



Financial Liberalization, Institutions and Environmental Quality in GCC Countries

Abdul Basit Awan¹

¹ M.Phil. Scholar, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
Email: abdulbasit.pbc@gmail.com

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ABSTRACT

This paper examines the impact of financial liberalization and institutional factors on the environmental quality in GCC countries, specifically focusing on CO₂ emissions. The study employs a panel ARDL model to analyze the link between these variables and environmental quality using data from a pooled mean group of GCC countries spanning the years 1984 to 2021. The study reveals several key findings. Firstly, it establishes a positive association between CO₂ emission and democratic accountability. Secondly, corruption is found to hurt environmental quality. Additionally, the research indicates that ethnic conflicts contribute to a rise in CO₂ emissions. Moreover, government stability is negatively linked with CO₂ discharge. In GCC countries, the results demonstrate a negative connection between high domestic credit granted to the private sector and CO₂ release. Furthermore, the study reveals a negative link between CO₂ emission and GDP. Foreign direct investment is also shown to have a negative relationship with CO₂ emissions, while urbanization and general government final consumption expenditure exhibit a positive relationship with CO₂ emissions based on the findings of this research.

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Corresponding Author's Email: abdulbasit.pbc@gmail.com

1. Introduction

The earth is fast approaching a precarious state due to climate change and global warming. This is mainly attributable to the fact that human actions have effects on the environment that are cumulative over time. Recent increases in energy use worldwide have resulted in a significant rise in emissions of greenhouse gases. As opposed to the modest increase of about 2.0 percent seen in 2018, the growth rate in CO₂ emissions was 6.0 percent in 2021. Several national governments have shown a desire to act against the progression of global warming, which has resulted in the formation of multilateral agreements such as the Kyoto Protocol and the Paris Agreement. These pacts have, for the most part, as their primary objective the reduction of GGEs.

The degradation of the environment has evolved into a primary concern for all countries. As has been discussed in several international conferences focusing on the environment and energy, it is strongly recommended that all nations participate in an initiative that works toward the reduction of CO₂ emissions (COPs conferences). During the Conference of the Parties (COP) session, which took place in Paris from November to December 2015, several governments agreed that it would be desirable to keep the average global temperature rise to less than 2 degrees Celsius (COP21 conference). The use of primary forms of energy increased at a rate of 1.3 percent worldwide in 2019 BP Statistical Review (2019).

The economies of the Gulf Cooperation Council are characterized by having high levels of per capita income as a direct result of their reliance on petroleum exports. However, this dependence negatively impacts the environmental quality over time due to the widespread combustion of fossil fuels. The Gulf Cooperation Council (GCC) countries have abundant natural

resources and control 19.8 percent of the world's natural-gas reserves. The countries that make up the Gulf Cooperation Council are seeing a significant increase in energy demand. For instance, Qatar has the highest energy consumption among other countries, and between 2010 and 2020, its energy needs are projected to climb by between 12 and 15 percent. Concerns about the state of Qatar's environment have been reignited due to the meteoric ascent of the fossil fuel sector and the staggering growth in the country's overall fuel usage. These factors are to blame for the rising levels of carbon dioxide emissions and pollution in the air. Financial liberalization and fuel usage are detrimental to the environmental quality in GCC nations. There is an urgent need for policy intervention to correct this relationship and produce possible economic growth in GCC countries.

It is possible that liberalizing the nation's financial system will benefit the country in several ways; however, the potential drawbacks of this strategy are generally overlooked because of its alluring advantages. In recent years, researchers have focused a great deal of attention on the effects of financial liberalization on the environment, which is only one of the many unintended consequences that resulted from this policy. The liberalization of financial markets has a significant role in attracting foreign direct investment (FDI), which makes it possible for a nation to adopt cutting-edge and more advanced technology, which in turn helps the nation's economy to advance. Financial liberalization may contribute to environmental harm in many ways, including releasing CO₂ and other greenhouse gases. When financial liberalization occurs, loans and consumer credit are easily accessible, making it possible to purchase several electric household appliances and automobiles, both of which significantly increase the energy used. The advent of more comfortable lives has led to a significant rise in the amount of carbon dioxide (CO₂) emitted by home appliances and consumer goods.

