Relationship between Government Spending and Revenue: Evidence from Oil Exporting Countries

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Abstract-This Paper investigates the causality and the long-run relationships between government expenditure and government revenue in oil exporting countries during 2000-2009 by using P-VAR framework. Since the major share of total revenue in these countries is related to the oil revenue, hence the oil revenue is applied as proxy of total revenue. The findings reveal that there is a positive unidirectional long-run relationship between oil revenue and government expenditures, as it is expected. What's more, the findings show that one percent increase in oil revenue induces the increase of government expenditure to 1.16 percent. In other words, the "revenue-and-spend" hypothesis is confirmed in oil exporting countries.

Keywords-Government Expenditure; Government Revenue; Oil Exporting Countries; P-VAR

I. INTRODUCTION

Government budget deficits have significant impact on the economy. Such fiscal imbalance tends to reduce national savings and economic growth. Therefore, the decrease of the fiscal deficit by reducing government expenditures and/or raising revenues would stimulate economic growth. However, one of the most studied topics in macroeconomics is the testing of relationship between government expenditures and its revenues. Determination of the interdependence direction between these two macroeconomic variables would assist policy makers to recognize the source of any fiscal imbalances that might exist. Consequently this would facilitate efforts to develop a suitable strategy for fiscal reforms. Hence, the analyzing of relationship between government expenditure and government revenue has attracted significant interest. However, it has remained an empirically debatable issue in field of public finance, especially for the developing countries. In general, there are three main possibilities: first, raising revenue leads to more expenditure that called "revenue-and-spend" hypothesis. Second, changes in government expenditure cause changes in revenue. It is known as "spend-and-revenue". Final, the causality runs from both directions (bilateral causality) that are called "Fiscal Synchronization".

Despitethe causality between government revenue and government expenditure, it is important to explore the way to address fiscal imbalances. Empirical studies on this issue are scarce, especially in oil-exporting countries. Hence, this paper investigates both the causality and long-run relationships between government revenues and government expenditures for oil exporting countries applying P-VAR during 2000-2009. The rest of this paper is organized as follows: section two provides a brief review of theoretical and empirical literatures; section three describes data and methodology; Section four presents the results; section five gives concluding remarks.

II. LITERATURE

There are several hypotheses on government revenue and spending nexus. The first hypothesis is the "revenue-and-spend" hypothesis. According to this approach, any expenditure budget must be expanded in line with revenue and therefore expenditure must follow revenue. It means that if revenue is raised, then government increases spending. Hence, cutting revenue is a remedy to reduce budget deficits. This view supports and suggests that there is a positive causal link between government revenue and its expenditure ([1]–[3]). Likewise, some researchers also hold the same view that revenue led to government expenditure but the causal relationship is negative ([4], [5]). The second hypothesis is the "spend-and-revenue" which argues that, any change in government expenditure causes changes in revenue. This hypothesis was advocated by [6] and others like [7], [8]. They argue that any large-scale exogenous disturbances like wars and other unstable political conditions or natural disasters, will induce an increase in government spending and therefore an increase in revenues (taxation). Therefore, in order to solve budget deficits, government spending should be reduced. The third hypothesis is the "Fiscal Synchronization" which indicates that, government revenue decisions are not made in isolation from government expenditure decisions. The decisions are made concurrently. Therefore, there is a bilateral causality between government revenue and its expenditures ([10]–[14]). In addition, [14] find that the "spend-and-revenue" hypothesis is confirmed in short-run in Greek while in long-run the fiscal synchronization hypothesis is supported. Finally, [15], [16] have advanced the "Institutional Separation" hypothesis in that, decisions on revenue are taken independently from allocation of government expenditure, hence no causal relation between revenue and spending is expected.

In general, there are three reasons why the nature of link between government expenditure and revenue is important. First, if the "revenue-and-spend" hypothesis holds, budget deficits can be avoided by implementing policies that stimulate government revenue. Second, if bi-directional causality does not hold, then government revenue decisions are made independently from government expenditure decisions. Third, if the "spend-revenue" hypothesis holds, then government spends first and pay for this spending later by raising revenues ([17]).

