THE EFFECT OF TOURISM AND FOREIGN DIRECT INVESTMENT ON ENVIRONMENT: TIME SERIES EVIDENCE FROM PAKISTAN

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Abstract:
The main focus of the present research work is to scrutinize the effect of Tourism and Foreign Direct Investment (FDI) on Environment in case of Pakistan. For this motive, the research work put to use annual time series data for from 1990 to 2021. In the affairs of dependent and independent variables, the make use of CO_2 Emission as dependent and Tourism, Foreign Direct Investment, GDP, GDP2, Renewable Energy and Non-Renewable Energy are utilized as independent variables. The study used Ordinary Least Square (OLS) approach. The empirical results show the optimistic and statistically significant effect of Tourism, GDP and Non-Renewable Energy on the CO_2 Emissions in Pakistan. Other independent variables like Foreign Direct Investment, Renewable Energy and GDP^2 have a negative and significant impact on CO_2 Emissions in Pakistan. The study also supports the existence of Environmental Kuznets Curve (EKC) Hypothesis in Pakistan. The results of Granger Causality Test Indicate that
Keywords: Tourism, Foreign Direct Investment, Capital Investment, Labor Force Participation Rate, Inflation, ADF, ARDL

1.   Introduction

Environmental pollution is one of the most pressing topics now being argued in policy circles all over the world. According to the Intergovernmental Panel on Climate Change, (IPCC) carbon emissions are a major human-induced factor to environmental deterioration. There are many factors that contribute to global warming but CO_2 emission is the largest factor. A CO_2 emission (Carbon Emission) emancipates in atmosphere by burning of carbon flues and decomposes of wood and other plant matters. The rise in CO2 emissions is mostly responsible for unanticipated economic and population expansion. During the years 1970–2010, industrialization and fossil fuel combustion were responsible for more than three-quarters of all greenhouse gas (GHG) emissions.

It has been observed that the global temperature is rising these days; the cause of this rise in global temperature is global warming. Many causes contribute to global warming, but CO2 emissions are the most significant. A Carbon Emission also called CO2 emission happen

when carbon flues are burned and wood and other plant matter putrefy in the atmosphere. CO2 emissions are an interchangeable and odorless gas that is removed from plants to the atmosphere, which collect CO2 to construct their tissues, and to the seas, where CO2 dissolves. Since humans began burning enormous amounts of coal and petroleum in the 19th century, the amount of CO2 released into the atmosphere has increased. In recent years, forest deforestation has become a leading source of CO2 emissions. Environmental deterioration is another term for CO2 emissions.

The environmental Kuznets curve (EKC) is a non-linear relationship between income and environmental deterioration (EKC). According to the EKC theory, when capital is expended during the early stages of economic development, the environment suffers as a result of increased economic growth. This suggests that when one's money rises, the environment suffers as a result. However, as income levels rise and people and governments become more concerned about environmental and public health concerns, the quality of the environment improves in the latter stages of economic growth. As a result, the EKC hypothesis depicts a U-shaped link between wealth and environmental deterioration. There are many various sorts of environmental pollutions, and one of them is CO2 emissions. CO2 emissions are a severe issue that many developing, developed, and developing poor nations throughout the world are dealing with.

Contradictory opinions about the role of FDI in the environmental degradation of many countries may be found along with a number of good contributions to economic growth. One school of thought contends that foreign direct investment (FDI) lowers CO2 emissions by bringing cleaner technologies to speed up industrial processes through investments in the research and development industry. Rahman et al (2021), Jalil and Feridun (2011) and Stretesky and Lynch (2009). Others reject this assertion by asserting that FDI contributes to air pollution through the importation of harmful technologies. They advocate for the notion that FDI promotes economic growth by employing non-green practices. Sabir and Gorus (2019). According to the Pollution Haven Hypothesis (PHH), the adoption of nonrenewable energy-intensive technology in manufacturing sectors might worsen local environmental conditions as a result of FDI inflows into a country via increasing emissions.