The problem addressed in this research paper is the relationship between financial liberalization, institutional factors, and environmental quality in the GCC countries. It is crucial to understand the extent to which financial liberalization and institutional frameworks have influenced environmental quality in the GCC countries and whether any trade-offs or synergies exist between economic development and environmental preservation. By examining this relationship, the objective of this study is to provide valuable insights and policy recommendations to support sustainable development in the GCC countries while ensuring environmental protection.

There are various reasons why this research is significant. Firstly, it fills a void in the literature by concentrating on the GCC countries' relationship with financial liberalization, institutions, and environmental quality. This specific emphasis delivers critical information regarding the environmental effects of regional economic policy. The study's results also have significance for GCC countries' leaders. Policymakers may establish educated policies that foster sustainable growth while decreasing environmental dangers by being aware of the trade-offs and synergies between economic liberalization and environmental sustainability. The rest of the paper is organized as Section 2 is about literature review, section 3 is about model and methodology, section 4 is about methodological discussion, section 5 is about results and discussion, and Section 6 is about concluding remarks and policy suggestions.

2. Literature Review

Hamdi, Hakimi, Sbia, and Jlassi (2015) evaluated the influence of trade liberalization on environmental quality in Tunisia. The study demonstrated a two-way causal relationship between carbon emissions per capita and capita real income. On the other hand, this interdependence means that Tunisia requires higher carbon dioxide emissions to achieve wealth and quick economic progress.

The long-term and short-term effects of financial liberalization on stock market efficiency were studied by Naghavi and Lau (2016). Rather than focusing only on financial development, they discovered evidence of financial liberalization and underlined the need of evaluating the informational efficiency of stock markets. Financial liberalization was found to have a negative effect on stock return autocorrelation over the long term, but a favorable effect over the short term. These results are consistent with the J-curve hypothesis, which suggests that stock market efficiency suffers from financial liberalization in the short term but benefits from it in the long run.

Charfeddine and Khediri (2016) looked at the connection between carbon emissions, GDP growth, electricity use, financial advancement, urbanization, and trade openness in the United Arab Emirates. The results showed that an EKC (Environmental Kuznets Curve) does exist. An inverted U-shaped link was also observed between financial development and CO₂ emissions. Our research shows that the usage of energy, increased urbanization, and freer trade all contribute to better environmental conditions.

Per capita CO₂ emissions in Pakistan were studied by Javid and Sharif (2016), who looked at how these variables changed over time in relation to financial development, per capita real income (squared), per capita energy consumption, and openness. The results showed that during the early stages of development, CO₂ levels increased in tandem with rising income. However, after a society reaches a certain level of prosperity, the trend may reverse when more advanced, energy-efficient infrastructure and technologies are adopted. The study also found a significant positive link between the coefficient of financial development and CO₂ emissions, implying that environmental quality has suffered as a result of economic expansion. Carbon emissions in Pakistan were shown to be mostly caused by three factors: income, energy use, and economic growth. It was also discovered that the openness variable had no discernible short- or long-term influence on carbon emissions.

The impact of financial liberalization on economic growth was studied by Akinsola and Odhiambo (2017), who analyzed data from 30 countries in Sub-Saharan Africa (SSA) between 1980 and 2015. The study found that for SSA, the coefficient on the financial liberalization variable is positive and statistically significant.

Lenka and Sharma (2017) looked at the impact of financial inclusion on India's economic growth from 1980 to 2014. To establish the long and short-term relationship between financial inclusion and economic growth. Based on empirical evidence, it has been established that financial inclusion positively affects India's economic growth in both the short and long term. The research highlighted the significance of both the services offered and the accessibility of credit in achieving financial inclusion. Simply opening bank branches is insufficient; it is crucial to ensure that the population is adequately served. The study also indicated that India's financial reforms have had a positive impact on economic growth, both in the short and long term.

