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Greenfield, Mergers and Acquisitions, Energy Consumption, and Environmental Performance in Selected SAARC and ASEAN Countries

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ABSTRACT

This study by using the random effects (RE) and robust least square estimates (RLS) examines the influence of two different types of foreign direct investment namely Greenfield (GF), Mergers and Acquisition (M and A) and energy consumption, on environmental performance of the eight selected economies in SAARC and ASEAN regions over the 2003-2014 period. Moreover, economic growth and population growth are used as controlled variables. The originality of this study is the use of Environmental Performance Index (EPI) to examine the effects of two different types of foreign capital inflows on the environment. According to the empirical outcomes of this study, GF and M and A investments have exacerbated the environmental performance in the selected eight SAARC and ASEAN countries, hence confirm the Pollution Haven Hypothesis (PHH) to be valid. In addition, energy consumption and population growth are also found to be serious havoc for the environmental performance in this case. Nonetheless, economic growth has improved the overall environmental performance in these countries. The study suggests the formulation and enforcement of strict environmental regulations to seek environment friendly and energy efficient GF and M and A investments. In addition, renewable energy use and population control policies are highly desirable in these countries for clean and healthy environment. Accordingly, these economies are recommended to develop policies to realize sustainable economic development for improved environmental performance.

Keywords: Greenfield, Mergers and Acquisition, Environmental Performance Index, SAARC, ASEAN
JEL Classifications: F21, C1, F10, F64, F10

1. INTRODUCTION

The world, as a consequence of anthropogenic activities, is facing severe environmental challenges. Henceforth, environmentalists characterize this epoch as Anthropocene. According to a report by Intergovernmental Panel on Climate Change (IPCC), a recent climate change phenomenon has no parallel precedent in the last 4.5 billion years history of the earth. Furthermore, IPCC report intimates that more of such anthropogenic activities will cause pervasive and irrevocable damages to the human beings and the ecosystem as well (IPCC, 2014). Therefore, recognizing the significance of this issue, researchers have endeavored to empirically reveal the influence of some of the responsible factors such as foreign direct investment (FDI), use of non-renewable energy, rapid economic and population growth on the degradation of natural environment (Zhu et al., 2016).

Admittedly, FDI accelerates economic growth by enhancing productivity, technological diffusion and employment generation (Abu and Afolabi, 2017; Hassan et al., 2014). Nevertheless, it exacerbates the environmental conditions too, by enhancing the energy demand, accelerated economic growth, urbanization and over utilization of the natural resources (Baek and Koo, 2008; Kareem et al., 2014).

The debate about the impacts of foreign capital on environmental quality is contentious these days among the academicians and as well as policy fabricators. The prevalent literature discussing FDI (hereafter) and environment nexus, exhibits two interesting however, different hypotheses. Firstly, Pollution Haven Hypotheses (hereafter PHH) asserts that FDI from the developed countries aggravates the quality of environment in the developing host countries by transferring the environmentally hazardous industries (Yoon and Heshmati, 2017; Jiang, 2015). Likewise, according to PHH, lax environmental regulations in developing countries poses it attractive for the developed economies to relocate their dirty industries in the developing countries to reduce the cost of production. Hence, this dirty industry relocation from the developed countries, converts the developing countries into something like "pollution havens" of the industrialized nations (Xing and Kolstad, 2002). On the other hand, Pollution Halo Hypothesis argues that Multinationals' (MNCs) by transferring the advanced and environmentally efficient technologies and following the international environmental standards improve the environmental quality in the developing host countries (Zarsky, 1999; Zugravu-Soilita, 2015).

Recently, capital flows around the globe have increased by manifolds as a result of rapid globalization. Particularly, the developing countries have been seeking a substantial share of global FDI since 1990s. For instance, in 2014, the developing countries collectively received FDI worth of $681 billion, with an increase of 2%, as compare to 2013. Certainly, this enormous FDI has helped the developing countries in multiple ways. For instance, a contribution of the MNCs' to the budget of developing countries is accounted approximately $730 billion per year, and they further add 10% revenue to the governments of the developing countries. Moreover, MNCs contributes more to the revenues of developing countries as they do in the developed countries (UNCTAD, 2015).

Nonetheless, this massive capital flows are considered responsible for producing adverse environmental challenges by increased energy consumption and economic growth (Zwerg and Arango, 2009; Hoffmann et al., 2005; Abdouli and Hammami, 2016). For instance, in the Northern hemisphere, since 1983-2012, these three decades are considered the warmest in the last 1400 years. Moreover, the average land and ocean surface temperature has increased by 0.85 centigrade since 1880. Therefore, climate change as a consequence of increased economic activity has created multifacet challenges of health and food shortage for the human beings (IPCC, 2014; UNEP, 2016).

