The relationship between reserves of oil endowment and economic growth from the resource curse viewpoint: a case study of oil producing countries

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Abstract

This research investigated the effective economic growth determinants using a panel data set over the period 1995 to 2010 in oil-rich countries divided by the level of democracy into two groups: countries with low and high democracy. The result of OLS method rejects the curse hypothesis; however, TSLS method reveals the reserves of oil endowment has a negative effect on economic growth of low democracy countries and the curse hypothesis is approved.

JEL Classification: O31, Q43, P28

Key words: Resource curse, Economic growth, Reserves of oil endowment, Panel data

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Introduction

Resource curse is one of the most important empirical findings of development economics in twentieth century. This hypothesis concerns resource-rich countries which have less economic growth in comparison to resource-poor ones. Generally resource curse hypothesis is a paradox because natural resources are the primary sources of all development routes. They also provide the fastest source of foreign exchange and absorb foreign skills and capitals and increase access to raw materials, and will raise the demand for manufacturing and industrial products. However, over the past 50 years, natural resource-rich countries such as Russia, Nigeria, and Venezuela have experienced much slower economic growth than others with fewer natural resources (Auty, 2001) (Rainis, 1991) (Bulmer, 1994) (Sachs and Warner, 1995, 1997) (Lal and Myint, 1996). Oil-rich countries, rich countries with fertile land and the sea have faced a slow economic growth over the last three decades which OPEC countries are the obvious example so that during the past four decades, all OPEC countries have experienced negative growth rates (Gylfason, 2001) and GDP per capita has decreased by 1.3 percent per year between 1965 and 1998 in these countries while at the same period GDP per capita has increased by 2.2 percent for countries with medium and low growth (Gylfason, 2001). Studies have confirmed the view that countries that have little oil reserves often have a higher economic growth compared to resource-rich countries and in most studies, the negative relationship between natural resource abundance and economic growth has been verified. The current study sought to examine the relationship between the reserves of oil endowment and economic growth in selected oil producing countries with low and high democracy.
The following parts of paper are as below: theoretical basis for resource curse and democracy are represented in second section. Then in third section literature will be reviewed. Specification and estimation of the model is presented in fourth part and finally section 5 concludes.

Resource curse

Michael Ross (2012) in his book The Oil Curse: How Petroleum Wealth Shapes the Development of Nations, states although the developing world has been wealthier, more democratic and pacifist since 1980, it is just true in countries without oil. Scattered oil countries in Middle East, Africa, Latin America and Asia are not wealthier, more democratic and more pacifist than what they were in three decades ago, some even are worse. Income per capita has decreased 6 percent in Venezuela, 45 percent in Gabon and 85 percent in Iraq over 1980 to 2006. A large number of oil producing countries such as Algeria, Angola, Nigeria, Sudan and Iraq with several decades of civil war have faced a bad situation too. These political and economical chronic diseases create the same thing is called Resource Curse. Since these diseases and curses are not made by other natural resources like jungles, clean water and fertile land, it is more relevant to say this is a mineral curse. Among minerals oil, which contains more than 90 percentage of the world trade, causes the largest problems for most countries. Generally resource curse is the oil curse.

Resource curse literature investigates the reasons of why countries with these blessings fail in economic development and especially in achieving a continuous and proper economic growth. Sachs and Warner (1995, 1997), Auty (2001), Papyrakis and Gerlagh (2004) presented the first empirical relationship of resource curse hypothesis. In addition to calling resource curse as a historical common pattern, they introduced natural resource abundance as the most obvious cause of low economic performance.

