The Impact of Globalization and China's Foreign Direct Investment in South Asian Countries on Carbon Dioxide Emission

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Abstract: The world is currently confronted with a growing challenge in the form of CO2 and climate change, which pose grave risks to human lives worldwide. This article attempts to investigate the nexus between CO2 emission, FDI, and Globalization for the period of 2003 to 2018 in south Asian countries. This study enables policymakers to devise and execute policies to decrease CO2 emissions in the future. We use panel data techniques to investigate the determinants of CO2 emissions over the world. Our finding shows Globalization, GDP, CO2 emissions are influenced positively and significantly by financial development and energy consumption. Trade openness and FDI have a positive relationship with CO2 emission, While social Globalization has a negative impact on carbon emission. This article has key policy implications. Policymakers should formulate policies to provide incentives to their citizen to decline CO2 emissions in the world.

Key Words: Globalization, China's FDI, Carbon emission

Introduction

Background of Study

Both nationally and internationally, environmental conditions have changed more rapidly in the past half-century. Climate change is a very serious threat; it negatively impacts health, agriculture, and the overall economy of the world. If all pollution from human activities stopped immediately, the climate would still change. However, continued intense, anthropogenic pollution and gas emissions, on the other hand, will lead to global warming, natural ocean action, geological process, and over changing climate patterns. Rising CO2 levels in the air, alongside different gases, warm the planet, causing environmental change.

Carbon dioxide emission has increased during the past half-century with quick economic process and development. The nexus between carbon and globalization area unit is widely studied within the current literature below the environmental economist curve (EKC). EKC hypothesis posits that at the initial stage of the economic process, emission can will

increase with financial gain. Once the economy reaches to intensity of financial gain per capita, dioxide emissions begin to say no with financial gain. There's an inverted u formed between dioxide emission and economic process.

For developing and developed countries, foreign direct investment is important. Particularly after the 1980s, in developing countries, it became interesting. In recent decades the policymaker has shown a significant interest in the economic growth in developing and developed countries. How its the potential to realize economic growth without serious pollution? However, is CO2 emission reduced in the progress of economic growth? To answer these queries, foreign direct investment and dioxide emission area unit 2 main factors interacting with economic process. Foreign direct investment has become of the most vital economic forces for the Chinese economy. In developing countries, Chinese FDI lies in polluting industries with high CO2

emissions, which come from the use of fossil fuels. For evaluating the worth of economic growth, CO2 emission should be taken into consideration. On one way, its highest potential is that use of fossils fuels have a positive impact on economic growth since fossil fuels area unit inputs for production processes.

In this article report, we investigate the relations among Globalization, foreign direct investment, and CO2 emission in South Asian countries over the period of 2003 to 2018. The nexus between Globalization, foreign direct investment, and CO2 are an ambiguous one. Some researcher shows the positive linkage between Globalization and CO2 due to climate change and economic growth, while on the other hand, some researcher and scholars have an opposing view for Globalization and CO2 emission. While in the same way, foreign direct investment also has both positive and negative nexus with CO2 emission. The analysis is executed by estimating the theoretical concept of the environmental Kuznets curve (EKC).

Statement of Research Problem

Globalization and foreign direct investment has provided enormous setup to the growth and development of economies of the world. However, the world is presently facing a mounting challenge inside the shape of environmental degradation and international temperature change, as they sit grave risks to human lives everyplace within word; furthermore, the impact of Globalization and foreign direct investment on environmental degradation cannot be overlooked. On the one hand, there is a paucity of research on the link between Globalization and environmental degradation. On the other side, Globalization is measured by trade openness, the inflow of foreign direct investment, worker remittances, and the relationship between Globalization and economic process also as environmental degradation has drawn a lot of interest in recent time because of increase within the awareness of dioxide emission and its impact on air quality. The empirical estimation of many aspects of Globalization is ignored. Further in this literature relationship between FDI and environmental degradation are mixed. it is worth considering that how the inflow of foreign direct investment and globalization influence the environmental quality, growth, and development of world economies. Thus, this article aims to report the environmental outcome

of Globalization and FDI to fill the gap within the existing literature.

Research Objectives

1. To look into how Globalization affects environmental degradation.
2. To assess the effect of Chinese foreign direct investment on environmental degradation.
3. To put forward policy implications for policymakers to improve environmental degradation

Research Questions

1. Does economic growth have on environmental degradation?
2. Does Chinese FDI has an influence on environmental degradation?

