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Revisiting the Link between Foreign Direct Investment and Industrialization on Environmental Quality in Pakistan: Empirical Investigation by Using NARDL

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ABSTRACT

The main objective is to investigate the short-term and lasting non-linear effects of foreign direct investment and industrialization in Pakistan on environmental degradation. The nonlinear autoregressive lag method has been used to analyze the short and long run relationship. Overseas direct funding and Industrialization are split into superb and poor options to find out non-linear dating with CO2. In long run, an increase in foreign direct investment will have a significant impact on CO2 emissions, but a decrease in foreign direct investment will have a negative and small impact. The development of industrialization had a significant impact on CO2 emissions, although the decline of industrialization had a negative and small effect. The government should issue environmental regulations for industrial zones. Innovative administrative and business premises in the workplace are essential to control the pollution caused by imaginative innovation. Foreign financial investors must adopt guidelines and restrictions to search for harmless ecosystems.

Introduction

In the last two years, the parties have changed their trade agreement. As a result, economic development, foreign direct investment, industrial development and emissions of ozone-depleting substances have changed. Many legislators and environmental partners have focused on these changes, including the United Nations Environment Program, the World Organization for Nature, the Intergovernmental Commission on Environmental Change, and more. Some scientists have encouraged increasing monetary measures, consisting of monetary increase, overseas direct funding and industrialization within the country, boom in carbon dioxide emissions, which is risky for all people residing in particular people in homeless international locations. In some South Asian countries, the normal future has steadily increased from 75 to 60 years (WHO, 2013).

Foreign Direct investment and industrialization are important factors in the economic development of developing countries. Global direct investment has increased by $ 205 billion since the 1990s. $ 1.746 billion (UNCTAD, 2017), so many market analysts and naturalists have estimated the environmental costs and benefits of direct investment. In Pakistan, Foreign direct investment fell 6% to 2.1 billion. USD for Grants for Power Construction and Media Communications (UNCTAD, 2021).

Two schools of thought debated foreign direct investment and the environment. Foreign direct investment will increase according to first thought but also become a source of foreign trade and help maintain the economic balance over time. For the development and economic benefits of the EC, the World economic countries for the sake of FDI amended the national regulation. In developing countries, Foreign direct investment played an important role in this way that it raised overall investment opportunities which would be resulted in highly productive and technological progress. (De Mello, 1999).

The second thought is to counteract the fact that foreign direct investment displaces national organizations and is a futile innovation that is the biggest source of pollution. For the sake of having capital and generation, the growing international locations ought to want overseas direct investment from evolved countries. Industrialization's first perspective remained in the sense that the representation of investments, despite the improvement of data sources and rural equipment, reduced development costs and provided jobs for a large part of the population (Vogel, 1994). Industrialization, as shown by later perspectives, pollution and depletion of normal assets (Leonard, 1984). Companies use large quantities of assets as fuel, such as gasoline, and man-made waste and fuel ignition are the two main pollutants (Chernivchan, 2012; Ali & Ejaz, 2021).

Environment and economic development relationship have been studied by many economists and policymakers; However, their approach is categorized into two camps. The foreign direct investment would have to boost the industrial sector and strengthen the economy in the context of the first group. Most of the studies stated that Kuznets Curve theory of environment also suggests that EG has a positive natural effect Environmental scenario become worse if inverted U fashioned was not formed this is the factor of view of the second comp.

Literature Review

From1972-2002 Khalil and Inam (2006) examine the short- and long-term relationship between foreign investment and the quality of the Pakistani environment. Taking into account that there is a long cross between global investment and the quality of nature, they found that global trade has a negative impact on Pakistan's environmental quality. They argued that the government should also protect the environment through practical economic development. 1980-2003 Acharyya (2009) examines the results of GDP on direct investment and environmental degradation in India. The results that have been found for a long time relating to CO2 emissions, GDP, such as direct investment, and direct investment have an impact on CO2 emissions. According to the report, direct investment has damaged India's environmental conditions.

