Analyzing the Interactive Relationship Between Trade Liberalization, Financial Development, Economic Growth and Quality of the Environment in OPEC Member Countries

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Abstract: In the passage of time and the development of economic theories new variables as factors affecting each are introduced. So, the relationship between economic growth, financial development, trade openness and environmental quality has always been a major concern of researchers, each of which examines the relationship between some of these variables. However, comprehensive model that considers potential interaction between different sets of variables is ignored. In this study, in order to cover a comprehensive model and fill gaps in the existing literature, subsets for OPEC member countries are examined. For this purpose, the estimation method of simultaneous equations and GMM using panel data over the years 1990-2010 is used. The results indicate a reciprocal relationship between carbon dioxide emissions and economic growth. Also, economic growth and the degree of trade liberalization also have a bilateral relationship and mutually affect each other. But the relationship between economic growth and financial development is a one-way relationship. This means that financial development affects economic growth but economic growth has no significant effect on financial development. The relationship between carbon dioxide emissions and financial development is also a two-way relationship. Also, the results of the model suggest no relationship between carbon dioxide emissions and the degree of trade liberalization. The results show that the relationship between financial development and trade liberalization is a two-way relationship. In addition Sargan test shows the correct specification of the econometric model.

Key words: Economic growth, financial development, trade openness, emissions of carbon dioxide, Generalized Method of Moments (GMM)

INTRODUCTION

Recent studies by economists reflect the importance of interactive relationship between the variables of trade liberalization, financial development, economic growth and environmental quality.

In the Johannesburg Summit 3, the key role of energy as an engine of economic development, social equality and poverty reduction was stressed because energy consumption has a vital role in economic and social development. Energy and climate change are inherently interconnected. Energy consumption and utilization efficiency is one of the determinants of the level of environmental quality of the society and therefore, analyzing energy consumption and its relationship with economic growth and environmental quality is one of the underlying solutions in achieving sustainable development.

Economic growth is considered as one of the important indices for evaluating the development of a country. Some researchers, including Kolstad 4, believe that economic growth and increased production requires greater use of natural resources, especially fossil fuels which in turn leads to environmental degradation. So this group of researchers believe that in order to prevent the ecological disaster in the future, economic growth should be abandoned over and beyond the capacity of the environment.

Meadows argue that economic growth is essential to maintain and improve environmental quality in the long run before it be a threat to the environment. The World Bank has long maintained that economic growth is good for both people and the environment. The idea is that economic growth increases per capita income that can reduce poverty and create clean environment (Tamazian *et al.*, 2009).

So, finally it can be said that energy consumption on the one hand is an important production factor that can play an important role in growth economic. Hence, investigating the relationship between energy

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consumption and economic growth, particularly in the economic sector is of great importance and on the other hand, financial development and trade openness with the effects they have on economic growth, can be taken into consideration. In OPEC countries as well as developing countries with average income, addressing financial development subjects and trade openness is necessary in order to reach a proper and sustainable economic growth and ultimately a sustainable development. On the other hand, per capita energy consumption in OPEC countries is not suitable compared to most developing countries and developed countries regarding economic growth and reaching a high economic growth requires us to revise energy strategies (Tayebi *et al.*, 2009). With regard to the abovementioned, equipping countries around the world in order to use the opportunities, especially countries with average income, seems essential. So, exploring the possibilities and advantages in the economy and recognizing the difficulties and their challenges can provide grounds to move in the right direction.

Statement of the problem: Today, the issue of economic growth is one of the most important concerns of all societies and most countries are willing to achieve optimum growth and its prerequisites; financial and trade openness. This often leads to environmental loss which is the emission of more pollutants.

In recent years with the increase of greenhouse gases such as methane, carbon dioxide, water vapor and nitrous oxide in the atmosphere, global temperatures has increased which leads to unpleasant changes in the environment. Hence, the Kyoto Protocol, after many negotiations aimed at reducing greenhouse gas emissions that are the main factors affecting climate change was signed. Under this protocol, during 2012-2008 the level of greenhouse gas emissions was to reach to at least 5% below the gas level in 1990 (Halicioglu, 2009).

