new manufacturing plants has been seen as ambiguous in the 1970s (see Bartik, 1988). Scherp and Suardi (1997) point out that there is no evidence that the export of pollution is triggered by a relocation of European industries to developing countries, and neither through international specialisation of EU industries. Additionally, the emergence of foreign direct investment is not deterred by more stringent environmental regulation, and regulation raise the costs for domestic firm more than for foreign firms (Dijkstra *et al.,* 2011).

3.0 Research Methodology

This section discusses data analysis techniques, a conceptual framework of study, econometric models, research hypotheses, and sources of data. The results of descriptive analysis present the mean, standard deviation, and number of observation of the number of variables. Data analysis techniques is divided into

several sections, namely, the descriptive statistics, pooled ordinary least squares (OLS), correlation analysis, Hausman test, fixed effects regression and random effects regression. The Hausman-test indicates the suitability of the method used in the regression of model. Finally, the fixed effect regression analysis is chosen to evaluate the hypothesis for the relationship between trade openness and environmental regulation, and the random effects regression analysis is chosen to evaluate the hypothesis for the relationship between foreign direct and environmental regulation.

3.1 Conceptual Framework of the Study

This study consists of two structure models with different dependent variables (see figure 1 (a) and 1 (b)). In figure 1 (a), trade openness is the dependent variable (measured in million dollars) and the independent variables are environmental regulation (environmental performance index or EPI), foreign direct Investment (measured in million dollars), gross domestic product (measured in million dollars), and inflation rate (CPI) (measured in %). Meanwhile, figure 1 (b) shows trade openness as the dependent variable, and independent variables are environmental regulation (EPI), exports (measured in million dollars), population (measured in billions of people), and gross domestic product or GDP (measured in million dollars).

Figure 1 (a): Conceptual Framework

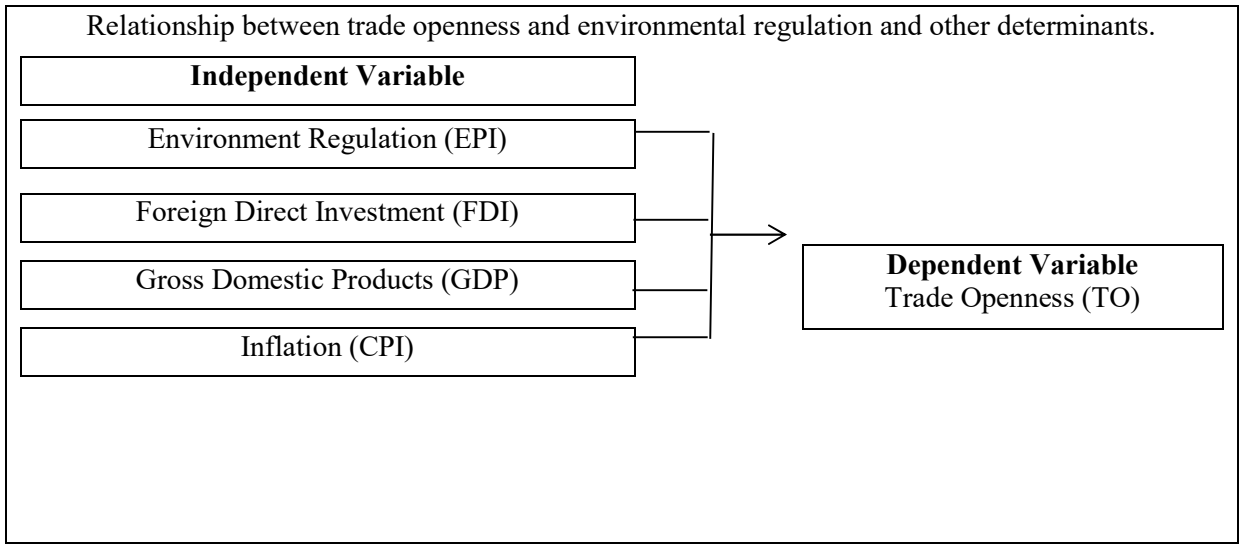
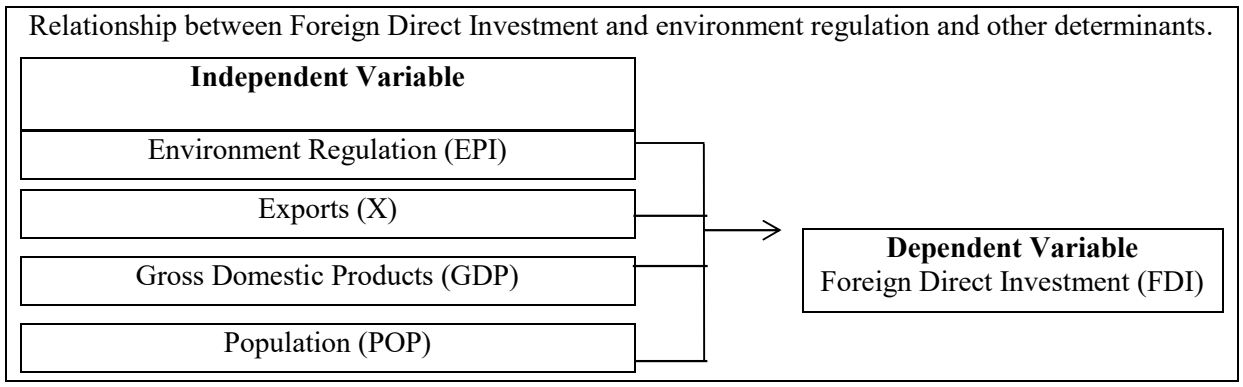