Pao and Tsai (2011) tested the impact of monetary improvement and enlargement on environmental situations during the year 1980 to 2007. From the

information, they gathered they came to know that financial and economic improvement wishes greater strength for production, which raised emissions (1965-2010). Hitam and Borhan (2012) examine the effect of financial change and foreign direct investment on the natural decline in Malaysia. The outcomes showed that GDP and CO2 emissions display an environmental curve, and foreign direct investment has a sizable impression on the surroundings. 1972-2013 Javid and Sharif (2016) targeted on according to capita energy consumption, monetary improvement, business desire, and current in keeping with capita concentration affect Pakistan's CO2 emissions. In Pakistan, they found that the ECC idea applies to monetary development, energy intake and real consistent with capita income, which all upward thrust CO2 emissions, but the sensitivity of change has no effect.

From 1990-to 2012 he changed member of the board of administrators of Wang et al., China. (2016) tested the consequences of modernized cities and financial development on (SO2) secretions, with the help of further theories like the Kuznets curve. They have found that there is a U-shaped link between economic development and sulfur dioxide emissions, but there is an intangible link between urbanization and sulfur emissions.

Using balanced annual data from 17 Asian countries from 1980 to 2014, (khan and Ozturk 2020) Examined the relationship between FDI and (CO2) how both impact environmental pollution not only some other variables like economic growth measured by real per capita income and trade openness. Long-run relationship between variables was confirmed by panel cointegration tests. Fully modified ordinary least squares (FMOLS) were used. The pollution haven hypothesis was supported by FMOLS estimates on a CO2 emission model, which shows that inward FDI had a considerable positive influence on pollution (PHH). Similarly, the results of the FDI model suggested that CO2 emissions were a form of pollution and that economic growth and trade openness were the most important factors influencing FDI. Economic policy adjustments were needed to channel foreign capital inflows in a more ecologically friendly manner, according to empirical data. (Hassam, Saifullah, Hussain & Ali, 2021).

Material and Methods

Common strategies of Cointegration, the error correction model (ECM), and causality testing are to explain the link between foreign direct investment, industrialization, and carbon. Systems allow the analysis of long-term and short-term collaborations but accept symmetric associations of dependent and independent factors. Khalil and Inam (2006) have a look at the surprisingly lengthy-time period and quick-term relationships between global change and the pleasant of Pakistan's environment between 1972 and 2002 to recognize the uneven dating among situations. They point to the long-standing link between trade and environmental quality and show that global trade affects Pakistan's natural quality and these are more independent factors. A nonlinear autoregressive distribution lag model was provided by Schin et al. (2014). For this reason, the following time series model is used in this study:

$$CO_2 = f(FDI^+, FDI^-)$$

$$CO_2 = f(IND^+, IND^-)$$

where CO2 carbon dioxide emissions mean foreign direct investment. The term IND refers to industrialization, and the indicators + and - refer to partly positive and partly negative aggregate variables. Stationarity is a critical issue in time trial data. An extended Dickey-Fuller Root test is used to confirm the repair. The serial communication problem was mostly against the ADF test. It contains a state delay variable and is used for troubleshooting when error terms are linked. Philips and Perron (1998) review a consistent relationship and propose non-parametric evidence-based strategies that do not include the layer of the dependent variable.

As Engle and Granger (1987), while Johansen and Juselius (1990), used extraordinary techniques to monitor factor co-integration but factors have to be applied similarly for these strategies to work. For instance, suppose the factors are an aggregate of I (0) and I (1). Some other co-integration method is called autoregressive distribution postpone, as described by using Pesaran et al. (2001). (ARDL). Schin et al. (2014) developed the structure of NARDL in Pesaran and Shin (1995) and Pesaran et al. (2001) belong to. Schin et al. (2014) used the distribution of positive and negative fixed variable changes as described by Granger and Yoon (2002) and Schorderet (2003).

The model was not set in stone by demonstration tests. Sequence binding residues are monitored with the Breusch-Godfrey test, the Breusch-Pagan-Godfrey test for conditional mean, the Ramsey recovery test for practical specification defects, and the Cumulative Sum used for the durability of the Model. This evaluation employed annual time series statistics from Pakistan in view that 1990. Until 2019 production and incineration plants are used as an intermediate station to determine the CO2 emissions and the absolute combustion. Industrialization (IND) is characterized by an industrial value ratio at the level of GDP, although direct investment is defined as GDP growth. Most of the data come from the World Bank's "real development indicators".