Statistics of greenhouse gases production over the period 2007-1973 shows that the average growth of carbon dioxide emissions in OPEC countries has been more than the world average. Due to these countries reliance on oil, fossil and mineral resources on the one hand and to achieve higher growth and development on the other hand, they have been trying to develop their industrial sector by turning to highly polluting industries. Therefore, it is expected that emissions of greenhouse gases and environmental degradation will increase in these countries and lead to the development of environmental problems in them.

While most studies have focused on economic development and the environment, a limited number of studies have investigated the effect of financial development on environmental preferences. However, it seems that financial development can play an important role in reducing emissions. Further, development of the financial sector can provide financial incentives for firms that can help them use environmentally friendly technology in their production process. Some researchers such as Jensen, suggest that although further development of the financial sector may improve economic growth but can lead to increased industrial pollution and environmental destruction. A large part of the demand for fossil fuels is related to crude oil in the world. In recent decades, the increase in oil consumption in various economic sectors has led to massive release of toxic pollutants and greenhouse gases, especially carbon dioxide, as well as creating worldwide problems such as global warming and climate change. The organization of petroleum exporting countries known as OPEC is the largest oil cartel. Regarding the fact that country members of these series are rich in oil, there is an abundance of energy resources and their prices are often low. For this reason, it is possible that in this group, the environmental quality be low since the production and extraction of energy resources are at lower levels (Shahbazi, 2010).

OPEC countries can use oil revenues as an additional source for financial sector development. If these incomes are purposefully used to raise the level of technology used by the aforementioned firms, they can significantly reduce emissions in these countries. In contrast, pushing these resources to polluting industries without regard to environmental issues can cause irreversible damage to these countries.

As it is clear from the above discussion, the relationship between economic growth, financial development, trade liberalization and environmental quality has always been a major concern for researchers, each of which examines the relationship between some of these variables without proposing a comprehensive model be. Therefore the potential interaction between different sets of variables is ignored. The current study aims to propose a comprehensive model in order to fill the gaps in the existing literature in this area by examining the following subsets of OPEC member countries (Omri *et al.*, 2015).

The present study aims to investigate the dynamic relationship between the variables of trade liberalization, financial development, economic growth and environmental quality in OPEC member countries based on economic theory and available empirical evidences. For this purpose four hypotheses are designed and have been evaluated as follows in this study:

- Environmental quality, financial development and trade liberalization do not affect economic growth
- Economic growth, financial development and trade liberalization do not affect environmental quality
- The trade liberalization, economic growth and environmental quality, do not affect financial development
- The financial development, economic growth and environmental quality, do not affect trade liberalization

Research background: Omri *et al.* (2015), in a study entitled "Financial Development, Environmental Quality, Trade and Economic Growth: its Reasons in Middle East Countries and North Africa", "the paper examines the relationship between financial development, emissions of CO_2, trade and economic growth using panel data and simultaneous equations model for 12 countries in the Middle East and North Africa during 1990-2011. The results show a bilateral relationship between CO_2 emissions and economic growth.

Shahbaz *et al.* (2013), in an article entitled "The effects of economic growth, energy consumption, financial development and trade on the emission of CO_2 in Indonesia and in another study examined the effect of economic growth, energy consumption, financial development and trade openness on CO_2 emissions during 2011-1975 in Indonesia. In their study, the domestic per capita real credit to the private sector is considered as a measure of financial development. Results showed that economic growth affects energy consumption in Indonesia and increased CO_2 emissions while financial development and trade will decrease that on the contrary. Also, the inverted U relationship between financial development and CO_2 emission was confirmed.

Jalil and Feridun (2011), in a study entitled "The Impact of Growth, Energy and Financial Development on Environment in China Investigated" the effect of growth, energy consumption and financial development on CO_2 emissions in China over the periods of 1953-2006 and 1978-2006 using ARDL pattern. In their study, the share of cash debts of GDP, the share of commercial banks assets from total assets of the banking system assets and the share of foreign assets and liabilities of GDP as an indicator of financial development were used, respectively. The results showed that the financial development led to reducing environmental pollution in China and economic growth and energy consumption has been increasing environmental degradation. Also, the results confirmed the existence of Environmental Kuznets Curve in China.

