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EMPIRICAL STUDY ON THE EFFECT OF GOOD GOVERNANCE IN CARBON DIOXIDE EMISSIONS: COMPARISON BETWEEN MENA AND OECD COUNTRIES

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ABSTRACT
This paper examines the effect of good governance on carbon dioxide (CO2) emissions in a cross-section of some of the MENA countries including Algeria, Djibouti, Egypt, Iran, Jordan, Lebanon, Malta, Morocco, Saudi Arabia, Tunisia and the United Arabic Emirates as well as some of the OECD countries such as Australia, Belgium, Canada, Czech Republic, Chile, Denmark, Estonia, Ethiopia, Finland, France, Iceland, Italy, Korea, Luxembourg and the Netherlands over the period of 1996-2012. Using Panel data method, GDP has a positive effect and its square has a negative effect on Carbon Dioxide Emissions in both groups. Thus the results provide evidence in support of the Environmental Kuznets Curve (EKC). The results provide confirmation that the good governance parameters (rule of law and control of corruption) and democracy are negatively and statistically significantly correlated with CO2 emissions in OECD countries. Government effectiveness and regulatory quality does not indicate a significant impact on CO2 emissions. Value added in agricultural and the industrial sectors have positive and negative effects on Carbon Dioxide Emissions respectively. In MENA countries, good governance variables have a negative effect on CO2 emissions except government effectiveness which has a positive effect. Value added in agricultural sector has a positive effect on CO2 emissions as OECD countries; however, value added in the industrial sector has a positive effect on Carbon Dioxide Emissions contrary to the result of OECD countries. This is because OECD countries do not apply dirty industries and export them to the developing ones.

KEYWORDS: Good governance, Carbon `dioxide emissions, OECD and MENA countries

1. INTRODUCTION

Over the past three decades, environmental risks and damages have been more exposed. These damages can often be caused by a combination of factors such as population growth, economic growth, energy consumption, and industrial and agricultural activities. The need of economic activities, especially agricultural and industrial activities, for using diverse chemical fertilizers and pesticides has led to a situation in which environment is a victim of human development. Chemicals such as nitrogen oxides, carbon monoxide and suspended particulates and sulfur dioxide, caused by a certain activities of some contaminants, will have significant deleterious effects on the environment (Robert, Grimes and Fride, Manuel, 2003). In recent years most countries, including developing countries, have faced serious environmental issues such as soil erosion and loss of biodiversity so that much of the world's natural resources during the last hundred years, especially in the second half of the last century aimed at developing, were trampled with avarice of human. Governance has been defined in different ways. One definition that World Bank, Committee for Development Cooperation, the Organization for Economic Cooperation and Development, United Nations Development Programme and the international development institutions and organizations agree is that: Governance means "a complex system of interactions between structures, traditions, functions (responsibilities) and processes (operations) which are identified by three key values of accountability, transparency and participation[1]. Tokyo Institute of Technology Definition: The concept of Governance refers to a complex set of values, norms, processes and institutions by which formally and informally society deals with to resolve conflicts and manage the development process. Governance involves the government and civil society (economic and social activists, community based organizations, unstructured groups, media, and etc.) at all local, national, regional and global levels (Doornbos, M.,

2003). In accordance with the foregoing, each of the scientific circles has defined Governance based on a set of objectives, assumptions and emphases. In other words there is no definitive consensus on the definitions.
This paper studies the effect of good governance on carbon dioxide emissions in a cross-section of some of the MENA and OECD countries.

2. Literature review

Gani (2012) investigated the effect good governance associated with value added in industrial and agricultural sectors on Carbon Dioxide Emissions. He concluded value added in industrial and agricultural sectors has a positive effect and good governance indicators has a negative effect on Carbon Dioxide Emissions. Hwang (2002) shows corrupt governments change policies in a way that the corrupt politicians (or corrupt public administrations) collect the maximum amount of bribe. Dietz, Neumayer and De Soysa (2007) indicate corruption (as a governance indicator) influences real savings. They find out the reduction of corruption has a positive effect on the real savings in interaction with resource abundance. More evidence is presented in Welsch (2004) which shows a number of environmental indicators increase uniformly Along with a raise in corruption and the relationship is very powerful at lower levels of income.