Tourism is defined as short-term travel for the purpose of pleasure, recreation, exploration, religious, familial, or business. In today's globe, tourism is a major source of revenue for many countries, benefiting both the tourist and host economies. Tourism contributes a significant amount of money to the local economy in the form of payments made by visitors for products and services. It also creates job opportunities in the tourism-related service industry. The importance of tourism in stimulating economic growth can only be recognized if CO2 emissions, climate change, and environmental issues are taken into account while promoting tourism development. As a result, the growing importance of tourism presents questions for policymakers regarding the best way to boost economic development while reducing CO2 emissions.

Pakistan is one of the emerging nations in South Asia. Its economy is expanding quickly, and it is anticipated that this trend will continue in the next years. Farm is the primary dominant industry in Pakistan and the backbone of its economy. However, as the industrial sector has grown, agriculture land is being lost as a result. In addition, a rapidly growing population accelerates the process of deforestation; Pakistan is the worst-affected Asian nation. Pakistan, the world's sixth most populous country, is confronted with a number of economic difficulties, including expanding external and fiscal imbalances, declining foreign currency reserves, and increased dangers to Pakistan's economic and financial prospects. One of the major routes that the government sees to overcome economic issues is encouraging foreign investors to bring more FDI into the country. Both FDI and environmental contamination have increased in Pakistan in recent decades. This study examines the role of FDI and Tourism on the Environmental Degradation. It is also critical to determine if both FDI and Tourism causes an increase in CO_2 emission in Pakistan. So that, In Pakistan, necessary regulations can be implemented to limit emissions.

2   Literature Reviews

Ahmad et al (2022), examines the impact of financial development, human capital, and institutional quality on rising countries' environmental footprint. The study analysed panel data from 17 rising nations from 1984 to 2017 for this aim. The study used different variables including, Ecological Footprint, Financial Development, Institutional Quality, Economic Growth, Energy Consumption, Human Capital and Fossil Fuel Energy. The short-run and long-run empirical analyses were conducted using the Cross-Sectional Autoregressive Distributed Lag (CS-ARDL) approach. Financial development lowers ecological integrity by increasing the EF, according to the empirical findings. Human capital and institutional quality, according to the research, minimise the EF. Furthermore, through the channel of human capital, financial development promotes environmental sustainability. Furthermore, the environmental implications of financial development are reduced when institutions are of high quality.

Khan, et al (2022), on the worldwide panel, the influence of institutional quality in FDI information and carbon emission reduction is examined. The study examined panel data from 107 developing nations and 39 Belt and Road Initiative countries from 2002 to 2019. Both Static and Dynamic Panel Models are used in this study. The study used different variables including, CO_2, FDI, Institutional Quality, Economic Growth, Energy Consumption, Trade, and Urbanization. Governance variables are critical for FDI inflows, according to the findings. Institutional quality has a significant and favourable influence on FDI information, but energy usage has a negative impact. The environmental Kuznets curve is evidenced by the square of GDP, which is positively related with carbon emissions. FDI and trade raise global and developing-country emissions, whereas Belt and Road nations reduce emissions. Individual indicators of institutional quality, political stability, rule of law, and regulatory quality are found to be poor governance indicators in all panels, while voice and

accountability, as well as corruption control, are weak indicators in Belt and Road countries; however, the interaction term shows that the quality of institutions is regulated by FDI in carbon emission reduction in all panels.

Javaid et al (2022), investigates the role of institutions in reducing climate change risk by reducing the influence of environmental quality. Based on the availability of data, an analysis was conducted on Panel data of 114 nations from 1998 – 2013. The study used different variables including, CO2, Institutional Quality, Economic Growth, Renewable Energy Consumption, Climate Risk Index and Urbanization. The findings were estimated using descriptive statistics, correlation analysis, change effects, and a Panel Feasible Generalized Least Squares (FGLS) model. According to the worldwide assessment, CO2 emissions increase climate risk, but the impact may be mitigated by improving institutional quality. Furthermore, increased renewable energy usage and economic growth lessen climate risk.

Islam, et al (2021), examine the impact of globalisation, foreign direct investment, economic growth, trade, innovation, urbanisation, and energy consumption on CO2 emissions in Bangladesh from 1972 to 2016 in the context of institutional quality. For this purpose the study used Annual Time Series Data from 1972 – 2016 by utilizing Dynamic ARDL technique. The study used different variables including, CO2, Globalisation, Foreign Direct Investment, Economic Growth, Trade, Innovation, Urbanisation, and Energy Consumption. Globalization, foreign direct investment, and innovation all have a negative impact on CO2 emissions, according to the findings. CO2 emissions are influenced favourably by economic development, commerce, energy use, and urbanisation.