Democracy

Barro (1996), Ross (2001) and Polterovich and Popov (2006) state if political institutions and political power are in the hands of one person or a small group or even be as democratic dictatorship and leaders and legislators to be elected by the public (but not in complete freedom), property rights secure and equal opportunities for the people and economic institutions can hardly be achieved. Most of the developing oil exporting countries are accompanied by poverty, low quality of education and lack of civil society. Corruption exists at all levels of social, political, cultural and economic life and increased corruption, reduction in the rule of law, the quality of governance declines the economic growth. Ross (2001) also states oil wealth may prevent the promotion of democracy and the attempts to formation of a democratic government, especially in developing countries due to the tendency of powerful leaders to use repressive methods. In this case, the huge oil revenues in oil-exporting countries make it possible for political regimes to suppress the social objections with more power. Ross suggests that oil wealth with military spending in turn is associated with despotism. Wantchekon (1999), Ross (2001) and Smith (2004) know the reason behind the lack of democracy in oil-rich countries, firstly the tendency of their leaders to be autonomy in decision-making. These countries by relying on vast resources do not receive tax thus the leaders considered themselves separate from the society and not accountable to the people. Chaudhry (1997) states experience of the tax bureaucracy cut in Saudi Arabia and Iran during the Pahlavi regime refers to the authoritarian regimes in most Arab Petroleum Exporting Countries and other oil-exporting countries. Secondly, government will allocate oil revenues to calm down and suppress populations and third, the social structure of these countries is not a good atmosphere for democratic regimes. The main question is that why the oil rent increase in political systems will affect economic performance?

Literature review

Many studies have been performed in the area of resource curse. Rocha (2010) states Perbish (1950, 1964) and singer (1950) studied the subject firstly. These development economists argued raw materials exporters in trade with industrialized countries due to deteriorating of terms of trade, would lose their benefits and the economy fell behind in development path. Olomola et al. (2003) investigated the effect of oil rent on economic growth using a panel data set over 1970 to 2000 in 47 oil exporting countries among the African countries. They concluded resource curse does not occur because of Dutch disease and effect of exchange rate, but the lack of democracy leads to oil rents and will reduce economic growth in these countries. To indicate the relationship, he applied the variables

such as income per capita, ratio of investment to GDP, oil wealth, institutional quality, real per capita income, population growth, and the exchange rate.

Wantchekon (1999) investigated the effect of natural resources on economic growth of democratic governments. He revealed when governmental institutions are weak and there is a lack of transparency in the budget, oil bonanza caused authoritarianism and increased social and political instability. The variables of the research consist of the Gini coefficient, the ratio of exports to GDP and the governmental concentration measurement. He refers to the failure of democracy in the Middle East and admits that the increased government revenues tend to raise their democracy; however, if income is derived from oil wealth, democracy reduces or disappears. Romer (1970) and Lewis (1989) emphasize a positive relationship between natural resources abundance and economic growth. Papyrakis and Gerlagh (2004) by considering the direct and indirect effects of natural resources abundance on economic growth, concluded when natural resources are the single explaining variable have a positive effect on economic growth; however, the effect is negative when other explaining variables such as corruption, investment, openness to trade, terms of trade and education are inserted to the model. Olusi and Olagunju (2005) showed the agricultural production and exports of Nigeria have been depressed along with the oil boom and higher oil prices over 1980-2003. Brunnschweiler (2006) found out a positive and significant relationship between natural resources abundance and economic growth. Papyrakis and Gerlagh (2007) in a study for the United States showed that resource abundance has a negative and harmful effect on the growth of this country. Thereby resources reduce investment, years of schooling, openness to trade and costs of R&D and increase corruption in the society.

Omes and Kalcheva (2007) by examining the Dutch disease hypothesis in Russia and using indicators such as strengthening the real exchange rate, reducing the growth of manufacturing sector and increasing the service sector indicated rising oil prices in addition to increase the exchange rate cause the growth of manufacturing sector and employment decrease.

James and Aadland (2010) investigated resource curse phenomenon in United Stated and concluded increased natural resources in different states led to economic slowdown. Boyce and HerbertEmery (2011) found a negative relationship between natural resources and economic growth.

According to the literature, we are going to investigate the effect of reserves of oil endowment on economic growth along with variables such as population, openness to trade, religion, type of government and indicators of economic freedom and breadth of the oil-rich countries which are divided by the level of democracy into two groups: democratic and non-democratic countries. This division is performed by using Index of Democracy[4]. Democratic countries consist of Full democracies, Flawed democracies, and Hybrid regimes and Non-democratic countries include Authoritarian regimes as mentioned in the index of democracy.

