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The Effect of Tourism, Foreign Direct Investment and Growth on CO2 Emissions: Panel Data Analysis

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Abstract

Natural resources provide the foundation for the growth and competitiveness of tourist destinations; hence, changes in these resources might affect tourism's development. The world is attempting to speed up its policies to decrease emissions of greenhouse gases, and the costs of these efforts are particularly difficult for low-development nations to bear. As a step in this direction, the purpose of the research is to analyze the impacts of foreign direct investment, tourism, and economic development on the deterioration of the environment in the countries of Morocco, Zimbabwe, Mauritius, and Ethiopia, all of which receive significant amounts of foreign capital inflows. In the section of the research devoted to empirical analysis, the authors investigated the impact that tourism had on CO2 emissions, as well as gross domestic product and foreign direct investments, in the countries of Morocco, Zimbabwe, Mauritius, and Ethiopia between the years 1995 and 2019. The panel analysis technique was employed in the time series analysis to investigate the link between the variables. The Hausman test was used to validate the analysis between the random and fixed effect models in determining the causal association. It has been established on the basis of the findings of the investigation; it has been established that tourism and CO2 have a considerable positive and negative impact on one another.

Keywords: Tourism; environmental pollution; CO2 emissions; foreign direct investments; time series; panel data analysis.

Introduction

In recent years, the growth of many of the world's economies has resulted in high levels of air pollution in some regions. This factor seriously affects the health status of the population living in these areas. For example, in China, air pollution caused by the enormous industrial growth in recent years leads to the premature death of 1.1 million citizens a year (Maslova, 2015). In addition, air pollution hinders the implementation of many types of economic and social activities, including tourism, the development of which is becoming increasingly important in supporting the sustainable economic growth of many countries around the world. The burning of gas, coal, and oil in the world causes more deaths than road traffic accidents, and according to some estimates, air pollution has an economic cost of $2.9 trillion, which is 3.3 percent of global GDP (Bogdanov, 2013). Air pollution is a serious problem in modern cities that has a toxicological impact on human health and the environment. Automobiles and industrial enterprises are the main anthropogenic sources of emissions (Maslova, 2015).

A high level of air pollution can affect the competitiveness of a destination as a tourist destination, which will undoubtedly affect the size of the tourist flow. For example, due to increasing pollution caused by industrial growth and urbanization, China has recently experienced a loss of income from international tourism. Although the contribution of tourism income to China's GDP is an insignificant 1.2%, this has a greater economic effect due to the fact that the tourism industry involves almost all sectors of the economy. Thus, the loss of

income from tourism can potentially have a more significant impact on the country's GDP (Nazarkina, 2014).

Since the turn of the 21st century, the travel and tourism business has developed into one of the most significant in the whole globe. This occurs due to the globalization of capitalism, the mobility of people, and developments in transportation and communication technology. The economy of numerous countries all over the globe has benefited tremendously from tourism's substantial contributions (Dwyer & Forsyth, 2008; Terzi & Pata, 2016). One of every ten jobs available across the globe is in the tourism industry, making it one of the world's biggest and most rapidly expanding industries. Tourism contributes 10% to the global gross domestic product (GDP) and 7% to global exports. The tourism industry has the potential to bring in large investments, provide new employment opportunities, boost overall exports, and integrate cutting-edge and developing technology. Consequently, the tourist industry has emerged as a significant driver of economic expansion and development throughout the globe (Yurtkuran, 2020).

According to research published by the World Travel and Tourism (WTTC, 2016), the tourism sector was responsible for 10.2% of the global GDP and 9.6% of the total employment worldwide in 2016. According to projections made by the United Nations World Tourism Organization (UNWTO), the total number of international visitors will reach two billion by the year 2030. This will result in an annual revenue of two billion USD throughout the globe. According to the data shown below, tourism is one of the most important factors driving the expansion of the world economy (Saritaş & Gökhan, 2022).