However, studies about the relationship between government expenditure and government revenue have been flourishing recently. [18] We examined the causal relationship between the government tax revenues and government expenditures in Malaysia by using the case of Toda and Yamamoto during 1960-1997. The evidence generally supports the existence of bi-directional causality between the two variables. [19] also investigated the direction of causality between total government expenditure and revenue in oil dependent GCC countries by using VECM method. The findings show that government expenditures follow oil revenues. [20] examined the casual relationship between

government expenditure and tax revenue in Botswana during the period 1976-2000 by applying both bivariate and multivariate Granger casualty method. The findings revealed that there is a negative unidirectional relationship between variables revenue and spending, which in turn supports the "tax-and-spend" hypothesis. [21] tested the causality link between government revenue and spending for the Turkey by using the Granger-causality. The findings supported that growth of government expenditure causes increases in tax revenues in Turkey. [22] investigate the interrelationship between government expenditure and tax revenue in Barbados by using Engle-Granger co-integrating models during 1985-2008. The results suggest that there is a unidirectional link from government spending to revenue. [23] examined the causal relation between government expenditure and tax revenue for Pakistan, and found unidirectional causality from expenditure to revenue. [24] examined the causal relationship between tax revenues and government expenditures in twenty-two OECD countries, eleven European Union (EU) member states, and eleven non-EU using ARDL bounds test and the Toda-Yamamoto approach to test for causality. The results show that the long-run and short-run causal patterns differ across these groups within OECD. For the long-run causal patterns they find evidence to confirm the tax-and-spend hypothesis in eight of the twenty-two countries; but the evidence is more prevalent within the EU countries, where tax burdens are much higher than in the non-EU OECD countries. In addition, the result of long-run causality confirms the "institutional separation" hypothesis in twelve countries, with two-thirds coming from the non-EU OECD countries. Also, while there is no evidence to support the fiscal synchronization hypothesis in the long run, the short-run results show evidence of fiscal synchronization in five out of twenty-two countries.

III. DATA AND METHODOLOGY

This paper evaluates both causality and long-run relationships between government expenditures (G) and oil revenues (R) in 15 oil exporting developing countries1 using P-VAR approach. Both variables are in terms of constant 2000 price USD. The studied period is 2000-2009, while the availability of data from World Bank is considered. Likewise, in order to interpret the elasticity of the variables, there are terms of logarithm.

In order to specify the empirical model properly, an important step is to test for unit roots and stationary. Consequently, we used the "Im, Pesaran and Shin" (IPS) test. The IPS test assumes the series are non-stationary. According to [25], the two non-stationary variables integrated in same order are co-integrated if one or more linear combinations that exist between them are stationary. If all the variables are integrated of order (1), they are co-integrated. Thus the appropriated model is Panel Vector Autoregressive (P-VAR). Also, in order to perform the standard causality test, it is necessary to determine the optimum degree of VAR method considering SBC criteria. We applied auto-regressive equations for testing of causality relationship between variables as follows:

$$LG_t = \sum_{i=0}^{k} \propto_i LR_{t-i} + \sum_{i=1}^{k} \beta_i LG_{t-i} + \varepsilon_t$$

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1 Egypt, Indonesia, Algeria, Venezuela, Iran, Kwait, Tunisia, Colombia, Malaysia, Kazakestan, Brazil, Argentina, Trinida and Tobago, Bolivia, Russia.

$$LR_t = \sum_{i=1}^{k} \gamma_i LR_{t-i} + \sum_{i=0}^{k} \theta_i LG_{t-i} + \delta_t$$

K is the optimum order of VAR method.

After testing unit root and certainty from the existence of the co-integration relationship between variables as well as testing for Granger casualty, in order to estimate long-run relationships between variables, we used the maximum likelihood method developed by [26].

IV. EMPIRICAL RESULTS

Table Ⅰ presents the results of Im, Pesaran and Shin (IPS) unit root test. The IPS statistics indicate that both variables are stationary after first differencing. In other words, both variables are integrated of order (1). Therefore, they are co-integrated ([25]).