[4] From The Economist Intelligence Unit (2012)

Table 1. selected countries

Group	Name of countries	Period
Democratic countries	Australia, Canada, Colombia, Ecuador, Indonesia, Malaysia, Mexico, Norway, Russia, Britain, America and Venezuela	1995-2010
Non-democratic countries	Algeria, Angola, Cameroon, China, Egypt, Gabon, Kuwait, Oman, Saudi Arabia and Syria	1995-2010

These countries have been selected because of the availability of information.

Introducing the variables and specification of the model

Referring to the literature and based on the studies of Olomola et al. (2003) the model is specified as following:

$$LGDP_{it} = \beta_0 + \beta_1 \times LPOP_{it} + \beta_2 \times LGOV_{it} + \beta_3 \times LFT_{it} + \beta_4 \times LFFC_{it} + \beta_5 \times LOIL_{it} + \beta_6 \times POLITY_{it} + \beta_7 \times LRATE_{it} + \beta_8 \times LFF_{it} + \beta_9 \times LPT_{it} + DU_{it} + U_{it}$$

We just added the economic freedom indicators in comparison to the model of Olomola et al. (2003). The variables and sources of information are presented in Table 2.

Table 2. The variables and sources of information

Variable	Description	Resource
LGDP	Logarithm of Gross Domestic Product (Constant 2000 US$)	*World Bank (2013)*
LOIL	Oil Proved reserves (Million Barrels)	*OPEC (2013) & BP (2013)*
LPOP	Logarithm of population (the number of people)	*World Bank (2013)*
POLITY	Polity represent "a particular form or a system of government", defined as the basis of regime legitimacy. It ranges from -10 (purely Autocratic) to +10 (purely Democratic). Increase in Polity then signifies a more democratic polity and decrease for a more autocratic one	*Center for Global polity George Mason University (2013)*
LGOV	Logarithm of the size of government, which belongs to the index of economic freedom. It ranges from 0 to 100. Countries with larger governments have lower ranks. In all indicators of economic freedom, increase in the number indicates more economic freedom.	*heritage.org (2013)*
LFT	Logarithm of the trade freedom (indicators of economic freedom)	*heritage.org (2013)*
LFFC	Logarithm of the freedom from corruption (indicators of economic freedom)	*heritage.org (2013)*
LFF	Logarithm of the freedom from tax (indicators of economic freedom)	*heritage.org (2013)*
LPT	Logarithm of the property rights (indicators of economic freedom)	*heritage.org (2013)*
LRATE	Logarithm of the real exchange rate	*World Bank (2013)*
LGEO	Logarithm of the breadth of the country (the area of each country to square meters)	*World Bank (2013)*
ISLAM	Religion as a dummy variable in the model. For Muslim countries it considers 1 and for others 0.	*United Nations (2013)*
LL	Logarithm of employment	*World Bank (2013)*
LSCH	Logarithm of the number of enrollees in secondary schools	*World Bank (2013)*
DUM_{it}	Since there is a possibility that a missed effect change the results, a dummy variable is added to the model. This variable can represent to some extent the effect of rent-seeking and factors like war, religion and security and etc. which are not included in the model. The figures zero and one are given to the variable in the absence and presence of the missed effect.	
U_{it}	The error term	

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ are the coefficients of the model and should be estimated.

Stationary test

Since the period of this research is considered in long term, unit root test is performed. All variables are stationary in level except GDP in countries with low democracy and oil proved reserves in countries with high democracy. Thus the first difference of I(1) variables entered to the model and hence the cointegration test is not necessary.

Tests of fixed and random effects

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 (Mohammadi and Mohammadzadeh, 2009).

Table 3. F-Limer and Hausman tests for each group

	Democratic countries			*Non-Democratic countries*		
Effects Test	*Statistic*	*def.*	*Prob.*	*Statistic*	*def.*	*Prob.*
Cross-section F	*395.587219*	*(10,143)*	*0.0000*	*1.930917*	*(4,53)*	*0.1188*
Cross-section Chi-square	*546.966469*	*10*	*0.0000*	*9.114787*	*4*	*0.1083*

Source: findings of research

Table 4. Hausman test for Democratic countries

	Democratic countries		
Effects Test	*Statistic*	*def.*	*Prob.*
Cross-section random	*309.088002*	*9*	*0.0000*

Source: findings of research

Since F-statistic and Hausman tests are indicating the rejection of H_0 hypothesis for democratic countries, selected method for estimation is fixed effects method; however, because of not rejection of H_0 hypothesis in F-limer test for non-democratic countries, the pooled data model will be used for estimation.