As a result, the purpose of this research is to conduct a comparative analysis of the impacts of FDIs and domestic investments on environmental degradation during the period of 1970–2018, with a particular focus on Turkey, which is experiencing a high level of FDI influx as a result of its position in the developing world and its potential for economic growth. There are studies in both the local and international literature that deal with the effects of economic expansion and foreign direct investment on the deterioration of the environment. However, it is anticipated that this research will offer the chance to examine the impacts of foreign direct investment (FDI) and domestic investments on environmental degradation simultaneously and that it will make a substantial addition to the literature as a result of this, given that a study of this kind has not been discovered in the literature. In the study, environmental degradation is represented by CO2 emissions. On the other hand, it is also represented by other elements such as sulphur dioxide (SO2) and methane (CH4) in some studies. Domestic investments, another component of economic growth, are represented by fixed capital formation. Fixed capital investments, which are based on the theories of classical economists, highlight the importance of physical capital in economic growth (Esen & Farahmand, 2020: 132). According to the study plan, first of all, empirical examples from the domestic and international literature on the subject were examined. Afterwards, the definitions related to the data used in the empirical analysis part are presented, and the model it is based on is given. In this section, the method is also explained, and the findings obtained from the estimation of the model are presented with the help of tables and figures. Finally, conclusions and evaluations based on empirical findings are given.In this study, following the introduction, in the first part, the tourism industry and types of the countries are mentioned, and in the second part, the literature summary of the studies examining the relationship between tourism and environmental pollution is presented. In the third section, the data set, methodology and empirical results are given. Finally, policy recommendations are mentioned in the conclusion.

Literature review

The influence that greenhouse gases have on the environment and the link between carbon emissions and macroeconomic factors have become some of the most investigated issues as a direct result of the intensification of global climate change. As a result of the growing interest in examining the connection between tourism and carbon emissions over the course of the last several years, a great deal of research has been carried out in this regard (Gössling, 2013; De Vita et al., 2015; Gössling & Peeters, 2015; Bayramli & Kapan, 2016; Sharif et al., 2017; Tang et al., 2018; Akın et al., 2018; Paramati et al., 2018; Şahin, 2018; Lenzen et al., 2018; Nepal et al., 2019; Dereli et al., 2019; Le & Nguyen, 2020; Akadiri et al., 2020; Atay Polat & Suzan, 2020; Satrovic & Muslija, 2020; Karadağ, 2021; Yurtkuran, 2022; Saritaş & Akar, 2022). In this context, some studies in the literature are briefly summarised below.

Bach and Gössling (1996) were the first to address the contribution of tourism to global greenhouse gases within a theoretical framework. It was emphasized in this research that the aviation sector contributed considerably to greenhouse gas emissions. The argument touches on a wide variety of academic subfields, which is one reason why, during the 2000s, there has been an increase in the number of studies that provide novel and distinctive perspectives (Scott et al., 2012). Accordingly, research on CO2 emissions connected to tourism has gained significant attention from scientists ever since the turn of the twenty-first century. Gössling (2000) was the first person to develop a technique for quantifying the CO2 emissions produced by the tourist sector. According to Davies and Cahill (2000), the effects of tourism on the natural environment may be broken down into three distinct areas. The first category consists of direct impacts, which also include the consequences of traveling to a certain location. The second benefit is the positive impact that service providers have on the capacity of suppliers to be influenced by them. Third, there are negative impacts that might arise from service providers having the ability to affect the behavior of customers or their consumption habits. According to Becken et al. (2001), tourism is a major factor in the use of energy, which in turn contributes to the mismanagement of natural resources and the acceleration of global climate change. The authors also discovered that some tourist activities, such as scenic flights and jet boating, require more energy than attractions such as museums and experience centers designed for visitors in New Zealand. The writers compared the energy consumption of these two types of tourist destinations. In the years that followed, a great number of studies were conducted to investigate the connection between tourism and carbon dioxide emissions.