Figure 1 (b): Conceptual Framework



Adopted and modified based on the Environmental Kuznets Curve Model.
(Source: Panayotou, 1993)

3.2 Econometric Model

In this study, panel data analysis is used to determine: 1) the relationship between environmental regulation and trade openness, and 2) the relationship between environmental regulation and foreign direct investment. A panel data set which has both a time series and a cross-sectional dimension is used.

In the first regression model, the relationship between trade openness and environmental regulation is tested, while in the second regression, the relationship between foreign direct investment and environmental regulation is tested. The empirical equations are as follows:

$$TO_{it} = \beta_{0\,it} + \beta_{1\,1it}\, EPI_{1it} + \beta_{2\,2it}\, FDI_{2it} + \beta_{3\,3it}\, GDP_{3it} + \beta_{4\,4it}\, CPI_{4it} + \varepsilon_{it} \quad \text{(Eq. 1)}$$

$$FDI_{it} = \beta_{0it} + \beta_{1\,1it}\, EPI_{1it} + \beta_{2\,2it}\, X_{2it} + \beta_{3\,3it}\, GDP_{3it} + \beta_{4\,4it}\, POP_{4it} + \varepsilon_{it} \quad \text{(Eq. 2)}$$

Where:
TO_{it} = Trade openness, EPI_{1it} = Environmental regulation, FDI_{2it} = Foreign direct investment, GDP_{3it}= Gross Domestic Product, and CPI_{4it} = Inflation rate, X_{2it} = export volume, POP_{4it} = Population.

The Hausman test is performed to determine the appropriate method to analyse the panel data.

3.3 Sources of Data

Secondary data is used in the analysis. The period sample for this study covers 10 years from 2002 to 2011, and the cross-sectional units involve 10 ASEAN countries and 34 OECD countries. The countries are Australia, Austria, Brunei, Belgium, Cambodia, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Indonesia, Iceland, Ireland, Israel, Italy, Japan, Korea, Laos, Luxemburg, Malaysia, Myanmar, Mexico, Netherland, New Zealand, Norway, Philippines, Poland, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, and Vietnam. Data were taken from the Yale Centre for environmental law and policy, Yale University, World Development Indicator Database, World Bank, Index Mundi, and Chile inflation rate.

4.0 Empirical Study: Data Analysis and Results

Table 1 and 6 (see Appendix A and F) shows the descriptive statistics which consists of the values of the mean, median, maximum, minimum, standard deviation, skewness, and the number of observations.

4.1 Pooled OLS

The results from the pooled Ordinary Least Squares (OLS) regression analysis are shown in Table 2 and Table 7 (see Appendix B and G). The coefficients of the independent variables, environmental regulation (EPI) and inflation (CPI), were found to have a positive relationship with trade openness. The coefficient of environmental regulation is statistically significant only at 10 percent significance level, and indicates that one percent increase in EPI will increase trade openness by 3.41 percent. Meanwhile, foreign direct investment (FDI) and GDP per capita were found to have negative relationships with trade openness, with statistically significant coefficients at the 5 percent level of significance. The results indicate that one percent increase in FDI decreases trade openness by -0.18 percent.

