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THE IMPACT OF FINANCIAL SECTOR DEVELOPMENT ON ENVIRONMENTAL DEGRADATION (CARBON DIOXIDE EMISSION) IN PAKISTAN

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ABSTRACT

The main purpose of this research article is to determine the impact of financial sector development on environmental degradation in Pakistan. The study used the time series data of the financial sector development on environmental degradation (CO_2 emission) in Pakistan during the period of 1974-2018. Due to the nature of the times series data, the Augmented Dicky Fuller test is used to detect the level of stationarity in the data. Mixed orders of the stationarity in the data are reported, and the Auto Regressive Distributed Lag model is the best technique to provide efficient results. The ADF result clearly shows that the variables except for Y, Y2, and Y3 are stationarity in the first order, while the mentioned variables are stationarity at a level. And Trade openness is stationary at first difference. The bound test results (the F-statistic value is 5.208 that exceeded the values of upper bounds value, i.e., 3.28 at a 5% significance level. Therefore, the co-integrational relationship is confirmed for the model of the study at a 5% significance level. The model depicts the impact of Financial Sector Development on environmental degradation regarding CO_2 emission. It was found that FSD negatively affected environmental degradation in Pakistan in both the long and short run during the period from 1974 to 2018. The impact of PG, EC and FDI is positive and statistically significant in the long run. The impact of TO on CO_2 emission is negative and significant in the long run. On the other hand side, negative shock can produce harmful effects on the environment. A positive and significant relationship is reported regarding economic growth and CO_2 emission. The impact of Population growth, Financial Development Index, Trade Openness, Energy Consumption, and Economic growth is also positive and significant to CO_2 emission. It is quite evident from the detailed examination of the above model. This study concluded that financial sector development efficiently contributes to long-term and short-term environmental degradation. Financial sector development negatively and significantly affects environmental quality as measured by CO_2. Therefore, it is concluded that the financial sector can be used as a policy tool to reduce CO_2 emission in Pakistan based on the data set from 1974-2018.

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INTRODUCTION

Growth and development are desirable and considered necessary to improve the standard of living of the masses in society. It took a long time to achieve the desirables and needed some prerequisites. High growth requires the intensive use of resources in any economy. The intensive and efficient use of resources is necessary and sufficient to boost productivity at a large scale. Therefore, growth and development are considered vital sources of environmental degradation. Growth theories are purely focused on the factors which could be used to expedite the speed and scale of growth. They ignored the consequences and repercussions on different aspects of society, especially on environmental quality. In the last quarter of the 20th century, researchers thought about nature preservation to secure the future generation. The non-linear statement relationship between GDP and carbon dioxide emission is also supported by Stern (2004). They are of the view that at the beginning of growth, accompanied by carbon emission, but after the threshold level of growth (income), environmental quality starts to improve. Peoples start thinking about sustainability to preserve their future by improving the quality of the environment.

The topic under consideration is important because climate change might be due to environmental degradation and global warming, which adversely hit Pakistan's economy and are a source of economic loss in the country of about 2.8 billion Dollars. The country's government is willing and interested in reducing it and providing relief to society in terms of a clean environment for Pakistan's residents. The country has

employed many approaches and policies regarding the environment to reduce emissions. The present research study helps to provide a guideline to policymakers in making sound policies to tackle severe environmental problems in Pakistan. The study of the literature discloses that environmental quality is necessary and important for the survival of mankind on earth. Different factors are examined in this context to identify factors affecting environmental quality. The development of the financial sector is one of the main factors affecting environmental quality. Different perceptions are existed about the association between FSD and the environment. Both positive and negative associations are found and justified. This study is important for policy regarding matters because this is a detailed study investigating the impact of financial sector development and the environment. Other important variables are also investigated, i.e., FDI, energy consumption, foreign trade, and economic growth. The main significance of the study for policy purposes is that this study has used different emissions as environmental damage, i.e., CO_2 emissions, which was ignored in past studies and provides an outlook for policymakers to think about emissions in both cases during policy formulation.