Likewise, energy production and consumption have also increased as a result of enormous FDI flows and production of goods at massive scale. This increased energy demand, therefore, is assumed as another responsible factor for environmental degradation. For instance, since 1990-2014, carbon dioxide emissions (CO_2) have increased by 16% as a result of fossil fuel based primary energy production. Moreover, as a consequence of increased CO_2 emissions in the environment, air quality has been severely deteriorated and creating serious health issues. For example, air pollution due to the energy usage is now the fourth largest death reason around the world. The statistics indicate that around 6.5 million pre-mature deaths are caused by air pollution merely. International Energy Agency in a latest report has indicated that since 1970-2014, total primary energy supply has increased by 150% globally (IEA, 2016).

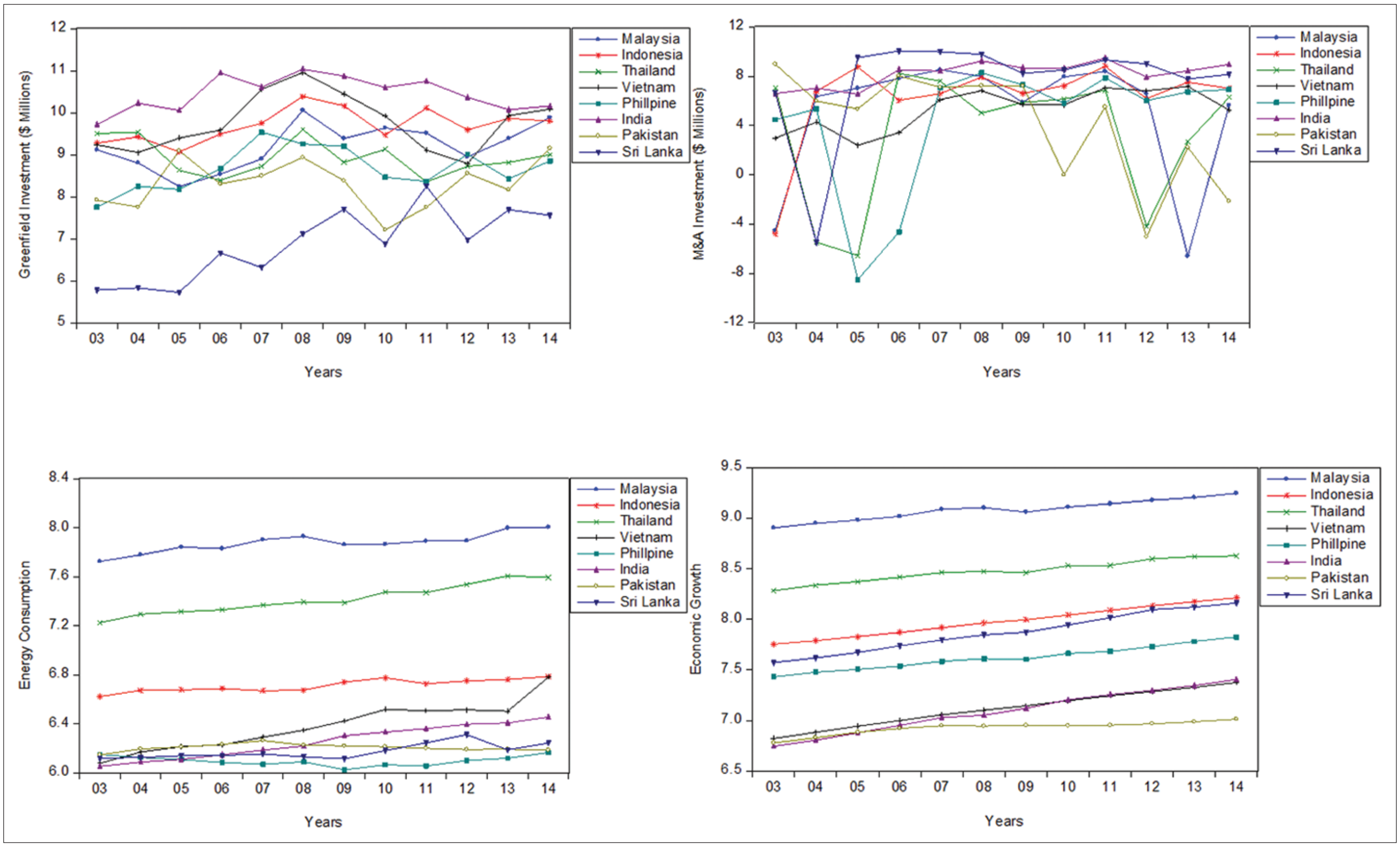
1.1. Overview of the SAARC and ASEAN Regions

