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Article

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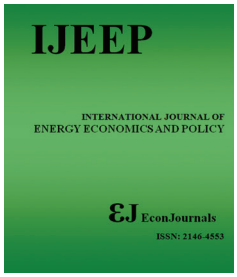

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The Impact of Government Effectiveness and Political Stability on Energy Consumption in the Selected MENA Economies

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ABSTRACT

This paper examines the impact of the quality governance on the energy sector in the MENA region, particularly, political stability and government effectiveness. Several macroeconomic variables are taken into account in a panel analysis, and the study employs the POLS and Fixed effect approaches to find out if the government's effectiveness and political stability among all governance indicators have a vital role in promoting energy efficiency in MENA. Panel data for the period 2003-2018 are used. The empirical results show he political stability and the effectiveness of government are positively affected the energy consumption for the MENA countries. Moreover, the findings of the study show a negative relationship between energy consumption and economic growth. This situation referred to the unimproved relationship in the MENA region, as literature confirms no relationship exists for some countries in the region.

Keywords: Energy Consumption, Quality Governance, Political Stability, Government Effectiveness, POLS, Fixed Effect, MENA
JEL Classifications: H11; Q38; Q43

1. INTRODUCTION

In the last decades, many studies propose that governance is an important determinant of economic development, where governance has been linked to economic growth improvement (for example, Furubotn and Richter, 2005; Kaufman and Kraay et al., 2008; Mantzavinos, 2001). The main motivation behind testing whether energy consumption causes an increase in economic growth or not? However, numerous studies have been well-established that a positive relationship between growth and energy consumption exists (Abdellatif, 2003; Barro, 1996; Cleveland et al, 2000; Gillingham et al., 2009; Medlock and Soligo, 2001; Stern, 2015).

Recently, the relationship between governance and energy consumption attracted great attention from decision makers and academic researchers. Even though, there are many studies have examined this relationship across the world, the impact of governance on energy consumption still expanding, particular in the Middle East and North Africa region (MENA). Generally, MENA countries have a fluctuated governance record in comparison to other regions of the world. These countries have suffered from important issues of which are signs of bad governance, such as the government's ineffectiveness, political instability, and lack of transparency. In the last few years, some countries in the MENA region have made significant progress in terms of governance such as Qatar and United Arab Emirates.

In this paper, we try to examine the relationship between energy consumption and some of governance indicators, particularly the government effectiveness and political stability, and seek to fill this gap in the literature. Therefore, this paper makes a modest contribution to this debate by addressing the question: Does the government effectiveness and political stability among all governance indicators, have a vital role in promoting energy efficiency in the MENA region, and hence increasing economic growth? To the best of our knowledge, this empirical study is amongst the few studies that investigate the impact of the government effectiveness and political

stability on energy sector in MENA using disaggregated institutional indicators. The rest of this paper is structured as follows: Section 2 reviews some of the literature in this field. Section 3 discusses the main model used in the analysis and presents data and methodology adopted in this paper. The empirical results are reported in Section 4, while Section 5 is the conclusion.

2. LITERATURE REVIEW

Good governance is said to be "the best set of all laws, regulations, processes, and practices that affect the functioning of a regulatory framework and the market" (Hancher et al., 2004). In recent years, various empirical studies have been produced to examine the effect of governance on economic activities performance, where these studies have been well-documented in the economic literature. In general, the results of these empirical studies show that the quality of governance has a positive association with growth policy (see, for example, Mauro, 1995; Ades and Di Tella, 1999; Wei, 2001; Fredriksson and Svensson, 2002). The common theme being that corruption has a harmful impact on growth and leads to suboptimal growth rates due to the waste of scarce economic resources and misallocation of productive resources, increasing poverty and reducing investment growth. However, although energy consumption is one of the most importance in the MENA region, the impact of government effectiveness and political stability on energy policy in this region have been ignored. In this paper, we seek to fill this gap in the literature.