Estimation results with OLS method

Table 5. Results of OLS estimation

Democratic countries				*Non-Democratic countries*			
Variable	*Coefficient*	*t-Statistic*	*Prob.*	*Variable*	*Coefficient*	*t-Statistic*	*Prob.*
LGOV	*0.071552*	*2.445471*	*0.0158*	*LGOV*	*-0.054252*	*-1.632421*	*0.1088*
LFF	*0.014877*	*2.044574*	*0.0429*	*LFFC*	*-0.006929*	*-6.523766*	*0.0000*
LFT	*-0.050042*	*-2.026914*	*0.0447*	*POLITY*	*0.008296*	*7.613701*	*0.0000*
LOIL	*0.002642*	*0.643754*	*0.5209*	*LOIL*	*0.008124*	*4.409842*	*0.0001*
LFFC	*0.020840*	*2.876512*	*0.0047*	*LFF*	*-0.241670*	*-6.124245*	*0.0000*
LPOLITY	*0.006019*	*3.397025*	*0.0009*	*LPOP*	*0.623699*	*11.56620*	*0.0000*
LPOP	*-2.857418*	*-2.823727*	*0.0055*	*LFT*	*-0.083812*	*-7.903477*	*0.0000*
LRATE	*0.158385*	*5.016431*	*0.0000*	*LRATE*	*-0.142681*	*-8.918439*	*0.0000*
LPT	*0.044434*	*2.371003*	*0.0192*	*LPT*	*-0.056687*	*-5.503698*	*0.0000*
DU1	*-0.015699*	*-12.15564*	*0.0000*	*LGEO*	*-0.455426*	*-35.51064*	*0.0000*
LGEO	*0.347968*	*10.47123*	*0.0000*	*ISLAM*	*0.291002*	*4.765011*	*0.0000*
ISLAM	*-0.021825*	*-13.53198*	*0.0000*				
R-squared		*0.99*		*R-squared*		*0.99*	
Durbin-Watson stat		*1.86*		*Durbin-Watson stat*		*1.54*	

Source: findings of research

Results of OLS estimation indicate that the size of government, the freedom from corruption, the freedom from tax, the property rights, the breadth of the country, and the real exchange rate have a positive effect in democratic countries and a negative effect in non-democratic countries on economic growth. Polity has a positive effect on economic growth in both groups of countries. Oil Proved Reserves does not impact growth in countries with high democracy; however, it has a positive effect in countries with low democracy. Religion and population have a negative effect in high democracy countries and a positive effect in low democracy countries on economic growth. The dummy variable has also a negative effect in democratic countries. Results reveal that when we estimate the model with OLS method, resource curse does not occur in any groups and Oil Proved Reserves has a positive effect on economic growth in non-democratic countries.

Estimation results with TSLS method

Growth models for oil-rich countries assume that oil revenue, which is correlated with the status of each country, varies over time. However economic growth depends on the breadth of the country (GEO, which is constant over the years) and its resources. Due to the variable, GEO or the breadth of the country, fixed effects method cannot estimate the model appropriately. GLS method would not also estimate coefficients in random effects method accurately (Mohammadi, 2013). Thus we estimate the mentioned model by TSLS method. We use education, employment and polity as instruments. Democracy affects economic growth both directly and indirectly through investment, inflation, population growth and income distribution. Democratic system accompanied by political stability secures private property rights including inventions, and strengthens fundamental linkages between political institutions and investors. Similarly, democracy provides social stability and improves income distribution in favor of the middle class and toilers and so augments the quality and quantity of education and human resources skills and this leads to economic growth increase. The positive effect of democracy on economic growth is largely through improved human resources education and skills. Income distribution

improvement is due to the power transmission from wealthy class to middle class. Although in the short term democracy may increase consumption, reduce investment and economic slowdown, long-term sustainable economic development requires an equitable distribution of income. Helkman and Naak (2002) state in a democratic system, the government is obliged to respond to people and hence its decisions is accompanied by the majority vote of the people and thus the economic freedom will increase.
There is also a bidirectional and reciprocal relationship between education and employment and economic growth. This means that by increasing the level of education, human capital and employment, economic growth will augment and mutually higher economic growth results in human capital and employment improvement.

