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## Article

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# Performance and Potential of Central Government Revenue: A Panel Data Analysis for Oil Exporting and Importing Countries

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## ABSTRACT

The main goal of every government in the country is to promote economic and social development. The fulfillment of this goal depends on the availability of sufficient amount of central government revenue. Unfortunately, in developing countries, the collection of revenue is far below than expectations. This study initiated with twin objectives. First, to identify the macroeconomic variables that affects central government revenue and examines their importance. Second, to access the performance and potential of revenue collection by the central government of oil- exporting and importing countries. The panel data estimation results of a sample of 22 countries for the period 2004-2017, identified several important macroeconomic variables that significantly affect central government revenue. It is also concluded that some countries are very poor in revenue generation compare to what we expect based on their macroeconomic performance. It is also observed that some oil-exporting and importing countries could not maintain their revenue generation performance and are facing serious problem to finance their expenditures.

**Keywords:** Central Government Revenue, Economic Development, Panel Data, Oil Exporting and Importing Countries, Revenue Performance of Government

**JEL Classification:** H20, F63, C23, O57, H11

## 1. INTRODUCTION

Revenue generation is the main source of concern for every government for economic and social development. The policy-makers try hard to increase central government revenue by focusing on different variables and policy reforms. Unfortunately, the revenue generation has been very low in many developing countries, resulting in a serious budget deficit and growing public debt problem.

There are different sources through which revenue can be generated. Developing countries mainly generate revenue from taxes. Such as income, property, trade, sales, and value added taxes. There are some non-tax sources of revenue generation such as fee, fine and social contributions. The generation and composition of central government revenue are different in

oil-exporting and importing countries. In many oil-exporting countries, the income tax does not exist while in oil-importing countries the revenue from fee and fine is very low.

This study intends to investigate the main determinants of central government revenue in oil-exporting and importing countries, as it is believed that there will be some differences in the two samples of countries.

It is seen that some countries performed well in the generation of revenue while the performance of other countries was very poor and they relied on internal and external debt to finance their expenditures. Delay in the collection of revenue can politically be helpful but economically cannot be a prudent policy as it results in poor economic and social development and accumulation of public debt.

This study initiated with twin objectives. First, to identify the main economic determinant of central government revenue in oil-exporting and importing countries separately. Second, to use the estimated models to assess the performance and potential of revenue generation in two groups of countries. To achieve these objectives this paper is divided into six sections.

Following brief introductions, Section 2 presents the review of the literature. Section 3 discusses the model and data. Section 4 presents the estimation results of the models. Section 5 assesses the performance and potential of revenue generation. The final section concludes the study, discusses policy implications and set directions for further research.

## 2. REVIEW OF LITERATURE

According to Adam Smith, a very well-known classical economist, his principles called classists' tax principles. These four principles are: Principle of justice that describes the fair distribution of tax load among taxpayers, principle of specificity that describes clear method of taxes must be determined, principles of convenience that describes the facilities considered to the taxpayers for tax collection and the last is principle of conservation that describe cost in collecting taxes must be diminished. This last principle also explained in the studies of Dadgar (1999) and Jamshid (2012).

Another school of thought is the Keynesian view; it gives three principles for the tax system. These principles are: principles of personalizing tax that describes the fair distribution of tax burden with various tax bases, the principle of intervention that describes augmenting welfare and community services system and the last principle is the principle of income desirability that describes the fair distribution of income and diminished tax on consumption expenditure.

Lastly, the modern view school of thought, it also gives three principles for the tax system. These principles are: principles of differentiating to spend that describe where the taxes to be spent, another principle is about accessibility in willingly pay the tax that describes accepting and organizing the tax payment. Lastly, the principle about participation which describes the public structure and public participation in tax payment.

Addison and Levin (2006) tested the relationship between tax revenue and GDP for the 39 sub-Saharan Africa Countries over the period of 1980-2005 by using GMM approach. The study concludes that the total tax to GDP ratio is higher in more open and less agricultural dependent economies. It is also higher in less populated and more peaceful countries. The positive and significant effect of value-added tax was also found on overall tax to GDP ratio.

