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The nexus between size and efficacy of government: evidence from OPEC

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Abstract. From classic to modern economic theories, the scope and size of government in economy have been always main topics for economists. The governments have played different roles in a historical context. Provision of public goods is a generally accepted task for all governments. The supply of public goods requires efficient allocation and management of scarce resources. Government efficacy stems from good governance and proper planning and policy-making. This paper aims to bridge from government size to government efficacy the Organization of the Petroleum Exporting Countries (OPEC). To this end, a panel data in the model is estimated during 2002-2015 by using some control variables. Findings indicate a negative relationship between government size and efficacy. In addition, oil rents affect government efficacy negatively. The trade openness result in efficient government. Finally, economic growth has positive effect on result in government effectiveness. According to findings, minimization of government size, injection of oil revenues into Sovereign National Funds (SNFs), adoption of open door policies, and targeting sustainable economic growth give rise to an efficient government.
Keywords. Government size, Government effectiveness, Trade openness, Oil rents, OPEC.
JEL. F41, F53, H11, P48.

1. Introduction

During the early courses on economics, every student gets familiar to multi-sector macroeconomic models. Besides firms and households, government is the third agent in a typical three-sector economy. There is no dispute on presence of government in different economic systems. In a liberal economy, government has to guarantee property rights, defend against hostiles, and provide public services. In a centrally planned system, government owns major economic enterprises, and allocates existing human and financial resources according to given plan. Finally, government plays dual roles in an Islamic economic viewpoint. In Islamic economic system, government holds most of natural assets and resources on one hand, and opens rooms to act markets freely on the other hand. However, how to intervene government in each society is controversial. Hence, size and efficacy of government is an interesting topic in public economics.

Organization of the Petroleum Exporting Countries (OPEC) was established by Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela in 1960 in order to coordinate petroleum polices by its members, to secure fair and stable prices for petroleum producers; an efficient, economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the industry (OPEC, 1971).

This organization has experienced various economic and political challenges during 1960-2017. The substantial developments in the OPEC history are as follows: The first oil shock and Iran's Islamic revolution occurred in the 1970s.

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OPEC established a Fund for International Development in 1976. Iran-Iraq war took place during 1980-1987. OPEC introduced paper market for oil transactions in the 1980s. Iraq invaded to Kuwait in 1990-1991. War happened between Iraq and US-led coalition in 2002-2003. The global financial turmoil and economic recession increased oil prices to new records in mid-2008. Arab spring resulted in the fall of ruling authority in Libya, and so on.

Due to entry-exit episodes, the number of OPEC members has been variable in the period mentioned. For example, Ecuador joined to OPEC in 1973, suspended its membership in 1992, but reactivated it in 2007. As of July 2017, OPEC members composed of 14 countries including Algeria, Angola, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela [Retrieved from].

Although historical trends indicate relatively bigger governments in OPEC cartel, however the quality of governance has been kept nearly unaltered. All OPEC members are of small scores in terms of good governance [Retrieved from]. In general, OPEC members have pluralistic political systems, which stem from financing budgets by oil revenues.

In this paper, the main question is: "which factors affect the efficacy of government in resource-based economies?". To answer this question, we focus on the link between the government size and government efficacy in OPEC. This economic bloc is oil-abundant, so oil revenues and rents influence the effectiveness of government. In addition, OPEC members are inherently open economies due to oil and gas exports. Hence, oil rents, trade openness and economic growth are included in the regression models as control variables.

The remainder of this article is organized in 4 sections. Section 2 devotes to theory and literature. Section 3 introduces the methodology. Section 4 explains the results and section 5 concludes.

2. Theory and Literature

The distinguished public finance theorist, Richard Musgrave (1959), classified the economic role of government into allocation, distribution, and stabilization. By allocation, the government affects the quantity and quality of outputs that the economy produces. The allocation function refers to direct government production, regulation, taxation and penalties for illegal activities. By distribution, the government influences the distribution of income and wealth. The government redistributes the income and wealth through construction projects, tax cuts, subsidies, insurance plans, and so on. By stabilization, the government influences the level of employment, output, and prices.

All governments make fiscal policies in order to direct whole economy towards full employment, balanced budget, stable prices, and trade surplus. They are equipped with particular tools (taxes, tariffs, subsidies, and regulating prices for utilities) to achieve macroeconomic targets (Tanzi, 1992; Frenkel *et al*, 1996; Nijkamp & Poot, 2004; Feldstein, 2009). However, the government involvement in the economy is costly. As government size increases, its outlays grow too, but its receipts may change in different way. Ulbrich (2011) refers to citizen demand, bureaucracy behavior, elastic revenue sources, increased use of fees and charges, and lack of an effective budget constraint at the federal level as causes of rapid growth in government size.

