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A Panel Examination of Economic Growth and Environmental Pressure in the Middle East and South Asia

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ABSTRACT

The study observes the relationship between environmental scarcity and per capita income through carbon dioxide in twenty-six countries from 1990 to 2020. The detailed objective is to find whether the projected associations validate the inverted U-shaped hypothesis as demonstrated by the Environmental Kuznets Curve (EKC). Using panel fixed and random effects valuation procedures, the manuscript finds the negative and significant impact of income on pollution, which proves the validity of EKC. But energy consumption, population and industrial sectors have positive effects on the environment. Besides this, we also found inverted U curve status by using generalize method of moments (GMM) technique. Therefore, we reveal that the increase in income will reduce the pollution in our study sample.

INTRODUCTION

Economic growth and government policies can change the types of mechanical and financial doors employed to address environmental challenges. It would be interesting to discover if ecological conservation and economic development can coexist under these circumstances. When everything is said and done, the quality of environmental products is definitely acceptable, therefore increased income from deregulation would increase people's interest in natural resources of better quality. (Day & Grafton, 2003; Egli, n.d.; Lindmark, 2002)

Many countries economic growth is influenced by various sorts of pollution, including air pollution, noise pollution, resource depletion, climate change, deforestation, and many others. According to the EKC statistical association, environmental damage rises with growth and industrial development due to dirty practices, increased reliance on natural resources, high pollutant discharges, and a greater desire to increase production and yield levels without considering the environmental consequences.(Sabroso *et al.*, 2023) Therefore, achieving economic growth is significantly more complicated for states than guaranteeing environmental safety. The strict environmental regulations in industrialized nations highlight the degree of industrial expansion into underdeveloped economies in a straightforward emphasis on the environment.(Egli n.d 2002; Nguyen Van, 2005).

Since much empirical papers have presented the subject of Environmental Kuznets Curve (EKC) over the previous years. These lessons observed the occurrence of the EKC in some areas and republics of the world by means of various environmental pointers such as, freshwater quality, carbon emissions, sulfur dioxide, nitrogen oxide and so on. In some studies, the EKC numerical relationship between environmental deprivation and per capita income was detained for some indicators of environmental and on the other hand the EKC theory could not be recognized. Furthermost, the studies were directed in high income countries (Omotor & Orubu, 2015; Bouvier, 2004; Bartoszczuk *et al.*, 2002; Roca *et al.*, 2001); with limited number in Asia and middle east region.

Apparently, it is necessary to know the nature of the affiliation between environmental degradation and economic growth before encouraging the use of EKC as a policy director in resolving environmental complications. Certainly, if EKC is empirically confirmed as true, it will just imply that environmental damage is an inevitable consequence of progress. Given the status of the reputed EKC for economic development and environmental sustainability, a significant extent of study on the reality of EKC has appeared but with mixed empirical support. For instance, those which have established the presence of EKC e.g., (Akpan & Chuku, 2011; Beckerman, 1992; Bednar-Friedl & Getzner, 2003; Gene M. Grossman 1991, n.d.; Heil & Selden, 2001; Holtz-Eakin & Selden, 1995).

Our study is herewith related in conducting a new path for improving environmental quality. The study objects to subsidize the current literature on the EKC and conduct an empirical analysis to determine whether the EKC concept holds or not in the middle east and south Asia. These two regions have numerous environmental and economic issues, i.e., climate change, water scarcity and land degradation from the last three decades. The implication of showing a learning on the empirical investigation of environmental Kuznets curve in these regions would essentially go an extended way in terms of policy result making. Hence, checking for EKC has big policy suggestions in the sense that its existence or absence would control the sort of policies that will be expressed by policy makers.

The primary motivation behind this paper is obtained from the detail that the geographic structure of south

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Asia and middle east makes it helpless to the atrocities of climate change restricting from the rising CO_2 trends within this region. Moreover, these developing economies have insistently showed increasing trends in the overall energy mandate, in most cases, is principally derived from uses of fossil fuel.

