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Macroeconomic Performance of Pakistan: The Role of Foreign Direct Investment and Institutional Quality

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ABSTRACT

This study investigates the influence of FDI and institutional quality on the macroeconomic performance of Pakistan using annual time series data from 1996 to 2022. In this study, the macroeconomic performance of Pakistan is measured using three variables including GDP, trade, and environmental performance. Different econometric techniques are used for data analysis, such as ADF test, bound test, and ARDL model for the long-run parameters estimation. The study shows that FDI, human capital and globalization are positively and significantly linked to the GDP, while institutional quality is negatively related to the GDP in Pakistan. Similarly, the results also show that FDI, institutional quality and GDP are positively and significantly associated with CO_2 emissions, while human capital is also positively but insignificantly related to the CO_2 emissions in Pakistan. In addition, institutional quality and exchange rate are negative and significant, while FDI is positive and significant factors of trade in Pakistan. The findings suggest that to enhance GDP growth, the government should continue attracting FDI and investing in human capital and globalization-friendly policies. However, the negative impact of institutional quality on GDP and trade indicates a need for institutional reforms to improve governance and regulatory effectiveness. Additionally, since FDI and GDP are linked to higher CO_2 emissions, environmental regulations must be strengthened to ensure sustainable development. Exchange rate stability is also crucial for promoting trade performance.

Keywords: *Foreign Direct Investment, Institutional Quality, Trade, GDP, Environment, Pakistan*

INTRODUCTION

Emerging nations view foreign direct investment as transferring resources and technologies from developed to developing nations. The use of new knowledge, experience, production techniques, and management gives the company a comparative advantage when FDI enters a home nation (in a specific industry). The economic expansion of the countries can be explained by the catch-up effect of

technological advances between emerging and industrialized countries (Melnyk et al., 2014). The amount of funds available for local investment can be increased and boosted by FDI inflows, which can have a major impact on the host nation. This can be achieved by foreign purchasers buying locally produced inputs and using the supply chain to sell intermediate products to local companies. Additionally, FDI inflows can potentially increase the export capacity of the host nations, raising their foreign exchange profits. This benefits developing nations. Additionally, FDI can enhance technology transfer, open up new opportunities, and boost overall economic growth in the host nation (Belloumi, 2014).

Furthermore, the host country's environmental degradation (ED) may result from foreign influx. Certain foreign investors introduce technologies to their host countries with significant environmental implications (To et al., 2019). Environmental degradation is caused by the depletion of natural resources, harm to infrastructure, and loss of human life and health (Cohen et al., 2018; Asghar et al., 2024a). The growth of the economy is affected by atmospheric pollutants. There is proof of the worldwide nature of air pollution and its effects on the planet's surface. The disturbing reality of environmental degradation and its detrimental long-term impacts could have a negative impact on the economy and well-being of people. As a result, welfare and healthcare expenses may increase (Borhan et al., 2012). Because of this, CO_2 emissions may directly affect production by decreasing the effectiveness of labor and capital that humans create. In this instance, pollution appears to be a negative externality. The deteriorating quality of industrial equipment results from air or water pollution and health problems. Secondly, reducing pollutant emissions by firms increases their production prices (Abdouli & Hammami, 2017).

On the other hand, political governance institutions are made to carry out certain tasks, such as developing and executing socioeconomic policies that promote the expansion and development of productive employment on a large scale. The quality of the state is determined by how well it accomplishes this constitutional purpose. To address the long-standing socioeconomic issues of widespread poverty, wide disparities in inequality, and "jobless growth" that bedevil many low-income developing economies, emphasizing the quality of institutional governance is therefore essential. Regretfully, it is still difficult to acknowledge institutions' role in fostering equitable growth in these economies (Saez, 2012; Stiglitz, 2016).

Ali & Son (2007) emphasized how important institutions are in attaining progress. Their study defined the essential steps to encourage inclusive growth and argued that institutions are necessary for any program to be successful. They went on to say that governance and institutional roles must be integrated to achieve equitable growth results. All people from all socioeconomic backgrounds, including the most marginalized members of society, must participate in inclusive growth by participating in the process of progress and decision-making. The policies can be crafted by including these organizations to benefit the underprivileged and meet more ambitious growth targets (Asghar et al., 2024b).

Ferrini (2012) states that institutions promote growth by facilitating economic exchanges. He maintains that the costs associated with economic transactions can be reduced through common business codes, enforceable contracts, and improved information availability. These factors lower transaction costs, reduce risks, and enhance growth rates. In conclusion, institutional quality enhances the level of economic growth, while financial development contributes to an increase in the growth rate.

Depending on their quality, institutions have the potential to positively or negatively impact the environment and economy. Via institutions, efficient regulatory frameworks and strong procedural enforcement improve the environment. These regulations include guidelines for raising awareness of the need to use natural resources more sparingly and lowering emissions. Institutions under the rule of law may concentrate on afforestation, pro-environment agriculture practices, and the use of renewable energy.

Therefore, the only way to create an accountable and environmentally conscious community is through environmental accounting by organizations with authority. On the other hand, inadequate institutions allow for corruption and disregard for environmentally friendly practices. In this approach, a bad governance system increases an economy's ecological hazards (Yousaf & Mahtab, 2023).