4.2 Hausman Test

The Hausman test is used to differentiate between the fixed effects model and random effects model (see Paul Clarke *et al.,* 2010). The Hausman Test results are shown in Table 3 and Table 8 (see Appendix C and H). Table 3 shows that the chi-squared statistic is 13.37, with a p-value of 0.0096. Thus, the null hypothesis (H_0: Cov (λ_i, x_{it}=0) is rejected. The results indicate that the random effects model is not appropriate and that the fixed effects specification is to be preferred for the existing panel data set. Table 8 (see Appendix H) shows that the chi-Squares statistic was 5.13, and is not statistically significant. . Thus, the null hypothesis (H_0: Cov (λ_i, x_{it}=0) is not rejected. This means that the random effects specification is to be preferred for the existing panel data set.

4.3 Trade Openness and Fixed Effect with Robust Standard Error

The fixed effects model with robust standard error corrects for heteroskedasticity. Table 5 (see Appendix E) shows the results of the estimation of the model for trade openness with robust standard errors. The coefficients for the variables that represent environmental regulation and foreign direct investment are statistically significant at the 5 percent level of significance. A one percent increase in the environmental performance index (EPI) is indicated to lead to a 3.41 percent increase in trade openness, while a one percent increase in foreign direct investment leads to a 0.18 percent decrease in trade openness.

4.4 FDI Model and Random Effects with Robust Standard Error

Table 10 (see Appendix J) shows the results of the estimation of the random effects model for foreign direct investment using robust standard error. We find evidence to suggest that net exports, gross domestic product (GDP) and population affect foreign direct investment at the 1 percent level of significance. A one percent increase in environmental regulation leads to a 0.61 percent increase in foreign direct investment, while a one percent increase in GDP leads to a 0.73 percent of foreign direct investment, and a one percent increase in population leads to a 0.69 percent increase in foreign direct investment.

On the other hand, the results show that the coefficient of the variable EPI that measures environmental regulation is not statistically a significant coefficient. This indicates that there is no evidence to suggest that environmental regulation affect foreign direct investment.

5.0 Discussion

The pollution haven hypothesis posits that firms may relocate their pollution-intensive production activities to areas with lax environmental regulation and avoid stringent regulation in their home country. In the context of international trade, theory predicts a negative relationship between environmental

regulation and trade openness, and between environmental regulation and foreign direct investment. These predictions are contradicted by our findings. First, in the regression analysis of trade openness, evidence suggests a positive relationship with environmental regulation, where a negative relationship is expected. Second, in the analysis of foreign direct investment, environmental regulation has no effect on foreign direct investment. Theory predicts a negative effect from environmental regulation on foreign direct investment.

The first finding implies that as environmental regulation, our variable of interest, becomes stricter, trade openness would increase. This finding is opposite from prediction, and is not supported by findings in previous studies. The Pollution Haven Hypothesis suggests that environmental regulation affects trade openness where less stringent environmental policy leads to an increase in trade openness when countries with weaker environmental regulation attempts to attract foreign firms as lax regulation implies a comparative advantage to host countries that aim to increase economic growth through the expansion of trade.

In the second finding, environmental regulation has no effect on foreign direct investment. This finding is also in contrast to the Pollution Haven Hypothesis. The Pollution Haven Hypothesis suggests that weaker environmental regulation is related to increases in investment from foreign countries that engage in pollution intensive activities. Dirty industries abroad that attempt to avoid stringent environmental regulation in the home country would prefer to relocate and invest in countries with lax environmental regulation. The findings in our study do not support this theory.

6.0 Conclusion

The results of the empirical analyses in this study show a positive relationship between environmental regulation and trade openness. Further, we find no evidence of a relationship between environmental regulation and foreign direct investment. These findings contradict expectations based on the Pollution Haven Hypothesis. Hence, our results indicate that the pollution haven hypothesis does not hold for the countries in our data sample. We suggest further research that may use more comprehensive data sets, and perhaps differentiation between analyses for developing countries versus developed countries.