Table 6. TSLS estimation

Democratic countries				*Non-Democratic countries*			
Variable	*Coefficient*	*t-Statistic*	*Prob.*	*Variable*	*Coefficient*	*t-Statistic*	*Prob.*
LGOV	*-0.032749*	*-0.403351*	*0.6877*	*LGOV*	*-0.546845*	*-2.547969*	*0.0157*
LOIL	*0.108810*	*4.221609*	*0.0001*	*LFFC*	*0.053914*	*1.206265*	*0.2363*
LFF	*0.421341*	*2.609982*	*0.0107*	*LOIL*	*-0.046096*	*-5.059069*	*0.0000*
LFT	*-0.004540*	*-0.298918*	*0.7657*	*LPT*	*-0.456537*	*-2.064760*	*0.0469*
LFFC	*0.038571*	*2.477073*	*0.0152*	*LFT*	*-0.450442*	*-7.059618*	*0.0000*
LPT	*0.096709*	*3.624431*	*0.0005*	*LRATE*	*0.980161*	*3.269683*	*0.0025*
LRATE	*0.268887*	*6.761203*	*0.0000*	*LPOP*	*0.826280*	*17.21220*	*0.0000*
LPOP	*1.660249*	*3.935718*	*0.0002*	*LFF*	*-1.527658*	*-4.534759*	*0.0001*
ISLAM	*0.003082*	*0.263958*	*0.7924*	*DU6*	*5.120066*	*8.002996*	*0.0000*
				DU5	*-0.347527*	*-2.198109*	*0.0351*
				ISLAM	*3.192958*	*4.224394*	*0.0002*
R-squared		*0.99*		*R-squared*		*0.99*	
Durbin-Watson stat		*2*		*Durbin-Watson stat*		*1.79*	

Source: findings of research

TSLS estimation indicates trade freedom has a negative and significant effect on economic growth in low democracy countries; however, there is no significant relationship between them in high democracy countries. It can be safely said that Dutch disease effects are visible in nondemocratic countries which oil revenues are deteriorating terms of trade and causing Dutch disease. Population is positively related to economic growth in both groups therefore with the increase in population, economic growth will rise in these countries. This result is not consistent with previous studies. The size of government does not affect economic growth in democratic countries and it has a negative and significant effect on economic growth in non-democratic countries. Most government expenditures in low democracy countries spent on current expenses, as well as to suppress dissent and thus it reduces economic growth. Wagner Act also notes that with the increase in per capita income in an economic system, the relative size of the public sector will augment (Pajooyan, 2002). In some theories, the relationship between government spending and economic growth is investigated by the method of financing through tax and point to extra taxation load. Barro (1992) in endogenous growth model revealed in most cases, taxation causes a gap between private and social rates of return. The gap puts tax rate between net and gross rates of return on savings that reduces capital accumulation and thus leads to lower rates of economic growth. Theoretical foundations that explain the relationship between the size (and expenditure) of government and economic growth have been examined from two perspectives. In first viewpoint positive or negative effect of the size (expenditure) of government on economic growth have been reviewed and criticized, and

the subject of the second approach is the optimal size. According to first viewpoint, there are two fundamental terms, a) a larger size of the government has a negative effect on economic growth. Government is inefficient. For example, undertaking public investments with high costs and also inefficient ownership in agriculture, industry, energy, banking and financial services, reduces opportunities for private sector investment. Thus a larger size of government has a negative effect on economic growth in long term. In addition funding the government through internal and external debts squeezes the private financial system and will take profitable investment opportunities for the private sector, b) government plays an important role in developing the countries and hence has a long-term positive effect on economic growth. This group believes government on guiding the economy towards the optimal development point holds a crucial and key role in conflicts that arise between private and public interests.