In addition, the flow of international trade rises with better governments and institutions. According to Anderson & Marcouiller (2002), the caliber of the institutions involved has a beneficial impact on bilateral commerce, which provides significant evidence for this argument. Similarly, Alvarez et al., (2018) claim that institutional quality positively impacts bilateral trade and that this benefit grows over time. Additionally, Linders et al., (2005) conclude that the volume of trade between exporting and importing countries is positively correlated with the quality of institutions in both countries. Institutional development lowers transaction costs, boosts economic incentives, and lessens information defects (Jalilian et al., (2007). Similarly, Chowdhury & Audretsch (2014) claim that improved formal and informal institutions facilitate trade while higher institutional quality and strong governance lower trade costs and default risks. Researchers have validated these claims by demonstrating a statistically significant positive impact of institutional quality on trade.

By considering the above theoretical discussion, this study analyzes the dynamic linkage of FDI and institutional quality on the macroeconomic performance of Pakistan. The macroeconomic performance of Pakistan is measured using GDP, trade and environmental performance. The outcomes of the study will show how FDI inflows and institutional quality influence Pakistan's GDP, trade, and environment. The study outcomes also have important implications for policymakers in designing policies to encourage FDI inflows, improve institutional quality and thus macroeconomic performance. By considering the outcomes, this study will also provide policy suggestions to improve the country's macroeconomic performance. Therefore, this study is presumed to be significant and will contribute significantly to the literature.

LITERATURE REVIEW

Studies on the Influence of FDI and Institutional Quality on Economic Growth

Different studies analyzed the relationship between FDI, institutional quality, and economic growth. Islam (2022) used an ARDL technique to study how human capital formation and institutional quality affect the relationship between economic growth and poverty in Bangladesh, covering data from 1990 to 2019. The results of the ARDL analysis show that the variables have a long-term relationship: government spending on education has a negative long-term impact on economic growth rate but a positive short-term impact; institutional quality has a long-term positive impact on economic growth, and spending on health care has a long-term positive impact on economic growth rate. The findings of the causality test showed a one-way causal relationship between health spending and economic growth rate, as well as a feedback relationship between institutional quality and growth. Rahman & Sultana (2022) used panel data for 19 developing countries from 2002 to 2019 to examine the effects of institutional quality, economic growth, and exports on the usage of renewable energy. The panel PMG-ARDL technique served as the foundation for this study, which looks at the long-term relationships between the variables. The empirical analysis yielded robust results indicating that renewable energy consumption was significantly impacted by institutional effectiveness, economic growth, and export growth. A unidirectional causal relationship was discovered between renewable energy, corruption management, and economic growth and export to renewable energy. Wang et al., (2022) investigated whether institutional quality and foreign direct investment promoted economic growth and environmental quality in oil-producing and non-oil-producing African countries from 1999 to 2017. The FMOLS results showed that,

in non-oil-producing nations, institutional quality significantly boosted economic growth and enhanced environmental quality; in oil-producing countries, however, it just enhanced environmental quality and had no discernible effect on economic growth. In oil-producing nations compared to non-oil-producing nations, foreign direct investment substantially increased economic growth, but it had no discernible effect on environmental quality in either group.

Ali et al., (2022) explored the impact of institutional quality and financial inclusion on the financial development of 45 OIC countries covering data from 2000 to 2016. The empirical findings supported the strong positive correlation between institutional quality, financial development, and financial inclusion. It was discovered that institutional quality significantly boosts financial development while moderating financial inclusion. Munir et al., (2022) examined the connection between inclusive growth and institutional quality using panel data for 86 nations from 1996 to 2015. By leveraging institutional quality and the social welfare function, it further created indices of inclusive growth by applying the principle component methodology to global governance indicators. According to the fixed effect results, attaining growth inclusivity was significantly influenced by institutional quality. Shittu et al., (2020) analyzed the effects of globalization, political governance, and FDI on economic growth in West Africa between 1996 and 2016. The study indicated that political governance and globalization positively impacted economic growth. Ramzan et al. (2019) investigated the connection between FDI and economic growth using panel data from 70 developing economies from 1980 to 2015. The study demonstrated the existence of a human capital threshold, over which foreign direct investment had a positive influence on economic growth and below which it had a negative effect. These outcomes suggested that an economy with high human capital development benefits from FDI. In order to encourage growth and benefit from the integrated global economy, policymakers must consider the conditional effect.

Studies on the Influence of FDI and Institutional Quality on Environmental Degradation