Governments have to finance both current and capital expenditure. Besides national defense, they should provide services in three general areas: public education, health care and social security (Lindert, 2004; Rosen, 2003; Shelton, 2007). In addition, they may invest directly in capital projects including roads and highways, ports and airports, power plants, dams and so on.

How to finance public expenditure depends on government structure in each country. Some countries like US have accepted both state and federal systems, which state governments are of financial independence (Oates, 1968; Boadway & Flatters, 1982; Rhodes, 1996), but most of developing nations such OPEC

countries rely on central government planning and budgeting (Alavirad, 2003; Karl, 2007, Fesharaki & Isaak, 2016). The government structure affects certainly the efficiency of government offices. If the level of bureaucracy in public sector increases irrationally, and when public authorities are less accountable, then financial and administrative corruption will be likely high.

Although governments have different financing methods to cover expenses, however they share in taxes and fees as traditional instruments for gathering public funds. The numerous empirical studies confirm the high dependency of governments on tax-based financing in democratic systems (Scharpf, 1997; Swank & Steinmo, 2002; Lancia & Russo, 2016; Eusepi & Wagner, 2017). Moreover, in emerging economies, foreign direct investment (FDI) boosts public financial affordability through local transfers and taxes to host government (Kim & Wu, 2008; Kumar & Baldacci, 2010; Wang *et al*, 2012). However, OPEC bloc is heavily reliant on exports of oil, gas, petrochemicals and petroleum products. Evidently, OPEC members choose the cheapest way to finance their economies, i.e., oil-based financing.

Due to freedom to express views and ideas, people in democratic systems monitor the performance of ruling political parties through mass media, newspapers, written reports, social networks and even web-based sources (Street, 2010; Norris, 2011; Nisbet *et al*, 2012). Hence, sometimes people protest against ruling party in the form of civil demonstrations. This continuous monitoring can reveal the government inefficiency or failure in satisfying public wants. As a result, the frequent reforms in political regimes may improve the governance by next cabinets. This is the fruit of democracy.

In resource-based economies, the easy access to foreign incomes causes resource rents (Auty, 2007; Boschini *et al*, 2007; Stevens & Dietsche, 2008; Frankel, 2010). These rents combined with totalitarian systems result in various socio-politic problems. Willing to grasp resource rents by individuals and public authorities fuels the fraud, kickback and systematic corruption. The final output is social unrest, riots, civil war, and people uprising, which was experienced in some MENA countries during early 2010s. In this regard, the history of OPEC is full of complicated political events. The regime change in Iraq and Iran in the 1970s and Libya revolution in 2010 are samples of turmoil.

In the evolutionary course of public economics, various theories have tried to explain necessity of public sector, size of the government and composition of public expenditure (Hindriks & Myles, 2013). The efficiency and equity are two ideals and common features in these theories. Efficiency means to produce more output per inputs consumed and to minimize the wastes of resources, whereas equity relates to the fair distribution of income, wealth and opportunity. To make efficient policies to reach both equity and efficiency requires the skilled, well-informed, and honest public authorities and managers.

The main reason for the presence of a public sector is that fully free economy cannot operate efficiently if there are no specified property rights. The lack of property rights eliminates the trust among people and enterprises. In Hobbes (2010)[2] view, government as a social contract hinders social anarchy and protects the property rights. Property rights are prerequisites to enforce lawful contracts and commitments.

The formation and control of property rights is not free of charge. The judicial process to resolve disputes requires well-organized courts and skilled judges (Hirschl, 2009; Rose-Ackerman, 2010). This legal system lies in public sector body in a general term. The enforcement of contracts and laws, the provision of security and public services, and collection of taxes justify the need for a minimal public sector. Furthermore, government intervention in the economy may increases social welfare.

[2] . Revised of 1651's version

When market fails in valuation of private and social benefits/costs correctly, the government should intervene to amend the market inefficiency. In a broader sense, negative externalities, the need for public goods, and existence of imperfect competition motivate the government intervention (Cullis *et al*, 2009; Stiglitz, 2010; Atkinson & Stiglitz, 2015). Certainly, government intervention is not always advantageous, especially if the government is not accountable. Thus, the extent of intervention is of crucial importance in public economics. Evidently, a corrupt and ineffective government imposes additional costs to the whole economy. As Rose-Ackerman & Palifka (2016) point out corruption can be a symbol of government failure.