Gupta (2007) contributed to the empirical literature on the determinants of tax revenue from 105 developing countries from Sub Saharan Africa and Latin America for the past 25 years by using various estimation techniques. The author found that institutional and governance quality is reflected as one of the most important factors that determines the adequacy of tax

collection. The structural factors such as GDP per capita, the share of agriculture in GDP and trade openness, corruption, political stability, the share of direct and indirect taxes are also important. The author also found that the reduction in corruption could be expected to increase tax revenue.

Mahdavi (2008) used the fixed and random effects model to establish the determinants of tax revenue performance for the 43 developing countries over the period of 1973-2002 by using the GMM method with cross-section fixed effects. The study used various explanatory variables such as trade openness, exchange rates and industrial share to GDP, which have positive and statistically significant effect on tax revenue performance while foreign aid, population density, relative share of old-age population, agricultural share to GDP, the rate of inflation and the degree of monetization have negative effect on tax revenue performance.

Pessino and Fenochietto (2010) determined tax potentials and tax efforts for the data of 96 developed and developing countries over the period of 16 years from 1991-2006 by using stochastic frontier models of Battese and Coelli (1992, 1995). They conclude that OECD countries have more tax capacity than the lower-income countries except for Singapore and Hong Kong. They also explained the inefficiencies in tax collection due to corruption and changes in CPI. They further investigated in their study [Fenochietto and Pessino (2013)] with the same strategy by using Mundlak (1961) random effect model to determined tax effort for the data of 113 countries. They distinguished 17 countries generated revenues from natural resources more than 30 percent of total tax revenue and 96 countries generated revenues from non-natural resources. They found larger inefficiency of tax collection in non-natural resource countries. They concluded that the average tax effort of high-income countries is higher as compared to other lower-income and middle-income countries.

Castro and Camarillo (2014) analyzed the impact of structural, social and economic factors on tax revenue for 34 OECD countries over the period 2001-2011. The used dynamic and static panel data techniques. The study concludes that GDP per capita in the agricultural sector and the share of foreign direct investment in gross fixed capital formation have a negative impact while in the industrial sector have a significant and positive impact on tax revenue.

Brun and Diakité (2016) investigated the countries' VAT'S tax and non-resource tax potential independently and the overall tax potential and tax effort for a large sample of developing countries over the period of 1980-2014. They used the stochastic frontier model of Kumbhakar et al. (2014) and concluded that Low-income countries have higher tax effort. The results also suggested that inefficiency in taxation may be influenced by policy decisions rather than on tax administration performance.

Morrissey, et al. (2016) investigated the relationship between revenue and export structure to capture economic growth of number of countries according to income levels, political regimes and natural resources. The study found is a negative relationship between manufacturing exports and revenue in lower income

countries and evidence of a steady effect of resource wealth on autocratic rule. The same evidences found in the studies of Collier and Hoeffler (2005); Hendrix and Noland (2014); Tsui, (2010); Wright et al. (2015).

Kreishan et al. (2018) also investigated the impact of government revenues on government expenditures on the annual data of Bahrain (oil exporting country) over the period 1990-2017 by applying Unit root tests and Granger causality test. The result showed unidirectional casualty from government revenue to government expenditure, thus Bahrain explored the sources of government revenue from non-renewable resources.

Ade et al. (2018) investigated the determinants of tax revenue performance in all 15 Southern African Development Community (SADC)<sup>1</sup> countries for the period of 1990-2010 by using panel data. The study also introduced a tax policy management measure in investigating the impact of FDI and taxation on tax revenue collection. The study concluded the strong role of tax rates and tax policy management variables in improving tax revenue in the (SADC). FDI inflows in the SADC have a negative impact on tax revenue collection. Ibrahim, et. al. (2018) also emphasized the importance of taxation in energy sector for Indonesian economic growth. Study found that tax revenue can be mostly generated from the renewable energy sector especially mining industry but it still low and determined by total number of tax payer as number of tax payer increases, tax revenue collection also increases in the energy sector.