Study's Significance

The world has started to see the dramatic environmental degradation caused by human actions in the name of development. Given the limited research that examines the nexus between Globalization, Chinese foreign direct investment, and environmental degradation, this work will provide an in-depth considerate by taking a large panel of countries from around the world. In the above studies, Globalization is proxy by trade openness, inflow of foreign direct investment, and worker remittances which give an insufficient conclusion on its effect on environmental degradation. In our research report, various aspects of Globalization (economic, social, and political) will give useful perception in relationship with environmental degradation. Chinese foreign direct investment boosts the economy of the world; however, its potential effect on environmental quality is unexplored. Our funding will offer useful policy implications for the policymakers to review and minimize harmful effects of three aspects of Globalization (social, economic, political) as well as Chinese FDI on CO2 emission in the panel countries.

Literature Review

This chapter includes the literature review of positive aspects of globalization and CO2, negative aspects of Globalization and CO2 emissions, positive aspects of FDI and CO2, negative aspects of FDI and CO2, and the last one is a summary of the chapter.

Positive Aspect of Globalization and Co2

Cam et al. (2019) looked at the impact of Globalization on C02 emission exploitation using ARDL data from Vietnam from 1990 to 2016. They ensure that CO2 emissions, Globalization, FDI, export, coal use per capita, and fossil fuel electricity generation are all linked in the short and long run. This outcome indicates that Globalization will increase carbon emissions, whereas export will decrease them. According to this study, FDI had no effect on carbon emission.

Shahbaz et al (2017) estimate impacts of Globalization on CO2 emission for the period1970 to 2014 in japan. They used the ARDL model, which showed that the edge has both positive and negative shocks due to increased carbon emissions as a result of Globalization, whereas energy consumption has positive and carbon emission has a positive and significant effect.

Dinda (2006) used panel data to investigate the influence of globalization on CO2 emissions and revealed the effect of commerce on the climate, pollution intensity, and relative changes of pollution that occur within the world. The relationship of trade and environment is also determined by the Factor endowment and pollution haven hypothesis. Dinda found the effect of Globalization on the environment powerfully depends upon the essential attribute of the country. That results that C02 emission increases with Globalization which is the main reason of global warming.

Shahbaz et al. (2013) estimate the presence of the environment Kuznets curve for CO2 and its relationship with the economic process, energy consumption, and Globalization by using GMM estimator for 18 countries for the year of 1990 to 2010.GMM estimator explain the problem of serial correlation, heteroskedasticity, and endogeneity for some independent variables. There work result that Globalization increases production activity by utilizing domestic resources while energy consumption and CO2 emission have positive nexus. They saw that urbanization and fossil fuel byproducts have an altered U-formed association, implying that urbanization works on ecological quality by bringing down fossil fuel byproducts.

From 1975 to 2014, Khan et al (2019) researched the connection between globalization and CO2 emissions in Pakistan. The ARDL bound test and Johansen co integration were used. CO2 emissions and globalization have a long-term critical link, according to the Johansen co-integration test. According to the ARDL model, increasing globalization components (economic, political, and social globalization) by 1% will result in 0.38, 0.19, and 0.11 percent increases in CO2 emissions, respectively. They also support the inverted U-formed association that exists between globalisation and CO2 emissions.

Kalagci et al. (2018) used panel data estimates for NAFTA countries from 1990 to 2015 to capture out the influence of globalization and trade openness on CO2 emissions. According to their results, economic progress, trade openness, and CO2 emissions all have a positive relationship. Under the EKC, CO2 and economic growth have a positive linear and square relationship.

Negative Aspects of Globalization and Co2

Abbas et al. (2018) used CIPS, CADF unit root test, In the experiment of environmental factors, the Westerland cointegration test and the Dumitresca Hurlin Granger causality test were used to assess the impact of energy usage, money development, globalization, economic expansion, and urbanization on CO2 emissions for BRICS countries. They found that data cross-sectionally dependent and heterogeneous while variables are cointegrated, energy use and money development increases CO2 emission, whereas Globalization and urbanization has negative and insignificant linked with CO2 emission. There is bidirectional nexus between economic process, money development, energy use, and square of GDP with CO2 emission, while Globalization and urbanization are unidirectional with CO2 emission.

From 1985 to 2013, You et al. (2018) look at the geographical impacts of economic development on CO2 emissions in 83 developing nations. They used a spatial panel methodology to examine the issue of spatial dependency as well as the results of the comparison between neighboring countries. This shows that indirect results of economic Globalization on greenhouse gas emission are negative to beat the positive direct result that is negative and significant. EKC is inverted U formed between greenhouse gas emission and income.