The current body of research provides a number of different explanations for the CO2 emissions caused by tourism. Nepal (2008) investigated international tourism as one of the most significant industries in South Africa in terms of energy use. According to what he said, a significant portion of the energy used and the emissions produced as a result of activities connected to international tourism is the responsibility of the transportation industry, particularly the aviation industry. Most of the recent research published in the field of energy economics has concentrated on the relationship between expanding economies, increasing energy use, and increasing CO2 emissions. The research conducted by the author revealed that key energy sources include kerosene and wood. Still, the author also discovered that the tourist sector is increasingly making use of locally produced energy-saving technology and renewable energy sources. According to Scott et al. (2010) argument, the tourist business is related to many other economic sectors, such as air travel, which makes the tourism industry a possible danger to the deterioration of the environment and excessive CO2 emissions. According to the findings of the authors, the tourist sector has the potential to become the most important supplier of greenhouse emissions in the world in the not-too-distant future. Alternately, they argued that there is a possibility that environmental contamination may be minimized if major policy and practice improvements were made within the aviation industry.

Using a panel data technique, Lee and Brahmasrene (2013) evaluated the impact of tourism on economic development and CO2 emissions in the nations that make up the European Union. They discovered that tourism positively impacted the environment by lowering pollution levels. Using the panel data approach, Aissa et al. (2014) analyzed the link between CO2 emissions, economic growth, renewable energy, and tourism during 1995–2010. Their findings were published in the journal Environmental Research Letters. The authors concluded that CO2 emissions might be reduced by increasing the use of renewable energy as well as the number of tourists. Al-Mulali et al. (2014) investigated the connection between tourist arrivals, the amount of energy used, the number of people living in metropolitan areas, and the number of CO2 emissions. Panel data with cointegration analysis were used, and five areas were chosen for the study (Africa, the Middle East, the Americas, Asia-Pacific, and Europe). It has been discovered that these factors have a beneficial influence on CO2 emissions; nevertheless, the demand for tourism is not statistically significant in Europe. This conclusion was reached based on the findings of econometric research. Using ARDL, boundary tests, and the Granger causality approach, Solarin (2014) examined the link between GDP, energy consumption, financial development, urbanization, tourism, and CO2 emissions in Malaysia during the period of 1972–2010. This research covered the span of time from 1972 to 2010. The author came to the conclusion that more carbon dioxide is produced as a result of tourism. Using the ARDL, boundary test, error correction model, and Granger causality approach, Katircioglu et al. (2014) evaluated the link between tourist arrivals, energy consumption, and CO2 emissions in Cyprus between the years 1970 and 2009. The study covered the period from 1970 to 2009. The scientists came to the conclusion that tourism drives up both energy consumption and pollution levels in the environment. According to Gössling et al. (2015), the part of global tourism that uses the most energy is traveling to other countries for tourism. Gössling and Peeters (2015) noted that the tourist industry satisfies virtually all of its energy demands using fossil resources such as oil, natural gas, and coal. They emphasized that fossil energy resources in the tourist industry primarily come from transportation, accommodations, and activities at destinations. According to the authors, in recent years, air travel has been rising more quicker than other forms of transportation. As a consequence, the contribution of the aviation sector to the overall level of CO2 emissions has been a positive one.

Researchers Dogan et al. (2017) investigated the link between GDP, energy consumption, openness, and tourism in OECD nations between 1995 and 2010. They discovered that tourism lowers the quality of the environment by increasing CO2 emissions. The findings of the causality test indicated that there is a one-way causal connection between tourism and CO2 emissions. The authors reached this conclusion based on the findings of the test. In the panel data analyses that were carried out in the nations of the Asia-Pacific region between the years 1995 and 2013, Shakouria et al. (2017) found that tourism contributed to a rise in the level of environmental pollution over the long run. In addition to this, they concluded that there is a causal relationship between the two variables. Balli et al. (2019) examined the surrounding Mediterranean nations using the panel data approach between 1995 and 2014. The time span under study was from 1995 to 2014. The authors came to the conclusion that more carbon dioxide is produced as a result of tourism. The researchers Akadiri et al. (2020) investigated the connection between tourism, economic growth, and CO2 emissions in 16 different small island nations over the period of 1995–2014. The authors concluded that rising tourism levels result in higher levels of carbon dioxide emissions. Recent years have seen an increase in the number of research that investigates the link between tourism and ecological footprint (EF).