Meanwhile, in this research paper, we check the rationality of EKC expectations in the Hausman test using a panel dataset in twenty-six countries (See appendix Table.A.1) for the period 1990–2020. We illustrate that economic growth, energy consumption, population density, trade openness, and industrialization create environmental destruction in the extensive run, but the square form of the per capita income reduces the CO_2 emissions. These consequences, which are in courtesy of EKC theory clarify the energy of the worldwide public in significant revision policy to global warming justification particularly in industrialized and developing countries.

LITERATURE REVIEW

The EKC is a revised form of the Kuznets curve hypothesis put forward by Simon Kuznets (1955) in which the author supposed a nonlinear inverted-U shaped association between economic growth and income inequality. The modification between these two hypotheses is that the EKC hypothesis substitutes income inequality in the Kuznets curve hypothesis and remarks on the changing plans of environmental value, emissions of CO_2 in the outline of this paper, with increasing state income level which is used to assignment for economic development.

The first empirical study that verified the rationality of the EKC hypothesis for Mexico was founded by (Gene M. Grossman 1991, n.d.) in which the writers used sulfur and smoke releases to measure environmental quality within the EKC examination. But the findings destined the presence of the EKC hypothesis in Mexico. Succeeding the paths of Grossman and Krueger (1991), numerous of the successive revisions have used various actions of environmental quality to assess the legitimacy of the EKC hypothesis. These varied pointers of environmental quality, mainly with application to air pollution, comprised total GHG emission (Huang *et al*., 2008), carbon dioxide (CO_2) emissions (Ansari *et al*., 2020; Ehigiamusoe, 2020; Galtsev, 2020) nitrous oxide (NO) emissions (Leppelt *et al*., 2014) , sulfur dioxide emissions (Mosconi *et al*., 2020), and suspended particulate matter emissions (Orubu & Omotor, 2011).

Besides, indicators of water quality (Somlanare Romuald, 2010), land quality (Mrabet, 2017), ecological footprints (Ansari *et al*., 2020), and forest reserves (Rahman & Islam, 2020) was also used to represent environmental value within the EKC story. The greenhouse emissions-induced EKC theory has been discovered using together panel and time-series models. Among the panel studies, (Salim *et al*., 2019) found statistical indication in courtesy of the EKC theory holding for a panel of 13 Asian countries. Likewise, in a current study by (Leal & Marques, 2020), the authors also found evidence of the EKC hypothesis holding for the extremely globalized Organization for Economic Cooperation and Development (OECD) fellow nations. Identical decisions were finished by (Heidari *et al*., 2015) for five Southeast Asian countries, (ben Jebli & ben Youssef, 2016) for 25 OECD economies, (Al-Mulali & Ozturk, 2016) for 27 advanced economies, (Mrabet, 2017)for 90 high-, middle-, and low-income republics.

The EKC hypothesis was neither detained for the full sample nor the sub-samples of diverse income assemblies. Comparable findings were stated by (ben Jebli & ben Youssef, 2016)for 24 Sub-Saharan African economies, (Salim *et al*., 2019)for five Southeast Asian nations,(Gormus & Aydin, 2020) for top 10 advanced nations (Jin & Kim, 2020)for 34 Annex-I countries. Lately,(Ansari *et al*., 2020) used panel data estimators and found statistical rationality of the greenhouse emission induced EKC hypothesis in the setting of South Asian economies.

Alternatively, several of the current panel studies have used both the collective and disaggregated volumes of to estimate the EKC hypothesis.(Ewane & Ewane, 2023b) In a study including of 22 OECD nations, (Leppelt *et al*., 2014) showed statistical rationality to the EKC hypothesis for total greenhouse emissions as well as for emissions of CO_2, CH_4, and NO. On the other hand, (Mosconi *et al*., 2020) found the rationality of the EKC hypothesis, about a sample of six oil-exporting African thrifts, to be mixed across different gages used to calculate environmental quality. The consequences confirmed the EKC hypothesis only for CH_4 discharges while contesting it for CO_2 and nitrogen dioxide emissions. Between the country-specific lessons that used time-series EKC models, (ben Jebli & ben Youssef, 2016)used quantile regression methods and established the validity of the CO_2 emission induced EKC hypothesis for 12 out of 15 OECD member realms. Earlier studies focused on the pollution-induced EKC hypothesis have measured several judgmentally important macroeconomic masses that are likely to influence the economic growth-emissions relationship. Among these, numerous studies have measured for aggregate energy feasting levels within the EKC analysis based on the considerate that energy consumption disturbs both the economic wealth level and the quality of the atmosphere. By the way, (Murshed *et al*., 2022)controlled for aggregate energy consumption within the EKC model and found statistical validity of the CO_2 emissions brought EKC hypothesis for Indonesia, China, and Brazil but not in the context of India. However, the authors declared that energy consumption enlarged the CO_2 emission levels in all four countries.