Asgharpour *et al.* (2013), in a study entitled "The Impact of Financial Development and Economic Development on Environmental Quality in Selected Countries of OPEC" examined the impact of financial development on economic development on environmental quality in OPEC countries during 1973-2007 using panel model. The results show that financial development has a negative effect on CO_2 emissions.

Azad and Khaneghahi (2012), in a study entitled "The Effects of Economic Growth, Energy Consumption and the Degree of Trade Openness on Environmental Quality in Iran," examined the relationship between economic growth, energy consumption and the degree of trade openness on environmental quality during 1967-2007. Based on the results of co-integration test, long-term relationship between the examined variables was verified. The results show the positive impact of economic growth, energy consumption and the degree of trade openness on carbon dioxide emissions. The results also suggest that Environmental Kuznets Curve hypothesis is rejected.

Abbas Assari in an article entitled "Comparison of Financial Development and Economic Growth in OPEC Oil and Non-oil Developing Countries", using the Generalized Method of Moments" examined the relationship between financial development and economic growth. This study was conducted during 1990-2007. The results show the effect of financial development on economic growth in oil-exporting countries OPEC is negative while this relationship in the non-oil developing countries is positive.

Rasekhi and Ranjbar (2009), in a study entitled "The Effect of Financial Development on Economic Growth in OIC Member Countries" evaluated the effects of financial development on OIC member countries economic growth during 1980-2004. The results show that financial development has a positive effect on economic growth in OIC member countries.

Oskooi (2008), in a study entitled "The Effects of Trade Liberalization on Greenhouse Gas Emissions (Carbon Dioxide) in the Environmental Kuznets Curve" assessed the impact of trade liberalization on carbon dioxide emissions. Environmental Kuznets Curve is estimated using the combined data and using panel data and fixed effects approach, in four country groups, including countries with high per capita income, countries with above average per capita income, lower-middle per capita income countries and countries with low per capita income during 1992-2002. Results of this study indicated that increased trade liberalization in countries with high per capita income and per capita income and upper-middle income countries reduced carbon dioxide emissions and increased it in lower-middle income countries and countries with per capita income.

MATERIALS AND METHODS

The model used in research and the research variables:
The Model used in this study is econometric model
following Omri *et al.* (2015) as well as estimation method
for simultaneous equations using panel data and GMM
methods as follows:

$$\ln Y_{it} = a_1 + a_{2i} \ln C_{it} + a_{3i} \ln FD_{it} + \\ a_{4i} \ln T_{it} + a_{5i} \ln K_{it} + a_{6i} \ln Y_{it-1} + \varepsilon \quad (1)$$

$$\ln C_{it} = a_1 + a_{2i} \ln Y_{it} + a_{3i} \ln FD_{it} + a_{4i} \ln T_{it} + \\ a_{5i} \ln Y_{it}^2 + a_{6i} \ln E_{it-1} + a_7 \ln UR_{it} + \varepsilon_{it} \quad (2)$$

$$\ln FD_{it} = a_1 + a_{2i} \ln Y_{it} + a_{3i} \ln C_{it} + \\ a_{4i} \ln T_{it} + a_{5i} \ln FI_{it} + \varepsilon_{it} \quad (3)$$

$$\ln T_{it} = a_1 + a_{2i} \ln Y_{it} + a_{3i} \ln C_{it} + \\ a_{4i} \ln FD_{it} + a_{5i} \ln FDI_{it} + \varepsilon_{it} \quad (4)$$

Where:
I = The country
t = The year
Y = GDP
C = Carbon dioxide emissions
FD = Financial Development
T = Degree of trade openness
K = Capital
Y2 = Square GDP
E = Energy UR is percentage of urban population IF
     is inflation
FDI = Direct foreign investment

The models defined above are estimated for OPEC
during 1990-2010. It should be mentioned that collecting
this large amount of data was very time consuming. FDI
statistics in the country is collected and published each
year by the UNCTAD. Other stats and data from this
study have been taken from World Development WDI).
All figures are in US $ and variables estimation was done
using the patterns of the natural logarithm of variables.
One of the reasons for transforming the economic models
to logarithmic models is changing economic models into
linear models. Another reason for this is the conceptual
and technical discussion of economy. Case study
countries are: Ecuador, Algeria, the United Arabic
Emirates, Iran, Iraq, Saudi Arabia, Qatar, Kuwait, Libya,
Nigeria and Venezuela.