Raghutla and Chittedi (2020) empirically examined the association between economic growth, financial sector development, and the uses of energy for the Indian economy. They used data over the period of 1970–2018, and ARDL estimation was put into the examination. Vector Error Correction Model (VECM) was employed to examine the same in the short run. To get the causal relationship, causality was also used. The outcomes of the Granger causality test disclosed unidirectional causal relations running from growth level to financial development. The co-integration results confirmed the existence of a long-run bi-directional causal association between financial development, energy uses, energy consumption, and energy economics. They concluded that sustainable economic growth could be attained with financial development and energy consumption. A closer look at existing literature enabled us to get the gap in the literature which can be filled with the conduct of the present study. The first contribution of the current study is that there is a lack of a comprehensive study regarding financial sector development and environmental degradation in Pakistan. Secondly, add a new concept to the investigation of the N-shaped environmental Kuznets curve (N-shaped EKC), and this concept is not investigated in the case of Pakistan. Thirdly, it contributed using the most recent data for one of the developing countries, i.e., Pakistan.

The world of the 21st century is very dynamic, and various structural changes are advised by governments and leading institutions like World Bank and IMF to ensure and smooth the barriers in the way of sustainable development. These policies and development shifts might affect directly and indirectly the use (nature of utilization of resources, intensity and efficiency use) and consumption behaviors of the masses. It may also affect the contribution of different sectors of the economy towards output and resultantly affect the environment. Moreover, the current globalized world in which world financial institutions and multinational corporations (MNCs), which is an outcome of international investment, also affects the financial system of developing countries to facilitate transaction and reduces transaction costs. Foreign investment (capital inflows) also considers an important role in the variation in the shape of economic and non-economic forces in a productive environment in most developing countries, which also includes output and environment. Therefore, there is a need for a comprehensive study to inspect the effect of financial sector development on the environment in developing countries.

Financial Sector in Pakistan

Pakistan's financial sector consists of banking and non-banking financial sectors. The banking sector dominantly played its role in the determination of the development of a country. Banking and non-banking institutions, i.e., insurance companies, central directorates of savings, etc., are the financial sector's leading players. In Pakistan banking sector played its role efficiently in the financial sector by playing the role of financial intermediation. The record of financial sector development is important because it will help understand its role in the economy. Therefore this sector is devoted to discussing the stepwise development of the sector under consideration. Pakistan's financial sector is composed of the banking system and other financial institutions operating in the country. The contribution of the banking sector is higher than other non-banking financials and higher in magnitude and efficiency too. The magnitude of the Banking sector in terms of total assets composition was about 44% in 2003 as a percentage of GDP and became 53% in 2007, while in the same period, its magnitude as % of total assets increased from 62% to 73% (Ali, 2012). It means that Pakistan's financial sector as a percentage of assets and GDP are more impressively done in the banking sector than other non-banking sectors (The banking sector is dominant over the financial sector). Zaidi (2005) also explained that Pakistan's financial sector depends on the banking sector like the other developing countries in the region. It means that Pakistan's financial sector is a banking-based financial sector, whereas the non-banking sector is comparatively small and not properly developed.

Outcomes of Financial Sector Reforms

As the financial resources are low and found insufficient in most of the developing countries. Foreign direct investment is one of the most important sources to cover the deficit in financial resources. After financial reforms in the region (in developing countries, i.e., Pakistan, India, and Bangladesh), the net flows of the FDI varied over time in the region. After reforms in the financial sector, a significant increase was reported in the domestic saving rate. The domestic saving rate was at its highest in 2000, with about 15% of GDP in 2000, while the rate was about 10% in 1990. The saving rate again started in 2000 and reached about 9% in 2015.

Environmental Degradation in Pakistan

With the passage of time, in the race toward the top to get higher growth, many policies are implemented. These policies were considered one of the sources of optimal utilization of resources and resulted in huge consumption. Till the end of the 1970s, many policies were restricted to the agriculture sector

of the country. Moreover, in the 1980s, the country got access to world-leading countries and financial institutions to get help with technology and financial resources to overcome the lack of financial resources of the developing country (Afzal et al., 2007). One of the reasons to study the environmental degradation in Pakistan from the 1970s is that in 1973 the emission of CO_2 per capita was the lowest and then took an increasing trend. The per capita emission of CO_2 was the lowest, i.e., 0.31 metric tons per capita in 1973, while this trend was recorded to increase and reached 0.9 and above over the period of 2010 to 2018. The increasing trend in Carbon Dioxide, Methane, and Nitrogen dioxide was portrayed by Ahmad et al. (2021). The present study also used the mentioned sketch to provide a clear image of the trend in emissions from 1996–2017 in terms of per capita in Pakistan. This image shows the emission trend after the implementation of financial reforms. Therefore this is expected to provide a closer look at financial reforms and financial sector development and emission in Pakistan. In the present context and continuation, this study will look over to answer the question of whether any connection exists between financial sector development and environmental degradation in the country. The study's main objective is to analyze the impact of financial sector development on environmental degradation in Pakistan during 1974-2018.