Research conducted in the South Asian region looked into the connections between pollution levels, the availability of renewable and nonrenewable energy sources, GDP per person, and population density. Data from 1980-2013 are analyzed using time series and panel techniques. CO₂ is favored by the study because of per capita production, population density, and the use of nonrenewable energy sources. The results indicated a causal relationship running in only one direction between carbon dioxide and conventional power plants.

Robin, Salim, & Bloch (2018) looked at the profitability of Bangladeshi commercial banks before, during, and after a period of financial liberalization. The study examined data from 1983–2012. According to the findings, financial reform had no substantial impact on banks' return on assets, but the net interest margin grew. The findings also revealed that capital strength and asset quality are the most important factors influencing profitability. The data also showed that the influence of GDP growth on banking profitability does not filter through, although CPI inflation boosts the profitability of the sample institutions.

The effects of economic growth and international commerce on ecological sustainability were analyzed by (Moghadam & Dehbashi, 2018). The findings suggested that expanding financial opportunities hastens environmental degradation but that freer commerce reduces such damage in Iran.

Marc (2018) conducted an empirical investigation on the determinants of financial development in the eight SADC nations between 1980 and 2012. The study revealed that inflation harms credit to the private sector and bank deposits, indicating that the macroeconomic stability of these SADC member nations would be improved by implementing currency-linked savings accounts. Such accounts would safeguard deposits from potential losses caused by inflationary pressures. To mitigate the adverse effects on financial development, their central banks must employ monetary measures to maintain strict control over inflation.

The effects of carbon emissions in France were investigated in a study published in 2018 by Shahbaz et al. They looked studied how a variety of variables, including as FDI, financial growth, economic expansion, energy consumption, and advancements in energy research, affect the role of CO₂ emissions. The findings proved a connection between carbon emissions and their causes. The study also found that higher levels of FDI in France result in lower environmental standards because of associated increases in carbon emissions.

This study by Chang, Amran, Iranmanesh, and Foroughi (2019) looked into how financial institutions' SRQ was affected by institutional, cultural, and corporate characteristics. A moderating influence of the equator principles (EP) was also investigated. According to the findings, SRQ was affected by a number of external variables, including country of origin, Islamic or non-Islamic status, ownership, and vision and mission. The study also found that EP negatively impacted the connection between religious affiliation and SRQ.

The effect of institutional quality on carbon dioxide emissions in 47 developing countries was studied by Ali et al. (2019). The findings showed that in countries with higher institutional quality, CO₂ emissions and environmental damage were lower. This indicates that high-quality institutions can help improve the surrounding environment. The study also found that CO₂ emissions in the countries studied decreased as economic performance, trade openness, urbanization, and energy use all increased.

In order to evaluate the real-world effects of four variables on Qatar's environmental state, Salahuddin and Gow (2019) conducted a study. The findings across all three parameters pointed to the negative impact that energy use had on environmental quality. Although the impact of economic growth on CO₂ emissions and ANS per capita was small and short-lived, it did contribute to higher environmental intensity over time. It was discovered that FDI from other countries can help the environment.

Technically, financial development has an effect on environmental quality, as Aluko and Obalade (2020) investigated. The following findings emerged from the study. To begin, increased financial development reduces carbon dioxide emissions, suggesting that improved environmental quality results from increased financial growth in Sub-Saharan Africa. Second, the results revealed that there is a positive technological influence on CO₂ emissions associated with financial development. Thirdly, the results demonstrated a connection between CO₂ emissions and demographics, economics, and technology.

The impact of economic growth and foreign direct investment on ecosystem health was analyzed by Jakada and Mahmood (2020). According to the results, FD has a negative impact on the environment, while FDI has a positive effect. The environment suffers from energy consumption and urbanization, but benefits from freer trade. There is a two-way causality between FD, trade openness, energy consumption, and urbanization, as shown by the DH panel causality test.

M. Ahmad, Jabeen, Hayat, Khan, and Qamar (2020) conducted a study examining the complex and dynamic connections between financial development, the building industry, energy consumption, and environmental quality in 30 Chinese provinces with different levels of development from 2001 to 2016. The findings indicated the presence of reciprocal positive causal relationships between GDP and energy consumption, GDP, and the building industry, as well as GDP and financial development. Additionally, the study acknowledged the positive influence of financial development on the growth of the construction business.