Among these studies, Katircioglu et al.(2018) evaluated the link between economic development, energy consumption, tourism, and EF from 1995 to 2014 in the ten nations that get the most visitors and discovered that tourism had a negative impact on environmental pollution. During the years 1995-2016, Kongbuamai et al. (2020) investigated the link between economic development, tourism, energy use, natural resources, and EF in ASEAN nations. According to the authors, activities related to tourism help to lower EF. The researchers Godil et al. (2020) investigated the relationship between tourism, financial development, globalization, and environmental factors in Turkey between the years 1986 and 2018, and they came to the conclusion that tourism contributed to an increase in environmental pollution. Between 1974 and 2016 in Thailand, Kongbuamai et al. (2020) investigated the link between economic growth, energy consumption, tourism, openness, population density, and EF. The writers came to the conclusion that tourism lowers the amount of pollution in the ecosystem. In the study that Khan and Hou (2021) carried out in 38 countries that were members of the International Energy Agency between 1995 and 2018, they investigated the link between economic development, energy consumption, tourism, and EF. The writers came to the conclusion that tourism helps to cut down on pollution in the environment. Nathaniel et al. (2021) investigated the relationship between economic growth, natural resources, urbanization, tourism, and EF in ten countries with the highest number of tourist visits between 1995 and 2016. They discovered that tourism contributes to an increase in environmental pollution. When we take a look at the research that investigates the connection between tourism and CO2 emissions, we see that panel data studies for the nations that get the greatest number of visitors still need to be carried out. On the other hand, the panel Fourier Toda-Yamamoto (TY) causality test was used in this investigation rather than the conventional panel causality approach. This test was established relatively recently. The use of Fourier functions in the model leads to more accurate predictions being made. This research is expected to add to the body of knowledge in a manner as mentioned earlier.

Huseynli (2022) states in his study that the economies of Egypt, Kenya and Ethiopia are analyzed with the Granger causality test. According to the results of the analysis, a positive relationship was found between the number of tourists in Egypt and the energy use of businesses. In Kenya, a relationship was found between the income from the local tourism sector and the number of tourists, but no relationship was found in terms of energy. No causal relationship was found for Ethiopia. The relationship between renewable energy and tourism is not mentioned in the study.

In a study conducted by Baghirov and Sarkhanov (2023), the relationship between tourism revenues, number of international tourists and consumer price index in African countries with high tourism incomes was examined. According to the results of the analysis, while there is a positive relationship between tourism revenues and the number of international tourists, there is a negative relationship with the consumer price index. In other words, as the number of tourists increases, tourism revenues increase, while tourism revenues decrease as the price index increases.

Empirical analysis and results

Econometric model and methodology

The purpose of this study is to investigate whether there is a correlation between international tourism (number of arrivals) $TUR_{i,t}$ and CO2 emissions (metric tons per capita) $CO2_{i,t}$, along with two controlling economic indicators known as a foreign direct investment $FDI_{i,t}$ and gross domestic product $GDP_{i,t}$. The study is based on the hypothesis that there is a correlation between the two (i,t). This research uses data from a panel form and is based on participants from four different countries: Morocco, Zimbabwe, Mauritius, and Ethiopia.

The data was from 1995 to 2019. The study regresses below two models:

$$TUR_{i,t} = \alpha_{i,t} + \beta_1 CO2_{i,t} + \beta_2 FDI_{i,t} + \beta_3 GDP_{i,t} + \mu_{i,t} \quad (1)$$
$$CO2_{i,t} = \alpha_{i,t} + \delta_1 TUR_{i,t} + \delta_2 FDI_{i,t} + \delta_3 GDP_{i,t} + \mu_{i,t} \quad (2)$$

A fixed effect model will be used to regress the above models. The study uses the Hausman test to confirm the analysis between the Rendom Effect Model and the Fixed Effect Model.

Panel unit root test

Before continuing with the study, the panel unit root test was carried out. The results of the test are shown in Table 1. The variable tourism is not significant at the level, as shown by its t-statistic of -3.25 and its p-value of 0.006, but it is significant when compared to the first difference. Therefore, the tourist industry has to be included right from the beginning of the differentiation process. At the point of the first difference, the variable CO2 is similarly considered to be stationary. The p-value of 0.0001 suggests that the CO2 will be used at the very first stage of the process.