For the period 1980 to 2017, Ali et al. (2019) investigate the impact of urbanization and Globalization on CO2 emissions in South Africa. They used the single structural break unit tests and the Bai

and Perron multiple structural break unit test, and the ARDL cointegration test. The ARDL test result that urbanization produce CO2 emission while in the long term there is significant impact of Globalization. There is a bidirectional connection between CO2 emission and urbanisation, but no nexus between CO2 emission and globalisation, according to the Toda Yamamoto non causality test.

Positive Aspect FDI and Co2

To assess the influence of FDI on carbon intensity, Shao et al. (2017) analysed panel data from 188 countries from 1990 to 2013. According to the GMM estimator, FDI has a negative and substantial influence on carbon intensity, but urbanisation, industrial intensity, and trade openness all have positive and significant impacts on CO2. FDI has a favourable and considerable impact on carbon intensity in high-, middle-, and low-income nations.

The GMM estimator was used by Shahbaz et al. (2019) to decide the link between foreign direct investment and CO2 emissions in the Middle East and North Africa from 1990 to 2015. FDI and CO2 have an N-shaped association, but economic growth and CO2 emissions have an N-shaped and inverted relationship. They employed biomass energy, which resulted in a reduction in carbon emissions. CO2 emissions and biomass energy usage are linked in both directions.

Cong et al. (2019) use victimisation panel data from 19 Asian developing countries from 2002 to 2015 to evaluate how FDI affects air pollution and how institutional quality influences these adverse effects. As a result, FDI inflows increase air pollution at first, while institutional quality improvement aids in air pollution reduction. They also discovered that when institutional quality is considered, the pollution haven and pollution halo hypotheses do not emerge to be reciprocally exclusive.

Kim (2019) looks into the relationship between CO2 emissions, energy use, domestic income, and foreign direct investment in 57 developing nations between 1980 and 2013. The vector error correction model demonstrates that there is no short-run link between FDI and CO2 emissions. While the elasticity of FDI on CO2 emission is modest and statistically significant, this article shows that there is a long-term co-integrated relationship between CO2 emissions, energy use, domestic income, and FDI, which supports the EKC hypothesis.

Negative Aspect FDI and Co2

Shari et al. (2014) optimize panel information for the period of 1992 to 2012 for fifteen developing countries to work out the impact of FDI and economic process on carbon emission. They used the Johanson cointegration technique to work out the nexus between FDI, economical process, and carbon dioxide emission. FMOLS result that in the long haul, FDI doesn't have any impact on carbon dioxide emission, whereas the economic process has positive nexus with carbon dioxide emission. According to Granger causality estimates, FDI and GDP have no short-term impact on CO2 emissions.

Cam et al. (2019) looked at the impact of Globalization on C02 emission exploitation using ARDL data from Vietnam from 1990 to 2016. They ensure that CO2 emissions, Globalization, FDI, export, coal use per capita, and fossil fuel electricity generation are all linked in the short and long term. This outcome indicates that Globalization will increase carbon emissions, whereas export will decrease them. According to this study, FDI had no effect on carbon emissions.

Zafer et al (2016) employ the cointegration approach and Granger causality analysis to investigate the nexus among energy usage, wages, FDI inflows, and CO2 emissions in Turkey from 1974 to 2014. According to the cointegration results, the pollution halo hypothesis (FDI) has a beneficial influence on the climate in the short term; however, in the long run, there is a bidirectional causation link between FDI inflows and CO2 emissions, as well as a negative coefficient of FDI. The Granger causality test has been applied to explain the unilateral causation nexus between energy usage and economic growth.

Nuno (2018) used ARMIA model, OLS, ARCH regression, VAR, Granger causality for the years 1980 to 2013 for Portugal to study climate change. The impact of income per capita and CO2 emission have positive nexus and negative nexus between square income of per capita on carbon emission. This paper also explained that trade openness and FDI have a negative relationship with CO2 emission.

Summary

The nexus between Globalization, foreign direct investment, and CO2 are ambiguous. Some researcher shows the positive linkage between Globalization and CO2 due to climate change and economic growth, while on the other hand some researcher and scholars

have an opposing view for Globalization and CO2 emission. While in same way, foreign direct investment also have both positive and negative nexus with CO2 emission.

Shao (2017); Shahbaz (2019); Emrah (2017); Cong (2019); Kim (2019) present the positive relationship between FDI and co2 emission. Shari (2014); Shao (2017); Cam (2019); Zafer (2016); Nuno(2018) present the negative relationship of FDI and co2 emission.

Cam et al (2019); Shahbaz (2017); Dinda (2006); Anwer (2019); Shahbaz (2013); Kalagci (2018) claims that its harmful because CO2 emission increases with Globalization which is the main reason of global warming. Abbas (2018); Shahbaz (2015); You (2018); Ali (2019) claim that it is not harmful that Globalization have negative or no effect on co2 emission.