In addition, energy consumption was requested to positively influence the volumes of CO_2 release. Also, the results stated in the study by (Mrabet *et al*., 2017) maintained the CO_2 emission induced EKC theory for Qatar. Furthermore, the results also presented that advanced electricity use was accountable for lower CO_2

emissions in Qatar. In a new study,(Usman *et al.*, 2022) energy consumption in Pakistan declined the quality of the environment by inspiring greater volumes of CO_2 into the air. Also, the authors also found the legitimacy of the EKC hypothesis in the framework of Pakistan.

Therefore, it is apparent from confusing findings from the studies that the validity of the EKC hypothesis is not guaranteed. Rather, it depends largely on the macroeconomic variables, energy consumption, which are controlled within the analysis. Hence, this paper makes a different attempt to bridge the gap in the EKC literature in this regard.

METHODOLOGY

Data

We examine the clear state of an income pollution relationship for an example of twenty-six countries (Middle East and South Asia) over the period 1990–2020. The population is estimated as population density, and income, which catches economic wealth, is estimated as real GDP per capita (constant 2015 US dollars). Innovation is estimated utilizing energy force. Energy consumption is regularly communicated as all out-energy use per dollar GDP. This energy use is in Kg of oil per capita. Environmental degradation is determined by utilizing air toxins, in particular, CO_2 discharges. Here we consider two measures of CO_2 emission, (i) CO_2 emission measured by metric tons per capita (hereafter CO_2-A) and (ii) CO_2 emission measured by kg per PPP $ of GDP (hereafter CO_2-B).

Both data on CO_2-A and CO_2-B are used quinquennial from 1990 to 2020 (i.e., 1990, 1995, 2000, 2005, 2010, 2015, and 2020). However, the trade openness and industrialization are taken as a percentage of gross domestic product (%GDP).

The data is sourced from the World Bank's World Development Indicators online database.1 All explanatory variables are the same years as the dependent variables. Table 1 provides the summary statistics for CO_2-A and CO_2-B, and the correlation coefficients among major variables. The correlation between two CO_2s is 0.42, implying that the relation is weaker than a prior expectation. Also, Figure 1 shows the scatter plots between GDP and pollution indicators.