Saci (2021) analyzed how China's strategy of financial liberalization impacts income inequality across three channels: financial scale, financial structure, and financial efficiency. The research findings corroborated the Kuznets effect, a theory that explains the relationship between financial scale, financial structure, and income inequality. With the expansion of the financial industry, there is a shift towards direct financing, leading to an "inverted U-shaped" pattern in the income disparity among residents. Initially, the gap increases and then starts to narrow.

Dong-Hyeon Kim, Joyce Hsieh, and Lin (2021) examined the connections between income inequality, financial liberalization, and democratization. The results indicated that as democratization progresses, the impact of financial openness in reducing income disparity

diminishes. In countries with lower levels of democracy, the development of stock markets has been observed to decrease income inequality, whereas, in more democratic countries, it has been found to amplify it. Conversely, the advancement of banking tends to exacerbate wealth disparity, but this effect is mitigated by democratization. Lastly, in the presence of higher market volatility, income inequality is intensified, although democracy helps alleviate this effect.

The impact of insurance use on carbon dioxide equivalents was calculated by Appiah-Otoo and Acheampong (2021). The research concluded that the insurance industry as a whole (including life and non-life insurance) contributes to rising CO₂E levels in the BRICS. For every 10% increase in life insurance growth, BRICS CO₂E increases by 1%, but for every 10% increase in non-life insurance growth, BRICS CO₂E increases by 4%. There was a 2% jump in BRICS CO₂E as a result of a 10% gain in the composite insurance development index. CO₂E, like energy consumption and carbon dioxide emissions, was shown to be stifled by economic expansion in the study. CO₂E is influenced by the BRICS countries' population size, energy use, and trade liberalization.

Carbon emissions in ASEAN countries were studied by Sibuea, Sibuea, and Pratama (2021), who looked at the role of bioenergy output, biomass production, energy import, energy export, and economic development. The study found that carbon emissions in ASEAN countries can be affected positively or negatively by bioenergy production, biomass production, energy import, energy export, and economic development. In addition, the study emphasized the importance of energy import and export in determining the state of the environment in these nations.

Muhammad Azeem Ahmad, Arshia Hashmi, and Arshad (2021) examined the impact of trade and financial development on the state of the environment. The results revealed a significant coefficient for financial development, indicating that it contributes to the degradation of environmental quality, much like economic growth. The findings suggest that increased funding for industrial activities leads to environmental deterioration. Essentially, the expansion of financial development has resulted in a more extensive industrial sector without any accompanying technological improvements. This situation has had detrimental effects on the environment.

Ardakai, Ahmad Fatahi, Sakhi, and Fatemeh (2021) conducted a study to examine how environmental quality indicators impact financial development measures in Iran. The results revealed that population density and energy consumption positively and noticeably influenced financial development indexes. In contrast, carbon dioxide emissions, agricultural production, and the use of energy from fossil fuels exhibited a significant and negative impact.

Researchers investigated the link between pollution levels and economic development, financial stability, trade openness, gross fixed capital creation, and FDI. The results of the study showed statistically significant links between the variables across time. The research also demonstrated that FDI has a moderating effect on CO₂ emissions, while affluence, trade openness, investment, and financial instability all contribute to their rise. Muhammad and Khan (2021) did a study to investigate the relationship between economic growth and CO₂ emissions from energy use. All 184 countries in the research had higher CO₂ emissions as a result of increased energy use. Using energy consumption as a dependent variable, the study found that both economic growth and carbon dioxide emissions were associated with higher energy consumption across all 184 nations. In addition, the results of an analysis of financial development indicators as left-hand variables in a panel of 184 countries showed that reduced energy use speeds up financial growth.

The effects of Saudi Arabia's growing economy on the country's ecosystem were examined by Aljadani (2022). Carbon dioxide emissions, technological progress, and economic growth were all investigated. The results showed an inverse relationship between financial development and carbon dioxide emissions, suggesting that financial sector growth aids in environmental improvement. However, the study also found that there was a positive and statistically significant influence on carbon dioxide emissions from the combined effects of financial development and technology. Technology has been shown to have a negative effect on financial development, with

the study finding that technological advancements increase the negative effects of economic expansion on the natural world.