Table 1: Panel unit root test

Variable	*t*-statistic	*p*-value	Stationary Level
TUR	-3.25575	0.0006	1st Difference
CO2	-3.63803	0.0001	1st Difference
FDI	-2.68045	0.0037	Level
GDP	-3.81177	0.0001	Level

Foreign direct investment and gross domestic product are stationary at their current levels. FDI and GDP have a -2.68 and a 3.81 t-statistic, respectively. Both variables have p-values that are close to zero.

Panel cointegration test

In our model, we first examined the medium- to long-term trend before moving on to the final regression. This long-term relationship was unable to be validated in our series of experiments. The Pedroni Panel Cointegration test results are shown in Table 2, which may be seen below. As per Table 2, no cointegration equations were observed. The majority of the probabilities in the analysis are insignificant at level 0.05. The cointegration of the series indicates that we can regress the model using the ordinary least squares method.

Hausman test

When it comes to model definition, the Hausman test is used to decide whether a regression should have a fixed or random impact. The outcomes of the Hausman Test that was carried out in EViews are shown in Table 3. The research regresses the model with a random effect model prior to carrying out the Hausman test, which is then used to assess the model's specification. As per Table 3, the Hausman test statistics indicate that the study cannot analyse the model with a random effect. The null hypothesis in the above regression model is that random effects are unbiased estimators of parameters. The chi-square of cross-section random is 45.58, having a probability value almost near zero. Therefore. We cannot accept the null hypothesis.

Table 2: Pedroni panel cointegration test

Series: TUR CO2 FDI GDP

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	0.516118	0.3029	0.094519	0.4623
Panel rho-Statistic	-0.454330	0.3248	0.887523	0.8126
Panel PP-Statistic	-2.015122	0.0219	0.418653	0.6623
Panel ADF-Statistic	-2.248010	0.0123	0.003694	0.5015

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	1.610552	0.9464
Group PP-Statistic	0.663468	0.7465
Group ADF-Statistic	0.708305	0.7606

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.275	2.29E+11	2.14E+11	3.00	24
2	0.259	7.64E+10	2.78E+10	7.00	24
3	0.896	3.50E+09	3.67E+09	1.00	24
4	0.623	4.68E+09	4.84E+09	1.00	24

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	0.275	2.29E+11	0	4	24
2	0.259	7.64E+10	0	4	24
3	0.896	3.50E+09	0	4	24
4	0.623	4.68E+09	0	4	24

Table 3: Hausman test statistics

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	45.989529	3	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
D(CO2)	559135.178558	605559.273640	29408950818.033750	0.7866
FDI	13222.205594	18729.872928	14199565.047299	0.1438
GDP	89.034847	1.698038	2233779.681602	0.9534

Fixed effect ordinary least square regression

The pre-requisites related to ordinary least squares regression indicate that we can regress equation (1) and equation (2) with the OLS method. Furthermore, this is panel data; therefore, the Hausman test was implemented first, which indicates that the fixed effect regressor is the best unbiased estimator in our case. Table 4 presents the results of equation 1.

Table 4: Panel least square regression analysis (Equation 1)

Dependent Variable: D(TUR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	89737.14	57558.45	1.559061	0.1225
D(CO2)	559135.2	254519.8	2.196824	0.0306
FDI	13222.21	22271.24	0.593690	0.5542
GDP	89.03485	5462.624	0.016299	0.9870

R-squared	0.369287	Mean dependent var	134635.4
Adjusted R-squared	0.326767	S.D. dependent var	293821.3
S.E. of regression	241082.7	Akaike info criterion	27.69379
Sum squared resid	5.17E+12	Schwarz criterion	27.88077
Log likelihood	-1322.302	Hannan-Quinn criter.	27.76937
F-statistic	8.685027	Durbin-Watson stat	2.045778
Prob(F-statistic)	0.000000		

