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How Do Globalization and Foreign Direct Investment Affect Environmental Quality in OIC Member Countries?

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Abstract

The present study explores the effects of globalization and foreign direct investment (FDI) on environmental quality in OIC countries. The main purpose of the study is to analyze that how opening of OIC economies together with inward FDI affect the environmental quality in terms of CO_2 emissions. In this study, GMM technique has been applied to address the endogeneity issue in the variables of globalization and foreign direct investment, among others. The results of GMM method of estimation show that globalization and FDI enhance CO_2 emissions, means lowering environmental quality in overall OIC countries and low-income OIC countries but reduces CO_2 emissions in high-income OIC countries. Institutional quality, urbanization and industrialization have considerable impact on CO_2 emissions in overall OIC countries as well as low income and high income OIC countries. The study showed that globalization and foreign direct investment are contributing to improving the environmental quality in high-income OIC states but reduces environmental quality in all OIC states and low-income OIC countries. The present study comes up with the useful information that opening of markets of OIC countries to the world and inward foreign direct investment have very strong influence on the environmental quality and both factors should be used in a way which leads to lowering the level of carbon emissions in OIC states.

Keywords: globalization, FDI, industrialization, environmental quality, institutional quality, governance, CO_2 emissions.

1. Introduction

Natural resources are much valuable for the growth of any economy and essential to promote manufacturing and services sectors. However, in the recent decades these resources are badly affected by the process of urbanization and speedy growth specifically in developing economies. Hence these developing countries have serious concerns about challenges related to environment such as deforestation, water scarcity, air pollution, and water pollution, loss of biodiversity and deterioration of wildlife population. Bad quality of environment affect human being adversely and cause social losses (i.e. loss of healthy life, discomfort , premature death), economic losses (i.e. soil erosion, wastage of other natural resources and reduced worldwide tourism) and ecological losses(i.e. lessened recreational values of forests, lakes, canals and sand shores for the people) (Hussein, 2008; Destek and Sinha, 2020)

Regardless of the way that the developing world influenced by the increasing level of environmental destruction, its harmful impacts are still and will be even more noticeable in OIC member states. According to OIC Environment Repot written by Hussain et al. (2019), 24 out of 57 countries ranked as poor and vulnerable countries in environmental performance. Bangladesh is on the top of this list, whereas Qatar is the best performing country in environmental sustainability (Hussain et al., 2019) but still it is considered to be one of the highest rank in producing GHG.

The environmental degradation causes loss of natural resources, destruction of infrastructure and even more harmful impact is the loss of valuable human lives and other living beings. These consequences are the main reason to attract the attention of experts in environment and economics to deal with this issue (Cohenetal, 2018). Now the question arises what are the main factors that affect environmental quality. Many studies have been done to answer this question. The present study will also focus on different aspects of globalization and foreign direct investment (FDI) that are responsible to bring change in the environmental quality of OIC countries.

By globalization, we mean the opening of world economy through trade of merchandises and services, technology, tourism and foreign direct investment. It eliminates or decline the trade restrictions, give a boost to technology transfer, and enhance the capital inflows by increasing foreign investment (Mishkin, 2009). It is a wide-reaching phenomenon that considerably influence the human lives regarding economic, social and political aspects. Widely, it comprises three dimensions; economic globalization, social and political globalization measured by KOF aggregate globalization index (Dreher, 2006; Dreher & Gaston, 2008).One of the recent studies, Farooq et al. (2020) used KOF Globalization index to find out the impact of globalization and gender inequality on economic growth by employing GMM panel data technique and revealed very interesting results showing that Globalization increases growth in High income OIC states whereas it reduces economic growth in low-income OIC states. Though globalization is beneficial for economic growth in some countries, but it also has harmful influences on environment. Globalization increases economic activities and investment which require more energy

consumption resulting in environment degradation (Latif et al. 2018). Likewise, globalization promote the trade of non-renewable sources in the countries with insufficient pollution control policies. Adding more knowledge to the literature Alvi et al. (2020) affirmed the positive impact of trade liberalization and FDI while showed adversely effect of environmental pollution on growth. Antweiler et al. (2001) explored that Government had to lower the production cost at the expense of ignoring environment with the increasing level of trade liberalization.