Makdissi and Wodon (2006) state environmental regulations may theoretically increase the economic growth and have a beneficial impact. Pushak, Tiongson and Varoudakis (2007) express countries with better relative public sector governance would experience higher growth in consequence of the general expenditures and macroeconomic stability. Therefore effective governments (with the least bureaucracy, efficient public services and with regard to financial integrity and proper management of public resources), can be trusted by producers and manufacturers and simultaneously implement state laws and regulations related to the amount of CO2 emissions with more power. Chang and Gradstyn (2004) studied the effect of political institutions and governance indicators on income inequality for 121 industrialized and developing countries and conclude improvement in governance indices results in a reduction in income inequality. Lee and filler (2007) indicate in countries where rule of law is weak, Investors prefer foreign direct investment rather than foreign financial investment. Sahabi et al. (2012) showed government size has a negative effect and good governance has a positive effect on the development of financial sector of the countries. Nazemi Ardakani (2012) studied the good governance with a Islamic approach and concluded the Islam point of view toward good governance is a determinant and deep approach which guide humanity to Almighty. Komijani and Salatin (2010) showed there is a significant and positive relationship between good governance and economic growth in OECD and OPEC countries.

3. Theoretical Foundations

Carbon dioxide and sulfur oxides are two major types of pollutants that are most commonly used in the literature. Carbon dioxide plays an important role in the debates over the Environment and Sustainable Development and has been diagnosed as the main cause of global warming. These two gases are directly associated with energy use, which is a major factor in the global economy for production and consumption. Therefore economic growth and emissions have important applications for economic and environmental policies. The first transformation in attitudes about the environment occurred in the early 70th century which argued about the quality of the environment against the economic growth. During this period, many researchers believed that economic growth and the quality of environment are in contradiction with each other. The most famous work of the proponents of this theory was called "limits of growth" which considered economic growth as a threat to the environment. In the early 90s a change in attitudes has occurred. During this period the debate was about how economic growth can be achieved without causing hazard to the environment. In this regard, the optimistic ecological theory considered economic growth as the fastest way to improve the quality of the environment. Thus we can say that today, the economic growth is one of the major concerns of communities. The underdeveloped and the developing countries demand achieving economic growth for the transition to ideal condition. This often results in environmental damage (such as increased use of natural resources and a greater volume of emissions of pollutants). On the other hand, in terms of sustainable development, there is concern that global economic growth creates problems for the environment. This has caused economists to pay attention to this issue. Air pollution as one of the aspects of environmental pollution, appears as acid rain and global warming. On one side, one of the indicators of environmental degradation is pollutant emissions and creating unstable climate. On the other hand, economic growth was associated with particularly nasty consequences, especially in the field of environment since environment is the context for economic activities and they are dependent on each other at the most basic level.

Therefore, in recent years the world witnessed large and undesirable environmental changes, such as increasing Greenhouse Gas emissions. Greenhouse Gas especially CO2 emission is one of the main reason for global warming. According to the report of Human Development Index 2011, Per capita CO2 emission was 4.6 Metric Tons and its growth rate was 36 percentages between 1990 and 2007. The situation for Iran is more worrying according to the statistics. The data indicates a high per capita and increasing growth rate of emissions. Per capita CO2 emission for Iran was 7 Metric Tons and its growth rate with the amount of 118.3 has increased more than twice (World Bank report, 2011). This reflects the inappropriate amount of emissions and indicates the adverse environmental condition, as one of the most important factors in achieving sustainable development.

Indiscriminate use of energy, especially fossil fuels, to achieve the goals of economic growth and the lack of sufficient performance in consumption increases environmental pollution so that the most important causes of air pollution is emissions of the carbon dioxide, one of the most important types of greenhouse gases (Alam and et al, 2007, p 828).
According to Myer and Kent about the relationship between energy consumption and environmental pollution, after the Industrial Revolution, by using more energy, on one hand the average productivity of labor and on the other hand environmental degradation increased. Thus, energy and environmental policies are closely related and the energy sector plays the most important role in changing environmental conditions (Shim, 2006, p3). It should be noted that economic growth is one of the most important factors in the source of environmental impacts; because economic growth leads to more using of natural resources and also low quality products increases environmental pollution. In this context, many studies have been conducted; among them Environmental Kuznets Curves (EKC) can be mentioned. The Environmental Kuznets Curve has been derived from the idea of Kuznets (1955) in existence of an inverted U-shaped relationship between per capita income and income inequality, which at the first time developed in decade of 90 and coincided with the study of the potential effects of signing the North American Free Trade Agreement (NAFTA) on environment by Grossman and Krueger (1991) and also the study of Shafik and Bandyopadhyay (1992) that was published in World Development Report (1992). This report was noted:

"If the technology, tastes and investment in environment are considered fixed, increased scope of economic activity would undoubtedly lead to environmental degradation. Moreover with increased per capita income, the demand for improving the quality of environment will rise and the investment on the quality goes up. Therefore, it cannot certainly be said that economic growth results in environmental degradation."