In the equation that was just presented, tourism is a dependent variable. The constant's lack of significance was shown by the fact that its t-statistic was 1.55 and its p-value was 0.1225. That the constant cannot be considered significant at the 0.05 level is the implication of this. Because of the strong influence that the independent variable CO2 had on the tourist industry, the t-statistic was 2.19, and the p-value was 0.0306. That the effect of CO2 on tourism is substantial at the 0.05 level of significance indicates that both foreign direct investment and gross domestic product are deemed unimportant in the first equation because their respective t-statistics are 0.59 and 0.019. At a level of 0.05, none of the variables is significant. In equation (2), the answers to the equation can be found in table 5, which can be found below. The value of CO2 is the dependent variable, and the t-statistic for the constant term is -0.089, which indicates that it is statistically insignificant at the 0.05 level. In addition, when examined statistically, the independent variable known as "tourism" has statistical significance at the 0.05 level. The result of the t-statistic for TUR is 2.15, and its associated p-value is 0.0342. The model that follows shows that Foreign Direct Investment (FDI) is not relevant, whereas Gross Domestic Product (GDP) is. The values of the t-statistics, respectively, were 0.79 and 3.38. FDI has a p-value of 0.4282, and GDP has a p-value of 0.0010.

Table 5: Panel least square regression analysis (Equation 2)

Dependent Variable: D(CO2)
White cross-section standard errors and covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001431	0.015969	-0.089634	0.9288
D(TUR)	4.35E-08	2.02E-08	2.151369	0.0342
FDI	0.002974	0.003736	0.795862	0.4282
GDP	0.004436	0.001309	3.388522	0.0010
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.346474	Mean dependent var		0.024710
Adjusted R-squared	0.302416	S.D. dependent var		0.080494
S.E. of regression	0.067229	Akaike info criterion		-2.491289
Sum squared resid	0.402262	Schwarz criterion		-2.304305
Log likelihood	126.5819	Hannan-Quinn criter.		-2.415707
F-statistic	7.864047	Durbin-Watson stat		1.963811
Prob(F-statistic)	0.000001			

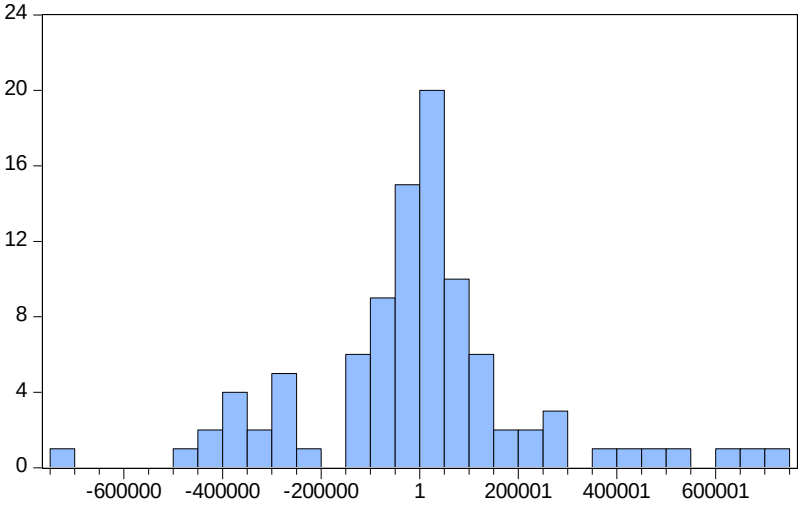
Moreover, in both models above, the R-square value of equation (1) is 0.3692 and the F-statistic is 7.86, which indicates that the model can explain 36.92% of the population and all independent variables are jointly significant. In equation (2), the R-square value is 0.3464 and

the F-statistic is 7.86. It indicates that the model can explain 34.64% of the population, and all independent variables are jointly significant as well.