Table 1. Globalization and Co2 Positive Aspects

Author	Country/Area and period	Technique	Main Finding
Globalization and Co2 Positive Aspects			
Cam et al (2019)	Vietnam 1990 TO 2016	ARDL Method	Observed the effect of Globalization on CO2 emission, Determine short and long-run nexus between CO2 emission, Globalization, export, coal consumption per capita, and fossils fuel generation of electricity. Result; Globalization increases CO2 emission while export decreases co2 emission
Shahbaz et al (2017)	Japan 1970 to 2014	ARDL Model	Globalization's effect on CO2 emissions was investigated. Result; Thresholds have both positive and negative shocks as a result of increased carbon emissions caused by Globalization. while energy consumption has a significant effect on carbon emission
DINDA et al (2006)	OECD Countries Non OECD Countries Whole World	Panel data Technique	Observed the effect of Globalization on trade They are also determined by factor endowment and pollution haven hypothesis Result Co2 emission increases with Globalization
Anwer et al. (2019)	Low-income countries 1996 to 2015	The FMLS and Pedroni panel cointegration test were used.	Examine how Globalization and microeconomic variables affect environmental degradation. result Globalization, urbanization, and clean energy have all had a positive impact on environmental deterioration, whereas the innovative index has a negative effect on climate change. Globalization and the environment have an inverted U-shaped connection.

Author	Country/Area and period	Technique	Main Finding
Globalization and Co2 Positive Aspects			
Shahbaz et al. (2013)	18 countries 1990 to 2010	GMM estimator	Analyze the correlation among C02, Globalization, utilization of energy Result Globalization increases the production activity by utilizing domestic resources while CO_2 emissions are reduced as a result of increased energy consumption. The track down rearranged U shape connection among urbanization and CO_2 emissions.
Khan et al (2019)	Pakistan 1975 to 2014	Johansen cointegration, ARDL bound test	The nexus among Globalization and CO_2 emissions was investigated. Result. According to the ARDL model, a 1% increase in economic, political, and social globalization outcomes in CO_2 emissions rises of 0.38, 0.19, and 0.11 percent, respectively. The nexus among financial development and CO_2 outflows is formed like (altered U)
Kalagci et al (2018)	NAFTA Countries 1990 to 2015	Panel data analysis	Globalization and trade openness have an effect on CO_2 emissions. Result Economic globalisation, trade openness, and CO_2 emissions all have a positive correlation. In both linear and square versions, the EKC for NAFTA nations shows a positive connection between CO_2 emissions and economic development.
Globalization and Co2 Negative Aspect			
Abbas et al(2018)	BRICKS countries	LM test, CIPS, CADF, Westerlandcointegration, and DumitrescaHurlin Granger causality test	Research the effect of CO_2 emissions on energy usage, financial development, globalisation, economic expansion, and urbanization. Result Globalization and urbanisation have a negative and moderate influence on CO_2 emissions, but energy use and financial sector expansion have a considerable impact. CO_2 emissions are one-way in the case of globalisation and urbanization but bidirectional in the case of economic growth, financial sector expansion, and energy use.
Shahbaz et al (2015)	China 1970 to 2012	Cointegration and the ARDL test were used	Examine how Globalization affects CO_2 emissions.

Author	Country/Area and period	Technique	Main Finding
Globalization and Co2 Positive Aspects			
		simultaneously by Bayer and Hanck.	Result The EKC hypothesis holds true in China in both the short and long term. CO2 emissions are positively related to coal consumption. While Globalization have a negative relationship with CO2 emission. Research the output of economic globalisation on CO2 emissions across space.
You et al(2018)	83 developing countries 1985 to 2013	Spatial panel method	Result According to the findings of this research, the indirect negative consequences of economic Globalization on CO2 emissions greatly outweigh the direct beneficial effect, which is both negative and large. The EKC link between CO2 emissions and earnings is a U-shaped inverted relationship. Study the effect of urbanization and Globalization on CO2 emission.
Ali et al(2019)	South Africa 1980 TO 2017	The single structural break unit test of Zivot and Andrews, the multiple structural break unit test of Bai and Perron, and the ARDL cointegration test	Result According to the ARDL test results, urbanisation causes CO2 emissions, whereas globalization has a significant long-term effect. There is bidirectional causation between CO2 emissions and urbanization, according to the Toda Yamamoto non causality test., but none between globalisation and CO2 emissions.
FDI and Co2 Emission Positive Aspect			
Shao et al (2017)	188 countries 1990 to 2013	GMM Estimator	FDI and carbon intensity are expected to have an impact. Result Regardless of the level of urbanization, industrial intensity, or trade openness, FDI has a negative influence on carbon intensity but a favourable impact on carbon emissions.
Shahbaz et al. (2019)	From 1990 to 2015, Middle East and North Africa	GMM Estimator	Investigate the nexus among FDI and CO2 emission. RESULT The FDI and CO2 have N shaped while economic growth and CO2 emission have N shaped and U inverted shaped relationship. They used biomass energy which lower carbon emission. The