SAARC (South Asian Association for Regional Cooperation) was formed in 1985, it has eight member countries (Adeel-Farooq et al., 2017; Khan et al., 2014). Since the acceptance of Structural Adjustement Program (SAP), introduced by international financial institutions in the late 1980s, SAARC countries have experienced a huge influx of FDI to the region. For instance, according to the United Nations Conference on Trade and Development (UNCTD), SAARC in 2014, collectively received total $41 billion as FDI, with an increase of 16%, comparable to the 2013 (UNCTD, 2014). Therefore, this region has experienced substantial economic growth since 1990s (Sahoo, 2006; Sahoo et al., 2014). For instance, Gross domestic product (GDP) of the three major economies of South Asia, namely, India, Pakistan and Sri Lanka was $466.533 billion, $79.876 billion and $20.612 billion in 1990, respectively. Whereas in 2014, GDP of these three countries was recorded as $2.131 trillion, $206.178 billion and $72.838 billion. Therefore, the World Bank in 2016, catagorized the SAARC as the fastest growing region in the world (World Bank, 2016).

In the same way, the Association of Southeast Asian Nations (hereafter ASEAN) was formed in 1967, and it has ten member countries. Since 1990s, ASEAN has also experienced an immence amount of FDI inflows. According to UNCTD, ASEAN received FDI worth of $133 billion in 2014, with an increase of 9.6% (UNCTD, 2014). Therefore, ASEAN region has achieved enormous economic growth due to the FDI inflows and technological diffusion (Thomsen, 1999; Lee and Tan, 2006; Pheang et al, 2017). Moreover, economic growth of ASEAN has been impressive during the previous decades. For instance, IMF economic outlook reported that average economic growth of ASEAN in 2003 was 5.67%, that surged to 6.91% in 2010 and during 2013 recorded at 5.04%. However, with this impressive economic growth, the energy consumption has also surged by manifolds. For example, ASEAN energy outlook reported that ASEAN's total primary energy supply was 238 million tonnes of oil equivalent (Mtoe) in 2000, that increased to 386 Mtoe in 2010 and further reached to 619 Mtoe in 2013. In addition, Malaysia, Indonesia, Thailand, Phillpines and Vietnam are the highest energy consuming countries in ASEAN. For example, these five rapidly developing economies collectively consume 88% of the total energy in ASEAN region (ACE, 2015).

Similar to the global level, massive FDI influx, substantial economic growth, increased energy demand and population growth have detriorated the environmental conditions in the SAARC and ASEAN too. For instance, the two major carbon dioxide emitting countries of the world, namely India and Indonesia are located in SAARC and ASEAN respectively. In particular, SAARC region has the world's most air polluted cities and also vast majority of the people is compelled to use contaminated water. Further, rampant air and water pollution in the SAARC countries are causing diseases like cholera, malaria and dengue. Additionally, this environmental

Figure 1: Trends in greenfield, M and A, energy consumption and economic growth in SAARC and ASEAN countries



degradation is expected to cost the region equal to 1.8% of its total GDP till 2050 (UNEP, 2014; Ahmed and Suphachalasai, 2014). Moreover, in a recently published online report by World Economic Forum (WEF), it is intimated that people in the SAARC region, particularly from India and Pakistan are expected to experience non-bearable and extreme heat waves by 2100, if essential measures are not employed to halt the process of climate change (Chandler, 2017). In the same way, ASEAN countries, particularly, Malaysia, Thailand, Indonesia, and Vietnam are also facing multi-facet environmental challenges like biodiversity loss, contamination of water, severe air pollution, decline of agricultural yield and increasing deforestation (Abdullah et al., 2017). Moreover, the economic cost due to environmental degradation is expected to reach 11% of GDP until 2100, in case if the appropriate and sustainable economic policies are not formulated for the region (ADB, 2013; Abu et al., 2017; Olivier et al., 2015). In the same way, population growth is also considered a major source of environmental degradation. Increase in population puts serious challenges for environment by enhancing indutrialization, extensive utilization of natural resources, urbanization, deforestation, land degradation and waste generation (Zaman et al., 2011). Therefore, assessing the environmental consequences of increasing population growth is essential for policy purposes in developing countries. Figure 1 indicates the trend of GF investment, M & A investment, energy consumption, and economic growth in the selected SAARC and ASEAN countries over the 2003-2014 period.