Khan et al (2021), In the global panel of 188 nations, investigate the link between environmental parameters by taking into account the effect of institutional quality and technological advancement. Panel data from 2002 to 2018 was used, and static and dynamic models such as OLS, fixed effect, GMM, and system GMM models were employed. The study used different variables including, CO2, Renewable Energy Consumption, Energy Consumption, Financial Development, Population, Innovation, FDI, Labor Force, Institutional Quality and GDP per capita. The findings show that using renewable energy from renewable sources is good for the environment, but using non-renewable energy increases carbon emissions, according to our findings. Financial development has a favourable influence on carbon emissions, however FDI has a negative impact. Technological advancement has a beneficial influence on carbon emissions, with the majority of institutional quality indicators being determined to be significant.

Nadeem et al (2020), uses the autoregressive distributed lag (ARDL) bounds test on annual data from 1971 to 2014 for foreign direct investment inflow and four pollutants, namely CO2 emissions, CO2 emissions from solid fuels, SO2 emissions, and GHG emissions, to investigate the existence of the pollution haven hypothesis in Pakistan. Eight distinct models are examined in each situation by combining various explanatory factors with the inflow of foreign direct investment. The results of this study indicate that there is a positive long-term

association between FDI inflow and CO2, CO2 emissions from solid fuels, and GHG emissions in some of the models and a negative long-term relationship between FDI inflow and SO2 emissions in others. Overall, we were unable to find any solid data supporting the pollution haven theory for Pakistan. It is crucial to implement proper environmental policies and institutional reforms that do not impede FDI inflows as Pakistan actively works to attract more FDI.

Sabir et al (2020), focuses on the importance of institutional quality (IQ) in the South Asian region as it studies the effects of foreign direct investment (FDI) on environmental degradation. Crosssectional dependency is addressed with a second-generation unit root test. We were able to analyse short-run and long-run associations using the panel autoregressive distributed lag (ARDL) method thanks to mixed order of integration. Additionally, the Granger causality test is used in this study to investigate the relationships between the chosen variables. According to empirical findings, FDI has a favourable and statistically significant impact on environmental deterioration. Rule of law has a negligible long-term and short-term impact on the ecological footprint, which is how institutions are judged to be of high quality. However, whereas corruption greatly increases environmental threats, political stability reduces environmental deterioration. The environmental Kuznets curve (EKC) for the nations of South Asia is also supported by this study. This study focused on how political institutions contribute to environmental deterioration. To attain the goal of sustainable development, South Asian nations must concentrate on implementing environmental laws and regulations through raising the standard of institutions.

3.   Theoretical Background

The link between several environmental degradation indices and per-capita income is theorised to follow the environmental Kuznets curve (EKC). This theory was renowned by Grossman and Kruger in 1991 during their experiential study. They found that there was an Inverted U-shaped association among Economic Growth and Environmental Degradation. The assumption of EKC hypothesis is that an Inverse U-Shaped association among Economic Behavior, frequently calculated in conditions of 'Income Per Capita' and the quality of environmental, and calculated by environmental indicators like Per Capita CO_2 Emission. The Figure 3.1 below shows U shaped of (EKC) Environmental Kuznets curve.
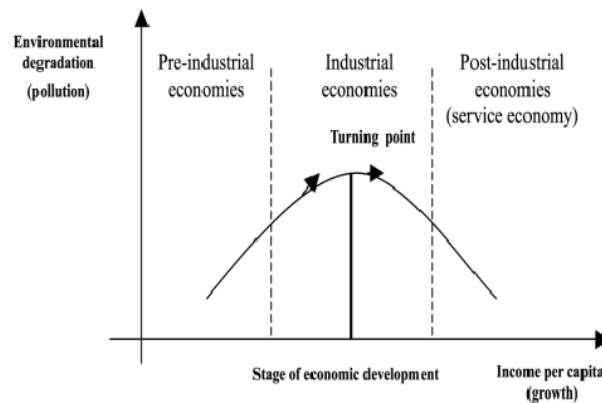
Figure 3.1: Environmental Kuznets Curve

So, at First Period of Economic Growth, Environmental Degradation will enlarge with an increment in Income Per Capita, and begin to diminish as an increase in Income Per Capita proceeds ahead of the Turning Point of Income.