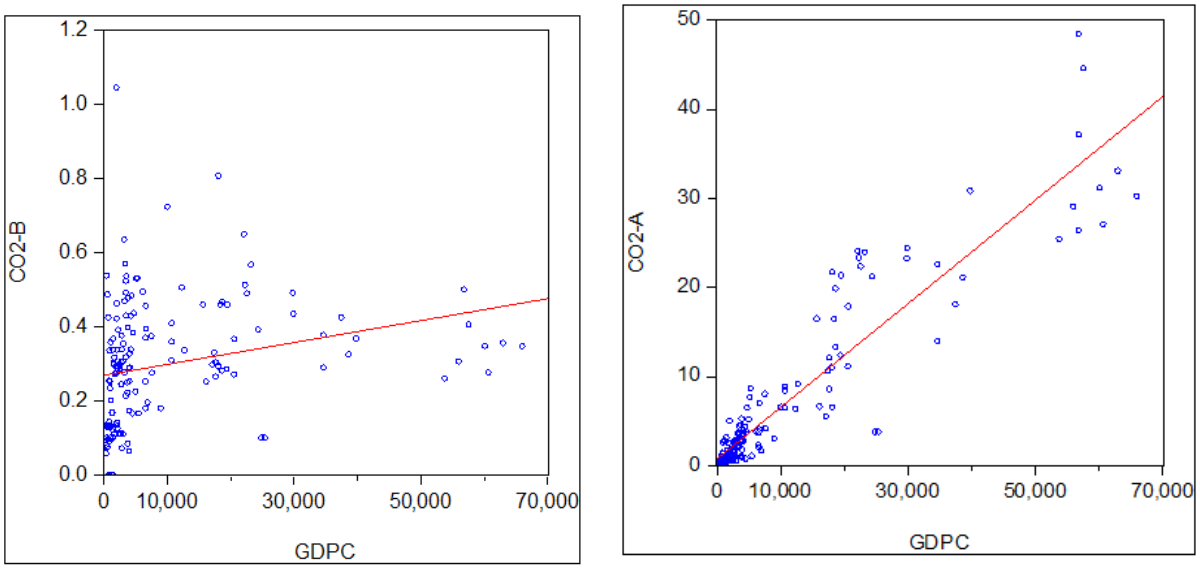

Figure 1: Scatter plot of CO2s and GDP

Notes: (i) See Table 1 for the definitions of variables. (ii) GDPC and both CO2-A and CO2-B are the average of 5 years (i.e., 1990, 1995, 2000, 2005, 2010, 2015, and 2020).

Table 1: Descriptive statistics

Variable	Explanation	Mean	Median	St. Dev.	Max	Min
GDPC	Gross domestic product per capita	10696.52	3575.38	15417.91	66023.63	436.56
CO2-A	CO2 emissions, metric tons per capita	6.95	2.72	9.70	48.37	0.04
CO2-B	CO2 emissions, kg per PPP $ of GDP	0.30	0.29	0.16	1.04	0.00

Correlation coefficient			
	GDPC	**CO2-A**	**CO2-B**
GDPC	1		
CO2-A	0.92	1	
CO2-B	0.26	0.42	1

Note: Variables GDPC and both CO2-A and CO2-B are the average of 5 years (i.e., 1990, 1995, 2000, 2005, 2010, 2015, and 2020)

Model Specification

With the earlier, and given the system previously thought to be over, the important formation of the EKC detailing is that contamination power declines as pay levels rise. By this proposition, the prime equation of EKC can be written as,

$CO2it=\alpha1+\beta1(y)i+\beta2(y2)i+\beta3(EC)i+\beta4(TOP)i+\beta5(PD)i+\beta6(IND)i+\varepsilon it\ldots$ (1)

where CO2 =[CO2-A,CO2-B]; and '*y*' = GDP per capita income and the y2 is the square form of GDP per capita. The subscript 'i' and 't' represent the countries and years respectively.

EC= Energy consumption in kg of oil per capita
PD= Population density in mass per unit volume
TOP= Trade openness in the percentage of GDP
IND= Industrialization in the percentage of GDP
ε = Error term

Estimation Techniques

First, this study includes a panel data examination using pooled least squares, the fixed effects (FE) and the random effects (RE) requirements. The Hausman test is also examined to regulate whether the fixed effects or the random effects are more suitable. The fixed effects model of valuation is determined in inspecting the influence of indicators which fluctuate over time. Fixed effects model also discovers the relationship between forecaster and result variables within an article. The fixed effects model runs for all time-invariant changes so that the approached coefficients of the fixed effects models would not be influenced because of lost time-invariant features. Summarily, the main goal of the FE models is to observe the reasons of fluctuations within an object (Torres-Reyna, n.d.).

Under the random effects model, the differences in the object are supposed to be independent of the illustrative variables which are present in the model. The random effects estimator also delivers estimates for time infinite covariates. In the RE model, distributional expectations are completed on the error term and an estimation technique is used which signs out the unrelated parameters. When a pooled-GLS estimator is completed use of, the random effects estimator is raised (Brüderl, 2005). The Hausman test is used to resolve between the fixed effects model and the random effects model. It is analyzed to govern which of the two models is suitable. The Hausman test estimates that the error terms are linked with the regressors. The fixed and random effects conditions seem desirable as result of the following: 1. The RE model supports in as long as estimates for time – constant covariates; 2. The FE model is used to originate unbiased estimates; 3. The RE is a well degree of finding the true causal result of an object; 4. The FE and the RE models' assistance in scrutinizing panel data which creates of timeseries data and cross-sectional data.