The aforementioned economic and environmental scenario makes it imperative for researchers to empirically investigate the impacts of FDI, economic growth and energy consumption in SAARC and ASEAN regions for the future policy purpose. Therefore, this study intends to examine the role of FDI, energy consumption, rampant economic and population growth on the evironmental performance of the eight selected SAARC and ASEAN countries. Although, there exists a plethora of research on the topic, however, the current study differs from the previous literature in the following ways:

Firstly, the previous studies in the domain of FDI and environment nexus have used aggregated FDI to examine the its influence on the environment of the developing host countries. Nonetheless, according to the literature, FDI can be classified into two major types: Greenfield (hereafter GF) and Cross Border Mergers and Acquisition (hereafter M and A). GF is a type of FDI that establishes new production plants in the developing host countries and commences production operations from the scratch. Whereas, M and A deals with the purchase of already built production units or firms operating in the host countries (Ashraf and Herzer, 2014; Analizi, 2012; Wang and Wong, 2009). Therefore, employing aggregated FDI can possibly blur the real scenario regarding the effects of foreign capital on the environment in the developing countries. Hence, the current study endeavours to fill this gap in the literature by investigating the influence of both major types of FDI, such as GF and M and A on the environment of the SAARC and ASEAN countries.

Secondly, previous literature in the nexus of FDI and environment has merely employed a single proxy variable (CO_2) to evaluate the environmental effects of FDI. Nonetheless, merely CO_2 emissions can not depict the overall environmental condition of the developing host countries. Therefor, an environmental index, developed by amalgamating the different essential environmental indicators can serve as an suitable proxy to observe the environmental performance (Jones et al., 2002). Accordingly, the current study uses Environmental performance Index (hereafter EPI), developed by the Yale university in order to unveil the environment related impacts of GF, M and A, economic growth, energy consumption and population growth in the SAARC and ASEAN countries. EPI was created in 2002 first time and it measures the environmental performance of a country in two border areas of environmental health and ecosystem vitality. Further, these two broader areas are divided into nine environment related indicators, including Air quality; Water and Sanitation; Water resources; Agriculture; Forests; Fisheries; Biodiversity and Habitat; Climate and energy; Health Impacts. Moreover, these nine environmental indicators are further categorised into twenty one sub environmental indicators. Therefore, each country is ranked on the basis of performance by each country in the twenty one vital environmental indicators.

Lastly, the literature about FDI and environment nexus, did not posses any study investigating the impacts of GF and M and A on the environment through using EPI, particularly for SAARC and ASEAN countries. Therefore, this study is the first of its own kind in the existing literature to examine the effects of GF and M and A on the overall environmental performance by using EPI in eight selected countries in the SAARC and ASEAN regions.

2. LITERATURE REVIEW

Recognising the significance of the environmental issues, researchers have put serious and rigorous efforts to unveil the impacts of FDI, energy consumption, economic and population growth on the environmental performance. Therefore, this section briefly reviews the existing literature discussing the impacts of FDI, energy consumption, economic and population growth on the environment.

2.1. FDI and Environment

The literature about FDI and environment nexus contains plethora of research elucidating the impacts of FDI on the environment. Nonetheless, according to the pragmatic outcomes the relationship between FDI and the environment is yet inconclusive. For instance, Zugravu-Soilita (2015) has examined the influence of FDI on the industrial pollution (CO_2, SO_2, NO_2, BOD) in a heterogenous panel of countries. The outcomes indicate that FDI has reduced the industrial pollutants in the countries with low to average capital-labour ratio, however with strict environmental regulations (pollution haloes hypothesis). Nonetheless, in the countries with average capital to labour ratio and lax environmental regulations, pollution haven hypothesis is proved to be true. Similarly, Tang and Tan (2015) by using the co-integration technique measured the role of FDI for the increased CO_2 emissions in the Vietnam. The study concludes that FDI is a major reason for carbon dioxide emission increase in Vietnam. Likewise, Abdouli and Hammami (2016) by using the GMM approach has estimated the effects of FDI and economic growth on CO_2 in the Middle Eastern and North African (MENA) economies for the period 1990-2012. The findings revealed that FDI and economic growth has caused CO_2 emissions to increase in both the regions. Nonetheless, Xiao (2015) conducted a quite meticulous research to divulge the potential impacts of FDI in coastal, central and western regions of China. The outcomes of the study asserted that the impacts of FDI on the environment in the three industrialized regions are good in general. In addition, they argued that, not the lax environmental regulation has determined the FDI influx in these regions, however the developed infrastructure and technology. Furthermore, Liang (2006) has empirically proved pollution haloes hypothesis to be valid in the case of China. The study estimated the effects of FDI on domestic air pollution in China and revealed that foreign firms by crowding out the domestic, environmentally inefficient firms, have reduced the air pollution in China. The study further argued that FDI brings energy efficient technology that has proven to be advantageous for the environment. Likewise, Yue et al. (2016) by using Slacks-Based Measure Directional Distance Function (SBMDDF) argued that FDI not merely has promoted economic growth, it has also reduced the air pollution (SO_2) in China. Nonetheless, at the same time, Jia and Yu (2011) asserted that though FDI has brought the economic benefits, however, this economic growth has happened at the cost of environment in the Chinese province of Jiangsu.