### 3. THE MODEL AND DATA

Based on the review of theoretical and empirical literature we selected the core economic variables that affect central government revenue using general to specific modeling approach. Following model is adopted for oil-exporting countries.

$$CGR_{it} = \alpha_0 + \alpha_1 GDPGR_{it} + \alpha_2 EXPGS_{it} + \alpha_3 IMPGS_{it} + \alpha_4 POIL_{it} + \alpha_5 FDI_{it} + \alpha_6 CGE_{it} + \mu_{it} \quad (3.1)$$

For oil-importing countries, following model is suggested.

$$CGR_{it} = \beta_0 + \beta_1 GDPGR_{it} + \beta_2 INF_{it} + \beta_3 FDI_{it} + \beta_4 LFPR_{it} + \beta_5 GCF_{it} + \beta_6 CRPVT_{it} + \beta_7 OPEN_{it} + \beta_8 CGE_{it} + \omega_{it} \quad (3.2)$$

$\alpha_0$  and  $\beta_0$  are constant terms,  $\alpha_1$  to  $\alpha_6$  and  $\beta_1$  to  $\beta_8$  are the parameters which needs to be estimated. The sign of the parameters

<sup>1</sup> The SADC consists of Angola, Botswana, DR Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe.

will determine the positive and negative effect. The  $\mu_{it}$  and  $\omega_{it}$  are the error term in each model respectively.

For Model (3.1) CGR is the central government revenue as a percent of GDP, GDPGR is the growth rate of GDP in percentage, EXPGS is the export of goods and services and IMPGS is the imports of goods and services in billion US dollars. POIL is the gross international price of WTI crude oil in US dollar per barrel and FDI is the net foreign direct investment in billion US dollar. CGE is the central government expenditure as a percent of GDP.

For Model (3.2) INF is the inflation rate, both in percentage. LFPR is the labor force participation rate for age 15-24 in percentage. GCF is the gross capital formation as a percent of GDP, CRPVT is the domestic credit to private sector by banks as percent of GDP, OPEN is the openness measure, which is the sum of export and imports as a percentage of GDP.

The data are collected from world development indicators of the World Bank, Regional Economic Outlook of the International Monetary Fund (IMF) and the Organization of Petroleum Exporting Countries. (OPEC).

### 4. RESULTS AND DISCUSSION

In the Panel data to avoid multicollinearity problem and to deal with parameter heterogeneity, we divided the sample into two homogenous groups namely: oil-exporting and importing countries. This study uses panel data of eleven oil-exporting and eleven oil-importing countries for the period 2004-2017. The selection of countries is made on the basis of availability of core data of important macroeconomic variables. The first step is to decide whether we have to use fixed effect model or random effect model. We have employed the Hausman Test for the selection of the model. Table 1 shows the result of the Hausman Test for both groups of countries.

Based on the results of the Hausman test for oil-exporting and importing countries, the null hypothesis is accepted. Therefore, in both cases, the random effect model is selected. The estimation results for both groups of countries are given in Tables 2 and 3.

The GDP growth rate plays an important role in central government revenue generation. The increase in real GDP growth will cause an increase in the revenue from sales tax, value-added tax, excise and corporate income tax, etc. the expected sign of the parameter of this variable is positive. From Tables 2 and 3 it is clear that

**Table 1: Hausman test for model selection**

Hausman Test (Oil Exporting Countries)			
test Summary	Chi-square statistic	Degree of freedom	Probability
Cross section random	9.429	6	0.151
Hausman test (Oil importing countries)			
test Summary	Chi-square statistic	Degree of freedom	Probability
Cross section random	8.37	8	0.40

Source: Authors' Estimation



GDP growth has a significant positive effect on CGR and its effect is slightly more in the case of oil-exporting countries. Thus, the revenue-enhancing effect of GDP growth is confirmed in both groups of countries.

Inflation rate (INF) is measured as a change in the consumer price index for final goods and services. An increase in inflation rate decreases the consumer demand for goods and services and negatively effects government revenue. Thus, the expected sign of the parameter of this variable is negative. As shown in Table 3, this variable is significant and has negative effect on CGR of oil importing countries.