Normal distribution of residuals

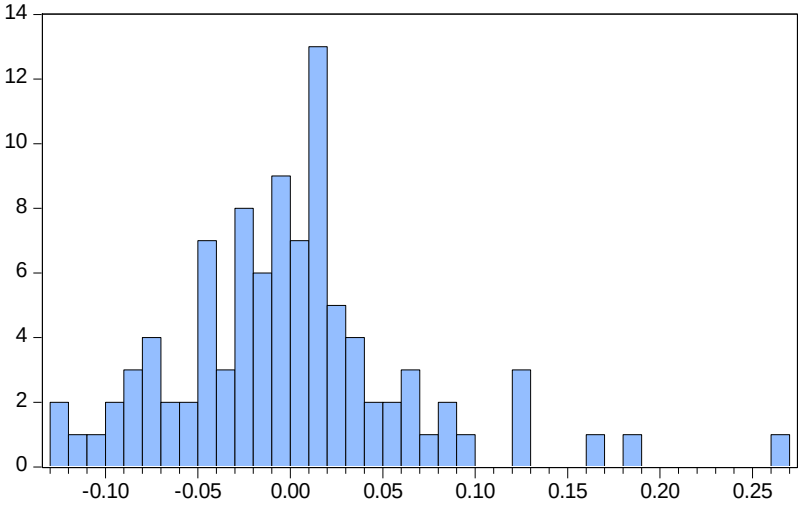
The results of the normality test are presented below in figures 1 and 2. Normality tests explain the normal distribution of residuals. It is the basic OLS assumption that normally distributed residuals indicate the unbiased prediction of results in OLS. As per the below two analyses, both of our fixed effect models produced unbiased results, as Jarque-Bera statistics were 14.29 and 40.78, respectively, with a p-value near zero. Therefore, we can conclude that the residuals of both models are normally distributed.

Figure 1: Normality Test for Residuals Distribution Analysis (Equation 1)



Series: Standardized Residuals	
Sample 1996 2019	
Observations 96	
Mean	-6.37e-12
Median	3021.203
Maximum	724516.9
Minimum	-703075.9
Std. Dev.	233345.4
Skewness	0.306098
Kurtosis	4.788877
Jarque-Bera	14.29945
Probability	0.000785

Figure 2: Normality Test for Residuals Distribution Analysis (Equation 2)



Series: Standardized Residuals	
Sample 1996 2019	
Observations 96	
Mean	-8.27e-19
Median	-0.004063
Maximum	0.264962
Minimum	-0.128114
Std. Dev.	0.065072
Skewness	0.990533
Kurtosis	5.504521
Jarque-Bera	40.78898
Probability	0.000000

Conclusion

In the study, the effect of foreign direct investments and gross fixed capital formations on carbon emissions, which have the highest share of greenhouse gases, was investigated using a panel analysis method in Morocco, Zimbabwe, Mauritius, and Ethiopia from 1995 to 2019. These factors play an important role in countries' economic growth and financial development. Therefore, it is emphasized that the significance of tourism and foreign direct investments (FDIs), which are important in maintaining stable and high growth rates in Morocco,

Zimbabwe, Mauritius, and Ethiopia, should also be taken into consideration. This is because tourism and FDIs are important in terms of maintaining stable and high growth rates. There are two points of view that are diametrically opposed to one another in the academic literature about the effect foreign direct investments have on the environment in host nations. The first is the point of view that industrialized nations have a tendency to pass on technology that is a heavy contributor to pollution to poorer countries. On the other hand, there is the argument that foreign direct investment (FDI) raises environmental standards by introducing cleaner and more energy-efficient technology into the nation that is receiving it. The research aims to investigate the relationship between tourism, foreign direct investment (FDI), and GDP as it relates to the deterioration of the environment. In addition, since a study like this has yet to be located in the existing body of research, it is envisaged that the findings of this study will constitute a very significant contribution to the existing body of research. In the first step of the empirical analysis, topics such as CO2 emissions per capita, which are representative of environmental degradation, the number of tourists who visit the country, the proportion of foreign direct investment inflows to gross domestic product, which is representative of FDI, and data regarding the gross domestic product, which is representative of growth, are discussed.

The study is based on testing the relationship between the number of tourists entering our selected countries and carbon dioxide emissions. This relationship was tested in the presence of foreign direct investment and gross domestic product. In our models, TUR had a significant impact on CO2, and CO2 had a significant impact on TUR. The relationship between these variables is positive, which means that both variables are directly proportional to each other. All of the aforementioned factors, of course, have a negative impact on the development of tourism in the aforementioned countries; however, countries have potential in this area. Measures to improve air quality can be: the protective use of less toxic fuel for cars, such as natural gas; the introduction of environmental control of the technical condition of cars; or the introduction of electric vehicles for urban transportation. These activities will promote the development of tourism in these countries, create favourable conditions for attracting foreign and domestic private capital, ensure the growth of small and medium-sized businesses, and also contribute to the development of related sectors of the economy.

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