Several studies examined the relationship between FDI, INQ and environmental degradation, such as Khan et al., (2023) analyzed how urbanization and institutional quality affected environmental quality in Belt and Road Initiative (BRI) countries using data from 2002 to 2019. The results demonstrated that urbanization causes a rise in carbon dioxide emissions and a decrease in environmental quality. Conversely, the square term of urbanization suggests that increasing urbanization eventually results in lower emissions once it reaches a certain point. Education has the opposite effect of reducing carbon emissions; instead, factors such as economic expansion, foreign direct investment, and government efficiency all increase carbon emissions. Jahanger et al., (2022) analyzed how globalization and democracy affected carbon dioxide (CO_2) emissions in 69 developing nations from 1990 to 2018. The fully modified ordinary least square (FMOLS) method was used in this study to evaluate the long-run coefficients and elasticity. The results demonstrated that the burden on the environment was greatly outweighed by democracy and renewable energy. Globalization and financial progress, however, greatly exacerbate environmental degradation. Furthermore, the results of an interaction term between globalization and democracy show that pollution levels are substantially lower and that the damping impact of globalization and democracy has a comparable effect on the environment. Pavlovic et al., (2021) investigated the effects of economic growth and foreign direct investments on environmental deterioration in the Balkans between 1998 and 2019. The results showed that the EKC hypothesis was disproved and PHH was validated in Serbia, Albania, Croatia, Romania, Bulgaria, and the Balkans overall. Abd Razak et al., (2021) examined the effects of asymmetry and cointegration between gross domestic product, financial development, energy use, and environmental degradation by featuring institutional quality and covering the Malaysian economy from 1984 to 2017. The findings establish the validity of the symmetric and asymmetric Environmental Kuznets Curve hypotheses for Malaysia by confirming the hypothesis' existence for both linear and nonlinear analysis. Furthermore, this study confirms the characteristics of

strong institutions and financial development that allay worries about CO_2 emissions; however, results on energy usage were inconsistent.

Farooq et al., (2020) explored the effects of foreign direct investment and globalization on environmental quality in OIC nations. The GMM estimation results demonstrated that FDI and globalization generally lower environmental quality in low-income and middle-income OIC countries and increase CO2 emissions in high-income OIC countries, decreasing CO_2 emissions in the former. Urbanization, industrialization, and institutional quality all significantly impact CO_2 emissions in both high- and low-income OIC nations. According to the study, environmental quality is declining in low-income and all OIC countries, while it is improving in high-income OIC states due to globalization and foreign direct investment. Ahmed et al., (2020) analyzed the symmetric effects of trade openness, financial development, and institutional quality on environmental sustainability in Pakistan using data from 1996 to 2018. This study's results indicated a substantial long-term symmetric and asymmetric relationship between financial development and, institutional quality and environmental sustainability. Furthermore, a positive or negative shock to financial development has a greater influence on environmental sustainability, but a positive shock to financial development and IQ has a higher impact on environmental deterioration, according to dynamic multiplier analysis. According to this study, improving trade openness, financial development, and institutional quality are all essential to improving environmental quality.

Studies on the Influence of FDI and Institutional Quality on Trade

Latif et al. (2022) examined the mediating roles of financial development, technical innovation, and labor productivity in relation to the impact of foreign direct investment on trade openness in the context of the China-Pakistan Economic Corridor (CPEC). This analysis gathered data from China and Pakistan between 1980 and 2019. The results demonstrated that trade openness, financial development, technological innovation, and labor productivity were all highly predicted by foreign direct investment in China and Pakistan. Trade openness was significantly increased by worker productivity and financial development. Trade openness in China and Pakistan was not supported by technological innovation. Additionally, the relationship between FDI and trade openness was somewhat mitigated by labor productivity and financial development but not by technical innovation. These results showed that in order to establish labor productivity and financial development that will boost international trade, both nations should encourage FDI. Abasiakan et al., (2021) investigated the factors impacting Nigeria's international trade using data from 1981 to 2017. The results showed that Nigeria's main variables affecting trade in services were GDP growth, secondary school enrolment, trade in goods, and exchange rates. International trade in services negatively correlated with secondary school enrollment, while exchange rates, GDP growth, merchandise trade, and services value-added all showed positive correlations. The study concluded that as technology and skill-oriented services are recognized as the global drivers of services, policies must be developed to enhance them. This was expected to boost local capacity and attract foreign direct investment to the services sector.

Abreo et al., (2021) analyzed the impact of the institutional gap between Colombia and its trading partners. The study examined Colombia's export flows to 136 trading partners using a panel data set covering the years 2005 to 2018. The results showed that Colombia's institutional quality and the institutional gap with its partners are statistically significant and impact the country's export sales. Similarly, when comparing the performance of Colombian exports to other variables in the model, regulatory quality and the rule of law variables have a significant impact. It was determined that to increase its exports, the Colombian government needed to enhance the quality of its institutions significantly. Alexiou et al., (2014) examined the short- and long-term links between institutional and several other important economic variables and economic growth throughout the 1972 to 2008 period

using an ARDL bound testing technique to cointegration. According to the empirical findings, one of the key elements determining economic prosperity in the Sudanese economy was the standard of the institutional environment. Valeriani & Peluso (2011) used panel data with observations from 1950 to 2009 about 181 countries to examine the influence of institutions on economic growth. The key findings showed that institutional quality has a beneficial impact on economic growth. The magnitude of the influence was the sole distinction between how institutional quality affects developing and developed nations. More specifically, of the three institutional variables, increased civil rights appear to have a stronger impact on economic growth in emerging nations, whereas the number of veto players has a higher bearing on the economy of industrialized nations.

DATA AND METHODOLOGY

The data engaged in this study describe the impacts of foreign direct investment and institutional quality on Pakistan's macroeconomic performance. Data range over the period from 1996 to 2022. Data is taken from the World Development Indicator (WDI) and the State Bank of Pakistan.