4.   Data and Methodology

To see the effect of Tourism and Foreign Direct Investment on Environment in case of Pakistan, the study used Annual Time Series Data from 1990 to 2021. The data is consists of different variables. The model of the study can be estimated by the following equation:

CO_2 = f (TOR, FDI, GDP, GDP^2, RE, NRE) …….. (4.1)

The econometric model of the study can be estimated by the following equation:

$CO_2 = \beta_0 + \beta_1 TOR_t + \beta_2 FDI_t + \beta_3 GDP_t + \beta_4 GDP^2_t + \beta_5 RE_t + \beta_6 NRE_t + \epsilon_t$ …….. (4.2)

In the above equation, CO_2 represent the Environment, TOR is Tourism Arrival, FDI is Foreign Direct Investment, GDP and GDP^2, is utilized according to the theory of Environmental Kuznets Curve (EKC). RE and NRE represent the Renewable Energy and Non Renewable Energy. The estimated model of the study is guided by the Literature Reviews and the Theory of Environmental Kuznets Curve (EKC).

5.   Measurement of Variables

Summary of variables which are used in present study, their abbreviation and their measurement unit are given below in table.

Table 5.1: Summaries of Variables

Variables	Explanation	Units
CO_2	Carbon Dioxide Emission	Thousand Ton (kt)
TOR	Tourism Arrival	Number of Arrivals in Millions
FDI	Foreign Direct Investment	Inflow, % of GDP
GDP	Gross Domestic Product	Annual Growth
GDP^2	Square of Gross Domestic Product	Annual Growth
RE	Renewable Energy	% of Total Consumption

NRE	Non-Renewable Energy	% of Total Consumption

6.   Data Type and Sources

To find the effect of Tourism and Foreign Direct Investment and different other variables on Environment in Pakistan, present research utilized Annual Time Series data from 1990 to 2021. The data is composed of different sources like World Development Indicators (WDI) and International Renewable Energy Agency (IREA).

7.   Data Analysis and Results Interpretation

7.1.   Analysis of Multicolinearity

"Multicollinearity is meant the existence of a perfect or exact linear relationship among some or all explanatory variables of a regression model." The problem of multicollinearity between the variables is commonly identified by Pair – Wise Correlation Matrix.

Table 7.2: Results of Pair – Wise Correlation Matrix

Variables	LCO_2	FDI	TOR	GDP	GDP^2	RE	NRE
LCO_2	1.000000						
FDI	-0.016728	1.000000					
TOR	0.569087	-0.110173	1.000000				
GDP	0.112957	0.069011	0.062853	1.000000			
GDP^2	0.196809	0.087914	0.140597	0.727908	1.000000		
RE	-0.673026	-0.101200	-0.424976	-0.135099	-0.259299	1.000000	
NRE	0.727161	0.255544	0.870210	0.132693	0.233755	-0.547947	1.000000

The table above indicates the results of Pair – Wise Correlation Matrix. It illustrates that high values shows the High correlation among variables. Overall results demonstrate that, Multi – Colinearity does not exist in the data set.

7.2.   Analysis of Autocorrelation

"The problem of Autocorrelation arises when consecutive error terms are correlated with each other." The problem of Autocorrelation is tackled by Breusch-Godfrey Serial Correlation LM test. The results of Serial Correlation LM test are given in the table below:

Table 7.2: Results of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test.			
F-Statistics	1.143829	**Prob. F(215)**	0.3449

The results indicate that, the probability values of LM test is insignificant (0.3449), this shows that the problem of Autocorrelation does not exist in the data set.

7.3. Analysis of Heteroskedasticity

"Heteroskedasticity is a situation where the variance of the residuals is unequal over a range of measured values." The problem of Heteroskedasticity is tackled by Breusch – Pagan – Godfrey Test.