Bekerman (1992) presented the argument that there is clear evidence that economic growth in the early stages, leads to the destruction of the environment; however, the best and perhaps the only way to maintain and improve the quality of the environment in the countries of the world is to become wealthier or as the same economic growth. By this perspective, he brought fame and expanded the environmental Kuznets hypothesis.

4. The Model

The research model is derived from the model of Gani (2012) for investigating the effect of good governance on carbon dioxide emissions in developing countries. He applied variables such as value-added in agriculture and industry sectors and indicators of good governance. In this study, we use the indicators of good governance, value added of industry and agriculture sectors and democracy.

Thus the model will be as follows:
Equation (1)

$$LCO2 = C(1) + C(2)*LGDPPER_{it} + C(3)*LGDPPER\hat{}2_{it} + C(4)*REG_{it} + C(5)*LAG_{it} + C(6)*LIND_{it} + C(7)*RUL_{it} + C(8)*GOV_{it} + C(9)*CONT_{it} + C(10)DEM_{it} + U_{it}$$

In this model, the variables are as follow:
GDPPER: Logarithm of GDP per capita in USD constant prices of 2005
LIND: Logarithm of the value added of industry sector in USD constant prices of 2005
REG: Regulatory Quality, Good governance indicator
GOV: Efficiency and effectiveness of government, Good governance indicator
RUL: Rule of Law, Good governance indicator
LAG: Logarithm of the value added of agriculture in USD constant prices of 2005
LCO2: Logarithm of carbon dioxide emissions in kilograms per GDP

CONT: Control of Corruption, Good governance indicator
DEM: Democracy

All variables are taken from World Band Website except Democracy variable which is taken from Center for Global policy, George Mason University (2013).

4.1. Estimation of the model for OECD countries

Selected countries are: Australia, Belgium, Canada, Czech Republic, Chile, Denmark, Estonia, Ethiopia, Finland, France, Iceland, Italy, Korea, Luxembourg and the Netherlands.

Stationary test

Since the period of this research is considered in long term, unit root test is performed and the results are shown in below table. Some variables determined as non-stationary or I(1) variables thus the first difference of these variables were inserted to the model and hence the cointegration test of model is not necessary.

Table 1 Stationary test for OECD countries

Variable	With intercept	
	t-statistic	*probability*
LCO2	1	0/8429 (non-stationary)
DLCO2	3/9	0/0000 (stationary)
LGDPP	2/7	0/0032 (stationary)
CONT	7/6	0/0000 (stationary)
GOV	3/02	0/0012 (stationary)
DEM	7/23	0/0000 (stationary)
LAG	7/23	0/0000 (stationary)
REG	7/2	0/0000 (stationary)
RUL	7/3	0/0000 (stationary)
LIN	3/31	0/0005 (stationary)
RESIDUAL	11/52	0/0000 (stationary)

Source: EVIEWS software output

Results indicate LCO2 has a unit root. Thus the test was performed again on first difference of the variable and it was stationary. The other variables are stationary.

Now we intend to estimate the model. At first tests of panel data models should be done, then model would be specified and estimated.

F-Limer test

This test is applied for choosing between pooled model against fixed effect model. Hypotheses are as follow:

H_0 : Pooled Model ↳ $\alpha 1 = \alpha 2 = \ldots = \alpha n = \alpha$

H_1 : Fixed Effect Model ↳ $\alpha 1 \neq \alpha 2 \neq \ldots \neq \alpha n \neq \alpha$

Null hypothesis is based on the restricted values and opposite hypothesis is based on unrestricted values. F-Limer statistic based on Restricted Residual Sum of Squares (RRSS) and Unrestricted Residual Sum of Squares (URSS) is as below:

$$F = \frac{(RRSS - URSS)/(N-1)}{URSS/(NT-N-K)} \approx F(N-1), (NT-N-K) \qquad \text{Equation (2)}$$