The regression proceeds in a panel analysis, using the method of generalized method of moments (GMM). Equation (1)'s pooled LS results are confused since it includes the lagged dependent variable among the explanatory variables. An instrumental variables estimator or the Generalized Method of Moments must be used to obtain consistent estimates (GMM). The system GMM estimator was then adopted. (Arellano and Bond, 1991) proposed the system GMM estimator and stated that if the orthogonality constraints between delayed values of the dependent and the disturbances were used, additional instruments may be acquired in a dynamic model from panel data. By first-differencing nation effects, the GMM estimator also accounts for potential explanatory variable endogeneity. If there is no second-order autocorrelation in the unique error terms, the first-differenced endogenous variables of EMS with two lagged periods can be considered valid instruments. Since the error term could be correlated with the first difference explanatory factors of GDP with one lag period, they were also employed as an instrumental variable. This is because environmental degradation may worsen economic growth in some circumstances.

The CO_2 variable for all nations utilized in the investigation is estimated in metric tons per capita/per annum and kg of PPP to change for the population size of the nations utilized for the examination. CO_2 information was gathered for the period 1990 – 2020 for the twenty-six nations utilized in this study. The low per capita CO_2 discharges for these nations would recommend that these levels should continue by progressively improving different methods of falling discharges, for instance using ecological guidelines. CO_2 release information was gotten from the World Bank, World Development Indicators.

Among the various factors that influence per capita carbon dioxide creation, per capita income is the factor that has provoked the biggest measure of theoretical and experimental investigation. Our proportion of pay per capita is GDP per capita at steady costs (US 2015) since this proportion of GDP is more solid and accessible than the proportion of GNP and the two measures are exceptionally associated. Gross domestic product is significantly more applicable to agricultural nations than the Gross National Product (GNP) as a proportion of yield. There is a wealth of economic writing and exact help of the EKC for the arrangement of toxins. Financial Growth and the Environment by Grossman and Krueger (1995) shaped the crucial reason for some econometric trial of the EKC done over the long run (Somlanare Romuald, 2010).

Energy is mandatory for economic growth because all manufacturing and consumption actions are directly related to energy consumption. The main sources of energy are converted from fossil fuels for the industrial revolution. The rapid usage of these fuels for economic progress has commanded significant growth in the global emissions of several hesitantly adverse gases. The harmful emissions are not only contaminating the atmosphere but also disturb human life to a major level. All the air pollutants are extremely dangerous, but CO_2 is the major source of global warming, which contributes more than

60% of the outcome of greenhouse gasses (Birdsall & Wheeler, 1993).

The effect of the industrial sector is one of the biggest challenges for all types of contamination in south Asia and middle east. In addition to automobile emissions being responsible for more than 45% of pollution, industrial pollutants are also creating a huge environmental deficiency. Industrialization to accomplish economic development has caused worldwide environmental deprivation. While the influences of industrial movement on the natural environment are the main concern in developing and developed regions (Saboori & Sulaiman, 2013). Agriculture, textile, oil, and gas industries are the main source of pollution in south Asia and middle east. Cleaner technologies and best government policies might be useful for controlling this contamination from manufacturing places.

Trade openness is proxied as (% GDP) and is estimated in this example as the proportion of the number of fares and imports to the apparent GDP. Exchange as proposed in the writing is a significant determinant of worldwide innovation reception and dispersion. This happens through imports of transitional info, learning-by-sending out experience, foreign direct investment (FDI), correspondence, and so forth (Somlanare Romuald, 2010). These cycles authorize the utilization of current innovation that advances contamination reduction. The exchange (% GDP) information is gotten from the World Bank, World Development Indicators informational index. Population density may have an outcome in the development of outflows (originally of the development in per capita livelihoods) using the interest for public products that are contamination serious, for example, framework and safeguard, as contended, for instance, by (Ravallion, 1997). Populace development insights for the chose nations show that the normal development rate in the locale to be 4.93%. It is additionally noticed that more thickly populated nations generally emanate more significant levels of CO_2 focus.