According to the second viewpoint there is an optimal point for government expenditures. On this basis, government expenditures divided into two parts of productive and unproductive expenditure. Barro et al. (1991), Gaurteni et al. (1998) and Barro (1989) indicated the government is a major impediment to economic growth. Salai Martin (1997) showed there is a weak relationship between economic growth and the size of government. Keler et al. (1999) state expenditures such as education and construction costs of government increase economic growth; however, security and welfare costs do not affect economic growth.

Freedom from corruption has a positive and significant effect on economic growth in both groups. The freedom from tax and property rights have a positive and significant effect on economic growth in democratic countries and a negative effect in non-democratic countries. Loson and Blak (1996) have two conditions for economic freedom: property rights, free operation and exchange. If there is economic freedom, people should know their legally acquisitions protected from encroachments of the others and be able to use or exchange it without trampling upon the rights of others. Property rights increase production incentives by producing private wealth prevent all the wealth of society to be a government monopoly. Property rights as well as the production of wealth, facilitate achieving political reconciliation, and implementing social arrangements. On the other hand free trade increases the efficiency of production, optimal allocation of resources, maximizing production level and ultimately produces maximum prosperity for the community. In low democracy countries because of the form of government, property rights is limited and also with regard to revenues from oil sales, tax revenues are limited, thus the levels of tax freedom and property rights are low and they do not have a positive effect on economic growth.

Exchange rate has a positive and significant effect in both countries. With the increase in the exchange rate and reduced imports, terms of trade improve and economic growth will increase.

Oil proved reserves has a positive effect in democratic countries and a negative effect in non-democratic countries on economic growth. Oil does not have negative and inhibiting effects on economic growth directly, but resource abundance often causes certain trends and distortions in economy and leads to economic backwardness. This result indicates that the resource curse phenomenon has occurred in countries with lower democracy.

Religion (Islam) as a dummy variable has a positive effect on economic growth in both groups. In contrast to previous theories including Swife which considered Islam little attention to the wealth of the Muslims an obstacle to capital accumulation, and also Ernest Renan that states Islam is opposed to scientific advances and industrial progress and is in conflict with science and culture, we see that Islam does not have only a negative effect on economic growth, but also causes economic growth to increase. This result is consistent with that of Ross (2008). He knows oil as the main cause of arrears in oil-rich countries, not Islam. Dummy variables in Egypt and Gabon have respectively positive and negative effects on economic growth which indicates the internal conditions of these countries.

Results

Natural resources (and its income), not directly, but by different paths such as changes in production level, creating dependence on resource extraction sector, raising the real exchange rate, increased imports, and etc. can influence economic growth. This research investigated the effective economic growth determinants in oil-rich countries divided by the level of democracy into two groups: countries with low and high democracy. The results of the OLS method shows that in countries with high democracy government size, freedom from corruption, polity (democracy), the real exchange rate, freedom from tax, oil revenues, breadth of the country, and property rights, have a positive and significant effect on economic growth and oil proved reserves has no significant impact on economic growth in these countries. However population, economic freedom and religion have a negative effect on economic growth.

In countries with low democracy the size of government, freedom from corruption, freedom from tax, real exchange rate, and property rights have a negative and significant effect on economic growth and polity, oil proved reserves, religion and population have a positive and significant effect on economic growth. Thus resource curse hypothesis is rejected by OLS method in both groups. However when we estimated the model by TSLS method and used employment, education and polity as instrument variables, the relationship between the variables and economic growth changed. The secondary model revealed in low democracy countries size of government, oil proved reserves, property rights, trade freedom, freedom from tax have a negative and significant effect on economic growth and freedom from corruption does not affect economic growth significantly. On the other hand religion, real exchange rate and population have a positive and significant effect on economic growth.

In high democracy countries size of government, trade freedom and religion does not have any significant effect on economic growth; however, freedom from tax, freedom from corruption, real exchange rate, population, property rights and oil proved reserves have a positive and significant effect on economic growth. Therefore by TSLS estimation, resource curse hypothesis is approved in non-democratic countries and is rejected in democratic countries.

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