Data analysis: Before fitting the model to test
hypotheses, variable data stationarity, used methods
(fusion method or panel) and assumptions of the classical
regression must be checked. The residual autocorrelation
test with emphasis on the Durbin-Watson statistic, the
residual variance heterogeneity test using white test and

variables stationarity test have been studied using Levin,
Lin Chu. The rules to recognize the simultaneous
equations model. Before applying the method to estimate
a simultaneous equations model, the equation
identification needs to be determined. The degree of the
equation identification, determines which of the methods
outlined in the previous section is appropriate to estimate
the model. Identification determines the specificity of
simultaneous equations model.

A simultaneous equations model may be over
identified, exactly identified, identified or under
unidentified or under identified. In this case, there are two
conditions to identify the equations as follows:

- Rank condition
- Order condition

RESULTS AND DISCUSSION

Rank condition in relation to identification: If in an M
model, Endogenous variables are present, the total
number of exogenous variables K, Given the number of
Endogenous variables in the equation m and the number
of exogenous variables defined in equation k. Then, if an
equation is identified preset number of variables that do
not exist in the above equation shouldn't be less than
dependent variables in the equation minus one. That is:
$K-k \geq m-1$.

If $K-k \geq m-1$, the equation is exactly identified and
if the $K-k \geq m-1$, the situation will be over identified
(Gujarati, 2007). Rank Condition based on the degree of
identification is presented in Table 1.

As can be seen in the table above, in all four
equations the $K-k \geq m-1$ is correct that according to the
Rank condition, all of the equations are exactly and overly
identified. After analyzing endogenous and exogenous
variables in the equations system, it can be said that the
number of exogenous variables of the whole system
(k = 6) and the number of endogenous variables of
whole the system (M = 4) is. Also by examining the
$(K-k)+(M-m) \geq M-1$. It can be said three equations were
overly identified and one equation was exactly identified.

Order condition in relation to identification: Rank
condition is just one of the conditions for the
identification of simultaneous equations. But one of
the other conditions in relation to the identification of

Table 1: Rank condition based on simultaneous equations system identification

Identification	m-1	K-k	Equation
Over identified	1-4	1-6	First
Exactly identified	1-4	3-6	Second
Over identified	1-4	1-6	Third
Over identified	1-4	1-6	Fourth

Table 2: Order condition based on simultaneous equations system identification

lnfdi	lnif	lnur	lne	Lny2	lnk	lnt	lnfd	lnc	lny	Equation
0	0	0	-	-	-	-	-	-	1	First
0	0	-	-	-	-	-	-	1	b	Second
-	-	-	-	-	0	-	-	-	-	Third
-	-	-	-	-	0	1	-	-	-	Fourth

Table 3: The results of the first equation estimation using GMM system of simultaneous equations for 2000-2012

Variables	Symbol	Coefficient	SD	T statistics	Possibility
Carbon dioxide emissions	lnc	-0.437182	0.179768	-2.431925	0.0152
Financial development	lnFD	0.021135	0.008580	2.463438	0.0140
The degree of openness	lnT	0.075199	0.021212	3.545126	0.0004
Capital	LnK	0.013693	0.032070	0.426972	0.6695
Lagged GDP	LnY (-1)	1.026318	0.006322	261.340300	0.0000

$\ln Y_{it} = a_1 + a_{2i} \ln C_{it} + a_{3i} \ln FD_{it} + a_{4i} \ln T_{it} + a_{5i} \ln K_{it} + a_{6i} \ln Y_{it-1} + \varepsilon$; Durbin-Watson statistic, 933007.1; Sargan statistic, 204241.38; the coefficient of determination (), 99.0; adjusted coefficient of determination, 99.0

simultaneous equations is the order condition which is rated as a necessary and a sufficient condition. If this condition is met, the rank condition is also met while the reverse is not true. According to the icons described in the previous section, a simultaneous equation has rank condition if at least one nonzero determinant of the (M-1)×(M-1) of the endogenous variables and external factors outside of the equation but included in other equations can be found in it.