Likewise globalization, FDI also has conflicting effects on environmental quality. Initially, many researchers focused on the connection between FDI and pollution discharge and ends up with different judgments. Like, one stream of literature advocates the existence of the 'Pollution Haven Hypothesis' according to which industrialized economies transfer energy-intensive production with low energy costs and salaries to developing economies, and promote pollution as a consequence (Copeland and Taylor, 1994; Bommer, 1999; Cole, 2003; He, 2006; Lan et al. 2012). Later on, this hypothesis was widely studied by (Cole and Neumayer, 2005; Merican et al. 2006; Blanco et al. 2013). Though certain scholars opposed and claimed that foreign direct investment create pollution halos by spreading the good quality management practices and advanced environment friendly technologies and thus cause pollution to decrease (Eskeland and Harrison, 2003). Some studies are also found having the similar results like, Tamazian et al. (2009) and someone endorsed that FDI is good for environment (Kim and Adilov, 2012).

The foremost purpose of the present research is to find out the overall influence of globalized process and FDI on environmental quality in OIC states with decomposition of economies in Low-Income and High-Income Countries. This study will use the panel data set for 47 OIC countries using GMM in order to consider the impact of the globalization (measured by KOF globalization index) and FDI (measured by capital inflows) on environmental degradation by employing CO2 emissions as a proxy variable. The interaction relation of globalization and FDI is also used to examine the joint effects. Apart from globalization and FDI the present study also includes institutional quality, urbanization, and industrialization as controlled variables to monitor for their potential effects on pollution/CO2 emissions. Few previous studies have shown that Institutional quality variables also affect the environment and improves its quality (Ozturk and Mulali, 2015). Povtkina (2018) showed that in the presence of low level of corruption democracy reduces CO2 emissions. Similarly, (Chang et al. 2018) also highlighted the importance of Govt. ideology in reducing the CO2 emissions.

This study would get its significance from the perspective of policy formulation especially with reference to globalization and FDI, by discussing their impacts on country's environment so, hopefully assessment of such impressions would help policymakers to make appropriate policies for economic and environmentally sustainable development of OIC economies. Moreover, this study would be value added to the existing literature as no one has analyzed the combined effects of Globalization and FDI on environmental quality with special reference to OIC countries. Although numerous studies attempted to analyze the effects of globalization across the regions in the world but the states of OIC were ignored and can hardly find any comprehensive study on the present subject (Konac, 2004; Kaminski, 2019; Pal and Tok, 2019).

Nevertheless, the present study stipulates systematic and comprehensive information on the link between Globalization, FDI and environmental quality in OIC countries by using latest data. Lastly, this study fills up the gap in academic literature by providing insights to environmental quality which has been translated through opening of markets and foreign investment in OIC countries. The findings of the study will help out to economic managers to design the policies for sustainable development in OIC countries.

The review of literature and theoretical framework is given in section 2 which covers crucial aspects of existing literature. The section-3 describes the specification of a model, data sources and methodology while section-4 elaborates the results with analysis. Section-5 concludes and suggests policy recommendations based on our findings.

2. Review of Literature and Theoretical Framework

Globalization and environmental quality are important issues defining the world economy. There are two distinct outcomes regarding the aftereffects of globalization on environmental quality. According to one group of analyst's environmental quality is known to be worsened by globalization while the other group of analysts argue otherwise.

There are mixed consequences of globalization and FDI on CO_2 emissions that varies from country to country. Talking specifically about economic globalization (trade liberalization) it diminishes CO_2 in OECD states while rises in Non-OECD states (Managi et al., 2009). Later, (Chang et al., 2018) investigated the same relationship and resulted that trade openness enhances CO_2 discharge in high-income states whereas for low and middle-income countries the opposite is true. Shahbaz et al. (2016) selected 19 African countries to analyze the impact of globalization on environmental quality and came to conclusion that CO_2 emissions reduces in overall sample of countries however these results differ from country to country. Later, he also tested environment Kuznets curve hypothesis for china and revealed that globalization cause CO_2 emissions to decrease. He also assured that there exists causality between growth and CO_2 and confirmed the existence of EKC hypothesis (Shahbaz et al., 2017). Existence of EKC hypothesis is also confirmed by Zafar et al. (2019) in their study for OECD countries for the time spam of 1990 to 2014. They used fully modified OLS and continuous updated bias-corrected approaches to check the elasticities of the variables and concluded that financial development and globalization improved environmental quality by lowering CO_2 secretions. Likewise, Haseeb et al. (2018) verified the existence of EKC in BRICS countries and stated that there is no causal sound effects of globalization and urbanization on CO_2 emissions and perceived that pollution is caused by financial development and energy consumption. Another recent study used tourism as a channel of globalization to see its impressions for 15 selected tourist destination countries and came to know that globalization positively and significantly increase carbon emissions (Akadiri et al., 2019).