Author	Country/Area and period	Technique	Main Finding
Globalization and Co2 Positive Aspects			
Emrah et al (2017)	Turkey 1974 to 2013	The Maki cointegration test, as well as the stock and Watson dynamic least squares estimators	existence of a link between economic growth and CO2 is confirmed by the findings they discovered in their research work. CO2 emissions and biomass energy use have a bidirectional relationship. Using EKC to explain the impact of FDI on CO2 emission. Result FDI have a positive relationship with CO2 emission.
Cong et al (2019)	19 Developing countries of ASIA 2002 TO 2015	Using Panel data	That FDI has an impact on air pollution and that this impact is dependent on institutional quality.. Result FDI inflows initially increase air pollution, while institutional quality improvement helps to reduce air pollution.
Kim (2019)	57 developing countries 1992 to 2012	Vector Error Correction Model	Indicate the relationships between CO2 emissions, energy usage, domestic income, and foreign direct investment. RESULT In the short term, there is no connection among foreign direct investment and CO2 emissions. The impact of foreign direct investment on CO2 emissions is small but statistically significant.
FDI and Co2 Emission Negative Effect			
Shari et al. (2014)	15 developing economies 1992 to 2012	Johanson cointegration	Examine how foreign direct investment, economic growth, and CO2 emissions affect each other. Result Foreign direct investment has no long-term effect on output, according to FMOLS, whereas economic growth increases CO2 emissions. Granger causality explains why, in the short run, FDI and GDP have no effect on CO2 emissions.
Shao et al (2017)	188 countries 1990 to 2013	GMM Estimator	to calculate the carbon intensity impact of FDI As a result, FDI reduces carbon intensity significantly. Regardless of the level of urbanization, industrial intensity, or trade openness,
Cam et al(2019)	Vietnam 1990 to 2016	ARDL	Observed the effect of Globalization on CO2 emission,

Author	Country/Area and period	Technique	Main Finding
Globalization and Co2 Positive Aspects			
Zafer et al(2016)	Turkey 1974 to 2014	Cointegration and Granger causality	Determine short and long run nexus between CO2 emission, Globalization, export, coal consumption per capita and fossils fuel generation of electricity. Result; Globalization increases CO2 emission while export decreases co2 emission
Nuno (2018)	Portugal 1980 to 2013	ARMIA, OLS estimator, ARCH regression, VAR model, Granger	Examine the relationship between energy use, income, FDI inflows, and CO2 emissions. study climate change. Result According to the study, per capita income has a beneficial influence on CO2 emissions, but per capita square income has a negative impact. This paper also explained that trade openness and FDI have negative relationship with CO2 emission.

Data and Methodology

The model specification and econometrics methods used for empirical analysis are discussed in this chapter. Following that, we presented our research report, which included model selection, data source descriptions, and variables used.

Model Specification

To estimate results, the following model will be used:

$$0CO2_{it}=\beta_0+ \beta_1 x_{it} + \beta_2 z_{it}+\gamma t +\eta_i+v_{it}$$

Where $0CO2_{it}$ denotes carbon emissions in the country I at time "t," and it denotes the dunning's two variables for $0CO2$. Z_{it} displays a set of control variables (financial development, energy consumption, GDP, trade openness, and urban population). η_i depicts country effects that are not observed but persist over time. γt is the unobserved amount of impact that is the same across countries, whereas it is the part whose square measure varies across countries and time.

Based on the above-mentioned theoretical framework and the structure of Pakistan and South Asian countries,

For analyzing the impact of globalisation and Chinese FDI on CO2 emissions, we used the model below.

$Ln0CO2=\beta_0+ \beta_1 \, ln(FDI) + \beta_2 \, ln(economic \, globalization) + \beta_3 \, ln(social \, globalization) + \beta_4 \, ln(political \, globalization) + \beta_5 \, ln(trade \, openness) + \beta_6 \, ln(urban \, population) + \beta_7 \, ln(GDP) + \beta_8 \, ln(energy \, use) + \beta_9 \, ln(financial \, advancement)\ldots\ldots(1)$

Where

$0CO2$ denotes CO2 emission in metric tons per capita

FDI stands for foreign direct investment from China.