METHODOLOGY

Data Sources

The data used in the present study naturally is annual time series spread over a period from 1974 to 2018. The data set on the dependent and independent variables have been collected from the World Bank database.

Econometric Techniques

Proper stationarity test selection and appropriate estimation techniques are necessary to deal with annual time series data. The first step in time series data is the selection of unit root tests. This study used Augmented Dickey Fuller (ADF) test to detect the problem stationarity. Since we have a mixed order of data series, the ARDL co-integration technique is the best.

The econometric model has been used for the concerned study is as follows.

$$ED = \alpha_0 + \beta_1 Pop_t + \beta_2 EG_t + \beta_3 TO_t + \beta_4 EC_t + \beta_5 FD_t + \mu_t \quad (1)$$

Where;

ED= Environmental Degradation (Emission of Carbon Dioxide)
FDI= Financial Development Index
Pop= Population Growth
EG= Income/Output Growth
TO= Trade Openness
EC= Energy Consumption

Different parameters will be estimated through specific econometric techniques. These parameters are α and βs. The term 'μ' is the error term, which is considered to be a white noise error term.

RESULTS AND DISCUSSION

Results of Econometrics Tests and Techniques

The present study is about to examine the impact of financial sector development on environmental degradation. Depending on the nature of the data, a suitable examination for the existence of unit root is needed. Therefore, unit root tests are employed to examine the order of stationarity. The result of the ADF test is given in Table 1.

Table 1 shows the result of the ADF test. It is clear from the results of the test that the variables of the model are of different orders of stationarity. It is clear from the values of T-statistic and probability values that the variables except for Y, $Y^{2,}$ and Y^3 are stationarity of order one, while the mentioned variables are stationarity at a level. ADF results tell us that Trade openness is stationary at first difference. Thus we consider the variable TO is stationary at the first difference, i.e., I(1). We concluded that all the variables except are stationary after the first difference. The outcomes of unit root tests guided us to use the ARDL technique for estimation. The estimation procedure of ARDL is given below stepwise.

Step Wise Procedure

The whole procedure may be divided into three steps. In the 1st step, an examination of the validity of the co-integrational relationship will be taken place. In the first step of the co-integrational relationship, the Bound-testing procedure is employed. Bound test outcome showed the value of the F-statistic, which is the outcome of given values, compared with the critical values reported by Pesaran et al. (1998) at 1%, 2.5%, 5%, and 10%. In the second step, long-run, estimated coefficients are estimated. And in the last step, short-run coefficients and convergence speed is estimated.

Some other aspects of the study are also necessary to be examined. Lags length selection of the variables is also very important. To decide about the number of lags of the variables used in the model is based on the Schwarz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC). Both techniques are suggested to use two lags for variables in the estimation and are also suited to the nature of the data.

Financial Sector Development and CO_2 Emission

Long-Run Relationship Existence (Bound Test)

The stationarity of the variables is tested, and the test results are presented in Table 1. The values of the test statistic and probabilities given in the tables ensured that the variables are of mixed order in nature, so it is evident that the research can proceed with the use of the ARDL technique to avail the estimates of the long-run parameters. The results of the bound test can check the existence of co-integration among the variables. The results of the bound test are given in Table 2; the value of the F-statistic is 5.208, which exceeded the upper bound values, i.e., 3.28 at a significance level of 5%. Therefore, a co-integrational relationship is confirmed for model-1 of the study at a 5% significance level.

Table 1. Results of Augmented Dickey Fuller Test.