TABLE I IPS UNIT ROOT TEST

Variables	Level	Prob. (0.05)	First Difference	Prob. (0.05)	Result
LG	2.12	0.98	-7.006	0.000	I(1)
LR	1.99	0.97	-2.44	0.007	I(1)

Table II reports the result of Granger causality test in the critical values at 5% in VAR framework. The optimal lag was selected with the Schwarz Criteria. It is obvious that null hypothesis that LR does not Granger Cause LG, is rejected, while LG does not Granger Causal LR, is not rejected. Thus there is a unidirection from oil revenue to government expenditure. In other words, the hypothesis of "revenue-spend" is confirmed.

TABLE II Granger Causality Test

H0		Chi-square	Prob.
$\propto_i = 0$ (i= 0,1,2)	LR does not Granger Causal LG	23.47	0.000
$\theta_i = 0$ (i= 0,1,2)	LG does not Granger Causal LR	0.070	0.965
Optimum degree of VAR method considering SBC criteria is equal to 2.			

In order to test co-integration, we used the procedure developed by [26], [27] to conduct the vector auto-regression (VAR)-based co-integration test. The Johansen procedure propose two test statistics for testing the number of co-integrating vectors, a Trace test (Tr) and a Max-Eigenvalue test (MAX) statistics. Table III shows the results of Johansen test, based on Max-Eigenvalue and Trace statistic test reject the hypothesis of no co-integration, and indicates that there is one co-integration equation at the 5% significance level. In other word, there is one long-run relationship between government expenditure and government revenue.

TABLE III Johansen Co-Integration Test

H0	λ trace	Critical Value	Prob.
r =0	72.63	15.49	0.000
r ≤ 1	2.72	3.84	0.099
H0	λ max	Critical Value	Prob.
r =0	69.91	14.26	0.000
r ≤ 1	2.72	3.84	0.099

Furthermore, Table IV shows the equilibrium long-run relationship by considering the result of Granger causality test that supported the existence of a unidirectional causality from government revenue to government expenditure. The result

revealed that there is a positive and significant long-run relationship between government revenue and expenditure. Therefore the long-run elasticity of government expenditure with respect to revenue is 1.16. In other words, one percent increase in revenue induces that government expenditure raise 1.16 percent. It implied to the existence of high dependence in government expenditure on oil revenue. Hence, policymakers in these countries could enhance the effectiveness of fiscal policy by making budget expenditure less driven by revenue availability.

TABLE IV Long-Run Relationship

Long-run Relationship	S.D	T Statistic
LG= 1.16 LR	0.28	4.14

V. CONCLUSIONS

This Paper investigates the causality and long-run relationships between government expenditure and government revenue in oil-exporting countries during 2000-2009 by using P-VAR approach. Since the major share of total revenue in these countries is related to oil revenue, hence the oil revenue is applied as proxy of total revenue. The findings reveal that there is a positive unidirectional causality between oil revenues and government expenditures, as it is expected. In other words, the "revenue-and-spend" hypothesis is confirmed in oil-exporting countries. Thus, the fact that government spending follows revenues suggests a pro-cyclical feature of expenditure policy for countries whose oil revenues compose the largest in budgetary revenue. . In this context, policymakers in these countries could enhance the effectiveness of fiscal policy by making budget expenditure less driven by revenue availability.

REFERENCES

[1] M. Friedman, "An Economist's Protest, Thomas Horton and Company", New Jersey, 1972.

[2] M. Friedman, "The Limitations of Tax Limitation", Policy Review, pp. 7-14, 1978.

[3] R. Blackley, "Causality between Revenues and Expenditures and the Size of Federal Budget", Public Finance Quarterly, vol. 14, pp.139-56, 1986.

[4] M. Buchanan and R. Wegner, "Democracy in Deficit", Academic Press, New York, 1977.