Koengkan et al. (2020) looked at the symmetrical effect of globalization on CO_2 emissions and declared that three different concepts of globalization namely economic, social, and political globalization adversely affect environment in Latin American and cyberian states. The results of the study are also consistent to the findings of Acheampong, et al. (2019) as they found that trade openness deteriorates environment whereas, FDI and renewable energy decreases carbon emissions. One of the latest

studies, done by Khan et al. (2019) in Pakistan also support the previous studies and confirms the harmful impact of all kinds of globalization, energy consumption and trade on CO_2 emissions whereas FDI increases CO_2 emissions in long run but decreases in short run. This positive relationship between globalization and pollution also exists in 25 developing economies during the period of 1970 to 2014 which has very harmful effects on environmental quality (Shahbaz et al. 2018b). Similarly, Le and Oztruck (2020) investigated the impact of globalization, institutional quality, government expenditure and financial development on CO_2 emissions in the incidence of EKC for 47 emerging and developing economies from 1990 to 2014. They exhibited that globalization, governance activities, financial development and consumption of energy raised CO_2 emissions and confirmed the presence of inverse relationship between economic growth and environmental quality in these selected economies.

While considering environmental quality as a variable, the role of FDI matters for the growth through capital formation, productivity growth and transferring the technology (Alvarado et al., 2017; Seker et al., 2015; Habib & Sarwar, 2013; Chaudhry et al., 2017). The understanding of the connection between FDI and environmental quality has grabbed the eye of different investigators and analysts especially since the mid-1990's. In the history of literature two types of arguments are raised, in one-point FDI considered to affect environment positively in host country while on the other side it has damaging spillover effect on the environment of receiving country. Number of studies justify this statement such as (Ali et al., 2020) used environmental trajectory as an environmental indicator and investigated how Environmental quality of OIC countries influenced by FDI, Trade liberalization and institutional performance. They found positive and significant association among environmental quality, FDI and trade openness while negative link between institutional performance and environmental condition. Comparably (Bakhsh et al., 2017) scrutinized the effect of economic growth and FDI on CO_2 emission in Pakistan and found a positive relation between these two.

Munir and Ameer (2019) used non-linear distributed lag model for finding the short-run as well long-run non-linear FDI effects, industrialization, and economic growth on CO_2 emissions for the period of 1975-2016 in Pakistan. They affirmed the positive and substantial association between rising level of FDI and CO_2 emissions while negative and insignificant association between declining level of FDI and CO_2 emissions. Abdouli and Hammammi (2017) investigated the impact of FDI, environmental quality and capital stock on economic growth of 17 MENA countries for the period of 1990 to 2012 by using OLS, Difference-GMM and System-GMM panel data approaches. They revealed that FDI inflows and increase in capital stocks caused economic growth to increase but the negative side of this enhanced economic growth is that it worsened the environmental quality and caused environmental degradation in MENA countries.

The detrimental impacts of FDI on CO_2 in OECD member states are also analyzed by (Pazienza, 2019) but remarkably they found the negative effect to decrease gradually with increasing FDI inflows which can be used as a driving force to improve environment quality. In China, which is at the top in omitting CO_2, the industrial CO_2 emissions get worsened by FDI at national level and negatively related at regional level. In terms of

R&D it recovers the CO_2 emission at both national and regional level (Yu & Xu, 2019). Similar conclusions were stressed by (Bakirtas & Cetin, 2017; He, 2006; Bae et al., 2017; Hatim and Borhan 2012; Masood et al. 2015) as they all agree that FDI cause CO_2 emission to rise and destroys environmental quality. In contrast one study (Wang et al., 2013) demonstrated combinedly the negative and as well as positive effects of FDI and showed that FDI enhanced the economic growth, productivity of labor and innovation in host country, but it is also responsible for increased unemployment rate and pollution. On the other hand, some researches are arguing in the favor of positive effects of CO_2 emissions on environmental quality and observed that in different countries and in different scenarios FDI improved environmental quality by reducing the level of CO_2 emissions (Acharyya, 2009; Kirkulak et al., 2011; Sapkota, 2017). Few more studies conducted on China (Zhang and Zhou, 2016; Jiao et al. 2018; Liu et al., 2018) also support the evidence and reported that FDI reduces CO_2 emission and consequently improve environmental quality.