Globalization denotes economic, social, political Globalization

Openness of trade in the host country (trade as a percentage of GDP)

Urban population the proxy use is (annual %)

GDP stands for Gross Domestic Product (constant=2010).

Energy use the proxy use is (kg of oil equivalent per capita)

Financial advancement Domestic credit provided by banks to the local sector serves as a proxy (trade percent of GDP),

Theoretical Framework

In the field of social sciences research panel, data technique and methodology are vastly popular form which is used for longitudinal data analysis. In the panel data method, entities of country, firms, or group of peoples are analyzed cross-sections wise and periodically over the specific time span. Panel data allows you to control for variables you cannot observe (culture factors). The ability to overcome the problem of heterogeneity, i.e., to regulate unobserved individual or time-specific heterogeneity, is one of the most valuable benefits of using panel data. (Hausman and Taylor, 1981). When the time series and cross-sections dimensions are combined, the data's standard and quantity can be improved in ways that would be impossible if only one of these two dimensions was used (Gujarati, 2003). Panel data technique has several advantages and benefits. The estimated parameters provide more information, accuracy, and precision with less chance of collinearity between the variables (Hsiao,2003, Baltagi, 2008, Greene,2005)

Globalization has facilitated a deeper integration of developing and developed countries around the world by encouraging investment in new technologies and innovations. Globalization would modify each group of economies to grow however a high price to a natural setting.

For developing and developed countries, foreign direct investment are important. Especially after the 1980s, in developing countries, it became important. In recent decades the policymaker has shown a major interest to the economic growth in developing and developed countries. How its possible to gain economic growth without the serious a threat of pollution? How co2 emissions can be a decline in the progress of economic growth? To answer these questions, foreign direct investment and dioxide emission area unit 2 main factors interacting with economic process. On one way its highly possible that the use of fossils fuels have a positive impact on economic growth since fossil fuels are inputs for production output. China has been the largest destination for foreign direct investment among all developing countries for a number of years. Chinese foreign direct investment boost the economy of the world; however, its potential effect on environmental quality is unexplored. The relationship between FDI and CO2 emission are studied by pollution halo and pollution haven hypothesis.

The panel data techniques/methods are used in this article report to try to determine the impact of globalization and Chinese FDI on CO2 emissions. Panel data models can be used in three ways: (a) Common constant (b) Fixed effects (c) Random effects. To make compression between random and fixed effects that which method is best. Thus, we run the Hausman test, if the value of the probability is less than 0.5 percent we use fixed-effect method.

Pooled regression has many limitations. One limitation is that it assumes homogeneity for all countries that doesn't allow management of the consequences of the particular country. The correlation between independent variables and unobservable shocks may lead to bias estimates (Cheng and wall, 1999, Bevan and Danbolt, 2004).

Variables Study

In this research report we use different variables. Carbon dioxide is our predicated variable; however, the proxies used for carbon dioxide is carbon emission (in metric tons per capita), and data are collected from WDI. The explanatory or control variable are FDI, financial advancement, Globalization, GDP, Openness to trade, energy use, and the urban population WORLD DEVELOPMENT INDICATORS provides annual data on financial development, GDP, trade openness, energy use, and urban population (WDI).

Globalization

In this study, we are looking at globalisation as an independent variable. The economic, social, and political aspects of globalisation are all important. The KOF Index of Globalization was used to collect data.

Trade and financial globalization are examples of economic globalisation proxies.

Interpersonal, informational, and cultural globalization are social globalisation proxies. Political globalization functions as a proxy for political globalisation.

Carbon Dioxide

Carbon dioxide emission is used as dependent variable.. The proxies used for C02 is carbon emission (in metric tons per capita), and data are collected from WDI.

FDI

Our independent variable is FDI stock from Chinese companies. The "2012 statistical bulletin of China's outward Foreign direct investment" was used to compile the annual data on Chinese FDI stock.

Financial Advancement

The availability of credit for investment in the host country is represented by financial development. Domestic credit to the local sector by banks (trade percent of GDP) is used as a proxy, and data is gathered from the World Development Indicators.

Trade Openness

International trade provides a path to the global market through economies of scale; thus, international trade provides opportunities for foreign investors. The nexus among trade openness and CO_2 emissions is undeniably of great concern to economists. The host country's trade openness proxy (trade as a percentage of GDP) is used, and data is gathered from the WDI.

GDP

GDP is our independent variable. Countries which have high GDP per capita are considered more developed. Some researcher found unidirectional nexus between GDP and CO_2 emission. *GDP* proxy is GDP of the country (constant=2010), and data are collected form WDI

Urban Population

Urban population is our independent variable. The urban population is the population inhabiting areas that have a larger population volume than rural areas. It is the population living in cities. The proxy use is (annual %), and data are collected from WDI.