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APPENDICES

Appendix A

Table 1: $TO_{it} = \beta_{0\,it} + \beta_{1\,1it}\,EPI_{1it} + \beta_{2\,2it}\,FDI_{2it} + \beta_{3\,3it}\,GDP_{3it} + \beta_{4\,4it}\,CPI_{4it} + \varepsilon_{it}$ (Eq. 1)

	LTO	LEPI	LFDI	LGDP	LCPI
Mean	-1.255245	4.178908	22.18185	9.682425	0.463011
Median	1.248245	4.279163	22.68833	10.16234	0.987713
Maximum	5.810615	4.486274	26.55240	11.62651	4.044358
Minimum	-13.52650	3.252697	10.31595	5.759092	-14.00481
Std. Dev.	4.866594	0.258253	2.645474	1.322964	2.490413
Skewness	-0.296315	-1.684541	-1.790796	-1.198652	-3.556272
Kurtosis	1.404451	5.212646	7.387704	3.574450	16.15370
Jarque-Bera	53.11143	297.8529	588.1287	111.4127	4099.484
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	-552.3077	1838.719	9760.015	4260.267	203.7246
Sum Sq. Dev.	10397.16	29.27896	3072.357	768.3522	2722.747
Observations	440	440	440	440	440

Appendix B

Table 2: Summary of Pooled OLS Result (Trade Openness as dependent variable)

Dependent Variable: Trade Openness (TO)				
Independent Variable	**Coefficient**	**Standard Error**	**t-statistic (t)**	**Probability P >| t |**
Constant (C)	-3.987101	5.506876	-0.724022	0.4694
Regulation (EPI)	3.410998	1.964940	1.735930*	0.0833
Foreign Direct Investment (FDI)	-0.184121	0.091006	-2.023182**	0.0437
Gross Domestic Products (GDP) per capita	-0.774976	0.390209	-1.986056**	0.0477
Inflation (CPI)	0.141255	0.094901	1.488445	0.1374
R-squared		0.029864		
S.E. of regression		4.815364		
F-statistic		3.347668		
Prob(F-statistic)		0.010254		
Durbin-Watson		0.760116		

*** Significant at one percent level of significance where the critical value is 2.588
** Significant at five percent level of significance where the critical value is 1.966
* Significant at ten per cent level of significance where the critical value is 1.649

Appendix C

Table 3:Hausman Test

Test Summary (2002-2011)	
Chisquared.f	4
Chisquare Statistic	13.372988
Prob>chi2	0.0096

Appendix D

Table 4: Fixed Effects Model

Dependent Variable: Trade Openness (TO)				
Independent Variable	**Coefficient**	**Standard Error**	**t-statistic (t)**	**Probability P >| t |**
Constant (C)	-48.48704	30.11036	-1.610311	0.1081
Regulation (EPI)	8.746054	7.957133	1.099146	0.2724
Foreign Direct Investment (FDI)	-0.097321	0.074013	-1.314921	0.1893
Gross Domestic Products (GDP) per capita	1.328798	0.705705	1.882937*	0.0604
Inflation (CPI)	-0.052652	0.074919	-0.702792	0.4826
R-squared		0.616442		
Ajusted R-squared		0.570454		
Number of observation		440		
Number of groups		44		
F(4, 392)		13.40447		
Prob> F-statistic		0.000000		
Durbin-Watson statistic		1.507511		

*** Significant at one percent level of significance where the critical value is 2.588
** Significant at five percent level of significance where the critical value is 1.966
* Significant at ten per cent level of significance where the critical value is 1.649

Appendix E

Table 5: Fixed Effects with Robust Standard Error Result

Dependent Variable: Trade Openness (TO)				
Independent Variable	**Robust standard error Coefficient**	**Standard Error**	**t-statistic (t)**	**Probability P >| t |**
Constant (C)	3.987101	3.360093	-1.186604	0.2360
Regulation (EPI)	3.410998	1.612279	2.115638**	0.0349
Foreign Direct Investment (FDI)	-0.184121	0.080670	-2.282385**	0.0229
Gross Domestic Products (GDP) per capita	-0.774976	0.407006	-1.904093	0.0576
Inflation (CPI)	0.141255	0.087360	1.616927	0.1066
R-squared		0.029864		
S.E. of regression		4.815364		
F-statistic		3.347668		
Prob(F-statistic)		0.010254		
Durbin-Watson		0.760116		

*** Significant at one percent level of significance where the critical value is 2.588
** Significant at five percent level of significance where the critical value is 1.966
* Significant at ten per cent level of significance where the critical value is 1.649