The theoretical argument in favor of our research design on which this study is based and gets support is discussed as follows. First, the relation of environmental degradation and economic growth known as Environment Kuznets curve (EKC) hypothesis has been considered. According to EKC hypothesis, as there is increase in economic growth, environmental pollution initially rises, touches its peak and after that start to decrease which is to be likely an inverted U-shape curve. The justification of this hypothesis is, at first, in the beginning as the economy grows there is no improvement in technology which leads to worsen environment but as the transformation continues to take place the technology improves, people with higher living standard demands more clean environment. Hence, pollution decreases, and environmental quality gets better which in turn reduce Co2 (Grossman & Krueger, 1991). Practically majority of the studies analyzed the relationship between economic growth and pollution by taking CO_2 emissions as a key indicator of environmental degradation (Shahbaz and Sinha, 2019). The present study has used CO_2 emissions to estimate the quality of environment. Secondly, institutional quality has also been estimated as according to "Ecological Modernization Theory" environmental changes occur due to three factors (i) political modernization, which emphasize on the role of institutions, state, and market to bring environmental reforms. (ii) upgradation of technology and (iii) transformation of social relations by focusing on environment friendly consumption patterns (Mol, 2002; Mol, 2010). Institutional quality can promote economic growth and environmental quality by implementation of powerful judiciary system, attracting FDI and establishing efficient mechanism for optimal use of capital (Frankeland Romer, 1999). High institutional quality can lessen the CO_2 emissions and improve the quality of nature (Dal Bó and Rossi, 2007) whereas low institutional quality can deteriorate the process of growth and damage environmental quality (Shah et al., 2019).

Summing up the literature, we can say that different studies have contributed with contradictory results, so the question of how and to what extent Globalization and FDI have advantageous or disadvantageous effects on Environmental quality is yet to be answered, and same is the main motivation behind the present study.

3. Specification of the Model, Data Sources and Methodology

3.1 Model Specification

Following the works of (Grossman and Krueger 1991; Antweiler, Copeland and Taylor 2001 and Wang et al. 2013) the model has been given as follows to show the impact of globalization and FDI on CO_2 emissions:

$$LNCO_{2it} = \alpha_0 + \alpha_1 LNCO_{2it-1} + \alpha_1 KOF_{it} + \alpha_2 FDI_{it} + \lambda Z_{it} + \varepsilon_{it} \quad (1)$$

Where,

CO_2 = Carbon dioxide emissions

KOF = globalization represented by KOF index

FDI = FDI inflows

Z = represents control variables of the model such as institutional quality, industrialization proxied by industry value added, and urbanization which is proxied by urban population. Institutional quality index (INQ) is calculated through panel principal component analysis (PCA). It is formed with four chosen indicators of institutional quality (government stability, socioeconomic conditions, governance, and corruption).

An interaction term is introduced in the model to show that how the interaction of globalization and FDI can combinedly analyze the effect of globalization and FDI on CO_2 emissions.

$$LNCO_{2it} = \alpha_0 + \alpha_1 LNCO_{2it-1} + \alpha_2 KOF_{it} + \alpha_3 FDI_{it} + \alpha_4 KOF*FDI_{it} + \lambda Z_{it} + \varepsilon_{it} \quad (2)$$

3.1 Data Sources

Out of total 57 OIC countries, a panel data set of 47 countries is selected due to the data availability. The data of CO_2, globalization, industrialization, and urbanization is taken from different sources like World Development, KOF Swiss Institute and International Country Risk Guide. The list of selected variables and sources of data are presented in table-1.