With regard to the issues related to identification of simultaneous equations, it is clear that the above equations are overly identification and exactly identification and using ordinary least squares method these equations cannot be estimated, so alternative methods are used (Table 2).

Model estimation using GMM in simultaneous equations: In the present study, panel data GMM is used to estimate simultaneous equations model. The equations in which specific non-visible effects of each country is seen and the dependent variable interruptions are a fundamental problem , the Generalized Method of Moments (GMM) 17 which is based on dynamic panel data models is used. For carrying the estimation by this method, the instrumental variables used in the model must be first identified. GMM estimator adaptability depends on the validity of none linear correlation of error terms and tools assumption. The results of the first equation by GMM for 1990 and 2010 are presented in Table 3, The first equation is as follows.

Coefficient of determination (R^2) indicates a good estimation of the model and variables used in it show the explanatory power of the model by 99% indicates that is a good number due to the used panel data model. Durbin Watson also indicates the absence of autocorrelation and number shows 1.93. Considering the probability coefficients (fifth column) the impact and significance of four variables of carbon dioxide emissions, the

development of financial and trade liberalization and GDP by interrupting the study is clearly observed.

Sargan test is based on the null hypothesis which shows that overly identified factors are valid. This means that the validation of null hypothesis confirmed the validity of the instrumental variables. (Null hypothesis indicates the lack of correlation between instrumental variables and the lagging factors).

Results in the first model are as follows: the continuous variable of gross domestic product has a significant positive effect on gross domestic product of OPEC countries which is of a very high confidence level, with an increase of one percent of lagged GDP, GDP increases by 1.02%. As shown in Table 4, this lagged dependent variable coefficient that was inserted into the model through the estimation process is positive and significant which shows the dynamics of GDP. During the investigation period, the carbon dioxide emissions affected GDP of OPEC countries by as much as -0.43 which is negative and significant and shows that carbon dioxide emissions have a negative effect on economic growth and a one percent increase in carbon dioxide emissions reduced GDP by -0.43. The effect of financial development on gross domestic product was positive and significant by 0.02 and shows that financial development is one of the factors influencing productivity and hence is dependent on it. So, it can be concluded that the financial development can affect economic through increasing savings level and raising investment efficiency.

The trade liberalization variable affected GDP by 0.07 which was positive and significant and a one percent increase in trade liberalization, increased GDP by 0.07%.

Another result obtained shows that the effect of investment variable gross domestic product which according to the data used in this study was not significant. The results of the second equation using GMM method for the years 1990-2010 are shown in Table 4, the second equation is as follows.

Table 4: Results of the second equation using GMM system of simultaneous equations for 1990 and 2010

Variables	Symbol	Coefficient	SD	Statisticst	Possibility
GDP	LnY	83.163380	23.64976	1.1688720	0.04228
Financial development	LnFD	0.043885	0.028844	1.5214860	0.02850
The degree of trade openness	LnT	-0.150813	0.107282	1.405,767	0.16020
GDP square	LnY2	91.097800	61.33239	1.1693210	0.24260
energy consumption	LnE	0.763373	0.205574	3.7133800	0.01580
The urbanization	LnUR	041.725300	63.70930	3.8334980	0.00480
Interval carbon dioxide emissions	LnC (-1)	-0.041236	0.060803	-0.678 202	0.04780

$\ln C_{it} = a_1 + a_{2i} \ln Y_{it} + a_{3i} \ln FD_{it} + a_{4i} \ln T_{it} + a_{5i} \ln Y_{it}^2 + a_{6i} \ln E_{it-1} + a_7 \ln UR_{it} + \varepsilon_{it}$; Durbin-Watson statistic, 108972.2; Sargan statistic, 204241.38; the coefficient of determination (), 94.0; adjusted coefficient of determination, 93.0

Table 5: The results of the third equation using GMM system of simultaneous equations for 1990-2010