RESULTS AND DISCUSSION

Panel data analysis under the panel data valuation method,

Table 2: Pooled LS

Dependent Variable: CO2-A					**Dependent Variable: CO2-B**					
Models	**(A)**	**(B)**	**(C)**	**(D)**	**(E)**	**(A)**	**(B)**	**(C)**	**(D)**	**(E)**
GDPC	0.08 (0.04)*	0.02 (0.03)*	0.03 (0.02)*	0.02 (0.05)*	0.40 (0.05)*	1.14E-05 (0.01)*	4.21E-06 (0.18)***	4.97E-07 (0.87)***	1.25E-07 (0.97)***	1.93E-07 (0.96)***
$GDPC^2$	-4.16E-09(0.02)*	-2.74E-09 (0.04)*	-2.11E-09 (0.05)*	-2.73E-09 (0.04)*	-3.04E-09 (0.04)*	-1.57E-10(0.00)*	-1.30E-10(0.02)*	-8.83E-11(0.03)*	-8.40E-11(0.09)***	-7.85E-11(0.04)**
EC		0.18 (0.03)*	0.11 (0.05)*	0.03 (0.05)*	0.01 (0.03)*		2.24E-05 (0.005)*	2.10E-05(0.00)*	2.12E-05 (0.00)*	2.10E-05(0.00)*
IND			0.05 (0.004)*	0.63 (0.0140)**	0.07 (0.0569)**			0.63 (0.001)*	0.04 (0.00)*	0.06 (0.04)**
TOP				0.77 (0.1058)***	0.90 (0.1364)***				4.41E-05(0.85)***	3.57E-05(0.96)***
PD					0.000553 (0.3068)***					9.95E-06(0.75)***
C	-0.19 (0.64)***	-0.14 (0.62)***	-1.4 (0.0020)*	-0.75 (0.2356)***	-0.52 (0.4306)***	0.23 (0.000)*	0.25 (0.000)*	0.11 (0.000)*	0.98 (0.00)*	0.13 (0.006)*
R^2	0.86	0.93	0.93	0.93	0.93	0.13	0.21	0.29	0.29	0.29
No. of obs.	156	156	156	156	156	156	156	156	156	156

Source: Research finings,

*Note: The values in the brackets are 'P' values and *, ** and *** representing the probability of 1, 5 and 10% respectively*

the pooled OLS, fixed effect, and random effect models were tried and the Hausman test was used to determine the most effective and reliable model. Additionally, GMM is also used to estimate the results of this study.

While evaluating the pooled analysis, in table 2, it is clearly seen the effect of economic growth on pollution level of the countries. The coefficients of GDP and GDP2 are positively and negatively affecting the CO2-A, respectively, in all models (A to E). In terms of GDP, the findings tell us, if the country's economic condition increases, the unwanted emissions will also be more. After that, with the increase of further economic per capita, the pollution will be minimized. Which shows the validity of EKC presence. Moreover, these two coefficients (GDP and GDP^2) are also significant. The coefficient values of the indicators can be seen from table 2. Moving towards energy consumption, the value of EC has positive but significant effect on dependent variable in models 'B to E'. Meaning that pollution will be increased with the usage of energy. But the alternative source of energy can diminish pollutants up to some level.

Also, like GDP per capita, we have the same results for industrial effects. With the upgradation of energy sources and modern techniques, the industrial level can decrease pollution with significant effect. Whereas trade and population density have positive effects on the environment but are insignificant. By increasing these elements, the environmental degradation will be more. So, the countries need to manage these two issues as well. On the other hand, CO2-B also has the same estimated results as CO2-A for all independent variables and the main thing is, here EKC curve also valid and significant. But the value of the R^2 is quite different in both CO2 measures.