Trade liberalization can have positive or negative effect on government revenue. If trade liberalization is with reducing tariff on imports and greater subsidy on export than it may effect negatively the revenue generation and the expected sign of the parameter of this variable (OPEN) will be negative. In oil-exporting countries the export of oil is the major source of government revenue. Thus, the expected sign of EXPGS variable is positive. In oil-exporting countries there are very low taxes on imports and in some cases, the imports are available on subsidize rate. Thus, the parameter of IMPGS is expected to be negative. It is clear from Table 2 that effect of EXPGS is significant and positive and IMPGS is significant and negative in the central government revenue of oil-exporting countries. But the magnitude of the negative effect is more than the positive effect so the net effect of trade liberalization is negative.

**Table 2: Macroeconomic determinants of central government revenue in oil exporting countries (random effect model)**

Variable	Coefficient	Std. Error	t-Stat.	Prob.
Constant	23.057	3.756	6.138	0.000
GDPGR	0.051	0.025	2.063	0.041
EXPGS	0.129	0.020	6.545	0.000
IMPGS	-0.208	0.026	-7.979	0.000
POIL	0.057	0.021	2.705	0.008
CGE	0.341	0.077	4.442	0.000
FDI	-0.095	0.126	-0.756	0.451
Adj. R <sup>2</sup>	0.480	F-statistic		22.827
DW Statistic	1.190	Probability (F-stat.)		0.000

Source: Authors' Estimation

**Table 3: Macroeconomic determinants of central government revenue in oil importing countries (random effect model)**

Variable	Coefficient	Std. Error	t-Stat.	Prob.
Constant	-5.70	2.436	-0.234	0.815
GDPGR	0.042	0.011	3.649	0.000
INF	-0.077	0.027	-2.826	0.005
FDI	0.151	0.038	4.019	0.000
LFPR	0.215	0.056	3.799	0.000
GCF	0.117	0.028	4.231	0.000
CRPVT	0.043	0.014	3.101	0.002
OPEN	-0.018	0.010	-1.853	0.066
CGE	0.403	0.045	8.931	0.000
Adj. R <sup>2</sup>	0.688	F-statistic		40.219
DW Statistic	1.141	Probability (F-stat.)		0.000

Source: Authors' Estimation

In case of oil-importing countries the effect of openness (OPEN) is negative and statistically significant. These results show that trade liberalization has revenue reducing effect on the revenue of both oil-exporting and importing countries. This result is different from what is expected and obtained by other studies. Since the countries are becoming a member of WTO, so tariff rates are reduced as results government revenue is falling from trade taxes. On the exports side, many countries are giving subsidies and reducing the taxes to promote the export of goods and services. Thus, the findings are in accordance with the current development in the trade sector.

Price of oil (POIL) is an important determinant for central government revenue of oil-exporting countries. The parameter of this variable (POIL) is expected to be positive as higher price increases the revenue of the government. Table 2 shows that this variable has a significant positive effect on the revenue of the government in oil-exporting countries.

Labor force participation is important to generate central government revenue, especially through income taxes. The parameter of this variable (LFPR) is expected to be positive. Table 3 shows that LFPR has a significant positive effect on the revenue of oil-importing countries. The one percent increase in labor force participation will increase central government revenue by 0.22%. It is observed that in oil-importing developing countries, the labor force participation rate is very low, which can be a major reason of low revenue generation in these countries.

Gross capital formation and credit to the private sector are both considered as important revenue-enhancing factor. The parameters of both variables are expected to be positive. The results of Table 3 shows that the coefficient of both variables has expected positive sign and are highly significant. The effect of GCF is more than CRPVT. This indicates that just giving credit to the private sector is not enough for revenue generation. The government needs to create investor friendly and ease of doing business environment for domestic investment. This would have long term revenue enhancing effects.

Foreign direct investment plays an important role in growth and development of the economy. Some countries offer tax incentive and subsidies to attract more FDI. This may affect their revenue generation. Therefore, the expected sign of the parameter of this variable may be positive or negative. The results (see Table 2) show that FDI has a negative sign but statistically insignificant effect on the revenue of oil-exporting countries while a significant positive effect on the revenue of oil-importing countries (see Table 3). It is important to note that oil-importing countries were successful in generating higher revenue through the inflow of foreign direct investment.

Finally, the central government expenditure, particularly on infrastructure development, may generate higher revenue. It is therefore expected that the parameter of this variable will be positive. The estimation results of both oil-exporting and importing countries show that central government expenditure has a significant revenue-enhancing effect. These results show

that prudent use of central government expenditure will generate higher central government revenue in the long term.