Variables	ADF test Statistics Level		ADF-test Statistics 1st Difference		Order of Integration (5% level of Sig.)
	T-Values	P-Values	T-Value	P-Value	Decision
CO_2	-1.094586	(0.7097)	-8.200773	(0.0000)	I(1)
ME	-0.483690	(0.8847)	-7.266525	(0.0000)	I(1)
FSD	-1.66908	(0.4394)	-3.967044	(0.0036)	I(1)
PG	0.689124	(0.8383)	-2.973207	(0.0145)	I(1)
Y	-4.388455	(0.0011)	----------	---------	I(0)
Y^2	-4.769009	(0.0003)	----------	----------	I(0)
Y^3	-5.158002	(0.0001)	---------	----------	I(0)
FDI	-2.9321	(0.0497)	-4.4030	(0.0010)	I(0)
EC	-2.1542	(0.2251)	-4.9000	(0.0002)	I(1)
TO	-2.4331	(0.1363)	-6.5524	(0.0000)	I(1)

Note: Decision about order of stationarity is taken at 5% level of significance. The values in Parenthesis ( ) are the P-values.

Table 2. Co-Integrational Relationship (Bound Test).

Model	F- Statistic estimated	Critical ^ Bounds Lower ----------upper		Decision
SD, Y , PG, TO, FDI, EC)	5.208			Long Run Relationship Confirmed
	Sig.			
	10%	1.99	2.94	
	5%	2.27	3.28	
	2.5%	2.55	3.61	
	1%	2.88	3.99	

Source: Author's Calculation.

Long-Run Results

Table 3 is about the long-run coefficients estimates. Here in the case of the present study, the dependent variable is CO_2 emission, while FSD, Y, PG, TO, EC and FDI are independent variables. In column one of the table, the main factors of environmental degradation are given. Parameters estimates, standard errors, t-statistic, and probabilities are presented in columns two, three, and four, respectively. The signs of the FSD and TO variables are negatively associated with environmental degradation, while the signs of other variables growth (Y), PG, and EC are positive to environmental degradation. All the variables are statistically significant at 5 percent (except FDI). This means that these variables considerably contributed to the determination of CO_2 emission. The impact of variable FDI is insignificant at 5% significance, which means that its contribution is not efficient in the case of the present study. But the same variable of FDI is significant at a 10% significance level, but this focused on 5% significance. It is clear from the signs of the coefficient that the impact of PG, EC, and Y variables are positive and statistically significant on CO_2 emission. On the other side, the impact of variables FSD and TO are negative and significant on CO_2 emission in the long run.

The negative sign of the coefficient of FSD shows the negative impact of the independent variables on the dependent variable, CO_2. The coefficient value of the variable tells us about the magnitude of the impact. It is 2.017, which means that a 1% increase in the independent variable, i.e., FSD, will lead to a decrease in the dependent variable by 2.017 % in the long run. The result of the present is parallel with the findings of the studies conducted by Majeed et al. (2020) and Ahmad et al. (2021). They are of the view that the development in the financial sector reduced emissions (negative relationship, i.e., an increase in financial development reduced environmental degradation or improved the quality of the environment). On the other hand side, negative shock can produce harmful effect environment. Zhang (2011) also favored a positive association between financial sector development and carbon dioxide emission.

The magnitude of the coefficient of 'Y' representing economic growth is 0.071. The coefficient's positive sign shows the variable's direct impact on the dependent variable. This means that the increase in economic growth tends to increase environmental degradation by increasing CO_2 emissions. The results report a positive and significant relationship. The 1% increase in economic growth will increase CO_2 by 0.071%. The positive association is also supported by many researchers in the most recent literature. They believe that a higher growth rate needs the intensive use of resources, which creates pressure on resources and could be one of the most important sources of carbon dioxide emission. The optimal utilization of resources leads to a higher growth rate. Also, it provides opportunities for the consumer to consume more and more, which could further be a source of CO_2 emissions, such type of studies (Khan et al., 2020; Nahian et al., 2017; Shahbaz et al., 2018) support this point of view. On the other hand side, some of the studies in literature contradict the view of a positive relationship between growth and environmental degradation. In this connection, Kasperowicz (2015) is of the same view that higher growth rates lead to a decrease in environmental degradation by using sophisticated technologies which reduce emissions and produce efficiently could produce environment-friendly productions.