Table 1: List of Some Selected Variables and Some other Details

Variables	Measurement	Data Sources
Globalization Index	KOF Globalization Index, Dreher (2006) and Gygli et al. (2019)	KOF Swiss Economic Institute' 2019
CO_2 Emissions	CO_2 emissions which are measured in kg per 2010 US$ of GDP	World Bank Indicators, 2019
FDI	FDI inflows at constant 2005 US$	World Bank Indicators, 2019
Institutional Quality Index	Estimated through panel principal component analysis (PCA) by taking four selected indicators of institutional quality	International Country Risk Guide
Urbanization	Total No. of urban populations	World Bank Indicators, 2019
Industrialization	Industry value added (constant 2010 US$)	World Bank Indicators, 2019

3.2 Econometric Methodology

The study employs GMM methods of estimation in terms of Differenced GMM and System GMM techniques for panel data analysis. The purpose of Difference-GMM method is (Arellano and Bover, 1995) to address the country specific consequences and with the possibility of combined endogeneity issue in some of explanatory variables. Every so often the Differenced-GMM which is taken to consider the country wise effects has some possible downsides. A foremost issue is of asymptotic samples and lagged instruments which are likely to be stemmed weak and, henceforth, resulted biasness in the estimations of parameters observed in small-sample sizes or consistent variance is not at large (Alonso and Arrelano, 1999) and (Blundell and Bond, 1998).

Outcome of both vagueness and biasedness resulted from Differenced GMM may be solved by the system GMM as proposed by (Holtz-Eakin et al., 1988; Arellano and Bover, 1995; and Blundell and Bond, 1998). This method of estimation is a way forward to control the issue of endogeneity of independent variables to address the unnoticed country specific effects and to include the lagged regressors are conventional problems when growth models are estimated. Keeping in view the structural limitations of the both methods of GMM, the present study employed the both techniques; one-step System GMM is used when sample period is relatively small whereas Two-Step System GMM is undertaken when sample size is comparatively large.

4. Results and Discussion

4.1 Descriptive and Pair-wise Correlation Analysis

The results of descriptive and pair-wise correlation matrix are reported in table 2. The top part of table shows descriptive statistics and lower part indicates pair-wise correlation between the variables. As per results, the average value for CO_2 emissions is 0.29, and average values for FDI and industrialization are $1593 and $39420 million respectively. Moreover, the globalization and institutional quality indices on average are 46.85 and 0.14, respectively. Similarly, there is strong and significant association between CO_2 Emissions, FDI, urbanization, industrialization, globalization, and institutional quality. However, there is insignificant association between institutional quality and urbanization. The correlations between the variables are also supported by theoretical framework.

Table 2: Descriptive Analysis of the Variables and Pair-wise Correlation

Variables/Statistics	CO_2 Emissions	FDI (Million US$)	Globalization (index)	Institutional Quality (index)	Urbanization	Industrialization (Million US$)
Mean	0.29	1593	46.85	0.14	12.99	39420
Median	0.25	300	45.46	0.17	4.54	8405
Maximum	2.12	39455	80.94	3.82	144.29	437889
Minimum	0.013	-5032	22.30	-5.08	0.19	53.71
Std. dev	0.226	3662	12.76	1.68	20.57	70496
Observations	1316	1316	1316	1316	1316	1316
CO_2 Emissions	1	0.61*	0.21*	0.33*	0.40*	0.15*
FDI		1	0.43*	0.27*	0.40*	0.60*
Globalization			1	0.61*	0.21**	0.38*
Institutional Quality				1	-0.05	0.28*
Urbanization					1	0.68*
Industrialization						1

4.2 Empirical Panel Data Analysis

In table 3, all OIC member countries are considered with the panel data set taken from 1991 to 2017. We made classification of OIC member states in two parts: low income and high income OIC members' countries. As per specification of the World Bank, low-income OIC countries are defined combinedly as low-income and lower middle-income countries and similarly all those upper middle and high income economies are collectively named as high-income countries.

Table-3 presents the upshots of first and second-steps system GMM and described panel data analysis describing the effects of globalization and FDI on CO_2 emissions in OIC states.