2.1. Research Gap

The data investigated in the prior articles began at the earliest in 1970 and ended in 2018 at the latest; however, the data range that has been emphasized in this research is from 1984 to 2021. Similarly, the nations covered in earlier literature studies are distinct and spread across almost every continent, but this study focuses on data from GCC countries.

This study examines several factors to determine their effects on environmental quality, including gross domestic product, final domestic product, government final consumption spending, energy use, financial liberalization, and other institutional variables like democratic accountability, government stability, corruption, and ethnic tensions. While there are many different factors included in the literature that has been reviewed, some of them are listed below: financial inclusion; CPI inflation; industrialization; education; bioenergy output; biomass production; energy import; energy export; construction industry; insurance consumption; technical innovation; government expenditures; institutional quality; tourism; stock market; good governance; financial volatility; capital stock; employed labor force.

3. Data, Model and Methodology

The model is expressed as follows:

$$CO2_{it} = \alpha + \beta_1 DCP_{it} + \beta_2 EU_{it} + \beta_3 UP_{it} + \beta_4 GDP_{it} + \beta_5 GGFCE_{it} + \beta_6 FDI_{it} + \beta_7 DA_{it} + \beta_8 GS_{it} + \beta_9 ET_{it} + \beta_{10} CORPT_{it} + \epsilon_i$$

Where, CO2 is carbon dioxide emission, DCP is domestic credit to the private sector, EU is energy use, UP is urban population, GDP is gross domestic product, GGFCE is General government final consumption expenditure, FDI is Foreign direct investment, DA is democratic accountability, GS is government stability, ET is ethnic tensions and CRPT is corruption.

Table 1: Variables, Measurement, Expected Relationship, and Sources

Variables	Measurement	Expected Relationship	Sources
Dependent Variable			
Environmental Quality	Co2 emission in metric kilograms.		WDI
Independent Variables			
Financial Liberalization	Domestic Credit to Private Sector	Negative	WDI
Energy Use	Kilogram of oil equivalent per capita.	Positive	WDI
Economic Growth	GDP Per Capita	Negative	WDI
FDI	Foreign direct investment (in US\$)	Negative	WDI
Urbanization	Total urban population	Positive	WDI
Government expenditures	General government final consumption expenditure	Positive	WDI
Institutional Quality	Corruption	Positive	ICRG
	Ethnic Tensions	Positive	
	Democratic Accountability	Positive	
	Government Stability	Negative	

The study employs the Panel Auto Regressive Distributive Lag Model to investigate the relationship between financial liberalization, energy consumption, gross domestic product, foreign direct investment, urban population, and other institutional factors that influence environmental quality. The Panel Auto Regressive Distributive Lag econometric approach is used to ensure the stationarity of all variables. If the variables are confirmed as stationary (I (0)) or in their first difference (I (1)), they are considered relevant.

4. Results and Discussions

The findings of this study are presented in this part. These results were obtained by using the EViews statistics program. Table 2 displays the findings derived from the evaluation of the stationarity qualities of the variables in the dataset. This test is critical in establishing if the variables display a unit root, which implies non-stationarity. It is evident from this table that Panel ARDI-PMG technique is the suitable due to having few variables stationary at level and few at 1st difference.

Table 2: Unit Root Test

Variable	Test for Unit Root At	Include in Test Equation	Probability	Remarks
Corruption	Level	Intercept	0.66	I (1)
	1 st Difference	Intercept	0.59	
Democratic Accountability	Level	Intercept	0.00	I (0)
	1 st Difference	Intercept	0.00	
Ethnic Tensions	Level	Intercept	0.94	I (0)
	1 st Difference	Intercept	0.02	
Foreign Direct Investment	Level	Intercept	0.15	I (1)
	1 st Difference	Intercept	0.99	
CO2 Emission	Level	Intercept	0.47	I (0)
	1 st Difference	Intercept	0.00	
Energy Use	Level	Intercept	0.006	I (0)
	1 st Difference	Intercept	0.09	
GDP	Level	Intercept	0.00	I (1)
	1 st Difference	Intercept	0.19	
Government Expenditure	Level	Intercept	0.96	I (0)
	1 st Difference	Intercept	1.00	
Domestic Credit to Private Sector	Level	Intercept	0.00	I (1)
	1 st Difference	Intercept	0.23	
Urban Population	Level	Intercept	0.85	I (1)
	1 st Difference	Intercept	0.99	
Government Stability	Level	Intercept	0.00	I (0)
	1 st Difference	Intercept	1.00	