Variables	Symbol	Factor	SD	T statistics	Significant effects
GDP	LnY	0.021916	0.021082	1.039562	0.2988
Carbon dioxide emissions	LnC	0.027852	0.013451	2.070585	0.0437
Trade openness	LnT	0.059631	0.050443	1.741281	0.0487
Inflation	LnIF	-0.307162	0.152157	-2.018714	0.0086
Lagged financial development		0.853319	0.054436	51.675740	0.0000

$\ln FD_{it} = a_1 + a_{2i} \ln Y_{it} + a_{3i} \ln C_{it} + a_{4i} \ln T_{it} + a_{5i} \ln FI_{it} + \varepsilon_{it}$; Durbin-Watson statistic, 862253.1; Sargan statistic, 204241.38; the coefficient of determination (), 4750.92; adjusted coefficient of determination, 0655.92

The coefficient of determination (R) Durbin Watson also indicates the absence of autocorrelation and number 10.2 show.

Coefficient of determination (R^2) indicates a good estimation of the model and variables used in it show the explanatory power of the model by 94% indicates that is a good number due to the used panel data model. Durbin Watson also indicates the absence of autocorrelation and number shows 2.10.

Sargan test statistics in this regression has x^2 distribution with degrees of freedom equal to the number of over identified limits. Null hypothesis indicates the lack of correlation between instrumental variables and the lagging factors. This means that the validation of null hypothesis confirmed the validity of the instrumental variables (null hypothesis indicates the lack of correlation between instrumental variables and the lagging factors) As a result, the validity of this regression for interpretation is confirmed.

Results in the second model are as follows: the lagged carbon dioxide emissions variable affected GDP of OPEC country by -0.04 which was negative and significant which shows that the carbon dioxide emission path has been dynamic and its status has been negatively affected by its status in the years prior to the study. During the investigation period, the GDP affected carbon dioxide emissions of OPEC countries -38.16 which is positive and significant and shows that GDP increase positively affects carbon dioxide emissions. The results if the study proves the accuracy of this finding. The financial development variable affected the carbon dioxide emission of OPEC countries by 0.04 which was negative and significant. The effect of trade liberalization variable on carbon dioxide emissions is not significant. The results also show that the effect of GDP square on emissions of

carbon dioxide was not significant. The energy consumption variable affected carbon dioxide emissions variable by 0.76 which was positive and significant which shows it plays an important role in carbon dioxide emissions in the country. Research shows that one of the most important pollutions of energy sector is air pollution caused by emissions from the combustion of fossil fuels. One of such pollutant emissions and the greenhouse gases is carbon dioxide.

Another result obtained shows that the urbanization variable positively and significantly affected carbon dioxide emissions by 140.72. There are two views on the effect of urbanization on pollution. The first view is of the opinion that with increasing urbanization, economic structure changes from agriculture to industry and pollution increases. The second views urbanization as a tool for using infrastructures, transportation and energy more efficiently and energy consumption in the cities has become more optimized than the villages and the pollution rate will decrease. So, the relationship between urbanization and environmental pollution can be positive or negative. The model estimation predicted that increasing urbanization will increase pollution rates and therefore greenhouse gases such as carbon dioxide emissions.

The results of the third equation using GMM for 1990-2010 are shown in Table 5. The third equation is as follows.

Coefficient of determination (R^2) indicates a good estimation of the model and variables used in it show the explanatory power of the model by 92% indicates that is a good number due to the used panel data Model. Durbin Watson also indicates the absence of autocorrelation and number shows 1.86.

Table 6: The results of the third equation using GMM system of simultaneous equations for 1990-2010

Variables	Symbol	Coefficient	SD	T statistics	Significant effects
GDP	LnY	0.050852	0.010112	5.029032	0.0000
Carbon dioxide emissions	LnC	-0.555572	0.327528	1.696,255	0.0902
Financial Development	LnFD	0.072372	0.019098	3.789444	0.0002
Foreign direct investment	LnFDI	0.021818	0.020026	1.089509	0.0600
Lagged degree of openness of		0.798887	0.034482	32.16816	0.0000

$\ln T_{it} = a_1 + a_{2i} \ln Y_{it} + a_{3i} \ln C_{it} + a_{4i} \ln FD_{it} + a_{5i} \ln FDI_{it} + \varepsilon_{it}$; Durbin-Watson statistic, 835575.1; Sargan statistic, 204241.38; The coefficient of determination, 7564.89; Adjusted coefficient of determination, 5548.89

Sargan test statistics in this regression is based on null hypothesis which shows that only over identified limits are valid. Null hypothesis indicates the lack of correlation between instrumental variables and the lagging factors. This means that the validation of null hypothesis confirmed the validity of the instrumental variables.