Appendix F

Table 6: $FDI_{it} = \beta_{0it} + \beta_{1\,1it}\, EPI_{1it} + \beta_{2\,2it}\, X_{2it} + \beta_{3\,3it}\, GDP_{3it} + \beta_{4\,4it}\, POP_{4it} + \varepsilon_{it}$ (Eq. 2)

	LFDI	LEPI	LX	LGDP	LPOP
Mean	22.18185	4.178908	5.248850	9.682425	16.52055
Median	22.68833	4.279163	5.204903	10.16234	16.29406
Maximum	26.55240	4.486274	6.514277	11.62651	19.55717
Minimum	10.31595	3.252697	4.465281	5.759092	12.56906
Std. Dev.	2.645474	0.258253	0.439288	1.322964	1.605453
Skewness	-1.790796	-1.684541	0.537264	-1.198652	-0.450158
Kurtosis	7.387704	5.212646	2.872225	3.574450	2.913217
Jarque-Bera	588.1287	297.8529	21.46716	111.4127	14.99850
Probability	0.000000	0.000000	0.000022	0.000000	0.000553
Sum	9760.015	1838.719	2309.494	4260.267	7269.044
Sum Sq. Dev.	3072.357	29.27896	84.71571	768.3522	1131.513
Observations	440	440	440	440	440

Appendix G
Table 7: Summary of Pooled OLS Result (FDI as dependent variable)

Dependent Variable: Foreign Direct Investment (FDI)				
Independent Variables	**Coefficient**	**Standard Error**	**t-statistic (t)**	**Probability P >| t |**
Constant (C)	-2.756878	3.728969	-0.739314	0.4601
Regulation (EPI)	0.763844	0.969804	0.787627	0.4313
Exports (X)	0.611090	0.257452	2.373602**	0.0180
Gross Domestic Products (GDP) per capita	0.734435	0.184634	3.977778***	0.0001
Population (POP)	0.691748	0.075454	9.167857***	0.0000
R-squared		0.236754		
S.E. of regression		2.321792		
F-statistic		33.73361		
Prob(F-statistic)		0.000000		
Durbin-Watson		1.744199		

*** Significant at one percent level of significance where the critical value is 2.588
** Significant at five percent level of significance where the critical value is 1.966
* Significant at ten percent level of significance where the critical value is 1.649

Appendix H
Table 8: Result of Hausman Test

Test Summary (2002-2011)	
Chi square d.f	4
Chi square statistic	5.133243
Prob>chi2	0.2739

Appendix I
Table 9: Random Effects Model

Dependent Variable: Foreign Direct Investment (FDI)				
Independent Variables	**Coefficient**	**Standard Error**	**t-statistic (t)**	**Probability P >| t |**
Constant (C)	-1.248345	5.278888	-0.236479	0.8132
Regulation (EPI)	0.290683	1.392493	0.208750	0.8347
Exports (X)	0.583847	0.280860	2.078782	0.0382
Gross Domestic Products (GDP) per Capita	0.811308	0.259601	3.125213***	0.0019
Population (POP)	0.683724	0.111885	6.110955***	0.0000
R-squared		0.138124		
Adjusted R-squared		0.130198		
Number of observation		440		
Number of groups		44		
F(4,392)		17.42820		
Prob> F-statistic		0.000000		
Durbin-Watson statistic		1.975145		

*** Significant at one percent level of significance where the critical value is 2.588
** Significant at five percent level of significance where the critical value is 1.966
* Significant at ten percent level of significance where the critical value is 1.649

Appendix J
Table 10: Random Effects with Robust Standard Error Result

Dependent Variable: Foreign Direct Investment (FDI)				
Independent Variables	**Coefficient**	**Standard Error**	**t-statistic (t)**	**Probability P >| t |**
Constant (C)	-2.756878	2.990820	-0.921780	0.3572
Regulation (EPI)	0.763844	0.768913	0.993408	0.3211
Exports (X)	0.611090	0.220079	2.776687***	0.0057
Gross Domestic Products (GDP) per capita	0.734435	0.141172	5.202426***	0.0000
Population (POP)	0.691748	0.055598	12.44186***	0.0000
R-squared		0.236754		
S.E. of regression		0.229736		
F-statistic		33.73361		
Durbin-Watson		1.744199		
Prob> F-statistic		0.000000		

*** Significant at one percent level of significance where the critical value is 2.588
** Significant at five percent level of significance where the critical value is 1.966
* Significant at ten per cent level of significance where the critical value is 1.649