In order to regulate the effective and operative model to include in our study (the fixed effects or the random effects), the Hausman test is examined. Basically, the Hausman test supports in determining whether the FE or the RE is appropriate for our regression investigation. The null and alternative hypothesis of the Hausman test is specified as follows:

$Ho = var(b) \neq var(B)$: there is a correlation random effect

$Ho = var(b) = var(B)$: there is no correlation random effect

The null hypothesis tells that there is an associated random effect which indicates that the random effect evaluations are favored to the fixed effects approximations, whereas the alternative hypothesis marks that there is no correlated random effect which shows that the fixed effects estimates are ideal to those of the random effects evaluations. The rule of thumb for the Hausman diagnostic test is that if the probability of chi2 < 0.05, then FE is best model and on the other hand if the probability of chi2 > 0.05, then it is not significant and the null hypothesis is acknowledged while the alternative hypothesis is excluded, which means RE is good fitted.

Resulting in the use of the Hausman test to know whether the FE or the RE method was more suitable, the outcomes state that the random effects assessments were more consistent than the fixed effects test in both pollution indicators (CO2-A andCO2-B). The result from our study has several economic suggestions in the investigated region. The FE and RE results of both dependent variables are explained in table 3.

On the base of random effects model, the significant negative coefficient of income per capita squared (GDP^2) variable shows a validation of EKC theory in middle east and south Asia in CO2-A analysis, whereas in

Table 3: Fixed effect (FE) and Random Effect

Dependent Variable: CO2-A			**Dependent Variable: CO2-B**	
	Fixed Effect	**Random Effect**	**Fixed Effect**	**Random Effect**
GDPC	0.000110 (0.604199)	0.000434(6.326225)*	3.57E-05(5.695411)*	8.89E-06 (2.1373)"
$GDPC^2$	1.65E-09(0.767041)	-2.77E-09(-2.918937)*	3.02E-10 (4.077894)*"	4.31E-11(0.771595)***
EC	0.000761(4.684145)*	0.001099(11.23299)*	0.001373 (1.530771)*"	0.002382(2.913815)*
IND	0.030351(1.164805)	0.035390(2.064045)**	-0.000164 (-3.556429)*"	-0.000111(-2.989369)*
TOP	0.001698(1.270241)	0.000543(0.940248)	1.02E-05 (1.823426)*"	2.04E-05(4.136153)*
PD	0.012014(1.183707)	0.005945(1.406439)***	0.000963 (2.757383)*"	0.000458(1.6482)***
C	3.411923(1.972429)	-0.548023(0.787295)	0.628890 (10.56299)"	0.309056(6.7334)
R^2	0.95	0.92	0.52	0.18
No.of obs.	156	156	156	156

Source: Research findings

*Note: The values in the brackets are 't statistics' and *, ** and *** representing the probability of 1, 5 and 10% respectively*

CO2-B, the results are converse. Concluding that, there is no EKC proof in CO2-B. Other variables also have opposite coefficient value in random effect model. Only the population density has positive value but insignificant, this is consistent with some extant studies in Africa region, for instance, (Rashid, 2009) Orubu & Omotor, 2011)found the existence of EKC for CO_2 in Africa countries.

On the other side, (Omojolaibi, n.d.)could not establish EKC for some selected countries. In case of CO2-A, the significant positive coefficient of income and the negative coefficient of the income squared suggests that as GDP per capita rises, environmental deprivation is also growing, but a positive edge is reached when GDP per capita ranges a point and environmental ruin begins to decrease. The effect therefore exposed that there is a negative but significant connection between GDP^2 and carbon emissions. Therefore, this result goes in line with the a priori belief of the EKC that as per capita income upsurges, pollution level falls.

Meanwhile, in terms of CO2-B, both values of GDP and square of GDP are positive, which shows by increasing the amount of per capita, the environment humiliation will be more. Resulting that, there is no EKC proof in CO2-B.

The indicator of energy consumption (EC) has a positive significant affiliation with carbon emissions in Asia and middle east in both estimators. These results showed that as energy use increases, environmental degradation rises. This confirms our expectation which means, the more usage of energy sources on commercial, and residential level will lead to degrade the environment. The indicator of population density (PD) has a positive but insignificant bond with total CO2.