Model Specification

To observe the impact of Foreign Direct Investment and Institutional Quality on Pakistan's macroeconomic performance, the study measures it using three variables: GDP, trade, and environment. The specification of the three models is given as follows:

Impact of Foreign Direct Investment and Institutional Quality on GDP (Model-I)

To analyze the influence of FDI and institutional quality on GDP of Pakistan FDI, institutional quality, globalization and human capital are used in a model. The functional form of the model is given as follows:

GDP = f (FDI, INQ, HC, GLOB) (1)

The econometric form of the model is as follows:

$$GDP_t = \beta_o + \beta_1 FDI_t + \beta_2 INQ_t + \beta_3 HC_t + \beta_4 GLOB_t + \mu_t \quad (2)$$

Where;

GDP = Gross Domestic Product.
FDI = Foreign direct investment
INQ = Institutional quality
HC = Human capital
GLOB= Globalization
u_t = Error term

Impact of Foreign Direct Investment and Institutional Quality on Trade (Model-II)

To analyze the influence of FDI and institutional quality on trade in Pakistan, the following functional form of the model is developed:

TR = f (FDI, INQ, ER, GDP) (3)

The econometric form of the model is as follows:

$$TR_t = \beta_o + \beta_1 FDI_t + \beta_2 INQ_t + \beta_3 ER_t + \beta_4 GDP_t + \mu_t \quad (4)$$

Where;
TR = Trade
FDI = Foreign direct investment
INQ = Institutional quality
ER = Exchange rate
GDP= Gross domestic product
u_t = Error term

Impact of Foreign Direct Investment and Institutional Quality on Environment (Model-III)

To analyze the influence of FDI and institutional quality on the environment of Pakistan, the following functional form of the model is developed:

ENV = f (FDI, INQ, HC, GDP) (5)

The econometric form of the model is as follows:

$$ENV_t = \beta_o + \beta_1 FDI_t + \beta_2 INQ_t + \beta_3 HC_t + \beta_4 GDP_t + \mu_t \quad (6)$$

Where;
ENV = Environment
FDI = Foreign direct investment
INQ = Institutional quality
HC = Human Capital
GDP= Gross domestic product
u_t = Error term

METHODOLOGY

Different econometric techniques are applied to analyze the dynamic relationship between FDI, institutional quality and macroeconomic performance in Pakistan. The techniques are described as follows: A correlation coefficient is used to examine how closely any two variables are related to one another. The value of the correlation coefficient falls between -1 and +1. A perfect positive correlation between two variables is represented by a value of +1, and a perfect negative correlation is represented by a value of -1. There is no association between two variables when the value is zero. A high correlation between two variables is indicated by a correlation coefficient value that is closer to 1, while a poor link between two variables is indicated by a correlation coefficient value that moves towards zero.

Unit root analysis is essential to assess the degree of stationarity of the variables in the unit. The stationarity level of variables is assessed using the Augmented Dickey-Fuller (ADF) test. We may also choose the best methods for the model's long-term estimation with the help of this analysis. OLS is appropriate for estimating long-run parameters provided all of the variables used in the model exhibit stationarity at the level of analysis; alternatively, ARDL would be a good technique for long-run variable estimation if the variables are discovered to exhibit mixed order of integration.

Autoregressive Distributed Lag Model can be utilized to test for a level relationship for variables that are either I(0) or I(1) as well as for a mix of I(0) and I(1) variables (Pesaran & Shin, 1998). By using an error correction term, ARDL integrates the short-run impact of given variables with long-run equilibrium without dropping long-run information. In contrast with traditional cointegration tests, taking different lags for each variable makes it more flexible. ARDL is easy to apply and yields consistent estimates of long-run coefficients, even in the case of a small sample size. The ARDL long-run form of the model, impact of FDI and institutional quality on GDP is given as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{l} a_{1i}\Delta GDP_{t-1} + \sum_{i=0}^{p} \alpha_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{3i}\Delta INQ_{t-i} + \sum_{i=0}^{r} \alpha_{4i}\Delta HC_{t-i} + \sum_{i=0}^{s} \alpha_{5i}\Delta GLOB_{t-i}$$
$$+\beta_1 GDP_{t-1} + \beta_2 FDI_{t-1} + \beta_3 INQ_{t-1} + \beta_4 HC_{t-1} + \beta_5 GLOB_{t-1} + \mu_t \quad (7)$$

In the above equation, Δ shows the first difference operator of the concerned variable and the deterministic drift parameter is α_0. Standard theory assumes that in the above model, $\beta 2>0$, $\beta_3>0$, $\beta_4>0$, $\beta_5>0$ and $\beta_6>0$. The error term is assumed to be normally distributed. The coefficients β_2, β_3, β_4, β_5 and β_6 are the elasticity of economic growth concerning the FDI, INQ, HC and GLOB.

The unrestricted error correction model (ECM) estimated as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{l} \alpha_1 \Delta GDP_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta INQ_{t-i} + \sum_{i=0}^{r} \alpha_4 \Delta HC_{t-i} + \sum_{i=0}^{s} \alpha_5 \Delta GLOB_{t-i} +$$
$$+\lambda ECT - 1 + vt_t \quad (8)$$

In equation 8, λ shows the speed of adjustment parameter and ECT denotes the residuals from the estimated model.