To reduce the inequality of income, wealth or opportunity is another justification for the government involvement in the economy (Rothstein, 2011; Giddens, 2013). In such environment, the government may improve the social welfare through poverty alleviation plans, public health and education services and social security programs.

An efficient government is able to match its expenditure and income. Hence, a robust nexus may exist between government size and efficacy.

3. Methodology

3.1. Data and variables

In this research, the statistical sample consists of OPEC members. Because of variability of number of members, this sample covers 12 out of 14 countries over the period 2002-2015. Therefore, it excludes Equatorial Guinea and Gabon.

To reply the question outlined in section 1, the following variables are considered according to relevant literature in the previous section:

Government Efficacy (GE): The dependent variable is a composite indicator, which accounts for efficacy of government. Here, the arithmetic mean of government effectiveness and rule of law measures the efficacy. The World Bank' official website publishes freely these sub-components under title of "*World Governance Indicators*.

Government effectiveness centers on the views about the quality of public and civil services independent from political pressures, the quality of policymaking and administration, and the commitment of the governments to implement public policies. In addition, rule of law measures the extent of confidence of agents and obedience of social rules, the quality of contract enforcement, perceptions on property rights, the performance of police and courts, and the possibility of crime and violence. Both government effectiveness and rule of law are defined by standard normal distribution in interval varying from -2.5 to 2.5. In this scaling, the higher scores of effectiveness of government (and rule of law) mean more efficient public sector.

The overall mean of government efficacy score is -0.51 during period under consideration, which indicates relatively poor effectiveness among OPEC countries.

Government Size (GS): The size of government is measured by revenue, spending, deficits, and debt. In order to make comparisons between time periods or between states, cities, and countries, data can be adjusted by correcting for inflation, dividing by population (per capita), and/or expressing revenue or spending relative to GDP or personal income (Ulbrich, 2011).

As a commonly used indicator, this paper measures the extent of public intervention in the economy by using government expenditure as percentage of GDP. Due to oil-dependent structure of OPEC countries, it is expected that government size grows in comparison with other developing countries.

The mean of government size is 14.32 percent of GDP during 2002-2015. This ratio seems unexpected, since the general presumption implies big and costly governments in OPEC. However, one should note to an imbalanced set of economies within OPEC, changing from wealthy Saudi Arabia to relatively small Angola.

Logarithm of GDP per capita [Log(y)]: In international comparisons, GDP indicates the market size. However, GDP per capita is a proxy for purchasing power. In this paper, logarithm of GDP per capita is used to explain the efficacy of government. This logarithmic variable is consistent with other variables' forms. It may have positive or negative effect on government efficacy. Nevertheless, higher per capita income can be interpreted as higher capacity to pay tax, which in turn increases the potential of government in providing services. As well, increasing personal incomes result in more responsibility, social awareness and commitment.

In the World Bank website, Per capita GDP has been reported in 2005 constant dollar. In OPEC, the mean of per capita GDP is US$ 17953 during 2002-2015. According to per capita GDP, OPEC countries can be considered as an upper middle income group.

Openness of economy (OPEN): The openness is another variable in explaining efficacy of government. An open state has international relations to other nations. Although goods and services are traded through commercial ties, but international trade standards require transparent public regulations, lack of corruption, effective administrative procedures, efficient logistic services and presence of control and monitoring mechanisms. Such provisions are perceivable in the efficient and accountable governments.

The average of this variable is about 78.4 percent of GDP. This ratio indicates that total external trade is less than total GDP. In other words, this cartel is of potential to expand its trade ties with other blocs and regions.

Rents from oil and gas exports *(RENT)*: The financing sources of OPEC members are mainly divided into resource rents, and taxes and charges. As far as oil and gas incomes are channeled into governmental budget, there will be low pressure on collecting taxes. Accessible oil and gas revenues lead to schedule capital projects by government, on one hand, and to hire more labor in public sector, on the other hand. Consequently, one can expect that resource rents help to enlarge government particularly in OPEC countries. In the model specified, the rents from oil and gas relative to GDP are included as another explanatory variable.

The mean of variable *RENT* is about 25.6 percent of GDP. This figure indicates high dependency of OPEC to oil and gas rents. If such rents are invested in man-made or physical capital, then development will be sustainable.