Table 3: GMM Estimates, Dynamic Panel (1991- 2017)

Explained Variable: CO_2 emissions				
	One-Step GMM		**Two-Step GMM**	
Variables	**M-1**	**M-2**	**M-1**	**M-2**
lag of CO_2 emissions	.543* {.047} (0.00)	.529* {.048} (0.00)	.465* {.061} (0.00)	.433* {.062} (0.00)
ln(globalization)	.002* {.007} (0.00)	.003* {.000} (0.00)	.001* {.000} (0.006)	.002* {.000} (0.00)
ln(FDI)	.019** {.008} (0.02)	.033* {.009} (0.00)	.029* {.007} (0.000)	.042* {.008} (0.00)
ln(institutional quality)	.005*** {.003} (0.08)	.001 {.003} (0.77)	.005 {.003} (0.14)	.001 {.003} (0.97)
ln (urbanization)	.035 {.039} (0.37)	.005 {.041} (0.89)	.023 {.033} (0.48)	.062 {.040} (0.12)
ln (industrialization)	.050* {.017} (0.00)	.017 {.035} (0.62)	.043*** {.011} (0.09)	.054 {.013} (0.00)
ln(globalization*FDI)	----------	-.0001* {.000} (0.00)	----------	-.0001* {.000} (0.00)
Constant	.772* {.087} (0.00)	1.256* {.104} (0.00)	.877* {.191} (0.00)	.849* {.215} (0.00)
AR(1) test, p-level	0.13	0.09	0.10	0.14
AR(2) test, p-level	0.22	0.12	0.34	0.32
Hansen Test p-level	0.99	0.95	0.22	0.14
Number of years	27	27	27	27
No. of Countries	47	47	47	47

The estimates of GMM for both systems are reported in model 1 and 2 shows that globalization, FDI, institutional quality, urbanization and industrialization are positively and significantly associated with CO_2. The results show that both globalization and FDI are contributing to enhance the level of CO_2 in OIC states. These estimates are of like the concept of scale effect of globalization explained by Grossman and Krueger (1991) and Antweiler, Copeland and Taylor (2001). According to scale effect when economy expands due to globalization and trade openness then CO_2 emissions increases due to use of energy and natural resources. The results are also coherent with pollution haven hypothesis (PHH) according to which environment of host economies becomes dirtier due to globalization and FDI (Copeland and Taylor, 1994; Xing and Kolstad, 2002; Baek

and Koo, 2009). Interaction term of FDI and globalization has reversely related and significant relationship with CO_2 emissions.

The estimates of diagnostic testing also backing the authenticity models. The Hansen test of over identifying restrictions yield total authenticity of instruments. As per Null Hypothesis, the instruments are considered exogenous in the form of a group which means that endogenous regressors are more than instruments. Therefore, the higher probability value is better (insignificant) to accept the null hypothesis.

H_0 = over identifying restrictions are acceptable.

We accept null hypothesis of over identifying restrictions are acceptable based on Hansen test p-values. In other words, the models are valid and not over-identified. Another test, Arellano-Bond is also used to identify the autocorrelation.

The OIC member countries are divided into two groups with the data set from 2000 to 2017. A total 26 states are contained in first group of low-income OIC sates and 21 states are considered in the high-income OIC states. One-step system GMM is employed as two-step technique in small samples has some technical issues.