Energy use

Energy use is our independent variable. Energy use and CO_2 emission have positive and significant relationship. Energy use is a major contributor to CO_2 emissions. The proxy use is (kg of oil equivalent per capita) and data are collected form WDI

Discussion of the Results

Descriptive Statistics and Diagnostic Tests

Table 2 displays the descriptive statistics for the selected data set. The existence and distribution of data can be revealed using descriptive statistics. Variables should be included in regressions if the standard deviation value is positive. The descriptive statistics explain the mean value, standard deviation, min, and maximum value.

Table 2. Summarize lnco2 lnfd, lneu, lngdp, lnup, lneg, lntg, lnsg, lnpg, lnfdi.

Variable	Obs	Mean	Std. Dev	Min	Max
lnco2	84	-.6063933	1.058527	-3.259436	1.121147
lnfd	109	3.346659	.7424752	1.182563	4.464143
lneu	64	5.997152	.413746	5.074517	6.793564
LDP	112	7.179326	.9012436	5.303793	8.991354
lnup	112	.9865353	.6785241	-3.066444	1.916329
lneg	105	3.667446	.2616309	3.054001	4.135099
lntg	105	3.707323	.2330212	3.015535	4.266396
lnsg	105	3.734196	.3072252	2.309403	4.242764
lnpg	105	4.041614	.5442473	2.694627	4.532599
India	102	4.606409	2.476537	-.9162907	8.650996

Table 3 shows the observed covariance results for the selected data set. It's worth noting that the highest correlation between economic globalisation and other variables is 0.881, which is statistically significant at the 5% level of significance. Despite the fact that the correlation matrix shows a significant relationship between some variables, none of these correlations is strong enough to cause the multicollinearity problem.

Table 3. Correlate lnco2, lnfd, lneu, lngdp, lnup, lneg, lntg, lnsg, lnpg, lnfdi.(obs=60)

lnco2	lnfd	lneu	lngdp	lnup	lneg	lntg	lnsg	lnpg	lnfdi	lnco2
lnco2	1.0000									
lnfd	-0.0719	1.0000								
lneu	0.5604	0.0445	1.0000							

LDP	0.6443	-0.0473	0.5487	1.0000					
lnup	-0.2219	-0.0031	-0.4518	-0.7905	1.0000				
lneg	0.7879	-0.0419	0.5924	0.8804	-0.6043	1.0000			
lntg	0.6997	0.1337	0.6440	0.7925	-0.5455	0.9142	1.0000		
lnsg	0.3945	0.3385	0.4068	0.7000	-0.5751	0.5763	0.7325	1.0000	
lnpg	0.9585	-0.1070	0.4782	0.4537	-0.0156	0.6454	0.5575	0.2321	1.0000
lnfdi	0.6159	-0.1233	0.3479	0.2738	0.0287	0.3166	0.3677	0.4148	0.6286	1.0000

The Variance inflation test (VIF) for the selected data set is shown in Table 4 The correlation test is supported by the variance inflation test in the table above. The correlation between one independent variable and other independent variables is explained by the variance inflation test. The 1/tolerance variance inflation factor is always greater than or equal to 1. According to (Neter, Wasserman & Kutner, 1985), the threshold level for multicollinearity is 10 and the value of VIF exceeding from 10 is regarded as a multicollinearity problem. The VIF results in Table 4.3 show that the highest value is 8.164 which is well below the threshold level. This suggests that our regression results do not suffer from the problem of multicollinearity. Furthermore, cluster standard errors that are correlated at the country level are used to overcome the possibility of serial correlation in our static analysis. These techniques minimize error and bias in our model as much as possible (Mottaleb & Kalirajan, 2010).

Table 4. estat vif

Variable	VIF	1/VIF
lneg	7.22	0.036731
lntg	8.64	0.053642
lngdp	3.89	0.072004
lnsg	8.17	0.122332
lnup	5.16	0.193732
lnpg	5.18	0.196194
lnfdi	3.09	0.323359
lneu	2.39	0.419118
lnfd	1.76	0.563674

The selection of 2003 to 2018 as the time period for analysis is appropriate and justified. CO2 emissions have been steadily increasing since the early 2000s, and this trend is expected to continue; thus, an examination of CO2 emissions is appropriate for those years.. The independent variables in the panel analysis model show little variation over time because the data contains few entities and few periods. The Hausman (1978) specification test is used to determine whether or not the model has fixed and random effects. This test shows that the random effect is better than the fixed-effect model, with a P-value of 0.1, indicating that individual effects are uncorrelated with regressors. The POLS results are presented in Table 5 for comparison, with pooled OLS assuming homogeneity for all countries.