3.2. Model

According the review of literature outlined in section 2, the following model is defined to explain the government efficacy (GE):

$$GE_{it} = \alpha + \beta_{it} + \gamma.GS_{it} + \lambda.Log(y_{it}) + \delta.OPEN_{it} + \theta.RENT_{it} + \varepsilon_{it} \quad (1)$$

where *GE* denotes government efficacy. It is the sum of two governance indicators, i.e., government effectiveness and rule of law. *GS* measures the government size, as ratio of government expenditure to *GDP*. *Log(y)* means logarithm of per capita income and indicates purchasing power in each country. *OPEN* is a proxy for trade openness, as ratio of total external trade to GDP. *RENT* indicates the share of resource rents in GDP. Subscripts i and t denote country and time, respectively. In addition, α, β, …, θ are parameters to be estimated and ε_{it} denotes error term.

In the OPEC framework, the signs of coefficients of right-hand variables in equation (1) are expected as follows:

$$\gamma \prec 0, \quad \lambda \succ 0, \quad \delta \succ 0, \quad \theta \prec 0 \quad (2)$$

4. Findings

Since Equation 1 includes both time-series and cross-sectional data, it takes a general panel data form. Prior to estimate this equation, stationary of variables should be tested. In panel data, the existence of weak or strong non-stationary is of research concerns. For testing the stationary in panel data, several methods have been proposed by Breitung (2001), Im, Pesaran, & Shin (2003), and Levin, Lin, & Chu (2002). This paper applies the LLC strategy, which assumes unit common root among variables under study. As Table 1 shows, the panel unit root is rejected at 1% level of significance. Thus, the regression is not spurious.

Table 1. *Panel unit root test*

Method	Stat.	Prob.	Cross-sections	Obs
Levin, Lin & Chu, t	-2.447	0.007	12	144

Note: *stat, Prob* and *Obs* denote t- statistic, probability and number of observations, respectively.

In the second step, model 1 should be tested for applying pooled or panel data specification. The common procedure is to test the null hypothesis indicating redundant fixed effects. If null hypothesis is rejected, then the decision will be in favor of panel data model. Otherwise, we can proceed with pooled data model. Table 2 reports the results of testing for redundant fixed effects. As shown, the panel data model is preferred to pooled data form.

Table 2. *Redundant fixed effects tests*

Effects Test	Stat.	d.f.	Prob.
Cross-Section/Period F	38.110	(24,139)	0.000
Cross-Section/Period Chi-square	340.289	24	0.000

Note: stat, df and prob denote t- statistic, degree of freedom and probability, respectively.

The third test is to decide on estimating Model 1 in fixed or random effects. This is carried out by Hausman (1978) test representing the random effects (RE) by default. By rejecting null hypothesis, the decision is made supporting fixed effects (FE). Table 3 represents the results of Hausman test, which do not reject null hypothesis. As a result, Model 1 should be estimated in random effects format.

Table 3. *Hausman test*

Test Summary	Chi-Sq. Stat.	Chi-Sq. d.f.	Prob.
Cross-section random	0.917	4	0.922
Period random	4.157	4	0.385
Cross-section/period random	4.311	4	0.366

Note: Chi-Sq. Stat., Chi-Sq. df and prob denote Chi-square statistic, Chi-square degree of freedom and probability, respectively.

After testing for good specification of model, it is estimated using Eviews software. Table 4 denotes the econometric output. All coefficients are statistically significant; therefore we can interpret the coefficients. The diagnostic statistics also indicate the robustness of regression. In this Table, σ_u and σ_ε are used to calculate the correlation coefficient (ρ) of error terms of a specified cross-sectional unit between two different periods. In exact terms, this coefficient is defined as follows:

$$\rho = \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_u^2} \tag{3}$$

Where σ_u^2 and σ_ε^2 denote within (intra-level) variance and between (inter-level) variance of error terms, respectively. Since computed ρ is about 0.101, then correlation between cross-section error terms seems weak. Thus, the estimation results are reliable.

Table 4. *Results of model estimation*
(Panel EGLS with Two-way random effects, Dependent Variable: GE)

Variable	*Coeff.*	*S. E.*	*t-Stat.*	*Prob.*
C	-4.151	0.689	-6.022	0.000
GS	-0.011	0.005	-2.187	0.030
LOG(y)	0.413	0.069	5.911	0.000
OPEN	0.004	0.001	3.673	0.0003
RENT	-0.011	0.002	-5.331	0.000
Effects Specification			S.D.	Rho
Cross-section random(σ_u)			0.459	0.899
Idiosyncratic random(σ_ε)			0.154	0.101
R-squared= 0.693			Number of observation=144	
Number of cross-sections=12				

Source: Author's calculation
Note: C, Coef, S.E, t-stat. and Prob denote intercept term of regression, coefficient, t- statistic and probability, respectively.