The ARDL long-run form of the model, impact of FDI and institutional quality on trade is given as follows:

$$\Delta TR_t = \alpha_0 + \sum_{i=1}^{l} a_{1i}\Delta TR_{t-1} + \sum_{i=0}^{p} \alpha_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{3i}\Delta INQ_{t-i} + \sum_{i=0}^{r} \alpha_{4i}\Delta ER_{t-i} + \sum_{i=0}^{s} \alpha_{5i}\Delta GDP_{t-i} +$$
$$+\beta_1 TR_{t-1} + \beta_2 FDI_{t-1} + \beta_3 INQ_{t-1} + \beta_4 ER_{t-1} + \beta_5 GDP_{t-1} + \mu_t \quad (9)$$

In the above equation, Δ shows the first difference operator of the concerned variable and the deterministic drift parameter is α_0. Standard theory assumes that in the above model, $\beta_2>0$, $\beta_3>0$, $\beta_4>0$, $\beta_5>0$ and $\beta_6>0$. The error term is assumed to be normally distributed. The coefficients β_2, β_3, β_4, β_5 and β_6 are the elasticity of economic growth with respect to the FDI, INQ, ER, and GDP.

The unrestricted error correction model (ECM) estimated as follows:

$$\Delta TR_t = \alpha_0 + \sum_{i=1}^{l} \alpha_1 \Delta TR_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta INQ_{t-i} + \sum_{i=0}^{r} \alpha_4 \Delta ER_{t-i} + \sum_{i=0}^{s} \alpha_5 \Delta GDP_{t-i}$$
$$+\lambda ECT - 1 + vt_t \quad (10)$$

In equation 10, λ shows the speed of adjustment parameter and ECT denotes the residuals from the estimated model.

The ARDL long-run form of the model, impact of FDI and institutional quality on the environment is given as follows:

$$\Delta ENV_t = \alpha_0 + \sum_{i=1}^{l} a_{1i}\Delta ENV_{t-1} + \sum_{i=0}^{p} \alpha_{2i}\Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{3i}\Delta INQ_{t-i} + \sum_{i=0}^{r} \alpha_{4i}\Delta HC_{t-i} + \sum_{i=0}^{s} \alpha_{5i}\Delta GDP_{t-i} + \\ + \beta_1 ENV_{t-1} + \beta_2 FDI_{t-1} + \beta_3 INQ_{t-1} + \beta_4 HC_{t-1} + \beta_5 GDP_{t-1} + \mu_t \quad (11)$$

In the above equation, Δ shows the first difference operator of the concerned variable and the deterministic drift parameter is α_0. Standard theory assumes that in the above model, $\beta 2>0$, $\beta_3>0$, $\beta_4>0$, $\beta_5>0$ and $\beta_6>0$. The error term is assumed to be normally distributed. The coefficients β_2, β_3, β_4, β_5 and β_6 are the elasticity of economic growth with respect to the FDI, INQ, HC, and GDP.

The unrestricted error correction model (ECM) estimated as follows:

$$\Delta ENV_t = \alpha_0 + \sum_{i=1}^{l} \alpha_1 \Delta ENV_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta INQ_{t-i} + \sum_{i=0}^{r} \alpha_4 \Delta HC_{t-i} + \sum_{i=0}^{s} \alpha_5 \Delta GP_{t-i} \\ + \lambda ECT - 1 + vt_t \quad (12)$$

In equation 12, λ shows the speed of adjustment parameter and ECT denotes the residuals from the estimated model.

RESULTS AND DISCUSSIONS

Descriptive Analysis

The descriptive statistics of variables are given in Table 2. The mean, maximum, minimum and standard deviation values of GDP in Pakistan are 4.025, 7.831 and -1.274, respectively. The skewness value of GDP distribution is -0.326, which indicates the distribution is negatively skewed and the kurtosis value (3.268) indicates leptokurtic distribution. The mean, maximum, minimum and standard deviation values of ENV in Pakistan are 426.397, 461.601, 403.272 and 13.678, respectively. The skewness value of ENV distribution is 0.389, which indicates the distribution is positively skewed and the kurtosis value (3.055) indicates leptokurtic distribution. Similarly, the descriptive statistics of other variables can be analyzed.

Table 2: Descriptive Statistics

Variables	GDP	ENR	TR	ER	FDI	INQ	HC	GLOB
Mean	4.025	426.397	29.509	4.652	0.976	2.59E-08	32.834	50.710
Maximum	7.831	461.601	38.330	4.801	3.035	1.754	38.617	54.448
Minimum	-1.274	403.272	21.459	4.569	0.309	-4.620	27.050	42.778
Std. Dev.	2.029	13.678	4.366	0.073	0.726	1.447	3.559	3.990
Skewness	-0.326	0.389	0.023	0.735	1.742	-1.484	0.005	-0.960
Kurtosis	3.268	3.055	2.168	2.171	5.063	5.250	1.770	2.359
Jarque-Bera	0.559	0.685	0.780	3.207	18.460	15.617	1.700	4.613
Probability	0.756	0.709	0.676	0.201	0.000	0.000	0.427	0.099

Correlation Analysis

Correlation matrix of model-I indicates that GDP is positively correlated with the FDI, INQ, HC and globalization. Correlation matrix of model-II indicates that FDI, GDP, HC and INQ are positively correlated with environmental degradation. Lastly, the correlation matrix of model-III indicates that FDI and ER are positively correlated with the trade while GDP and INQ are negatively correlated with the trade in Pakistan.

