PRUDENT MANAGEMENT OF OIL REVENUES: IMPACTS OF GOVERNMENT CAPITAL EXPENDITURES IN AZERBAIJAN ECONOMY

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Overview

World Bank estimates suggest that the net present value of Azerbaijan oil and gas revenues between 2008 and 2024 would amount to 198 billion USD (in 2007 prices). The State Oil Fund of the Republic of Azerbaijan (SOFAZ) (established in 1999) is the primary institution in which Azerbaijan accumulates oil revenues. Between 2001:Q2 and 2014:Q1, 105 billion dollars have been added to the oil fund. For long term sustainability of Azerbaijan's economic development, diversification away from oil in both its overall economic structure and that of its exports should be achieved. Head of the State Statistical Committee of the Republic of Azerbaijan announced in late 2013; total investments took place in social and infrastructure projects in the economy equaled about 132 billion dollars during the last 10 years (2003 - 2013). Considerable volume of the government capital expenditures in this given total amount raises a critical question: Did government capital expenditures allocated efficiently to achieve non-oil export diversification? It is the research question of this study.

Data and Econometric Methods

Sources of included data are as follows: Oil price is the Brent oil price per barrel in terms of US dollars. Data source is US Energy Information Administration. Non-oil industrial production, non-oil gdp, and government capital expenditures data in constant 2005 prices is collected from the State Development Indicators Bulletin, which is published by the The State Statistical Committee of the Republic of Azerbaijan in million manats (Azerbaijan national currency). Time series covers the 2000Q1 - 2013Q4 duration.

- ***Unit Root Test*** *:* We employ Augmented Dickey-Fuller (ADF hereafter, Dickey and Fuller, 1981) test for this purpose. The test maintains the null hypothesis of non-stationarity of a given time series.
- ***The Johansen Cointegration Method****:* Johansen (1988) and Johansen and Juselius (1990) full information maximum likelihood of a Vector Error Correction Model (ECM hereafter) is as follows:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta y_{t-i} + \mu + \varepsilon_t \qquad (1)$$

Where, y_t is a (n *x 1*) vector of the n modeled variables of interest, μ is a (n *x* 1) vector of constants, Γ represents a (n *x* (*k*-1)) matrix of short-run coefficients, ε_t denotes a (n *x 1*) vector of white noise residuals, and Π is a (n *x* n) coefficient matrix. If the matrix Π has reduced rank ($0 < r < n$), it can be split into a (n *x* r) matrix of loading coefficients α, and a (n *x* r) matrix of cointegrating vectors β. The former indicates the importance of the cointegration relationships in the individual equations of the system and of the speed of adjustment to disequilibrium, while the latter represents the long-term equilibrium relationship, so that $\Pi = \alpha\beta'$. Testing for cointegration, using Johansen's reduced rank regression approach, centers on estimating the matrix Π in an unrestricted form, and then testing whether the restriction implied by the reduced rank of Π can be rejected. Max and Trace tests statistics are used to test for nonzero characteristic roots. Significance of a given variable implies that the null hypothesis of corresponding β is zero can be rejected, while stationarity or trend stationarity of a variable assumes that $(1\ 0\ 0)'$ restriction on long-run coefficients cannot be rejected.

- ***Fully Modified Ordinary Least Squares Method (FMOLS):*** is developed by Phillips and Hansen (1990) also is used for our analysis. Note that this method has advantages of eliminating the sample bias in addition to correcting for endogeneity and serial correlation effects (Narayan and Narayan, 2004). Because Phillips and Hansen (1990) provide detailed mathematical derivation of the model, we will not discuss that to conserve space.
- ***Dynamic Ordinary Least Squares Method (DOLS):*** is employed which advocated by Stock and Watson (1993), but due to space limitation, we will not describe this method.

Results of Estimations

Results of the ADF unit root test showed that all the variables are integrated of the order one, namely I(1). First, we estimated the model which relates oil prices(*op*) and government capital expenditures(*govcap*). Since the

variables follow I(1) process, we can proceed the Johansen cointegration analysis. Using VAR and taking four as a maximum lag length, all of the lag selection criteria namely, the Likelihood Ratio, Final prediction error test statistics, Hannan-Quinn as well as Schwarz and Akaike information criteria prefer lag length of one, with no serial correlation in residuals. On the base of estimated VAR the Johansen cointegration test is performed. The results of Maximum eighenvalue and Trace test statistics prefer one cointegrating relationship between *op* and *govcap*. Therefore, it can be concluded that there is a long-run relationship between op and govcap as a result of cointegration test. Vector Error Correction Model (VECM) representation of the long-run relationship normalized for *govcap,* the estimated equation is given like that: $govcap_t = -1.28 + 1.66op_t$

Here variables are in the log form. Results indicate that the residuals of VECM are normally distributed, not serially correlated and their variance is constant over time. The speed of adjustment is negative (-0.73) and statistically significant, we can assume that short-run deviations adjust to long-run equilibrium path and hence, there is a stable cointegrating relationship between the variables. The coefficient of the op variable is statistically significant and indicates that 1% increase in oil prices cause on average 1.66% increase in government capital expenditures.

Next, we estimated relationship between government capital expenditures(govcap) and non-oil exports(noex). In VAR context 4 is chosen as max lag length and all criterias prefer 4 as an optimal lag length. Although, Max and Trece tests indicate no cointegration in this approach, results of Engle-Granger and Phillips-Ouliaris cointegration tests results based on employed DOLS and FMOLS methods concluded that the variables are cointegrated. The results of all three methods are close to each other. Results of the estimations are given below:

Dependent variable is *non-oil export*			
	VECM	**DOLS**	**FMOLS**
Coefficient of ***govcap***	-0.157	-0.133	-0.106
Standart deviation of the coefficient of ***govcap***	0.0171	0.026	0.024

Note that the test results for residuals satisfy the Gauss-Markov requirements. Variables are in the level form, and an appropriate coefficient of the *govcap* variable(VECM) can be interpreted as: 1 unit increase in government capital expenditures causes 0.157 units decrease in the non-oil export. Then, the relationship between government capital expenditures (*govcap*) and real non-oil gdp*(rgdpno)* is estimated. The employed Johansen's method has not given reasonable results. But, DOLS and FMOLS methods concluded that the variables are cointegrated. Results are given below:

	DOLS	**FMOLS**
Coefficient of ***govcap***	0.388	0.381
Standart deviation of the coefficient of ***govcap***	0.035	0.035

The test results for residuals are in line with the conventional approach. Variables are in the log form, that is the coefficient of the *govcap* variable indicates that 1% increase in government capital expenditures causes to 0.388% increase in real non-oil gdp. Detailed results of estimations can be taken under the request.

Conclusions

The first econometric model employed in this study suggests that, oil price increases stimulate increases in government capital expenditures. 1% increase in oil prices cause on average 1.66% increase in government capital expenditures. Even though, 1% increase in government capital expenditures causes to 0.388% increase in real non-oil gdp, non-oil exports could not get much benefit from government capital expenditures. Moreover, 1 unit increase in government capital expenditures causes 0.157 units decrease in the non-oil export. Put it differently, government capital expenditures does not generate considerable non-oil export diversification. It is mainly because of this reason; state fixed capital investments generally favor growth in non-tradable sectors, which are not the sources of non-oil export diversification.