The result clarifies that as population density grows, carbon discharges rise, this result is also true with regarding prior prospects. It is projected that as the number of people increases, there develops more burden on the present natural capitals which leads to a rise in smog. The purpose for this kind of result could be that even though the population is rising in the region, the people do not involve much in industrial sector activities, but relatively they participate in agricultural actions which have slight pollution marks when related with industrial and manufacturing happenings. This result therefore indicates that people do not significantly influence environmental degradation in some Asian states. Similarly, trade openness (TOP) has positive and insignificant effects on both pollution variables. Meaning that, by increasing the trade activities, the environment will be worse. But due to insignificance, this result is non robust.

Lastly, the effect of industrialization is negative and significant in CO2-B. The development in industrial level can reduce the emissions. But the significant impact tells us, the country should give more concentration to industry in developing friendly environmental projects. But in case of CO2-A, the value of coefficient is positive, which shows industry has harmful impact on environment quality. So, there must be more environmental regulation to avoid pollution in the industrial sector.

Finally, table 4 presents the results of Generalized method of moments (GMM). To begin with CO2-A, it is clearly seen that our regression supports the inverted U shape curve theory. As for the variables, GDP and GDP^2 have positive and negative effect respectively. On the contrary, CO2-B does not confirm the EKC statement, as the value of GDP^2 has positive sign. The fact that carbon emissions are global pollutants, whereas the difference between two CO2s is about unit and weight may account for the difference in the turning points between the two types of emissions. The literature review supports this discrepancy and its interpretation; for example, (Dinda, 2004) and (Nahman & Antrobus, 2005) summarized by saying that EKCs were more likely to hold for different global pollutants. All other explanatory variables have the same coefficients as table 3 except energy consumption, which has negative effect on both dependent variables.

Hence, it shows, that more energy consumption will lead to push down the environmental scenario of the society. It also suggests us, while using the right source of energy production like the advanced energy resources can lead to minimize the pollution level. The PD found that the positive and significant relation in both cases, meaning that rise to global pollution in those regions for both pollutants. This finding has similarities with (Omri, 2013). Lastly, trade has a positive and insignificant impact on environmental quality.(Zakari, 2015) established the impartiality hypothesis where no connection between CO2 production and trade was found.

Table 4: Generalized method of moments (GMM)

	Dependent Variable: CO2-A	**Dependent Variable: CO2-B**
GDPC	0.000988(2.326196) *	5.21E-05 (4.821649)*
$GDPC^2$	-1.08E-08(-2.767070)*	8.10E-10(3.623738)*
EC	-0.001251(-6.089305) *	-0.002473(-1.796982)***
IND	0.132222(1.7553)***	0.000169(3.846192)*
TOP	0.002115 (2.302912)**	9.10E-06(0.56442)**
PD	0.017112(1.371170)**	0.001270(1.438960)**
Observations	104	104

Source: Research findings

*Note: The values in the brackets are 't statistics' and *, ** and *** representing the probability of 1, 5 and 10% respectively*

CONCLUSION

In this examination, the relationship between per capita income and environmental degradation in the Middle East and South Asia has been explored, utilizing longitudinal information spread between 1990 and 2020.

According to the pooled OLS, RE and GMM the value of GDP^2 is negative and significant for CO2-A, whereas for CO2-B, the EKC does not exist in RE and GMM model. Thus, it proves the EKC theory is somehow valid in these regions. In addition to this, the value of 'P' in the Hausman test is greater than five percent, which proves the random model is well fitted for our study. The country variable which interfaced with the pay variable to make the inverted shape EKC signals the significance of public establishments in natural security. The impact of several factors, for example, population density, energy consumption, trade openness, and industry on natural quality gives profession to mainstreaming the climate into the whole cycle of anticipating advancement to guarantee ecological manageability in these states.

After the examination of these countries, it is noticed that there are some operational changes practiced in these republics and the policy makers must approve those legislative changes with the clean machinery. Policymakers must study technology, economy, and environment together and grip the official principles they will design accordingly. Consequently, individual environmental rules followed by states, linked to their own economic assemblies and cultural positions will have more influence in total. Environmental policies of these nations should cover fresh technology, renewable energy resources and sincere environmental regulations. Finally, the advance policies to be useful in these countries need to be accomplished with a sustainable growth target considering the environmental targets carefully.

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