Table 5. Regress lnco2, lnfd, lneu, lngdp, lnup, lneg, lntg, lnsg, lnpg, lnfdi

lnco2	Coef.	Std. Err.	t	P>|t|	95% Conf.	Interval
lnfd	.0968651	.0661609	1.46	0.149	-.0360229	.2297532
lneu	.0150451	.0674213	0.22	0.824	-.1203746	.1504648
lngdp	.2929257	.1129377	2.59	0.012	.0660836	.5197677
lnup	.0056217	.0490945	0.11	0.909	-.0929875	.104231
lneg	.3689204	.367312	1.00	0.320	-.3688476	1.106688
lntg	.0169995	.2856569	0.06	0.953	-.5567594	.5907583
lnsg	-.1100324	.2049445	-0.54	0.594	-.5216756	.3016108
lnpg	4.679793	.2946236	15.88	0.000	4.088024	5.271562

lnfdi	.0217651	.0136318	1.60	0.117	-.0056151	.0491453
_coms	-24.499	.9968972	-24.58	0.000	-26.50133	-22.49668

We considered a random effect over a fixed effect based on the Hausman test while p-value (0.1). This specific test with p-value (0.1) shows that random effects are a better choice than fixed effects, indicating that individual effects are uncorrelated with repressors, as shown in table 6. if there is 1% increase in GDP so carbon emission will increase by 0.292%. Among the three proxies used for Globalization, economic aspects produce a significant and positive nexus with carbon emission. 1% rise in economic Globalization enhances CO_2 emissions by 0.368% and social Globalization, enhances CO_2 emissions by decreases by -0.32%, respectively. Among the other variable of interest is Chinese FDI which produces positive and significant association with carbon emission. 1% surge in China's FDI increases CO_2 emissions by 0.096%. We find that the urban population has a positive relationship with carbon emission if there increase in the urban population so carbon emission will increase by 0 .005%. Trade openness have also positive relationship with carbon emission, if there is 1% rise in trade openness it will increases by 0.016

Table 6. Main Regression Results

lnco2	Coef.	Std. Err.	z	P > | z |	95% Conf.	Interval
lnfd	.0968651	.0661609	1.46	0.143	-.0328078	.2265381
lneu	.0150451	.0674213	0.22	0.823	-.1170983	.1471884
lngdp	.2929257	.1129377	2.59	0.009	.0715719	.5142794
lnup	.0056217	.0490945	0.11	0.909	-.0906017	.1018452
lneg	.3689204	.367312	1.00	0.315	-.350998	1.088839
lntg	.0169995	.2856569	0.06	0.953	-.5428778	.5768768
lnsg	-.1100324	.2049445	-0.54	0.591	-.5117163	.2916515
lrpg	4.679793	.2946236	15.88	0.000	4.102342	5.257245
lnfdi	.0217651	.0136318	1.60	0.110	-.0049527	.0484828
cons	-24.499	.9968972	24.58	0.000	-26.45289	-22.54512
Sigma_u	0					
Sigma_e	.09913782	fraction of variance due to u_i				
rho	0					

Policy Implications and Conclusion

Conclusion

The world is currently confronted with a growing challenge in the form of CO_2 and climate change, which pose grave risks to human lives worldwide. CO_2 emissions are rapidly increasing around the world. China is primarily responsible for CO_2 emissions. Using panel data from south Asian countries from 2003 to 2018, this paper empirically determines the determinants and pattern of CO_2 emissions. Stylized macroeconomic variables such as GDP, trade openness, FDI, Globalization, urban population, energy use, and financial development were used to determine the effects of CO_2 emissions in these countries. CO_2 emissions have a positive and significant relationship with GDP and financial development; as GDP rises, so do CO_2 emissions. On a similar direction, urbanization and energy use have also positive relationship with CO_2 emissions. These variables led to a high rapid increase in CO_2 emissions, however. These findings corroborate previous research.

Policy Implications

This study offers the following policy implications based on our findings.

1. Economic growth and Globalization, in general, will increase environmental issues and grow rapidly with energy consumption. Such industrialization and development process hugely contribute to CO_2 emission. The government should enact laws, regulations, and fiscal policies to encourage energy

efficiency and utilizing renewable energy sources

2. Chinese FDI has a positive influence on the environment, which authenticates the "pollution halo hypothesis". The host countries must strive to attract further Chinese FDI i.e. exchange of green/clean technology for their development and growth as it is less harmful to environmental quality.

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