In this equation RRSS and URSS are dependant to fixed effect model, N is the number of sections, T is the number of periods, K is the number of explaining variables. Also this statistic has the F distribution with N-1 and NT-N-K degree of freedom. If the value of calculated F-statistic is more than the given numbers, H_0 hypothesis will be rejected and there is no significant effect for sections. F-Limer test is as follow:

$$F = \frac{(R^2_{FE} - R^2_P)/(N-1)}{(1 - R^2_{FE})/(NT-N-K)} \qquad \text{Equation (3)}$$

R^2_{FE} is the unrestricted coefficient of determination for the estimation of fixed effect model and R^2_P is restricted coefficient of determination for the estimation of pooled model for all data (p).

This test is based on the coefficient of determination (R^2) and tests whether the coefficient of determination of regression with fixed effect is significantly more than pooled model regression or not. If the calculated F is bigger than required F of the table, then null hypothesis is rejected and opposite one is approved. In this case the difference between sections is acceptable.

F-Limer test result for OECD countries

Table 2 Pooled data against panel data test for OECD countries

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.095254	(14,180)	0.3647
Cross-section Chi-square	16.677367	14	0.2738

Source: EVIEWS software output

Since H_0 hypothesis is not rejected, the selected model would be pooled model.

Estimation results:

Equation (4)

*D(LCO2) = -3.21 + 0.67*LGDPP - 0.03*LGDPP^2 - 0.002*CONT - 0.001*GOV - 0.01*DEM + 0.01*LAG - 0.039*LIN - 0.005*RUL - 0.001*REG + 0.08*DU14 - 0.04*DU6*

Source: EVIEWS software output

Table 3 Estimation results for OECD countries

Variable	Coefficient	t-Statistic	Prob.
C	-3.214109	-2.673257	0.0082
LGDPP	0.677083	2.759413	0.0064
LGDPP^2	-0.035048	-2.807421	0.0055
CONT	-0.002366	-2.638731	0.0090
GOV	-0.001638	-0.142105	0.8871
DEM	-0.012454	-12.13010	0.0000
LAG	0.010607	5.388622	0.0000
LIN	-0.039793	-1.750208	0.0817
RUL	-0.005044	-16.28599	0.0000
REG	-0.001061	-0.911010	0.3634
R-squared	0.31	F-statistic	4.811638
Durbin-Watson stat	2.1	Prob(F-statistic)	0.000002

Source: EVIEWS software output

Results indicate that there is a positive relationship between the logarithm of GDP and emissions of carbon dioxide. Therefore, an increase of one percent of GDP, leads to 0.67 Percentages of increase in carbon dioxide emissions. Also there is a negative relationship between the square of GDP and carbon dioxide emissions. Thus the increase in GDP in the second stage will reduce CO2 emissions. This result is consistent with the Kuznets hypothesis. EKC states if the

technology, tastes and investment in environment are considered fixed, increased scope of economic activity would undoubtedly lead to environmental degradation. Moreover with increased per capita income, the demand for improving the quality of environment will rise and the investment on the quality goes up. Therefore, it cannot certainly be said that economic growth results in environmental degradation (International Review of Bipolar Disoreders (IRBD)). Bekerman (1992) presented there is clear evidence that economic growth in the early stages, leads to the destruction of the environment; however, the best and perhaps the only way to maintain and improve the quality of the environment in the countries of the world is to become wealthier or as the same economic growth.

Indicators of good governance (government effectiveness, rule of law and control of corruption) and democracy have a negative effect on carbon dioxide emissions. Therefore an increase in the indices and improving governance in these countries will reduce emissions of carbon dioxide. It should be noted that the government efficiency has no significant effect on CO2 emissions. This is consistent with Gani (2012). Regulatory quality has no significant effect on carbon dioxide emissions.