Table 7.3: Results of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test.			
F-Statistics	0.363306	**Prob. F(817)**	0.9259

The results indicate that, the probability values of Heteroskedasticity test is insignificant (0.9259), this shows that the problem of Heteroskedasticity does not exist in the data set.

7.4. Empirical Results of Ordinary Least Square (OLS) Method

The table below shows the results of Ordinary Least Square (OLS).

Table 7.4: Results of Ordinary Least Square (OLS) Method

Dependent Variable: Log of CO_2				
Method: Ordinary Least Square				
30 observations used for estimation from 1990 to 2021				
Variables	**Coefficient**	**Standard Error**	**T-Statistic**	**Prob.**
TOR	0.118650	0.036286	3.269902	0.0043
FDI	-0.008561	0.003284	-2.606736	0.0178
GDP	0.001907	0.001462	1.304753	0.0284
GDP^2	-0.000406	0.008271	-0.491485	0.0690
RE	-0.018197	0.001324	-1.374654	0.0000
NRE	0.010435	0.005682	1.836452	0.0029
LCO$_2$(-1)	0.963043	0.247921	3.884478	0.0009
C	5.250884	0.339316	15.47492	0.0000
R^2:	0.983559		**Adjusted R^2:**	0.977165
F-Statistics	153.8327		**Prob.(F-Statistic):**	0.000000
Durbin-Watson Stat:	1.928615			

7.5. Results and Discussion

In table 4.1 up above, the value of co-efficient of Tourism shows a positive and statistically significant impact on environment. It indicates that, visitor arrival and departure increase the amount of energy used in transportation. Foreign travelers contribute to the exchange of diseases and their spread. As a result, environmental issues are complex and cross national boundaries. The value of the co-efficient of FDI is showing the negative and statistically

significant impact on environment. It indicate that, An increase in FDI accelerates economic growth through capital formation as well as productivity growth brought on by the transfer of managerial expertise, technological know-how, and knowledge to modernize the economy through innovations and technology. By bringing cleaner technologies to streamline the production process and investing in the research and development industry, FDI lowers CO2 emissions. The value of the co-efficient of GDP shows positively and GDP^2 shows negatively impact on environment. This shows the Inverted U-Shaped Relationship between GDP and CO2 emissions. This supported the existence of Environmental Kuznets Curve (EKC) Hypothesis in Pakistan. The value of the co-efficient of Renewable Energy shows positively and Non-Renewable Energy shows negatively impact on environment. This indicates that the use of renewable energy including Solar, Wind, Biomass and Thermal is very helpful in reducing the CO2 Emission in Pakistan. While, the use of Non-Renewable Energy like Fossil Fuels Increase CO_2 Emission in Pakistan. The reason behind this is that Pakistan is developing country and most developing countries use Non-Renewable Energy to keep the economy on track.

7.7. Granger Causality Test

A statistical test for assessing whether one time series may be used to predict another is the Granger Causality test, Granger, C. W. J. (1969). The results of Granger Causality test is reported in the table below:

Table 5.1: Results of Granger Causality Test

Pair – Wise Granger Causality Test				
Null Hypothesis	**Obs.**	**F-Statistic**	**Prob.**	**Results**
TOR does not Granger Cause LCO$_2$	26	3.43094	0.0775	Accepted
LCO$_2$ does not Granger Cause TOR		5.36230	0.0303	Accepted
FDI does not Granger Cause LCO$_2$	26	0.02123	0.8855	Rejected
LCO$_2$ does not Granger Cause FDI		0.02945	0.8653	Rejected

According to the table above; the first Null Hypothesis is TOR does not Granger Cause LCO$_2$. The probability value of this Hypothesis is 0.0775 which is significant. The other Null Hypothesis is LCO$_2$ does not Granger Cause TOR. The probability value of this Hypothesis is 0.0303 which is also significant. Both variables are Granger Cause to each other. Therefore, we conclude that, there exist Bidirectional or Two way Causality.