Table 1
Unit Root (ADF) Test

Augmented Dickey Fuller Test			
Variables	Level	First difference	Results
lnCO2	−1.8014	−4.8761***	I(1)
lnFDI	−2.3376	6.5620***	I(1)
lnIND	−2.4999	−6.9890***	I(1)
On 1%			

Table I shows the ADF unit root test results, which demonstrate the whole variables are stable at the first difference. The ADF test confirms that all variables are of order one integration.

Table 2
Bound Test for Both Models

Model	F-state	I(0)	I(1)	There is co-integration.
Model-I: F(lnco2 |lnFDI+, lnFDI−) (4, 1, 0)	5.9085	3.88	4.61	yes
Model-II: F(lnco2 |lnIND+, lnIND−)(4, 0, 0)	6.6721	3.79	4.28	yes

Linked co-integration is used in the study to analyze the long-term relationship between factors. Black data standards are used as a delay time rule. Observations of F are compared with Pesaran et al. (2001) recommended upper and lower limit properties. The blended experimental outcomes show that the F measurements are as great as viable on the 1% degree; therefore, the null hypothesis is rejected in all fashions without cointegration (Table 2).

Table 3
Long and Short Run Results

Dependent variable: lnCO2				
Long run results				
	Model-1		**Model-2**	
	F-test	**Prob.**	**F-test**	**Prob.**
lnFDI+	0.1462***	0.0325	-	-
lnFDI–	-0.0419	0.0211	-	-
lnIND+			0.8321*	0.0184
lnIND–			-0.7984	0.3291
short-run ECM				
ECT(-1)	-0.6424***	0.2141	-0.2989***	0.0892

Notes: Standard errors are in parentheses. *,***Shows significance at 10% and 1%, respectively.

The absolute decline in FDI (growth and direct investment) had a larger effect on CO2 emissions, suggests Model 1 and suggests that an increase in FDI in Pakistan will lead to pollution and destruction over time. Time. As noted by Acharyya (2009), direct investment has a positive impact on CO2 emissions in India. In Pakistan, an entire discount indirect investment (a discount indirect funding) ought to have a terrible and insignificant impression on carbon dioxide emanations. Beneath the improvement situation, a boom in overseas direct investment will result in more speculation and boost the industry. National or environmental guidelines should not be allowed to keep pace and attract global investment to the most vulnerable countries. As a result, these global financial investors need more energy to operate in industrial areas, which increases pollution overall.

The absolute growth of Pakistan's industrialization (IND expansion) has a huge and critical influence on CO2. It proved that the improvement of Pakistan's business will keep reasoning pollutants and ecological deprivation in the end. Shahbazin et al. that industrialization affects CO2 emissions. (2014), Li and Lin (2015). In emerging countries, industrialization is an integral part of economic growth and progress. Industrialization keeps to growth employment prospects and air pollutants Harmful Fumes in business waste, water and soil. In Pakistan, the overall terrible stage of industrialization is affecting CO2 emissions. In Table 3, the short-term results show the consequences of the short-term elements. To expect quick-time period factors, its miles crucial to move from the NARDL model to the ECM. ECT stands for the percentage of alternate showing in what way elements adapt to concord. Its negative value means a short-term combination. In general, the term ECT is negative and significant in the models, so it is recommended to include it when implementation is complete.

Different diagnostic assessments are applied to this study to investigate the Autocorrelation, Heteroskedasticity, model misspecification into functional form and to evaluate the model's residuals following a normal distribution.

Table 4
Diagnostic Test

Model	Test	F-statistics	(p-value)	Null hypothesis
Model-I	Breusch–Godfrey LM Test	0.3019	0.3129	There is no serial correlation.
	Ramsey Reset Test	0.7129	0.3821	The model is properly stated.
	Breusch–Pagan–Godfrey Test	1.5643	0.5161	There is no heteroscedasticity.
Model-II	Breusch–Godfrey LM Test	0.3291	0.8925	There is no serial relationship.
	Ramsey Reset Test	0.4938	0.3645	The model is properly stated.
	Breusch–Pagan–Godfrey Test	1.0210	0.5931	There is no heteroscedasticity.