According to results reported in Table 4, if government size (*GS*) increases by 1%, the efficacy of government (*GE*) will decrease by 0.011, other things being equal. This finding is comparable to Afonso & St Aubyn (2005) arguments. In an analysis of the performance of 23 OECD Member States, they discussed that countries with small public sectors on average have a more efficient provision of public services. In addition, using a panel data set of 114 countries from 1980 to 2006, Hauner & Kyobe (2010) concluded that the higher government expenditure relative to GDP (or higher government size) tends to be associated with lower efficiency in the public sector.

Both government size and resource rents (*RENT*) affect inversely the government efficacy and the magnitudes of effects are nearly equal. The negative effect of rents on government efficacy has been also confirmed by Anthonsen *et al* (2012). Emphasizing on the quality of government, they found significant and negative effects of oil and gas rent dependency on three dimensions of quality, i.e., low corruption, bureaucratic quality and legal impartiality, in a sample of 139 states in the period 1984 to 2006.

GDP Per capita has significant and positive effect on government efficacy. In other words, the government efficacy will increase by 0.41, if the per capita GDP increases by 1%, ceteris paribus. Similar to findings reported in Table 4, La Porta *et al* (1999) reached a strong positive association between per capita income and government performance in a large cross-section of countries. As well, Hauner & Kyobe (2010) found that richer countries exhibit better public sector performance and efficiency.

The openness also affects directly the efficacy of government. Hence, the open door policies have positive impacts on the government efficiency in the OPEC. This finding is compatible to Brewer *et al* (2007) views. Focusing on Asian countries, they argue that more open and transparent societies are likely to be more effective at delivering public services.

5. Conclusion

The numerous theories have been developed to explain the causes of growth of the public sector in various countries. According to the economic development models, all economies involve in structural changes in an evolutionary and historical context.

Because of widespread ideas about economic development, there is no unique theory to explain the causes and phases of development. Nevertheless, Hindriks & Myles (2013) consider development as a three-phase process. The early phase of development is the period of industrialization in which the population moves from the countryside to the urban areas. In this stage of development, the dominant role of infrastructure determines the nature of public expenditure. In the so-called "middle stages" of development, the infrastructural expenditure of the public sector becomes complementary with expenditure from the private sector. Developments by the both public and private sector generate a range of externalities such as pollution and crime. And public sector gets ready to the control of these

externalities. Finally, in the developed phase of the economy, the equity concerns result in transfer payments, such as social security, health, and education, becoming the main items of expenditure.

OPEC has experienced above-mentioned development stages, although the speed and rate of socioeconomic changes have not been equal within this group. This cartel' members have spent huge capital in building construction and infrastructure projects. In addition, OPEC has recorded increases in literacy rate, health standards, and per capita income. However, there are some considerable issues regarding the second and third phases of Hindriks and Myles' model. In fact, income inequality, corruption and environmental externalities are common problems in this economic bloc.

The reaction of OPEC to these issues originates from institutionalized resource-based economies. The permanent injection of oil and gas revenues into economies has induced governments to exert low-tax regimes. The dilemmatic matter is low willingness of OPEC's citizens to pay taxes. Indeed, OPEC' people is reluctant to pay more tax, because they regard exhaustible resources' incomes as easy financing tools. In Ulbrich (2011) viewpoint, if [public] services are good, and taxes are low, the citizens vote to retain the incumbents, or move into well-run local communities.

What actions should be adopted by OPEC members in order to increase the efficacy of member states? According to findings, the top priority should be given to reduce the government size. Size of government may be decreased through adopting market-oriented policies and minimizing the extent of government intervention in the economic affairs.

The OPEC governments can design new export-oriented strategies in order to promote non-oil exports. The diversification of exports of goods and services is a vital strategy for OPEC. It can decrease the reliance of OPEC to single-product (petroleum) economy, and may provide new foreign earnings. Investing in tourism industry, attracting foreign direct investment (FDI) aiming at production of outputs with higher value added, exporting medical, educational and financial services, importing intermediate and capital goods required for domestic manufacturing sector and creating new destinations for exports are some recommendations to increase the degree of trade openness.

OPEC members can increase the effectiveness of own governments by reducing the share of resource rents in GDP. In this regard, OPEC countries have established the so-called "Sovereign Wealth Funds (SWFs) [Retrieved from]", under different names, to manage oil and gas revenues. The monitoring of the foreign receipts entering into these Funds would help policy-makers to neutralize the effects of negative oil price shocks.

This research opens new scope for future researches in order to inclusion the composition of government expenditure on one hand, and different indicators of quality of government on the other hand. In addition, the interactional effects of resource abundance and government size, geographical and demographic factors may be examined in the upcoming studies.

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