Various aspects of governance are directly or indirectly effective on the emissions of carbon dioxide. One of the aspects of governance is the rule of law. Where the rule of law dominates, the minimum results of market failures appear. Particularly Olsen (1996) noted that the quality of institutions (legal systems that enhance contracts and other operational forms in all fairness) can improve productive cooperation among market players. Aaron (2000) states institutions may weaken when laws easily are overlooked or useful rules won't be executed and they may even backfire when monitoring and implementation costs are very high. So the rule of law is the main element of observance of CO2 emissions. Where laws have been clearly articulated, controls of processes of CO2 emissions are more easily executed and firms do not doubt to comply. Similarly, where the implementation is difficult to observe the amount of CO2 emissions, loopholes in the law can act in the interests of the firms. Another aspect of governance that is closely related to the rule of law and can be important in the case of CO2 emissions is the absence of a legal mechanism for the enforcement of contracts. If there is no implementation mechanism for the enforcement of contracts, firms may not follow the terms of the contract. Therefore we assume that the execution of contracts helps the creation of compliance-oriented firms and firms that follow business contracts will probably follow the conventions of international environmental policy too.

Regulatory quality can also affect environmental outcomes (Esty and Porters, 2005). Countries that have designed and developed clear guidelines regarding the licensing, charged fees and taxes can expect the firms adhere to the legal framework of industrial production and waste management. Government Effectiveness can also be effective in controlling the amount of CO2 emissions. This aspect includes excessive administrative procedures, bureaucratic inefficiency and poor governance, financial mismanagement in public sectors and in particular the legal authority of the government in the field of the environment (Fischer et al., 2001). Pushak, Tiongson and Varoudakis (2007) found out countries with relatively better public sector governance will experience higher growth as a result of public spending and macroeconomic stability. Therefore, the countries with efficient governments (with a minimum bureaucracy, efficient public services, and with regard to financial integrity and proper management of public resources) can gain the confidence of producers and at the same time can execute state laws and regulations related to the amount of CO2 emissions by more powers. Control of corruption usually affects income and expenditure of government budget (Mauro, 1998; Tanzi and Davoodi, 2001). The recent study of Wihardja (2010) about corruption in public supply and procurement auctions indicated that this type of corruption hurts national welfare. Corruption has concepts in form and depth that are important in degradation of environment. For instance, public servants may take a bribe to pass government rules and regulations related to the amount of CO2 emissions for the benefit of specific groups.

Logarithm of the value added of industry and agriculture sectors have a direct relationship with the release of carbon dioxide. With the rise of value added of the agriculture sector, the use of agricultural machinery, chemical fertilizers and pesticides is increasing and it causes environmental pollution. Also, given that livestock is an important part of farming, the increase in value added will increase carbon dioxide emissions. With the increase in logarithm of the value added of industry, CO2 emissions will be reduced. Therefore, there is an inverse relationship between these two variables. This could be because of improvement in environmental performance in this group of countries as a result of the rise of industrial sector, in other words, industrial activities in the countries is going to be more environmentally friendly. In these countries, unlike developing countries, many incidental costs have been considered for dirty

industries and this has led to improved environmental performance. Furthermore industrial countries are pursuing new ways for withdrawing dirty industries out of the country. According to this policy, developed countries as much as possible hold clean and environmentally friendly industries inside the country. The developed countries transfer polluting industries out of their borders to developing and underdeveloped countries. Thus they protect their environment from pollutants and industrial wastes that are causing environmental destruction (Samimi et al., 2012).

4.2. Estimation of the model for MENA countries

Selected countries are: Algeria, Djibouti, Egypt, Iran, Jordan, Lebanon, Malta, Morocco, Saudi Arabia, Tunisia and the United Arabic Emirates

Stationary test

Table 4 Stationary test for MENA countries

Variable	With intercept	
	t-statistic	*probability*
LCO2	3/1	0/0007 (Stationary)
LGDPP	1/63	0/0527 (Stationary)
CONT	7/5	0/0000 (Stationary)
GOV	6/3	0/0000 (Stationary)
DEM	6/5	0/0000 (Stationary)
LAG	56/23	0/0001 (Stationary)
REG	4/5	0/0000 (Stationary)
RUL	5/07	0/0000 (Stationary)
LIN	3/5	0/0002 (Stationary)
RESIDUAL	7/6	0/0000 (Stationary)

Source: EVIEWS software output

All variables are stationary, thus the difference is not necessary.