Results in the third model are as follows: the lagged financial development variable positively and significantly affected financial development which shows that a one percent increase in lagged financial development, financial development increases by 0.85 which indicates that the financial development path is dynamic. During the investigation period, the GDP affected financial development of OPEC countries was not significant and shows that GDP did not significantly affect financial development. The carbon dioxide emission variable affected the financial development of OPEC countries by 0.02 which was positive and significant which shows that a one percent increase in carbon dioxide emission, financial development increases by 0.02. The effect of trade liberalization variable on financial development is as much as 0.05 which was positive and significant. As stated in the second chapter, efficient financial markets are among the most important mechanisms in the economy world. Without having an efficient financial sector, financial development and economic development cannot be achieved. In fact, the optimal performance of the economic system in any society depends on both the real and efficient, powerful and complementary financial sectors. These both have to operate together as necessary and sufficient conditions for economic systems. Since trade and financial liberalization and their effect on financial development is one of the important issues in economic policies, the relationship between these two was investigated in the current study and the findings revealed that trade liberalization positively and significantly affects financial development. The results show that inflation affects financial development in OPEC countries by -0.30 which is negative and significant.

The results of the fourth equation using GMM for 1990-2010 are presented in Table 6. The fourth equation is as follows: coefficient of determination (R^2) indicates a good estimation of the model and variables used in it

show the explanatory power of the model by 89% indicates that is a good number due to the used panel data model. Durbin Watson also indicates the absence of autocorrelation and number shows 1.83. Sargan test statistics in this regression has x^2 distribution with degrees of freedom equal to the number of over identified limits. Null hypothesis indicates the lack of correlation between instrumental variables and the lagging factors. This means that the validation of null hypothesis confirmed the validity of the instrumental variables (Null hypothesis indicates the lack of correlation between instrumental variables and the lagging factors) As a result, the validity of this regression for interpretation is confirmed.

Results in the fourth model are as follows: the lagged trade liberalization variable positively and significantly affected financial development which shows that a one percent increase in lagged financial development, financial development increases by 0.79 which indicates that the financial development path is dynamic. During the investigation period, the GDP affected trade liberalization of OPEC countries positively and significantly by 0.05.

The carbon dioxide emission variable affected the trade liberalization of OPEC countries by -0.55 which was negative and insignificant (It was significant at 90% level) the financial development variable significantly and positively affected trade liberalization of OPEC countries by 07.0.

CONCLUSION

The issues discussed in this article indicated that financial development and trade openness are one of the determinants of the level of environmental quality of the society. That is why investigating energy consumption and its relationship with economic growth and environmental quality is fundamental in achieving sustainable development and therefore, this study investigates the dynamic relationship between economic growth, financial development, liberalization of trade and carbon dioxide emissions. For this purpose four hypotheses are designed and examined by the models introduced in the study. The results show that there is a reciprocal relationship between carbon dioxide emissions

and economic growth. But the relationship between economic growth and financial development is a one-way relationship. This means that financial development affects economic growth but economic growth has no significant effect on financial development. The relationship between carbon dioxide emissions and financial development is also a two-way relationship. Additionally Sargan test shows the correct specification of the econometric model. Since political instability is also a useful indicator of poor economic performance in developing countries, political instability creates uncertainty in the environment and reduces investment and capital flight which ultimately reduces economic growth. Research on the effects of political instability shows that economic growth is positively correlated with the degree of political stability. On this basis, researchers can classify countries based on political stability and examine the impact of variables by having access to information of the field. Also, given that OPEC countries have plenty of fossil sources of energy.

RECOMMENDATIONS

Their indiscriminate use of them has caused excessive greenhouse gas emissions in these countries. It is recommended that this study be conducted in developed and developing countries without fossil resources and the results be compared with that of this study.

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