Furthermore, another empirical investigation by Baek and Koo (2008) explains that FDI in India and China has accelerated the economic growth in the long run. However, all this economic prosperity is attained by sacrificing the environmental quality in these developing countries. The study's empirical findings confirm the pollution haven hypothesis valid. In addition, Abdouli and Hammami (2015) has also discovered that FDI has put adverse effects on the environmental quality in MENA countries by accelerating the CO_2 emissions.

Likewise, in the literature, apart from examining the linear relationship, some authors have tried to explore the nonlinear association between FDI and the environment, by using the mediating factors. For instance, Chang (2015) by using corruption as mediating factors argued that FDI deteriorates environment by increasing CO_2 emissions until a threshold level of corruption is reached in the host countries. Furthermore, Hassaballa (2013), conducted a research about developing countries to explain the effects of FDI on the enviornment. On the basis of factual outcomes, the authors argued that the relationship between FDI and the environment is not conclusive and varies from country to country. Like, in some of the countries FDI has improved the environment, whereas in others it has deteriorated the environmental quality. Hence, the study suggested further investigation into the phenomenon.

2.2. Energy Consumption, Economic Growth, Population Growth and Environment

The association between the economic growth, energy consumption, population growth and the environment has been extensively discussed in the domain of the environmental degradation literature. Although, the relationship among the aforementioned variables is conceivable, however, empirical investigation has brought mixed findings. For example, Chiu (2017) employed

Panel Smooth Transition Regression (PSTR) to reveal the impacts of economic growth and energy on the environment in a panel of ninety nine countries. The outcomes indicate that economic growth and energy consumption are the paramount sources of CO_2 emissions in this panel of countries. Likewise, Akhmat et al. (2014) has explored the relationship between energy consumption and CO_2 emissions in the SAARC countries covering the period 1975-2011. By empirical analysis, the authors argued that energy consumption is the major reason for the rampant CO_2 emissions in the SAARC region. Similarly, Ali et al. (2016) by using ARDL technique, found that economic growth and energy consumption have caused CO_2 emissions to surge in Nigeria. Likewise, in another study, Zambrano-Monserrate et al. (2016) has observed that economic growth by encouraging the energy consumption has increased the CO_2 emissions and deteriorated the environment as a result in Brazil.

Despite the thorough investigation, the relationship between the economic growth, energy consumption and CO_2 emissions is not definite yet. For instance, Adeel-Farooq et al. (2017) by using fixed effects and robust least square estimation techniques observed that economic growth has improved the environmental performance in the slected Asian developing economies. sHowever, energy consumption was empirically found to have adverse consequences on the environmental performance. In the same way, Tamazian et al. (2009) by employing standard reduced-form modelling approach reveled that economic growth in the BRIC countries have ameliorated the environment by reducing the CO_2 emissions. Likewise, the influence of energy consumption on the environment is not conclusive still and makes it imperative for further empirical investigation. For instance, some studies argue that energy consumption helps to improve the environmental conditions in some cases (Pao and Tsai, 2011). whereas, some others are of the opinion that energy consumption deteriorates the evironmental quality (Begum et al., 2015; Ali et al., 2016). In the same way researches have shown population growth to be detrimental for environmental quality (Ohlan, 2015; Zaman et al., 2011). Table 1 and Table 2 contain the summary of reviewed literature in this study.

3. DATA AND EMPIRICAL ANALYSIS

The present study examines the influence of GF, M and A, energy consumption, economic and and population growth on the environmental performance of eight selected countries of the SAARC and ASEAN regions, including India, Pakistan, Srilanka, Malaysia, Indonesia, Thailand, Philippines and Vietnam for the 2003-2014 period. These countries are selected on the basis of rampant environmental degradation, increasing energy demand,rapid economic growth, and increasing population.