Table 4: Dynamic GMM Estimates of the Period 2000-2017

Explained Variable: CO_2 emissions						
	Aggregate OIC Member Countries		Low-Income OIC Member Countries		High-Income OIC Member Countries	
List of Variables	M-1	M-2	M-1	M-2	M-1	M -2
lag of CO_2 emissions	.402* {.060} (0.00)	.412* {.056} (0.00)	.273* {.110} (0.01)	.336* {.101} (.001)	.300* {.094} (0.00)	.348* {.083} (0.00)
ln(globalization)	.003* {.001} (0.00)	.003** {.001} (0.00)	.010* {.004} (0.01)	.0002 {.003} (0.95)	-.006** {.002} (0.015)	-.005** {.002} (0.015)
ln (FDI)	.019* {.008} (0.00)	.050* {.016} (0.00)	.012 {.016} (0.47)	.074*** {.039} (0.06)	-.031** {.013} (0.02)	-.023*** {.013} (0.07)
ln(institutional quality)	.012*** {.006} (0.06)	.020* {.007} (0.00)	.026** {.011} (0.02)	.036* {.009} (0.00)	.003 {.014} (0.79)	.026** {.014} (0.05)
ln (urbanization)	.115** {.050} (0.02)	.064 {.055} (0.25)	.283*** {.170} (0.09)	.498* {.161} (0.002)	.390* {.115} (0.00)	.475* {.119} (0.006)
ln (industrialization)	.100 {.020} (0.00)	.096* {.024} (0.00)	.271* {.077} (0.00)	.173* {.070} (0.01)	.211** {.040} (0.00)	.175* {.039} (0.00)
ln(globalization*FDI)	----------	-.0006* {.000} (0.00)	----------	-.0006* {.000} (0.00)	———	-.0003** {.000} (0.02)
Constant	1.262* {.090} (0.000)	.717* {.103} (0.001)	1.222* {.071} (0.000)	1.302* {.083} (0.000)	1.755 {.228} (0.000)	1.706* {.246} (0.000)
AR (1) test	0.10	0.089	0.091	0.12	0.12	0.13
AR (2) test	0.21	0.13	0.33	0.34	0.33	0.34
Hansen Test	0.98	0.92	0.22	0.13	0.13	0.12
No of Years	18	18	18	18	18	18
No of Countries	47	47	26	26	21	21

Table 4 reports the results of aggregate OIC states, low-income OIC countries and high-income OIC countries are reported for the period of 2000 to 2017. Results showed that globalization and FDI has positive impact on CO_2 emissions in total and low income OIC states while it has some negative impact on CO_2 emissions in high income OIC countries.

The negative impact of globalization and FDI on CO_2 emissions in high-income OIC countries is similar to the results of proposed hypothesis Pollution Halo which advocates that due to globalization, trade openness and FDI foreign firms bring advance and cleaner technology to host economies which will decrease CO_2 emissions and improve environmental quality (Zarsky, 1999) and (Wang et al., 2013). The interaction term has negative impact on CO_2 emissions in overall countries as well as in low-income and high-income countries.

5. Conclusion and Policy Suggestions

5.1 Concluding Remarks

The study shows that globalization and FDI enhance CO_2 emissions in aggregate OIC member countries and low-income OIC economies. The behavior of globalization and FDI in overall OIC countries are also same to the pollution haven hypothesis (PHH) according to which the environment of host economies becomes dirtier due to globalization and FDI. Conversely, the globalization and FDI decrease CO_2 emissions in high-income OIC countries. The negative impact of globalization and FDI on CO_2 emissions in high-income OIC countries is consistent with the Pollution Halo Hypothesis which advocates that due to globalization, trade openness and FDI, foreign firms bring advance and cleaner technology to host economies which will decrease CO_2 emissions and improve environmental quality. Moreover, institutional quality, urbanization and industrialization have a positive impact on CO_2 emissions in overall OIC countries as well as low income and high-income OIC countries. The study shows that globalization and FDI are supporting to improve the environment in high-income OIC states but degrade the environment in aggregate OIC countries and low-income OIC countries.

5.2 Policy Recommendations

Keeping in view the results obtained from panel data analysis, it is suggested that FDI and economic activities should be formulated to reduce CO2 emissions in aggregate OIC member countries and low-income OIC economies. As FDI is not contributing towards the concept of sustainable development, the low-income OIC countries should make their policies to open their markets with the rest of world, make effective use of globalization and FDI, and promote environment friendly and cleaner technologies to protect future generation. Based on the findings, the OIC countries should divert the investment inflow and trade-induced technical change towards sustainable development goals (SDGs) by using relevant policy instruments.

Moreover, the findings also reveal that the policies of globalization and FDI should be continued in high-income OIC countries as it improves environmental quality. Globalization is also helpful for obtaining the composite effect and comparative advantage in these countries. Simultaneous increase in globalization and FDI is also advantageous for the environment in OIC member countries which is also supported from the interaction term in our analysis. Industrialization and urbanization are also found harmful for environmental quality. The governments of OIC countries should limit such industrial and human activities which are hazardous for the biological and ecological capacity of the countries. OIC countries should formulate policies to provide jobs in

villages, remote areas and small towns so that the burden of overpopulation in big cities should be minimized. The OIC platform should be used for enhancement and strengthening of the region's obligations to the multilateral environmental agreements, the promotion of green technology, and the management and prevention of transboundary pollution.

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