The ARDL model is applied to study the long-run and short-run connections among the variables of interest. The long-run findings give insights into the equilibrium connection between the variables, while the short-run results reflect the dynamic adjustments taking place in response to short-term shocks. Both sets of findings are complemented by their corresponding interpretations, clarifying the implications and relevance of the computed coefficients and statistical measures. The link between Corruption and Co2 emission is positive. The probability value of corruption is 0.0001, which is significant, while the coefficient of corruption is 0.068, which shows that with an increase of 1% in corruption, co2 emission will be increased by 0.068%. Our findings are comparable to Chen, Hao, Li, and Song (2018).

Democratic Accountability and CO2 emission have positive relationships. As democratic accountability increases, co2 emission also increases. The probability value of democratic accountability is 0.44, which is insignificant, while the coefficient of democratic accountability is 0.016, indicating that with a 1% increase in democratic accountability, CO2 emission is increased by 0.016 percent. Our study is comparable to the study of Ahmad (2021). Ethnic tension and CO2 emission have positive relationships. The probability value of ethnic tension is 0.00, which is significant, while the coefficient value is 0.07, which shows that with an increase of 1% in ethnic tensions, there will be an increase of 0.07% in co2 emission. Our findings are comparable to the study of N. Ahmad and Amin (2020).

The relationship between Government Stability and CO2 emission is negative. The probability value of government stability is 0.0206, which is significant, while the coefficient value is -0.02, which shows that with an increase of 1% in government stability, there will be a decrease of 0.0206% in CO2 emission. Our findings are relatable to the studies of Gani (2012). Domestic credit to the private sector and CO2 emission has a negative relationship, and Table 5.2 shows that the probability value of the former is 0.0065, which is significant. The coefficient value is -0.086, which shows that with an increase of 1% in domestic credit to the private sector,

there will be a decrease of -0.086 % in CO2 emission. Our findings relate to the findings of Ganda (2019). The relationship between CO2 emission and energy use is positive. 0.00 is the probability value of energy use which is significant. The coefficient value of energy use is 1.031 % which shows that the increase in carbon dioxide emissions is 1.031% for every 1% increase in energy use. This relationship is comparable to the studies of Nasir, Canh, and Le (2021).

The relationship between GDP and CO2 emission is negative. The probability value of GDP is 0.40, which is insignificant. The coefficient value of GDP is -0.051, which shows that due to a 1% rise in GDP, CO2 emission decreased by -0.051 %. The studies of Liu (2006) are comparable to our study. The relationship between general government final consumption expenditure and CO2 emission is positive. The probability value of general government final consumption expenditure is 0.0002, which is significant, while the coefficient is 0.10, which shows that as general government final consumption expenditures increase by 1%, CO2 emission will be increased by 0.10 %. Our findings are comparable to the findings of Galinato and Galinato (2016).

The relationship between urban population and CO2 emission is positive. The probability value is insignificant, which is 0.89, and the coefficient value is 0.03, which shows that as the urban population increases by 1%, there will be an increase of 0.03 in co2 emission. Our findings are relatable to the studies of Khan (2021). The relationship between FDI and CO2 emission is negative. The probability value of FDI is 0.90 which is insignificant, while the coefficient is -0.003, which shows that with a 1% increase in FDI, CO2 emission will decrease by 0.003%. Our findings are comparable to the study of Paziienza (2019).