The value of the coefficient of PG is 0.289, which means that a 1% increase in PG variable will leads to an increase the CO_2 by 0.289%. The origin the same concept back to the theoretical perception of Malthusian (1798) that population leads creates

threats to society in term of disasters. Environmental degradation is one of the disasters. Along with theoretical, some empirical support also exists in the most recent literature, which claims that the population growth rate leads to increased pollution (CO_2). These empirical studies are conducted by Rehman et al. (2020), Regmi and Rehman (2021), Nabi et al. (2020), Mansoor and Sultana (2018), etc. The negative sign of the coefficient TO showed that the variable is negatively associated with CO_2 in the long run, and a 1% increase in the value of TO will decrease the value of CO_2 by 0.044%. The same result is supported by Wang and Zhang (2021) for high-income and middle-income countries, while they reputed a positive relationship between the two in the same study. They are of the view that trade openness is a source of technological diffusion and may increase the use of sophisticated techniques, which may reduce environmental degradation, while trade in lower-income countries is mostly based on non-technological equipment and doesn't leads to technological diffusion and doesn't put the use of technological equipment into a productive environment. Therefore, trade between lower-income countries leads to increase emissions. Another study conducted by Ullah et al. (2021) believes that trade dramatically increases CO_2. Moreover, Naranpanawa (2011) reported the nonexistence of any type of relationship between environment and trade openness

The impact of the independent variable FDI is found to be positive and statistically significant. The variable is found significant at a 10% level of significance. The positive sign of the coefficient of FDI shows the negative impact on CO_2. The coefficient estimate is 0.163 means that a 1% increase in FDI will decrease the CO_2 by 0.163%. The theoretical perspective of FDI and the emission of CO_2 is that its association has existed because FDI increases resource utilization and puts pressure on resources in the host country. In this way, FDI can increase CO_2. On the other hand, FDI is one of the important sources of technological diffusion and expertise in a productive environment. In this way, FDI may decrease environmental degradation by increasing the sharing of sophisticated technology and expertise. In empirical research conducted by Mahadevan and Sun (2020), they claimed that FDI doesn't contribute to environmental degradation in high and upper-middle-income countries, while it contributes negatively in low-income counties. Moreover, they reported a positive association between FDI and environmental degradation in lower-middle-income countries. Adebayo and Kirikkaleli (2021) and Zhang et al. (2019) have reported a positive relationship between FDI and environmental degradation.

The results also revealed that EC is also positive and significantly related to CO_2 in the long run, and the CO_2 may rise by 0.072% with an increase of 1% in EC. The theoretical consensus about energy consumption and environmental degradation is that energy consumption increases CO_2 because the increasing use of energy, particularly in industries sector and transportation lands, increases CO_2 emission. Empirical research conducted by Khan et al. (2020) believes that energy consumption leads to increased environmental CO_2 emissions. Conversely, the study conducted by Li et al. (2021) is of the view that efficient use of energy can have a negative impact on CO_2, which means that the efficient use of energy can be used as and policy tool to reduce CO_2 emission, which contradicts the results of the present study.

Table 3. Long Run Coefficient Estimates.

Var	B	SE	T	P
FSD	-2.017	0.600	-3.356	0.015
Y	0.071	0.022	3.140	0.020
PG	0.289	0.116	2.480	0.019
TO	-0.044	0.016	-2.608	0.040
FDI	0.163	0.069	2.342	0.057
EC	0.072	0.015	4.701	0.003
C	-1.346	0.458	-2.934	0.026

Note: Carbon Dioxide Emission is the Dependent Variable; Var= Variables, B= Coefficient, SE= Standard Error, t= t-Statistic values and P= Probability.

The short-run results are in the Table 4 illustrates that all the variables are significant at a 5% significance level in the short run. From the signs of FSD and TO is quite evident that the impact of financial development and trade openness affect negatively in the short run. The magnitude of FSD variable is -0.0317 and -1.3821 at the first and second lags, respectively. The magnitude of the coefficient is low at first lags while larger at second lags. It means that with the passage of time, its impact increases to reduce CO_2 emission. Ahmad et al. (2021) have also produced the same results in the short run. They believed that the development of the financial sector reduced emissions by reducing the use of outdated equipment and provided opportunities to use new and advanced technological products, which led to reduced emission in the short run. The coefficient of TO is -0.0048 and -0.016 at first and second lags, which are very low in magnitude, which means that the impact of trade openness is significant by a very low magnitude. Ullah et al. (2021) have the view about trade transactions reduce the fear of overproduction and enlarge the extent of the market to sell out produced goods, putting pressure on the utilization of resources which dramatically increases the emission of CO_2 by increasing consumption expenditure.