## 5. REVENUE POTENTIAL AND STABILITY

In this section, we estimated the potential and performance of central government revenue by calculating the ratio of actual revenue to estimated revenue based on the model results. Table 4 shows that among oil-exporting countries the performance of revenue generation has been poor in all selected countries except UAE and Azerbaijan. There exist the potential for higher revenue generation in Algeria, Bahrain, Iran, Oman, Qatar, Azerbaijan and Kazakhstan as their actual revenue generation was less than what we expect on the basis of their macroeconomic performance.

In oil-importing countries, the performance of revenue generation has been improved in Mauritania, Pakistan, Armenia, Kyrgyzstan, and Tajikistan. On the other hand, there has been deterioration in the performance of revenue generation in Egypt, Jordan, Lebanon, Morocco, Sudan, Georgia. If we look at the potential of revenue generation, Egypt, Jordan, Lebanon, Pakistan, Sudan, Armenia are the countries, where the actual revenue generation has been less than what we expected based as their macroeconomic performance.

From Table 4 it is clear that the actual revenue generation is much closed to estimated revenue generation which is based on the macroeconomic performance for almost all oil-importing countries. The actual revenue is very low in the case of Bahrain, Iran, and Kazakhstan in oil-exporting countries based on their macroeconomic performance.

The policy-makers in these countries need to pay special attention to macroeconomic variables mentioned in this study that play an important role in central revenue generation.

In some countries, we see that revenue potential is high but over time their revenue generation performance deteriorated. It is important not only to keep the high revenue potential but also to maintain its performance to upwards trend to generate enough resources for economic and social development and internal and external political stability.

**Table 4: Performance and potential of central government revenue**

Oil exporting countries			Oil importing countries		
Country	2004-10	2011-17	Country	2004-10	2011-17
Algeria	1.031	0.941	Egypt	1.047	0.976
Bahrain	0.712	0.645	Jordan	1.000	0.995
Iran	0.718	0.545	Lebanon	0.910	0.889
Iraq	1.091	1.009	Mauritania	1.050	1.056
Kuwait	1.582	1.430	Morocco	1.089	1.034
Oman	1.116	0.950	Pakistan	0.713	0.752
Qatar	0.998	0.992	Sudan	1.009	0.947
Saudi Arabia	1.109	1.036	Armenia	0.895	0.981
UAE	1.326	1.432	Georgia	1.132	1.078
Azerbaijan	0.879	0.952	Kyrgyzstan	1.103	1.143
Kazakhstan	0.778	0.647	Tajikistan	0.978	1.054

Source: Authors' Calculation

## 6. CONCLUSION AND POLICY IMPLICATIONS

The self – sufficiency of any country depends upon its ability to generate revenue. The developing countries face serious difficulties in raising the revenue. As a result, they are unable to make proper expenditures on economic and social development. This study tried to identify the main economic variables that can be focused by the policy-makers to raise revenue. The results obtained suggest that in oil-exporting countries higher growth of GDP, exports, POIL and central government expenditure have a positive effect on central government revenue while an increase in imports has a negative effect on central government revenue.

In oil-importing countries, higher GDP growth, foreign direct investment, labor force participation, domestic investment, credits to the private sector and central government expenditure positively contribute to central government revenue. On the other hand, an increase in inflation and openness decrease the central government revenue.

The study further concludes that the performances of revenue generation remain poor in Bahrain, Iran, and Kazakhstan and there is enough room for improvement in these countries for revenue generation. In the case of oil-importing countries, the policy-makers in Lebanon and Pakistan need to design prudent policies to increase central government revenue in their countries.

At this stage, we can set directions for further research. The first extension of the study would be to disaggregate revenue into tax and non-tax revenues, whereas tax revenue could be further disaggregated into direct and indirect taxes. This disaggregation would be helpful for policy-makers to focus on the most important revenue component. The second extension of the study would be to extend the sample of both oil-exporting and oil-importing countries. The extended sample could be helpful to test additional economic variables and can be used to test social and political factors for central government revenue generation.

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