Table 3: Correlation Analysis

Model-I					
Correlation	**GDP**	**FDI**	**INQ**	**HC**	**GLOB**
GDP	1				
FDI	0.044	1			
INQ	0.052	-0.157	1		
HC	0.015	-0.249	0.682	1	
GLOB	0.064	-0.084	-0.394	-0.241	1
Model-II					
Correlation	**ENR**	**FDI**	**GDP**	**HC**	**INQ**
ENR	1				
FDI	0.6452	1			
GDP	0.3256	-0.1715	1		
HC	0.3414	-0.2496	0.9654	1	
INQ	0.4591	-0.1579	0.5987	0.6821	1
Model-III					
Correlation	**TR**	**FDI**	**INQ**	**ER**	**GDP**
TR	1				
FDI	0.435	1			
INQ	-0.372	-0.157	1		
ER	0.274	0.422	0.248	1	
GDP	-0.251	0.044	0.052	0.076	1

Unit Root Analysis

Unit root analysis is important to check the stationarity level of variables in a model. For this purpose, the ADF and PP tests are utilized in this study. The outcomes from Table 4 show that the variable GDP is integrated at order zero I(0) whereas the variables FDI, INQ, HC, GLOB, ENR and TR are integrated at order one I(1). The results demonstrate a combination of integration orders and imply that the ARDL model is appropriate for estimating long-term parameters.

Table 4: Unit Root Analysis

Variables	**ADF**		**PP**	
	Level	**1st Difference**	**Level**	**1st Difference**
GDP	-3.7561	-6.8535	-3.7877	-8.1240
	(0.0090)	(0.0000)	(0.0084)	(0.0000)
FDI	-2.5241	-3.3327	-2.0292	-3.3327
	(0.1220)	(0.0240)	(0.2733)	(0.0240)
INQ	-2.5207	-5.7573	-2.4138	-6.9832
	(0.1223)	(0.0001)	(0.1478)	(0.0000)
HC	-0.2836	-8.6435	-0.1570	-24.4575
	(0.9142)	(0.0000)	(0.9325)	(0.0001)
GLOB	-2.3332	-3.7638	-2.2458	-3.7606
	(0.1687)	(0.0091)	(0.1960)	(0.0092)
ENR	-1.9995	-3.8831	-1.7362	-3.8892
	(0.2849)	(0.0069)	(0.4021)	(0.0068)
TR	-2.5432	-4.1864	-2.5779	-4.1747
	(0.1174)	(0.0034)	(0.1101)	(0.0035)

ER	-2.6937 (0.0891)	-3.3246 (0.0249)	-2.0420 (0.2682)	-3.8249 (0.0079)

Bound Test Analysis

This analysis uses the ARDL bound test to check the long-run cointegration. Table 5 reports the outcomes of the bound test. The estimates show that the F-statistic value (5.6362); (4.1347) and (4.1807) are greater than all upper bound values. Therefore, these outcomes confirmed the existence of long-run cointegration among variables in a model.

Table 5: F-Bound Test Analysis

Test Statistic	Value	Significance level	I(0)	I(1)
F-statistic (Model 1)	5.6362	10%	2.08	3.01
F-statistic (Model 2)	4.1347	5%	2.39	3.38
F-statistic (Model 3)	4.1807	2.5%	2.7	3.73
		1%	3.06	4.15

ARDL Long-Run and Short Run Analysis

This section provides the ARDL long-run estimates of how institutional quality and FDI impact the macroeconomic performance of Pakistan (as shown in Table 6). Foreign direct investment is crucial to promoting the country's GDP. The study found that FDI is positively and significantly associated with Pakistan's GDP. The coefficient of FDI shows that as FDI is enhanced by one unit, the GDP of Pakistan also improves by 0.1563 units. It suggests that FDI inflows bring capital and technology to a country, which is crucial to increasing the people's domestic production, employment, and income levels. Therefore, FDI inflows promote the country's GDP. These results were also found by Pegkas (2015) and Siddique et al., (2017). Better institutional quality is imperative to improve the GDP of the country. However, the results show that INQ is negatively but insignificantly associated with Pakistan's GDP. The coefficient of INQ reveals that as INQ is enhanced by one unit, Pakistan's GDP declines by -0.0336 units. It suggests that institutions in Pakistan are not performing well. The corruption, bad governance, rule of law and political stability conditions in Pakistan are adverse. Therefore, all of these factors negatively influence Pakistan's GDP. The human capital of any country is essential to promote the GDP. The study reveals that HC is optimistically and significantly associated with the GDP in Pakistan. The coefficient of HC shows that as HC is enhanced by one unit, the GDP of Pakistan also improves by 7.3301 units. It suggests that progress in HC improves education, skills, and specialization, which leads to employee productivity and a country's GDP (Ishfaq et al., 2024). These results were also found by Shah et al., (2020) and Pelinescu (2015). Lastly, the study also reveals that GLOB is positively and significantly associated with Pakistan's GDP. The coefficient of GLOB shows that as GLOB is enhanced by one unit, the GDP of Pakistan also improves by 1.8292 units. It implies that globalization promotes global connectivity among people in terms of trade and technology transfers, therefore, it positively enhances the GDP of the country (Asghar et al., 2023; Ameer et al., 2024). Lastly, the ARDL short-run EMC model estimates of the influence of institutional quality and FDI on the economic growth of Pakistan show that the ECM (-) term is found to be negative (-0.4133) and also statistically significant. This implies that in the case of disturbances, the short-run equilibrium is moved toward long-run equilibrium at a rate of 41.33 percent.