[5] A. Darrat, "Tax and Spend, or Spend and Tax? An Inquiry into the Turkish Budgetary Process", Southern Economic Journal, vol. 64, pp. 940-56, 1998.

[6] A.T. Peacock and J. Wiseman, "The Growth of Public Expenditure in the United Kingdom", Princeton University Press, Princeton: NBER, 1961.

[7] R. Barro, "On the determination of the public debt", Journal of Political Economy, vol. 81, pp. 940-71, 1979.

[8] G.M. Furstenberg, G. Jaffery, and Jin Ho Jeong, "Tax and Spend, or Spend and Tax", The Review of Economics and Statistics, vol. 2, pp. 179-188, 1986.

[9] G. Vamvoukas, "Budget expenditures and Revenues: An Application of the Error Correction Modeling", Public Finance, vol. 52, pp. 139-143, 1997.

[10] R. Musgrave, "Principles of budget determination. In Public Finance: Selected Readings eds. H. Cameron and W. Henderson. New York: Random House, 1966.

[11] A.H. Meltzer and S.F. Richard, "A rational theory of the size of government", Journal of Political Economy, vol. 89, pp. 914-924, 1981.

[12] N. Manage and M.L. Marlow, "The Causal Relation between Federal Expenditures and Receipts", Southern Economic Journal, vol. 52, pp. 617-29, 1986.

[13] S.M. Miller and F.S. Russek, "Co-integration and error-correction models: the temporal causality between government taxes and spending", Southern Economic Journal, vol. 57, pp. 221-229, 1990.

[14] G. Vamvoukas, "Budget expenditures and Revenues: An Application of the Error Correction Modeling", Public Finance, vol. 52, pp. 139-143, 1997.

[15] K.D. Hoover and S.M. Sheffrin, "Causation Spending and taxes: Sand in the sandbox or tax collector for the welfare state?", American Economic Review, vol. 82, pp. 225-248, 1992.

[16] H. Baghestani and R. Mcnown, "Do revenues or expenditures respond to budgetary disequilibria?", Southern Economic Journal, vol. 63, pp. 311-322, 1994.

[17] P.K. Narayan and S. Narayan, "Government Revenue and Government Expenditure Nexus: Evidence from Developing Countries", Applied Economic Letters, vol. 38, pp. 285-291, 2006.

[18] M. Abdul Aziz, and H. Muzafar Shah, "Testing for Causality between Taxation and Government Spending: An Application of Toda-Yamamoto Approach", University Putra Malaysia Press, vol. 8, pp. 45-50, 2000.

[19] U. Fasano and Q. Wang, "Testing the Relationship between Government Spending and Revenue: Evidence from GCC Countries", IMF Working Paper, 2002.

[20] D. Moalusi, "Causal Link between Government Spending and Revenue: A case study of Botswana", Fordham University, 2004.

[21] A. Wahid, "An Empirical Investigation on the Nexus between Tax Revenue and Government Spending: The Case of Turkey", International Research Journal of Finance and Economics, vol. 16, pp. 46-51, 2008.

[22] T. Maynard and K. Guy, "The Causal Relationship between Government Expenditure and Tax revenue in Barbados", Research Department Central Bank of Barbados, 2009.

[23] Z. Aisha and S. Khatoon, "Government Expenditure and Tax Revenue Causality and Co-integration: The Experience of Pakistan 1972-2007", Pakistan Development Review, 2010.

[24] O. Owoye and O. Onafowora, "The Relationship between Tax Revenues and Government Expenditures in European Union and Non-European Union OECD Countries", 2011.

[25] R.F. Engle and C.W.J. Granger, "Co-Integration and Error Correction: Representation, Estimation and Testing", Econometrica, vol. 55, pp. 251-276, 1987.

[26] S. Johansen, "Statistical analysis of co-integration vectors", Journal of Economic Dynamics and Control, vol. 12, pp. 231–254, 1988.

[27] S. Johanson, and K. Juselius, "Maximum likelihood estimation and inference on co-integration with application to the demand for money", Oxford Bulletin of Economics and Statistics, vol. 52, pp. 169–209, 1990.

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