Table 3: ARDL Long Run

Variables	Coefficient	Probability
Corruption	0.068686	0.0001
Democratic Accountability	0.016063	0.4430
Ethnic Tensions	0.074258	0.0000
Government Stability	-0.020850	0.0206
Domestic Credit to Private Sector	-0.086657	0.0065
Energy Use	1.031921	0.0000
GDP	-0.051143-	0.4083
Government Expenditure	0.105035	0.0002
Urban Population	0.035236	0.8949
FDI	-0.003675	0.9011

The interpretation of the ARDL short-run results is provided below. Corruption and carbon dioxide emissions have a negative short-term ARDL connection and are insignificant as the probability is 0.59. The link between Democratic accountability and co2 emission is positive, and the probability value is also insignificant which is 0.78. The association between ethnic conflicts and CO2 emissions is positive, although the probability value is not significant at 0.86. The association between government stability and CO2 emissions is positive; the probability value is 0.003, which is statistically significant.

Table 4: ARDL Short Run

Variables	Coefficient	Probability	Variables	Coefficient	Probability
COINTEQ01	-0.662180	0.0014	D(CRP)	-0.020712	0.5919
D (CO2 (-1))	-0.060001	0.8345	D (CRP (-1))	0.065383	0.3961
D(DA)	0.020782	0.7804	D(ET)	0.018678	0.8698
D (DA (-1))	0.035992	0.6463	D (ET (-1))	-0.019820	0.6914
D(GS)	0.019151	0.0037	D(DCPS)	-1.129171	0.3357
D (GS (-1))	0.016388	0.5188	D (DCPS (-1))	1.267858	0.3462
D(EU)	-0.087859	0.4451	D(GDP)	1.035663	0.3943
D (EU (-1))	-0.225152	0.1799	D (GDP (-1))	-1.309905	0.3327
D(GGFCE)	-0.123816	0.6012	D(UP)	2.541137	0.6421
D (GGFCE (-1))	-0.124547	0.7012	D (UP (-1))	-0.747389	0.8362
D(FDI)	-0.106924	0.4422	Constant	-3.844869	0.0035
D (FDI (-1))	0.281052	0.0010			

Domestic credit to the private sector and CO2 emission has a negative correlation, and the probability value is insignificant which is 0.33. Energy use and co2 emission have a negative relationship, and the value of probability is insignificant which is 0.44. GDP and CO2 emission have a positive relationship, and the value of probability is 0.39, which is insignificant. The link

between the General government's final consumption expenditure and co2 emission is negative, and the value of probability is insignificant, which is 0.60. Urban population and co2 emission have a positive association, and the value of probability is insignificant, which is 0.64. The relationship between Foreign direct investment and co2 emission is negative, and the value of probability is 0.44 which is insignificant.

5. Concluding Remarks and Policy Suggestions

This study's primary goal is to look at how factors such as financial liberalization and institutions affect environmental quality in GCC countries. This study takes into consideration factors including government stability, ethnic strife, democratic accountability, and corruption while examining the relationship between institutional quality and environmental quality. Also, the utilization of energy, urban population, gross domestic product, foreign direct investment, general government final consumption expenditures, and domestic credit extended to the private sector are all components regarded as independent. Data is available from 1984 to 2021.

As a result of this research, a study found (1) a positive link between corruption and carbon dioxide emissions, and (2) a positive link between democratic accountability and carbon dioxide emissions. Moreover, (3) a positive link between ethnic conflict and CO2 emissions. To round things off, the study finds a negative link between government stability and CO2 emissions. CO2 emissions and domestic private-sector credit are negatively linked. Carbon dioxide emissions have been shown to have a positive link with energy consumption and a negative link with gross domestic product. A positive link exists between general government final consumption expenditure and carbon dioxide emissions; CO2 emissions are positively linked with urbanization. Foreign direct investment and CO2 emissions have a negative link.