On the other side, the impact of other variables, i.e., Y PG, EC, and FDI is positive and significant at a 5% level of significance in the short run. The coefficient of Y is 0.0113 at first lags and 0.0252 at second lags, showing that the impact of economic growth is deepening with extending legs. The results of the current study are in line with the findings of the study originated by Shahbaz et al. (2018). They were of the opinion that growth 'Y' and FDI both affect the environment by

providing opportunities to consumers by increasing income and access to commodities by increasing the availability of output. The impact of population growth on emission is positive, with coefficient values of 0.99 and 2.85 at first and second lags also shows that the impact of population growth is increasing with the passage of time. In the past, literature studies were carried out by Rehman et al. (2020), Regmi and Rehman (2021), Mansoor and Sultana (2018) and Nabi et al. (2020) have claimed that population growth rate leads to increase pollution (CO_2).

The coefficients of FDI and EC are 0.0233% and 0.0015%, respectively means that with the increase in FDI and EC by 1%, there will be 0.0233% and 0.0015% in CO_2 in the short run. Moreover, the sign of ECT (Error Correction Term) is negative (less than one) and statistically significant at a 5% level of significance, confirming the existence of a long-run relationship. The negative coefficient shows that any disequilibrium in the short run will converge to long-run equilibrium with a speed of 60% in one year. The coefficient of the ECT term reveals the speed of convergence toward long-run equilibrium.

The values of R^2 and adjusted R^2 show the goodness of fit test. Both magnitudes are 0.86 and 0.80, which are quite high and confirm that the model is a good fitted model. Additionally, the value of DW test is about two, which is a good sign and shows the absence of any severe existence of an econometric problem of autocorrelation.

Table 4. Short-Run Coefficient Estimates (ECM).

Var	B	SE	T	P
D(CO_2(-1))	1.2854	0.1531	8.3947	0.0002
D(FSD)	-0.3178	0.0658	-4.8273	0.0029
D(FSD(-1))	-1.3821	0.1635	-8.4505	0.0001
D(Y)	0.0113	0.0013	8.1556	0.0002
D(Y(-1))	0.0252	0.0027	9.3531	0.0001
D(PG)	0.9985	0.1820	5.4859	0.0015
D(PG(-1))	2.8507	0.6494	4.3895	0.0046
D(TO)	-0.0048	0.0006	-6.9897	0.0004
D(TO(-1))	-0.0165	0.0018	-9.0637	0.0001
D(FDI)	0.0233	0.0046	5.0422	0.0024
D(EC)	0.0015	0.0002	6.1236	0.0009
CointEq(-1)*	-0.6088	0.0640	-9.5013	0.0001
R-squared= 0.86132,	Adjusted R-squared= 0.80251		DW= 2.0922	

Note: Carbon Dioxide Emission is the Dependent Variable; Var= Variables, B= Coefficient, SE= Standard Error, t= t-Statistic values and P= Probability.

An Investigation of Econometric Problems

It is one of the most important aspects of any research to investigate the problems associated with econometric Modeling. The results of those associated problems are presented in Table 5. The results describe that there is no serious problem associated with the model of the study under consideration. It can be seen from the values of F-statistic and probability. All the tests are statistically insignificant, showing the absence of econometric problems by accepting the null hypothesis (describes the absence of problem) in Table 5.

Table 5. Diagnostic tests.

Test	F-Stat	Probability
1. Ser-Corr	4.832	0.109
2. Hetero	0.5332	0.8862
3. Norm	0.829	0.257
1. Fun Form	1.448	0.3536

Ser Corr, Hetro, Norm and Fun Form represent serial correlation, Heteroscedasticity, Normality and Functional Form respectively.

To test the stability of parameters, CUSUM and CUSUM square tests are used. The results of both tests are given in the following figure 1. The 5% level of significance is represented by a line representing bounds (red lines). It is clear from the line that the line lies within the bounds of 5%. The line does not touch or cross the bounds from each side, confirming the stability of the parameters of the model.