Regarding the interaction between good governance and energy consumption, there are few papers in the field which is focusing on the impact of the quality of governance on energy use! Fredriksson et al. (2004) investigated the impact of corruption on energy efficiency for 12 OECD countries for the period 1982-1996 and found that corruption decreases the impacts of energy policy. They conclude that a greater corruptibility of policy makers reduces the stringency of energy policy which reflects implicitly by a decrease in energy efficiency. They prove that more corruption means less stringent pro-environment policies. Damania et al. (2003) examine the relationship between corruption, trade and environmental policy. Using panel data from a mix of developed and developing countries from 1982 to 1992, they found that more corruption leads to less environmental regulations, whereas the impact of trade liberalization on the stringency of the environmental policy depends on the level of corruption.

Using the cross-section of time-averaged data, Stern (2012) analyzed the energy efficiency trends in 85 countries over a 37-year period and used a stochastic production frontier model. He found that energy efficiency is higher in countries with, higher total factor productivity, undervalued currencies, and smaller fossil fuel reserves, in addition he explored that increasing good governance (decline in corruption) will leads to an increase in energy efficiency. Moreover, Stern (2012) argues that technological change was the most important factor counteracting the energy-use and carbon-emissions increasing effects of economic growth.

Nicolli and Vona (2015) studied OECD countries for the period 1970-2005 and concluded that reduced the level of governance (increased corruption) has an indirect effect on renewable energy policy through its impact on the regulation of the energy products market by entry barriers, while the negative impact of inequality is much greater for the richer countries. Their empirical results are consistent with predictions of political-economy models of environmental policies. Butler et al. (2018) investigate the impacts of governance on the energy sector by highlighting four different ways in which non-energy related governance can have important implications for energy issues. The central contribution of their paper was to set out a distinctive analytic framework for making visible 'non-energy' policy impacts, which might otherwise be obscured within an analysis. They conclude that we must rethink the governance of energy demand to meet contemporary challenges.

Sekrafi and Sghaier (2018) investigate whether energy consumption, corruption, environmental quality, and political instability affect economic growth in 13 MENA countries over the period 1984-2012 using both the static (POLS, FE, and RE) and dynamic (Diff-GMM and Sys-GMM) panel data approaches. They found that the increased corruption directly affects economic growth, environmental quality, and energy consumption. However, corruption has an indirect effect on economic growth through energy consumption and environmental quality, an indirect effect on environmental quality through economic growth and an indirect effect on energy consumption through CO_2 emissions and GDP.

In a more recent study, Arminen and Menegaki (2019) examine the causal relationships between economic growth, energy consumption and carbon dioxide (CO_2) emissions in high-income and upper-middle-income countries using the simultaneous equations framework, with data from 1985 to 2011. By taking institutional quality (measured by the level of corruption) and climate (measured by average temperatures over the winter and summer months) into account, the results have shown that there is a relationship between GDP and energy consumption, they argue that high-income and upper-middle-income countries base their economic growth on a feedback relationship with energy consumption and that the ensuing pollution has not yet reached a maximum point, even in these countries. Moreover, they found that climate and weather variations are more important determinants of energy consumption and CO_2 emissions than corruption, the results suggest that changes in institutional quality are likely to have only a limited impact on energy and environmental policies. Bercu et al. (2019) using a panel methodology, analyze the relationship between energy consumption, economic growth and good governance for 14 Central and Eastern European countries, over the period 1995-2017. The study shows that good governance influences electricity and Gross Domestic Product (GDP) consumption, and the governments from Central and Eastern European countries have to restore good governance in the economy, creating an environment conducive to investment in the energy sector, which would increase competition and reduce inefficiencies in the production, transmission, and distribution of energy.

Overall, this overview of some papers on the effect of the quality of governance on energy use supports the fact there are several

economic, political, and social factors that play vital roles in affecting the energy consumption. But the results of these studies reveal that the quality of governance is one of the main factors which determines energy consumption across the world. Therefore, we will consider this factor as the main determinant of energy consumption in the MENA region countries, where the impacts of government effectiveness and political stability on energy policy in this region have been ignored.