The next we turn to FDI and LCO$_2$, the Null Hypothesis is FDI does not Granger Cause LCO$_2$. The probability value of this Hypothesis is 0.8855 which is insignificant. The other Null Hypothesis is LCO$_2$ does not Granger Cause FDI. The probability value of this Hypothesis is 0.8653 which is also insignificant. Both variables are Not Granger Cause to each other. Therefore, we conclude that, there exists no Causal relationship.

7.6. Stability Test

We developed the Cumulative Sum (CUSUM) of Recursive Residuals& Cumulative Sum (CUSUMQ) of Recursive Residual Square to examine the Stability of the calculated coefficients. The consequence indicates that it is Stable because CUSUM is within 5% level of significance and CUSUMSQ is also within limits of 5% significance level.
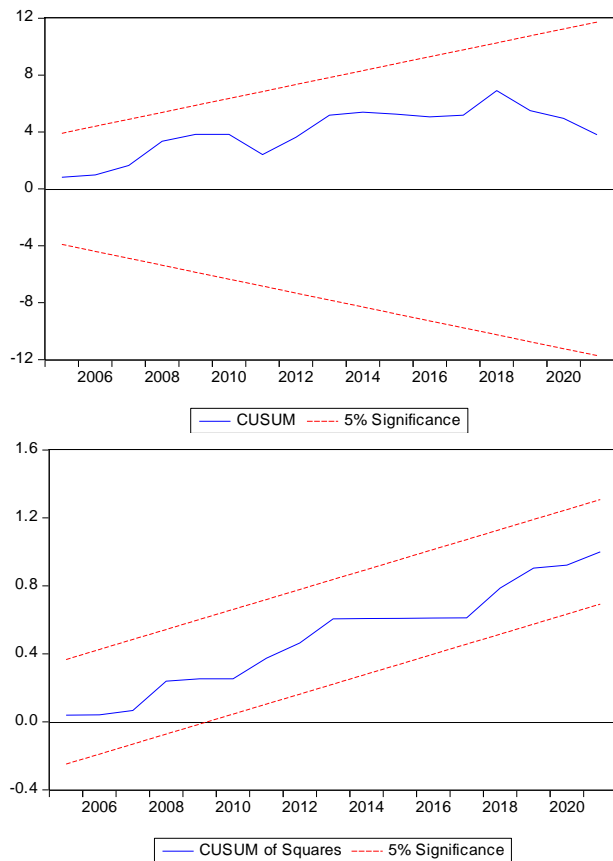
The consequence indicates that it is Stable because CUSUM is within 5% level of significance and CUSUMSQ is also within limits of 5% significance level.

8. Conclusion and Policy Recommendations

The main objective of present study is to investigate the impact of Foreign Direct Investment (FDI) and Tourism on Environment in case of Pakistan. This study used the Annual Time Series Data of Pakistan over the period of 1990 to 2021 collected from different data bases. The study employs Ordinary Least Square (OLS) method to find the results. Empirical results indicate several crucial findings. Firstly, Foreign Direct Investment (FDI), GDP^2 and Renewable Energy Consumption decrease the Carbon Dioxide Emission (CO_2) in Pakistan. On the other hand, Tourism, Gross Domestic Product and Non- Renewable Energy Consumption increase the Carbon Dioxide Emission (CO_2) in this region. The study also supports the validity of the EKC hypothesis in Pakistan.

The present study presents some policy recommendations on the basis of findings. By using clean and environmentally friendly technology for production, Pakistan urgently needs to establish and manage environmental legislation. To raise environmental quality, it is

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important to monitor the technologies that FDI introduces. CO_2 emissions can be decreased through the use of green technology innovation and renewable energy, which is a widely accepted indicator of sustainable development. As a result, significant investment in green technology and renewable energy sources, combined with careful economic activity management, can help Pakistan reduce its CO_2 emissions. In this regard, Pakistani governments ought to enhance their spending on environmentally friendly technical advancements. Additionally, it is crucial to encourage the use of renewable energy at the commercial and residential sectors by providing incentives, such as price subsidies for renewable energy sources, in order to solve the problem of environmental deterioration. There should be less consumption of fossil fuels, which has been a big factor in the region's tourism boom and economic expansion. In order to maintain Pakistan's environmental quality, the government and energy policymakers must adopt alternative and clean energy systems, such as renewable and other alternative uses of energy.

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