This study rather than employing aggregate FDI, used diaggregated FDI such as, GF and M and A to analyse the impacts of foreign capital on the environmental performance in developing SAARC and ASEAN countries. Moreover, unlike the previous studies, the present study uses the original GF data available at website of the United Nations Conference On Trade and Development

Table 1: Summary of literature review: FDI and environment

Study	Location/period	Methodology	Explained variable	Explanatory variables	Findings
Abdouli and Hammami (2016)	Middle East and MENA countries/1990-2012	Fixed effectcts/random effects/ GMM	CO_2	FDI EC	Positive
Yue, Yang and Hu (2016)	China/2004-2011	Slacks-based measure directional distance function (SBMDDF)	CO_2 emissions	FDI	Negative
Xiao (2015)	China/1997-2011	Oaxaca decomposition	SO_2/industrial smoke/ industrialy polluted water	FDI	Negative
Zugravu-Soilita (2015)	Panel/1995-2008	Fixed effects/Hausman's test	CO_2 NOx SO_2 BOD	FDI	Mixed
Hassaballa (2013)			CO_2/piochemical oxygen demand/energy	FDI	Inconclusive
Baek and Koo (2008)	India and china	Co-integration analysis/VECM	SO_2 emissions	FDI	Positive
Liang (2006)	China/1996-2003	Fixed effects	SO_2 emissions	FDI, trade	Negative

Table 2: Summary of literature review: Energy consumption, economic growth, population growth and environment

Study	Location/period	Methodology	Explained variable	Explanatory variables	Findings
Chiu (2017)	Panel of 99 countries/1970-2010	PSTR model	CO_2	Income energy consumption	Positive
Adeel-Farooq, Abu Bakar and Olajide Raji (2017)	Asia/2003-2014	Fixed effects/robust estimation	Environmental performance Index (EPI)	Economic growth energy	Negative
Ali et al. (2016)	Nigeria/1971-2011	ARDL	CO_2	Energy consumption economic growth	Positive
Zambrano-Monserrate et al. (2016)	Brazil/1971-2011	VECM/granger causality test	CO_2	Energy consumption economic growth	Positive
Akhmat, Zaman, Shukui, Irfan and Khan(2014)	SAARC/1975-2011	Johansen's cointegration tests/ engle and granger causality test	CO_2 methene nitrogen	Energy consumption	Positive
Tamazian, Chousa and Vadlamannati (2009)	BRIC/1992-2004	Standard reduced-form modeling approach	CO_2	Economic growth	Negative

(UNCTAD) since 2003. In the previous exiting literature, studies are being conducted to examine the effects of the GF and M and A, on economic growth and other macro economic variables (Wang and Wong, 2009; Calderón et al., 2004). These studies to obtain the data for GF, have subtracted M and A from FDI to create the data for GF. Nonetheless, unlike the previous studies, the current study uses original GF data available at UNCTAD since 2003. Moreover, the data for EPI are acquired from website of the Yale University[1]. Similarly, data for economic growth, energy consumption and population growth are acquired from the world development indicators. Table 3, summarises the data sources, measuring units and symbols used for the variables included in study.

The present study uses the model employed in the study of Adeel-Farooq et al. (2018):

$$LEPI_{it}=\alpha_i+\alpha_1 LGF_{it}+\alpha_2 LM\&A_{it}+\alpha_3 LEnergy_{it}+\alpha_4 LGrowth_{it}+\alpha_4 LTP_{it}+\varepsilon_{it} \quad (1)$$

$$LEPI_{it}=\alpha_i+\alpha_1 LGF_{it}+\alpha_2 LM\&A_{it}+\alpha_3 LEnergy_{it}+\alpha_4 LGrowth_{it}+\alpha_4 LTP_{it}+\theta_i \quad (2)$$

In the above equations, I = 1,2,3…,N=8 and t = 1,2,3…,12. Whereas, in equation (1), α_i is an intercept term that is free to move across each cross section but cosidered fixed over time. Every single intercept controls for the cross section specific differences. Moreover, the stochastic random terms ε_{it} are considered to be independent with zero mean and constant variance for all the cross sections and through the time span. In equation (2), m_i is cross section random effects that is supposed to vary across cross sections. Moreover, it is assumed to be random and not correlated with the explanatory variables in the model. Similarly, θ_i is a cross section stochastic error term. The dependent and independent variables are transformed into a natural log to interpret the outcomes as elasticities.

3.1. Estimation Method

The current study employs traditional panel data estimation methods such as fixed effects (FE) and random effect (RE) models. For panel data, having relatively small "t", the conventional panel estimation methods are most appropriate measures for empirical analysis (Adeel-Farooq et al., 2018; Azam, 2016). Furthermore, Hausman test (1978) is used to select the suitable method between the fixed and the random effect. When the probabality value of Hausman test is significant ($P < 0.05$), it indicates the fixed effect model is appropriate for the empirical estimation otherwise the random effect model will be an appropriate choice. In addition, to check the robustness of the outcomes, the study uses robust least square estimate.