3. THEORETICAL FRAMEWORK AND THE METHODOLOGY

3.1. Theoretical Framework

Following the previous literature, a general model is considered to formulate empirically the energy consumption function in the MENA region, and to identify the different theoretical effects of government effectiveness and political stability on the energy sector. Therefore, we use the following functional forms:

$$ENR_t = f(GDP_t, FCF_t, INF_t, Z_t, V_t,) \quad (1)$$

This model is estimated depending on POLS and fixed effect approaches, where this procedure allows us to control the unobserved time-invariant variables that change over time but are constant among cases, where the control variables vary between cases but are constant over time, while time series and cross-section studies cannot control these variables (see Wooldridge, 2016). The analysis in this article refers to 18 countries from MENA region (Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates, Yemen) in the period 2003-2018. Tables 1 and 2 show the correlational and descriptive statistics.

The variables taken into account are: ENR is the primary energy before transformation to other end-use fuels, it is used as a proxy for energy consumption. GDP is gross domestic product converted to international dollars using purchasing power parity rates. It is used as a proxy for the size of economy, FCF is the capital stock, INF is the consumer prises, V is the political stability indicator using to assess the absence of violence and politically motivated violence, and Z is the government effectiveness indicator which use to measure the level of government effectiveness as a proxy of the quality of public services and the quality of the civil service. These indicators are extracted from WGI. Figures 1 and 2 represent plots of the relationship between the energy consumption and the political stability and government effectiveness for 18 MENA countries.

Table 1: Correlational statistics

	ENR	GDP	FCF	INF	PS	GE
ENR	1.0000					
GDP	−0.1280	1.0000				
FCF	0.1988	0.2439	1.0000			
INF	−0.0457	0.1722	0.0358	1.0000		
V	0.2792	−0.0231	−0.0244	−0.3998	1.0000	
Z	0.1889	−0.0383	−0.3260	−0.4696	0.6565	1.0000

Table 2: Descriptive statistics

Variables	Obs.	Mean	SD	Min	Max
ENR	288	4.760323	0.3296077	4.148004	5.81249
GDP	288	26.11497	0.9942339	24.23871	28.11803
FCF	288	13.91912	2.200977	11.60467	24.18292
INF	265	6.102673	7.913182	−10.06749	53.23096
V	288	−0.7222222	1.082209	−3.18	1.22
Z	288	−0.1768403	0.8071087	−1.92	1.51

3.2. Methodology

In this section we will explain the econometric methodology adopted to investigate the relationship between the quality of governance and energy consumption. The empirical investigation conducted in this research is based on panel data analysis, where cross-section time series data are employed and analysed to examine he impacts of government effectiveness and political stability on energy policy in the Middle East and North Africa. For this purpose, we use POLS and Fixed Effect to examine this relationship. This section discusses the pooled OLS estimator and the Fixed Effect approaches.

There are various types of panel data regression techniques, a POLS estimator, a FE model and a RE model. These three methods basically vary with the handling of the intercept term, where a panel dataset must have data on N cases, over T time periods, for a total of $N \times T$ observations and k independent variables. The POLS estimator ignores the panel structure of the data and assumes that the intercept term is consistent across groups. The model assumes that:

$$y_{it} = x_{it}\beta + u_{it} \quad (2)$$

In this model, the assumption which is related to the error term (u) makes it simpler comparing with FE and RE models, where it is postulated as follows:

$$u_{it} \approx N\left(0, \sigma^2\right) iid \quad (3)$$

In the POLS estimator, *iid* indicates independently and identically distributed, which means that the error u term has normally distributed with zero mean, and no heteroscedasticity (a constant variance σ^2). Also, the distribution of the error term is orthogonal to the distribution of the other variables[1] and observations of u are uncorrelated with each other (i.e., no autocorrelation). As can be seen from the previous assumptions, for a given x, the errors are not heteroskedastic and there is no serial correlation between observations. However, assuming that the intercept term is consistent across all variables, and u for these variables are $N(0,\sigma^2)$ *iid*, leads to inaccurate results. Thus, pooled OLS estimator is unable to capture the omitted variables and the unobserved effects for countries, individuals and firms.[2]

The fixed effect model considers the special characteristics or the individual features of each cross-section case. It captures the unobserved time-constant variable in panel data analysis, by

1 Knowing the value of the error term does not tell you anything about the other variables in the model.

2 There are many other names for unobserved effects; unobserved component, latent variable and unobserved heterogeneity are common.