ARDL Long-Run and Short Run Analysis (Model: 2)

The outcomes of model-II show that FDI is positively and significantly connected with the CO_2 emissions in Pakistan. The coefficient of FDI exhibits that as FDI is enhanced by one unit, the CO2 emissions in

Pakistan also increase by 0.0445 units. The results imply that FDI inflows are essential to promote the GDP and trade level of the country, but due to lenient environmental regulations in developing countries like Pakistan, polluted technology is brought into a country in the form of FDI inflows. Therefore, it leads to an increase the CO_2 emissions in a country. These results were also found by Iram et al., (2024) and Muhammad & Khan (2019). Similarly, the results also show that INQ is positively and significantly associated with CO_2 emissions in Pakistan. The coefficient of INQ shows that as INQ is enhanced by one unit, the CO2 emissions in Pakistan also increase by 0.0299 units. These outcomes suggest that better INQ is essential to reduce the CO_2 emissions in a country by implementing strict environmental regulations; however, in the case of Pakistan, institutional quality needs to be improved to reduce the CO_2 emissions in Pakistan. These results were also found by Obobisa et al., (2022). In contrast, the results also display that GDP is positively and significantly associated with CO_2 emissions in Pakistan. The coefficient of GDP exhibits that as GDP is enhanced by one unit, the CO2 emissions in Pakistan also increase by 1.3082 units. These outcomes suggest that an increase in GDP means more economic activities, energy usage and industrialization which in turn increases the level of CO_2 emissions. These results were also found by Mentel et al., (2022) and Liu & Bae (2018). Lastly, the ARDL short-run EMC model estimates show that the ECM (-) term is found to be negative (-0.7389) and also statistically significant. This implies that in the case of disturbances, the short-run equilibrium is moved toward long-run equilibrium at a rate of 73.89 percent.

ARDL Long-Run and Short Run Analysis (Model: 3)

The outcome of model-III shows that FDI is positively and significantly connected with trade in Pakistan. The coefficient of FDI exhibits that as FDI is enhanced by one unit, the trade in Pakistan also increases by 0.1689 units. It suggests that FDI enhances the level of trade by augmenting technology transfer, production efficiency, and market access (Metulini et al., 2017). Similarly, the results also show that INQ is negatively and significantly associated with trade in Pakistan. The coefficient of INQ exhibits that as INQ is enhanced by one-unit trade in Pakistan, it are decreased by -0.0317 units. These outcomes suggest that better INQ is essential to increase trade in a country by implementing strict trade regulations; however, in the case of Pakistan, it shows that institutional quality in Pakistan is poor and is negatively influencing the trade; therefore, it needs to be improved to increase the trade in Pakistan. The results also display that GDP is positively and significantly associated with trade in Pakistan. The coefficient of GDP exhibits that as GDP is enhanced by one unit, the trade in Pakistan also increases by 0.0555 units. These outcomes suggest that increasing GDP means more economic activities and industrialization, which increases the level of trade. Lastly, the ARDL short-run EMC model estimates show that the ECM (-) term is negative (-0.4244) and statistically significant. This implies that in the case of disturbances, the short-run equilibrium is moved toward the long-run equilibrium at a rate of 42.44 percent.

Table 6: ARDL Long-Run Analysis

Long Run	**Dependent Variable:** GDP (Model:1)			
Variables	**Coefficient**	**S.E.**	**t-statistic**	**Prob.**
FDI	0.1563	0.0677	2.3073	0.0347
INQ	-0.0336	0.0454	-0.7399	0.4700
HC	7.3301	0.4744	15.4486	0.0000
GLOB	1.8292	1.0698	1.7097	0.1066
C	-21.4456	3.3356	-6.4291	0.0000
		Short Run		
D(FDI)	0.1214	0.0256	4.7368	0.0002
D(INQ)	0.0207	0.0101	2.0401	0.0582
D(HC)	1.3107	0.4992	2.6253	0.0184