4. RESULTS AND DISCUSSION

This study investigates the impacts of GF, M and A, energy consumption, economic and population growth on the environmental performance of the eight selected countries in the SAARC and ASEAN for the period of 2003 to 2014. We have employed fixed effect, random effect, and robust least square estimation methods for empirical estimation.

Table 4 explains the descriptive statistics of all the explained and explanatory variables. The mean, minimum and maximum values along with standard deviations of variables are reported in the table for empirical analysis.

Table 5, indicates the empirical outcomes obtained through the FE and RE estimators. However, based on the value of the Hausman's specification test, merely results obtained by RE estimators are discussed here. In addition, the value of R-square in the Table 5 shows that the explanatory variables significantly explain the 60% variation in the explained variable. Likewise, F-statistics has reasonably high value, indicating the joint significance of the explanatory variables. Moreover, the explanatory variables, except M and A and TP, are statistically significant, showing the robustness of the model.

The empirical outcome in Table 5 shows the negative relationship between GF and EPI. It implies that GF is deteriorating the overall environmental performance in the selected countries during the specific period. For instance, the coefficient value of GF shows that 1% increase in GF exacerbates the environmental performance by 0.3%. This adverse influence of GF on environmental performance proves the pollution haven hypothesis valid in the selected eight countries of SAARC and ASEAN. In the same way, energy consumption is also discovered to have devastating impacts on the environmental performance. The coefficient value of energy consumption indicates that 1% increase in energy consumption deteriorates the environmental performance by 0.15%. Nonetheless, economic growth is empirically observed to improve the environmental performance in this study. For example, the coefficient value of economic growth shows that 1% increase in economic growth tends to enhance the environmental performance by 0.38%. It implies that economic growth is indispensable for these countries to experience improved environment. However, the M and A and TP are discovered to be insignificant to have any influence on environmental performance in selected countries of SAARC and ASEAN.

Further, this study in order to examine the robustness of the outcomes employs Robust Least Square estimates. The results in Table 6 are obtained by using the robust least square estimates. Interestingly, the outcomes in Table 6 are in line with the outcomes in Table 5, indicating that GF and M and A is deteriorating the environmental performance in the selected SAARC and ASEAN countries. However, the havoc influence of GF on environmental performance is larger as compared to the M and A. For instance, the coefficient value of GF in Table 6 is −0.032%. Whereas, the coefficient value of M and A is −0.004%. This implies that GF is more detrimental to environment as compared to the M and A. This impact of GF on environmental performance is in line with the results of Adeel-Farooq et al. (2018). In addition, energy consumption is also revealed to be detrimental for the environmental performance in the selected countries. The coefficient value of energy consumption shows that 1% increase in energy consumption negatively affects the environmental

1 http://epi.yale.edu/

Table 3: List of variables

Variable name	Symbol	Measurement	Source
Environmental performance index	EPI	EPI score	epi.yale.edu/
Greenfield	GF	Value of greenfield investment ($ Millions)	UNCTAD
Cross border mergers and acquisition	M and A	Value of cross border mergers and acquisition ($ Millions)	UNCTAD
Economic gowth	Growth	GDP (constant 2010 US$)	World Development Indicators - World Bank
Energy consumption	Energy	Energy use (kg of oil equivalent)	World Development Indicators - World Bank
Population growth	TP	Total Population in a country	World Development Indicators - World Bank

Table 4: Descriptive statistics

Variable	EPI	GF	M and A	Energy	Growth	TP
Mean	3.78	8.98	4.89	6.64	7.77	3.62
Std.dev.	0.22	1.16	4.07	0.62	0.71	0.37
Minimum	3.38	5.72	−8.51	6.02	6.74	2.90
Maximum	4.13	11.04	9.45	8.00	9.24	4.30
Observations	96	96	96	96	96	96

Table 5: Results of fixed and random effect models explained variable: LEPI

Variable	Fixed effect		Random effect	
	Coefficient	t-ratio	Coefficient ratio	t-ratio
GF	−0.03 [0.00]	−2.94	−0.03 [0.01]*	−3.47
M and A	−0.00 [0.21]	−1.49	−0.00 [0.15]	−1.43
Energy	−0.35 [0.00]	−2.68	−0.15 [0.01]**	−2.47
Growth	0.44 [0.00]	5.40	0.38 [0.00]*	8.34
TP	0.19 [0.29]	1.04	−0.00 [0.99]	0.30
R-square	0.93		0.60	
Adj. R-square	0.92		0.58	
S.E. of regression	0.06		0.06	
F-Statistics	95.06		27.57	
F.Prob	0.0000		0.0000	
Correlated random effects-Hausman test				
Test cross-section random effects				
Test summary	**χ^2 statistics**	**χ^2 d.f.**	**Prob.**	
Cross section random	6.7725	5	0.2381	