Figure 1: The relationship between Energy use and Political Stability in the MENA region (2003-2018)

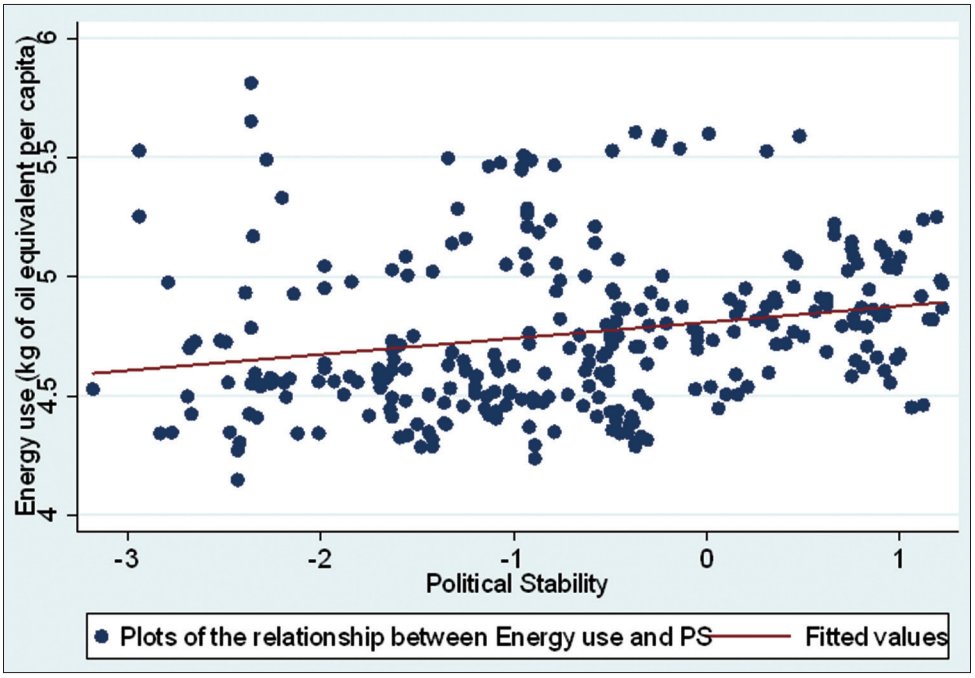
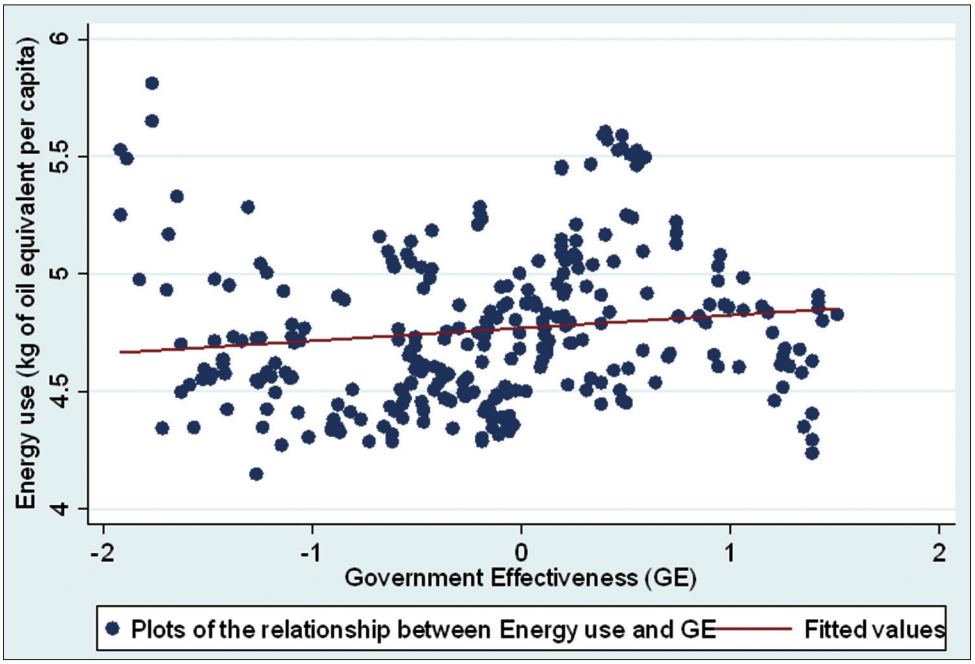