D(GLOB)	4.0914	0.6633	6.1682	0.0000
CointEq(-1)	-0.4133	0.0959	-4.3079	0.0005
Long Run		**Dependent Variable:** Environment (Model:2)		
FDI	0.0445	0.0201	2.2118	0.0388
GDP	1.3082	0.3043	4.2977	0.0004
HC	0.0987	0.5160	0.1914	0.8501
INQ	0.0299	0.0105	2.8432	0.0100
C	2.1291	0.6607	3.2222	0.0043
		Short Run		
D(FDI)	0.0328	0.0150	2.1794	0.0414
D(GDP)	0.9666	0.3362	2.8750	0.0094
D(HC)	0.0729	0.3878	0.1881	0.8526
D(INQ)	0.0221	0.0101	2.1695	0.0423
CointEq(-1)	-0.7389	0.2285	-3.2333	0.0042
Long Run		**Dependent Variable: Trade (Model:3)**		
FDI	0.0805	0.0263	3.0563	0.0065
INQ	-0.0317	0.0155	-2.0333	0.0562
GDP	0.0555	0.0454	1.2215	0.2368
ER	-0.5025	0.2691	-1.8668	0.0774
C	2.3216	1.3378	1.7353	0.0989
		Short Run		
D(FDI)	0.1689	0.0660	2.5561	0.0193
D(INQ)	0.0664	0.0342	1.9411	0.0672
D(GDP)	0.0435	0.0118	3.6607	0.0026
D(ER)	-0.0261	0.0124	-2.1002	0.0543
CointEq(-1)	-0.4244	0.0690	-6.1513	0.0000

Model Diagnostic Analysis

In this study, different model diagnostic tests are employed to check the issues of autocorrelation, heteroskedasticity, model misspecification, and residual normality. Table 7 reports the outcomes of model diagnostic tests. The outcomes of the model 1, 2 & 3 show no issue of autocorrelation and heteroskedasticity in the data. The residuals are normally distributed and all three models are correctly specified.

Table 7: Model Diagnostic Test Estimates

Diagnostic Analysis	Model 1	Model 2	Model 3
Breusch-Godfrey	2.9789 (0.1836)	0.5747 (0.5729)	1.1265 (0.3078)
Breusch-Pagan-Godfrey	0.7589 (0.6541)	2.0744 (0.1113)	0.6751 (0.7194)
Ramsey Reset	2.5149 (0.1336)	1.6019 (0.1257)	2.8985 (0.1124)
Jarque-Bera	1.015 (0.6017)	0.7633 (0.6827)	0.2369 (0.8882)

Conclusions and Recommendations

This study examines the role of FDI and institutional quality in impacting the Pakistan's macroeconomic performance. For this purpose, annual time series data of Pakistan from 1996 to 2022 is used in a study. Data is taken from the World Development Indicator (WDI) and the State Bank of Pakistan. In this study, the macroeconomic performance of Pakistan is measured using three variables: GDP, Trade, and Environmental performance. The explanatory variables in the GDP model are foreign direct investment, institutional quality, globalization and human capital. In the environment model, the explanatory variables taken are foreign direct investment, institutional quality, human capital and GDP. In the trade model, the explanatory variables taken are foreign direct investment, institutional quality, exchange rate and GDP. Different econometric techniques are used for data analysis, such as correlation coefficient for the degree of association between the variables, ADF test to check the data stationarity, bound test for the long-run co-integration of variables, and ARDL model for the long-run parameters estimation.

The ARDL long-run estimates (model 1) show that FDI, GLOB and human capital are positive and significant factors of GDP in Pakistan. In contrast, INQ is found to be a negative and insignificant factor in Pakistan's GDP. The short-run ECM model implies that in case of disturbances, the short-run equilibrium is moved toward long-run equilibrium at the rate of 41.33 percent. Lastly, the outcomes of the different model diagnostic tests imply no issue of auto-correlation and heteroscedasticity in the data. The residuals are normally distributed and the model is correctly specified. The ARDL long-run outcomes (model 2) show that FDI, INQ and GDP are positively and significantly associated with the CO_2 emissions in Pakistan. In contrast, human capital is positively but insignificantly related to the CO_2 emissions in Pakistan. The ARDL short-run ECM model implies that in case of disturbances, the short-run equilibrium is moved toward long-run equilibrium at the rate of 73.89 percent. Lastly, model diagnostic tests show that there is no issue of auto-correlation and heteroskedasticity in the data. The residuals are normally distributed and the model is correctly specified. ARDL long-run estimates (model 3) show that FDI positively affects trade in Pakistan. The relationship between these variables is found to be statistically significant. In contrast, INQ and ER are negatively and significantly related to the trade. On the other hand, the relationship between GDP and TR is positive and statistically insignificant. The short-run ECM model implies that in case of disturbances, the short-run equilibrium is moved toward long-run equilibrium at the rate of 42.44 percent. Lastly, model diagnostic tests show that there is no issue of auto-correlation and heteroskedasticity in the data. The residuals are normally distributed and the model is correctly specified.

By considering the study outcomes, the study suggested the following recommendations:

1. FDI inflows should be encouraged in a country, but strict environmental regulations need to be implemented to bring green and environmentally friendly technology into the country. This improves the country's GDP and can also be influential in reducing CO_2 emissions.
2. It is suggested that institutional quality needs to be improved as it is negatively influencing the GDP and environment of the country. The findings also imply that improved institutional frameworks can help prevent corruption, potentially lower carbon emissions, and guarantee improved governance, law and order, and political stability.
3. To improve the country's macroeconomic performance, the government should invest in the country's human capital. Health and education facilities should be improved, especially in rural areas of Pakistan.
4. The government should invest in projects that increase employment opportunities and raise the people's standard of living.

5. To increase the level of trade, the State Bank of Pakistan should take steps to keep the exchange rate stable, as it is crucial to influence the trade level of any country.

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