*, ** and *** show significance level at 1%, 5% and 10% respectively

Table 6: Robust least square estimate (Explained variable: LEPI)

Method: Robust least square		
Robust least square type: M-estimation		
M-setting: Weight=Bisquare, tuning=4.684, scale=MAD (median cantered)		
Huber type 1 standard error and covariance		
Variable	**Coefficient**	**z-Statistics**
GF	−0.032 [0.00]*	−5.26
M and A	−0.004 [0.00]*	−3.00
Energy	−0.080 [0.00]*	−3.82
Growth	0.350 [0.00]*	20.03
TP	−0.049 [0.01]*	−2.33
R-squared	0.73	
Adjusted	0.71	
Rw-squared	0.96	
Adjusted Rw-squared	0.96	

*, ** and *** show significance level at 1%, 5% and 10% respectively

performance by 0.081%. In literature, various previous studies have also found that energy consumption is detrimental to the environment (Chiu, 2017; Ali et al., 2016; Zambrano-Monserrate et al., 2016). In the same way, the outcome in Table 6 indicates that population growth is also adversely influencing the environmental performance. For example, it shows that 1% increase in population growth in the selected eight countries of SAARC and ASEAN deteriorates the environmental performance by 0.049%. Nonetheless, economic growth empirically is observed to be beneficial for the environmental performance in this study. For instance, by employing robust least square estimates, it is found that 1% increase in economic growth enhances the overall environmental performance by 0.355%. This positive influence of economic growth on environmental performance has also been empirically observed in the several previous studies (Adeel-Farooq et al., 2018; Tamazian et al., 2009).

5. CONCLUSION AND POLICY RECOMMENDATIONS

In the present era, globalization by capital mobilization across the globe has produced multi-facet and gigantic environmental challenges all over the world. Specifically, environmental issues in the SAARC and ASEAN countries are of serious concern. These two developing regions have formulated distinctive economic policies to acquire a substantial share of global FDI to realize rapid economic growth. However, with the influx of foreign capital, and FDI led energy use and economic growth, these regions are confronted with severe environmental concerns too.

Based on our extensive literature review, this study is a unique and fresh endeavor to unveil the environmental impacts of foreign capital on the overall environmental performance of the eight selected SAARC and ASEAN economies.

For instance, this study to evaluate the environmental consequences of FDI uses two types of FDI such as GF and M and A. Moreover, a comprehensive and recently created Environmental performance index (EPI), is employed to empirically examine the impacts of the GF, M and A, on the environmental performance of eight selected countries in the SAARC and ASEAN regions over the period 2003-2014. In addition, in this study economic growth, energy consumption and total population are used as controlled explanatory variables. The empirical outcomes of this study are reasonably essential for the policy purpose in the SAARC and ASEAN regions.

The findings of this study assert that GF and M and A are responsible factors for the low environmental performance in the selected eight SAARC and ASEAN countries. Hereafter, it confirms the pollution haven hypothesis valid for these regions. It implies that FDI in these countries is being invested in the environmentally hazardous industries, which as a result is deteriorating the environmental performance there. This outcome is in line with the various previous empirical studies in the nexus of foreign capital and environment. In the same way, energy consumption and population growth are also revealed to be detrimental for the environmental performance. Nonetheless, the outcome for economic growth indicates that economic growth improves the environmental performance in the SAARC and ASEAN countries. This positive effect of economic growth is in agreement with the Environmental Kuznets Curve (EKC). It implies that the economic growth in these countries is realizing better environmental performance.

Hence, this study on the basis of empirical results recommends the policy makers and governments of these selected eight SAARC and ASEAN countries to formulate policies to seek energy intensive and environmentally efficient FDI. These economies should prefer the quality FDI rather than quantity FDI. Moreover, these countries should have to develop and enforce strict environmental protection laws to keep the pollution emission at socially acceptable levels. In these countries, strict environmental laws possibly can ensure the sustainable economic development by restricting the production of dirty goods and use of environmentally hazardous inputs in the production process. In the same way, these economies are suggested to encourage the use of renewable energy rather than the fossil fuel based energy in industry, transportation and domestic affairs. For this purpose, these economies are advised to install environment friendly and energy efficient technologies for production purpose. Moreover, rampant population growth should be controlled by effective management in these countries to experience an improved environmental performance by the citizens in these countries.

Accordingly, in this study, economic growth is empirically proven to be beneficial for environmental performance in these countries. Hence, these countries in order to rejoice clean and healthy environment in the long run have to formulate sustainable economic development policies.

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