Figure 2: The relationship between Energy use and Government Effectiveness in the MENA region (2003-2018)



assuming that the slope coefficients are constant across countries but allow the intercept to change over time for each country, Gujarati (2004). The fixed effect model assumes that unobserved heterogeneity is correlated with other explanatory variables, *cov* $(x_{it},c_i)\neq 0$, where c_i is called an individual-specific effect or the unobserved effect. The model can be written as:

$$y_{it} = x_{it}\beta + c_i + u_{it} \quad (4)$$

Where u_{it} is a stochastic error term (also known as the idiosyncratic error) which is uncorrelated with x_{it}. That means for each t, the expected value of the stochastic error given the regressor variables in all time durations and the individual-specific effect (the unobserved effect) is zero: $E(u_{it}|x_i, c_i)=0$. See Wooldridge (2016). For i, taking the average for equation (4) over time, we get:

$$\overline{y_i} = \beta\overline{x_i} + c_i + \overline{u_i} \quad (5)$$

Where $\overline{y_i} = T^{-1}\sum_{t=1}^{T} y_{it}$, $\overline{x_i} = T^{-1}\sum_{t=1}^{T} x_{it}$ and $\overline{u_i} = T^{-1}\sum_{t=1}^{T} u_{it}$. Since c_i is constant over time, it appears in both equations (4) and (5). Subtracting equation (5) from equation (4) for each t, we will have the FE transformed equation:

$$y_{it} - \overline{y_i} = \beta\left(x_{it} - \overline{x_i}\right) + u_{it} - \overline{u_i}, \quad t = 1,2,\ldots,T,$$

Or

$$\ddot{y}_{it} = \beta \ddot{x}_{ii} + \ddot{u}_{ii} \tag{6}$$

Here, $\ddot{y}_{it} \equiv y_{it} - \overline{y_i}$ is the time-demanded data on y, and similarly for $\ddot{x}_{it} \equiv x_{it} - \overline{x_i}$ and $\ddot{u}_{it} \equiv u_{it} - \overline{u_i}$. The fixed effect eliminates the unobserved effect c_i, by using a transformation which is also called the within transformation. This suggests that we should estimate equation (6) by pooled OLS. A pooled OLS technique which is based on the time-demanded variables is known as the fixed effects estimator or the within estimator, because it uses the time variation within each cross-section, Wooldridge (2016). Thus, the original unobserved effects model is provided as:

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \ldots + \beta_k x_{itk} + c_i + u_{it}, t = 1,2,\ldots,T \tag{7}$$

This estimator is unbiased, under a strict exogeneity assumption on the explanatory variables. The unobserved effect c_i in equation (7), is the intercept for case i which is to be estimated for all β, changes across countries or the cross-section cases, but is constant across all time period and correlated with explanatory variables. The idiosyncratic errors u_{it} which varies arbitrarily across time and countries, should be homoscedastic, serially uncorrelated and uncorrelated with each explanatory variable, as mentioned before. In the fixed effect model, the way we can estimate the intercept for each i is to interact a dummy variable for each case, along with the explanatory variables, to see how it will be changed over time. This method is known as the dummy variable technique, particularly the differential intercept dummies. Through these dummy variables we can estimate c_i. Thus, the regression that is to be run is:

$$Y_{it} = x_{it}\beta + Dc_i + u_{it} \tag{8}$$

Where D is the matrix that contains with N dummy variables one for each cross-section observation: dn_i=1 *if* n=$_i$, dn_i=0 *if* $n \neq i$.