These results mentioned above have several practical implications. The results shed light on how governments and societies can employ energy consumption, foreign direct investment, government consumption expenditure, domestic credit to the private sector, democratic accountability, government stability, corruption, and ethnic tensions to ensure long-term environmental quality and reduce CO2 emissions. The policymakers of the GCC nations can obtain substantial benefits by conscientiously considering and implementing the following policy recommendations:

- The findings indicate that institutions play a crucial part in the reduction of CO2 emissions. To effectively decrease carbon emissions, countries need to overhaul their institutions and establish a stronger institutional framework.
- There is a positive relationship between CO2 emissions and democratic accountability. However, in GCC nations, democratic accountability does not contribute to environmental progress. Consequently, citizens are not effectively utilizing their democratic rights to urge the government to safeguard the environment. It is crucial to enhance their understanding of environmental issues. As individuals become more familiar with the diverse challenges posed by environmental degradation, they may be motivated to compel their political leaders to allocate more resources towards cleaner energy initiatives and implement stringent ecological regulations.
- Based on the study's findings, it is evident that corruption has a detrimental impact on the quality of the environment. As a result, policymakers in the GCC countries should take this into account as combating corruption would subsequently lead to a decrease in CO2 emissions. Achieving this reduction in corruption would necessitate implementing reforms in public administration, and financial management, and fostering transparency.
- The study suggests a correlation between the escalation of ethnic conflicts and an increase in CO2 emissions. Therefore, it is crucial to take ethnic tensions into account. Addressing the complex issues resulting from ethnic conflicts does not have a straightforward solution, but managing the flow of refugees and preventing the spread of instability could potentially mitigate these problems.

- Better governance has the potential to improve environmental quality by fostering political liberty and autonomy in countries with high levels of emissions. This, in turn, leads to increased public concern and efforts toward environmental preservation. To effectively address environmental challenges, governments need to implement tangible measures that support and uphold environmental standards. By doing so, they can potentially reduce emissions and minimize risks to human health, thus promoting a more successful environmental policy.
- The findings indicate that in the GCC states, a significant amount of domestic credit provided to the private sector is linked to a decrease in CO₂ emissions. This suggests that GCC nations should promote financial liberalization within their countries. By attracting more funds, producers will be encouraged to embrace environmentally friendly practices and invest in low-carbon technologies. This will lead to the advancement of clean energy sources like wind, wave, solar, and hydropower, which have lower CO₂ emissions.
- To ensure economic growth while reducing emissions, it is essential to prioritize the use of modern low-carbon technology. There exists a clear inverse relationship between GDP and CO₂ emissions, indicating that adopting energy-efficient and low-carbon advancements is crucial for maintaining current output levels. This approach enables us to achieve increased economic growth while effectively reducing carbon dioxide emissions.
- Given the ongoing discourse on the effects of Foreign Direct Investment (FDI), GCC nations must implement measures that enhance the business environment within their respective countries. By doing so, they can attract greater FDI, which encompasses not only financial resources but also technological advancements, knowledge transfer, skills, and expertise. It is important to emphasize the potential of FDI in promoting the adoption of advanced and environmentally sustainable technologies.
- To promote the development of environmentally friendly cities, it is crucial to keep the urban population within sustainable limits in different regions.
- Investing in sectors like education, research, development (R&D), and infrastructure will undoubtedly yield positive environmental outcomes. The government must allocate increased funds towards initiatives that prioritize environmental consciousness.

This study holds substantial theoretical implications for the relationship between financial liberalization, institutions, and environmental quality in GCC nations. It adds to the knowledge of how financial changes may influence environmental outcomes and underscores the necessity of strong institutional frameworks for achieving environmental sustainability. The results underline the interconnection of financial liberalization, institutions, and environmental quality, stressing the necessity to examine the simultaneous impacts of these elements when creating policies for sustainable development.

This study has many theoretical and practical implications, but it also has some limitations. First, this research has only looked at a small subset of economic and institutional variables that affect environmental quality, such as gross domestic product, foreign direct investment, government final consumption expenditures, energy use, domestic credit to the private sector, and other institutional variables. It is worth noting that this investigation does not include all the aspects that may affect the nation's environmental quality. Scholars need to investigate these gaps in the future to ensure the provision of reliable results. Second, all the quantitative information in this research is exclusive to the economies and nations of the GCC. Due to the specific economic and geographical circumstances of the GCC nations, it is possible that these findings may not apply to other developed economies. To make this study's findings more universal, future researchers should examine the climate in other nations.

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