F-Limer test

Table 5 Pooled data against panel data test for MENA countries

Effects Test	Statistic	d.f.	Prob
Cross-section F	250.089942	(10,132)	0.0000
Cross-section Chi-square	457.934972	10	0.0000

Source: EVIEWS software output

Random effect test

To understand the presence or absence of intercept individually for each section, F-statistic is used which is the zero hypothesis for equality of intercepts for different sections. If the H_0 hypothesis is rejected, there is no reason for uniform hypothesis of intercepts for each section. If the H_0 hypothesis is rejected another question comes out that: Does the difference in intercepts of each section operate in a fixed way or random operators can better explain this

difference? Usually these methods as applying Panel Data Method with Fixed or Random Effects are tested by Hausman Test which the rejection of zero hypothesis implies selection of fixed effects method and not rejection of zero hypothesis is the implication of choosing random effects method (Mohamadi and Mohamadzadeh, 2009).

Table 6 Hausman test

Effects Test	Statistic	def.	Prob.
Cross-section random	2500.899417	10	0.0000

Source: EVIEWS software output

Since F-statistic and Hausman test are implying the rejection of H_0 hypothesis, thus the selected model is fixed effect method.

ESTIMATION RESULTS:

*LCO2 = -21+ 4.08*LGDPP - 0.0003*LGDPP^2 + 0.3*LAG + 0.35*LIN - 13.5*REG - 0.32*CONT - 0.12*DEM + 0.88*GOV - 0.2*RUL* Equation (5)

Source: EVIEWS software output

Table 7 Estimation results for MENA countries

Variable	Coefficient	t-Statistic	Prob.
c	-21.02960	-12.92306	0.0000
LGDPP	4.087815	16.47618	0.0000
LGDPP^2	-0.000303	-13.48297	0.0000
LAG	0.304976	7.539260	0.0000
LIN	0.351433	3.509009	0.0006
REG	-13.51921	-20.37373	0.0000
CONT	-0.320690	-15.30580	0.0000
DEM	-0.120820	-3.630949	0.0004
GOV	0.880118	2.552792	0.0118
RUL	-0.203539	-2.854010	0.0050
R-squared	0.99	F-statistic	5246.740
Durbin-Watson stat	2.3	Prob(F-statistic)	0.000000

Source: EVIEWS software output

The results in this group are a little different from previous one. There is also a positive correlation between the logarithm of GDP and CO2 emissions and a negative correlation between squared GDP and CO2 emissions and Kuznets hypothesis is confirmed in this group too. Governance indicators such as quality of law enforcement, control of corruption and rule of law have an inverse relationship with CO2 emissions but the efficiency and effectiveness of government has a positive effect on it. Thus further involvement of government leads to degradation of environment instead of improving the environment quality. Maybe due to owning oil in these countries and excessive exploitation of the resources, degradation of the environment sooner happens. Democracy and public participation will lead to improved environmental quality. As we can see, unlike OECD countries, the logarithm of value added of industry sector has a positive effect on CO2 emissions. These countries do not have a strong and independence manufacturing sector and they use worn out industries of advanced industrial countries. In other words, the advanced industrialized countries export polluting industries to these countries. Logarithm of value added of agriculture sector has a significant positive effect on CO2 emissions in these countries. This result is consistent with previous theories and confirms them.

5. RESULTS

This paper examines the effect of good governance on carbon dioxide (CO2) emissions in a cross-section of some of the MENA countries including Algeria, Djibouti, Egypt, Iran, Jordan, Lebanon, Malta, Morocco, Saudi Arabia, Tunisia and the United Arabic Emirates as well as some of the OECD countries such as Australia, Belgium, Canada, Czech Republic, Chile, Denmark, Estonia, Ethiopia, Finland, France, Iceland, Italy, Korea, Luxembourg and the Netherlands

over the period of 1996-2012. Using Panel data method, estimation results indicate a negative correlation between the indicators of good governance (rule of law, control of corruption) and Democracy and CO2 emissions in the OECD countries. Government efficiency and regulatory quality variables do not have a significant effect on CO2 emissions. Value added of agriculture and industry sectors, respectively, have positive and negative effects on CO2 emissions in these countries.

In MENA countries good governance parameters have a negative effect on CO2 emissions except government efficiency which has a positive effect on dependant variable. Value added of agriculture sector has a positive effect on CO2 emissions like OECD countries; however, value added of industry sector has a positive effect on CO2 emissions unlike the OECD countries. This is because the advanced industrialized countries export polluting industries to these countries. GDP has a positive effect and its square has a negative effect on Carbon Dioxide Emissions in both groups. Thus the results provide evidence in support of the Environmental Kuznets Curve (EKC).

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