Therefore, the FE model is known as the least-squares dummy variable model (LSDV). But the problem for this model is that when we have a very large number of cross-sectional cases, the FE model consumes a lot of degrees of freedom, which is considered one of the drawbacks of this estimator, Gujarati (2004) and Wooldridge (2010).

4. RESULTS AND DISCUSSION

The impact of good governance on energy consumption is revealed in Table 3. Good governance measured by the political stability and effectiveness of government indicators. Both the POLS and FE estimation results are presented below, models 1 + 2 for POLS and 3 + 4 for FE. The value of the good governance coefficients are positive and statistically significant in all models, which means that the political stability and the effectiveness of government are positively affected the energy consumption for the MENA countries. About 10% increase in energy consumption due to 1% increase of political stability, and about 16% due to increase of effective government.

These percentages declined to 4% and 13%, respectively, in the third and fourth models. These results consistent with the literature. The results of the GDP coefficients (−0.07 and −0.50) assume that they have a negative and statistically significant effect on energy consumption in the MENA region. These surprising effect reveres to the unproven relationship between energy consumption and economic growth in the MENA region, where studies confirm a positive relationship in some countries and no relationship in other (Arfaoui, 2016; Ozturk, 2017; AlKhars et al., 2020).

In contrast, the results of the FCF coefficients ranged between (0.04 and 0.05) in the POLS models confirm that they have a positive and statistically significant effect on energy consumption. This effect increased to about (0.33) in the FE models. Although the inflation coefficients are statistically significant in all models, the magnitude is very small (about 0.003) confirms the negligible effect of inflation on the energy consumption.

Table 3: Estimations results

VARIABLES	(1)	(2)	(3)	(4)
	Energy (POLS)	Energy (POLS)	Energy (FE)	Energy (FE)
Political Stability	0.104***		0.0419*	
	(0.0198)		(0.0249)	
Government Effectiveness		0.159***		0.129**
		(0.0294)		(0.0509)
GDP	−0.0680***	−0.0783***	−0.505***	−0.517***
	(0.0201)	(0.0203)	(0.0484)	(0.0463)
FCF	0.0372***	0.0549***	0.332***	0.320***
	(0.00865)	(0.00929)	(0.0343)	(0.0262)
Inflation	0.00464*	0.00664**	-0.00365***	-0.00298**
	(0.00267)	(0.00281)	(0.00121)	(0.00125)
Constant	6.070***	6.034***	13.40***	13.85***
	(0.510)	(0.508)	(0.991)	(1.010)
Observations	265	265	265	265
R-squared	0.161	0.167	0.425	0.433
Number of countries			18	18

Standard errors in parentheses. ***P<0.01, **P<0.05, *P<0.1

5. CONCLUSION AND POLICY IMPLICATIONS

This paper aims to examine the effect of the quality governance on energy consumption in the MENA region. Including 18 countries (Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates and Yemen) for the time span period 2003-2018. Both the government effectiveness and political stability are used as indicators for quality governance. Two approaches are applied, POLS and FE. Findings confirm that the political stability and the effectiveness of government are positively affected the energy consumption for the MENA countries. Moreover, results show a negative relationship between energy consumption and economic growth. This situation referred to the unimproved relationship in the MENA region, as literature confirms no relationship exists for some countries in the region. Results also confirm that gross fixed capital variable affect energy consumption positively. Although inflation has a negative effect on energy consumption, its magnitude very small and can be ignored.

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