The table above shows the consequences of analyzing the various symptoms. In this table, the probability of the Breusch Godfrey LM test is 0.3129, which is more than 5% and reasonable because the model has no consistent ratio, is 0.51%, which is more striking than 5% and illustrates that model . 1 has no heteroskedasticity problem. In the second model, the probability value is more than 5%, or 0.59%, and there is no heteroskedasticity problem. The Ramsey Reset Test is used to ensure that the useful structure is suitable for discovery. In this model of ceramic production, the probability value is 0.36 percent, and in model 2 - 0.38 percent, which is more than 5 percent, we can talk about a poor coaching structure.

Cusum and CUSUMsq

The CUSUM test is used to evaluate the security of borders after they promote short-term elements in the NARDL model. The CUSUM tests for Model 1 and Model 2 are shown separately in Figures 1.1 and 1.2. The results of the CUSUM check to display that the fast-time period performance limits of every model are steady.

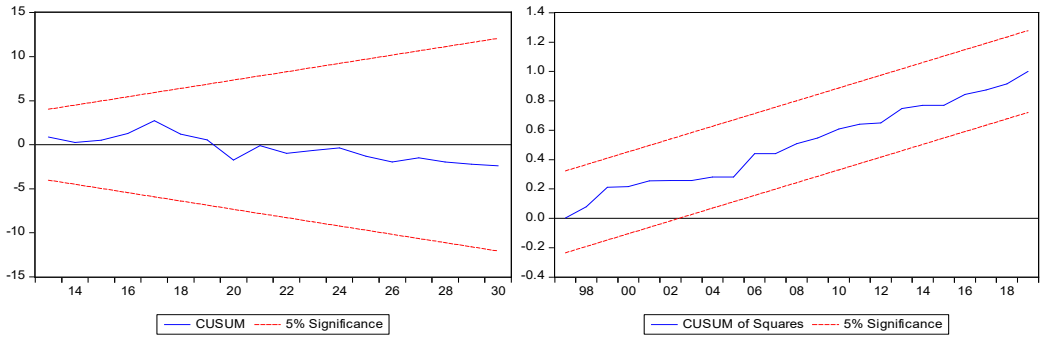

Figure 1:Cusum test and Cusum of Square of model 1

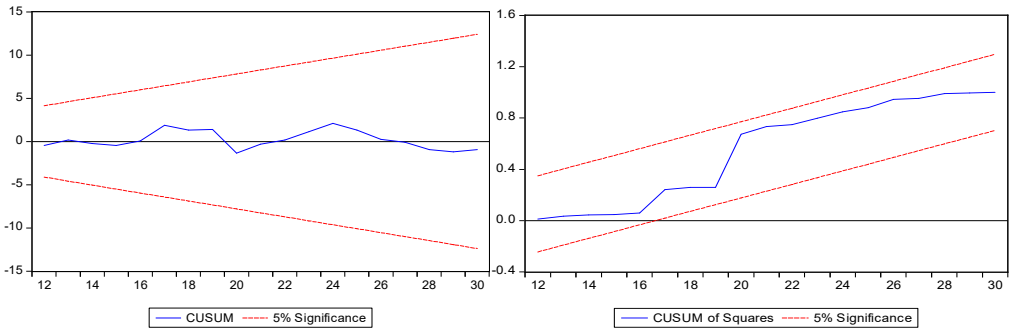

Figure 2: Cusum test and Cusum of Square of model 2

Conclusion

The primary item of this examination is to look at the nonlinear impact of these variables (Foreign direct funding and industrialization) on environmental degradation (CO2 emissions) in Pakistan. The non-linear ARDL model is used to examine the short-term and long-term relationships based on annual time series data from the year 1990 to 2019 in Pakistan. The results of the NARDL model show that in Pakistan, there may be a long time hyperlink between overseas direct funding and CO2 emanations and dating among industrialization and CO2 emanations. An increase in direct investment will in the long run have a significant impact on CO2 emissions, although a decrease in foreign direct investment will have a negative and small effect.

The development of industrialization has a large impact on CO2 emissions, and the decline of industrialization has a negative and small impact. Relevant recommends the positive effects of industrialization on CO2 emissions (2015). These results show that the development and industrialization of foreign direct speculation (FDI) in Pakistan are causing natural damage. The ideas below depend on the results: First, the government should create environmental laws for industrial zones. Second modern public and personal employment systems are needed to restrict and in addition enhance pollutants, even as refining using recycled commercial waste as an electricity source and lowering leakage. However, foreign financial investors must respect environmental guidelines and restrictions.

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