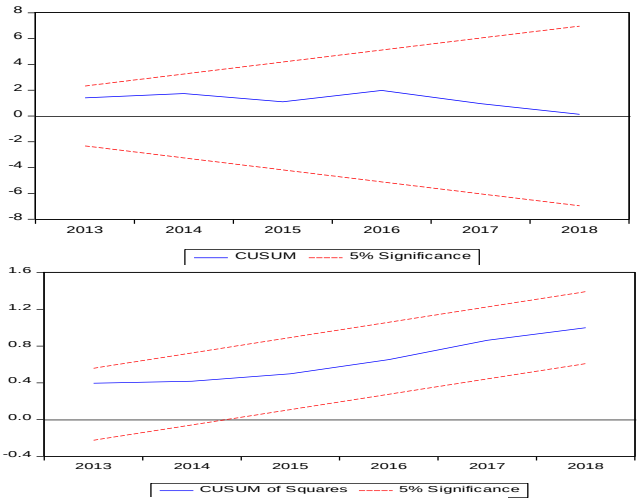

Figure 1. CUSUM and CUSUM square.

CONCLUSIONS AND RECOMMENDATIONS

Stationarity tests report that all the variables of the different equations used are of a different order of stationarity. The nature of data is time series. The test used for stationarity purposes is the ADF test. In the long run, the Bound test based on F-statistic is used to validate the relationship between the variables. Literature suggested that ARDL is the best technique

to deal with such type of data and to provide efficient results. ARDL technique is employed to get the required objective. The impact of FSD is examined on environmental degradation regarding CO_2 emission. It was found that FSD negatively affected environmental degradation in Pakistan in both the long and short run during the period from 1974 to 2018. The impact of PG, EC and FDI is positive and statistically significant in the long run. The impact of TO on CO_2 emission is negative and significant in the long run. The value of the co-integration term showed that it is less than zero and significant that endorsing the relationship in the long run. Diagnostic tests confirmed the absence of econometric problems, i.e., serial correlation, heteroscedasticity, functional form, and normality. Moreover, parameter stability is confirmed by CUSUM and CUSUM square tests. In the first model, the impact of FSD on environmental degradation is examined regarding CO_2 emission. It is found that development in the financial sector reduced CO_2 emission (negative relationship, i.e., an increase in financial sector development leads to a decrease in environmental degradation or improving the quality of the environment). On the other hand side, negative shock can produce harmful effects on the environment. A positive and significant relationship is reported regarding economic growth and CO_2. The impact of PG, FDI, TO and EC is also positive and significant to CO_2 emission.

The present study concludes that financial sector development contributed considerably to the environment. An indirect relationship was found, i.e., an increase in financial sector development leads to a decrease in the environmental pollution in terms of CO_2 emission. It means that the emission of health hazards gases decreased with the development in the financial sector. Based on the study's outcomes, it is suggested that it may be used as a policy tool to improve environmental quality. Financial sector development has reduced the use of transportation (by means of online banking) and paper (paperless banking). Financial sector development may help increase the mass's access to advanced technological equipment, which reduces the use of outdated equipment and might reduce emissions (environmental damage). Therefore, financial sector development may be used to reduce emissions, and this could be improved further by allowing financial incentives towards "green" finance. Green finance could be more effective if green bonds will issue. The development of the financial system from the conventional to the advanced public sector. The financial sector's development process helps innovation ensure cleaner production in different sectors. The financial sector could divert transportation from conventional (non-environmental friendly) use to an environmentally friendly vehicle (energy saver). Population growth has great repercussions for environmental degradation. IPAT model has examined the same. But the increase in population increases per capita damage by consuming more and more and shrinks the area for agriculture and building up (building and infrastructure), further worsening the situation. Population growth should be controlled to reduce environmental damage directly and indirectly. Green-tax reforms should be devised in developing countries to maintain air quality, which may reduce per capita damage. The impact of energy consumption is positive, which means that energy consumption increases emissions. Therefore, energy consumption should divert from dirty energy consumption (fossil or no-renewable energy) to cleaner consumption (renewable energy). More importance should be given to renewable energy as compared to non-renewable because renewable energy sources are less harmful to the environment and are considered cleaner energy consumption. Energy savers and users of renewable sources should be subsidized for saving energy and using clean energy.

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