

# What makes Oil Revenue Funds effective? The effect of Oil Revenue Funds on correlation between oil prices and exchange rates

## Introduction

### Old Question:

- Why oil rich countries grow at rate lower than resource poor countries?

### Old Answers:

- Due to volatile and unpredictable oil revenue movements.
- The quality of institutions and governance matters.

### New Question:

- What should oil rich countries with poor institutions do?

### Proposed solution:

- Keep oil revenue out of hands of Government. Place it in a separate fund and having Government commit to use this fund in certain ways.

**An existing literature:** The efficiency of Oil Revenue Funds is still under debate. An efficient fund must be able to delink exchange rates/Government expenditure and oil revenues. The results of the efficiency of funds are controversial. Many authors who studied efficiency of funds in different countries came to conclusion that rules which funds follow matters.

**Hypothesis:** The existence of Oil Revenue Fund alone does not guarantee the delinking of exchange rates and oil revenue. It is important which rules funds follow.

**Contribution:** The results explain why some funds are effective and others not. Provide a list of rules (accumulation rules, reference oil price, percent of oil revenue which accumulates fund) which affect funds' effectiveness.

## Theoretical Model

Effect of Balassa-Samuelson effect and Oil Revenue Funds on Real Exchange Rate:

$$Q = \left[ \frac{A_T/A_N}{A_T^*/A_N^*} \right]^\gamma \left[ \frac{\gamma(1-\tau) + \tau + \phi \rho \frac{p_{oil} \gamma_{oil}}{P_T Y_T}}{\gamma^*(1-\gamma^*) + \tau^*} \right]^{\gamma(1-\alpha)}$$

RER – real exchange rate

1-φ – share of oil revenue accumulated in Oil Revenue Funds and invested abroad.

ρ – tax on oil revenue (royalty)

P, Y – Price and Production of Oil

P, Y – Price and Production of tradable goods

A – productivity of goods tradable/nontradable domestically/abroad

## Data Sources

Abbreviation	Description	Units	Source/Formula
Q	real exchange rates	Weighted foreign currency per domestic currency deflated with CPI	$REER_i = \frac{E \times CPI_i}{\prod_{j \neq i} (E \times CPI_j)^{w_{ij}}}$
CPI	Consumer price index	Index	IMF/IFS/World tables/CPI
E	Indirect quotation of bilateral exchange rate	USD/Domestic currency	IMF/IFS/World tables/ER
w	Weight of trade	Weight	
X, I	Export and Import	Millions US Dollars	IMF/DOTS
Oil	Ratio of the value of oil exported in total export	ratio	Oil = P * Y / X
P	World Oil prices	US Dollars per barrel	IMF/IFS/Petroleum: Average Crude Price (World)
Y	Oil export	Millions Barrels	IEA/Oil information/World oil statistics/Oil products exports
P Y	Export	Millions US Dollars	IMF/IFS/World tables/Exports
F	Rules of Funds	See the following table	Sovereign wealth fund institute, official funds' websites

## Rules of Oil Revenue Funds

Country	Fund	Accumulation Rule	Reference oil price or % of oil revenue
Saudi Arabia	1958	N/A	N/A
Kuwait	1960	reference price	N/A from 1973, 36\$/b from 2006, 43\$/b from 2007, 50\$/b from 2008
UAE	1976	reference price	N/A
Canada	1976	% of oil revenue	30% from 1976, 15% from 1984, 0% from 1987
USA	1976	% of oil revenue	25% from 1976, 50% from 1980
Oman	1980	reference price	15\$/barrel from 1989, 45\$/barrel from 2009
Brunei	1983	N/A	N/A
Norway	1990	% of oil revenue	100%
Venezuela	1998	reference price	17\$/b from 1998, 9\$/b from 1999
Iran	1999	% of oil revenue	100%
Kazakhstan	2000	reference price	19\$/b
Algeria	2000	reference price	19\$/b from 2000, 22\$/b from 2006, 37\$/b from 2009
Mexico	2000	reference price	1.5\$/b from 2000, weight of 3/4 to oil futures prices and a weight of 1/4 to the average oil price of last 10 years from 2006
Trinidad	2000	reference price	11 year MA
Russia	2004	reference price	20\$/b from 2004, 27\$/b from 2006
Nigeria	2004	revenue above reference price	25\$/b from 2004, 30\$/b from 2005, 35\$/b from 2006
Qatar	2005	reference price	40\$/barrel
Libya	2006	N/A	N/A
Azerbaijan	Dec-99	% of oil revenue	100%
Bahrain	Jun-06	N/A	N/A

Table 2: The results of panel unit root tests (N=28, average T=449, lags=4)

Country	DF-GLS ln(REER)	DF-GLS oil	Johansen Cointegration Test
Kuwait	I(1)	I(0)	
Oman	I(1)	I(0)	
Azerbaijan	I(1)	I(0)	
Netherlands	I(1)	I(0)	
Saudi Arabia	I(1)	I(1)	1
UAE	I(1)	I(1) or I(0)	1
Kazakhstan	I(1)	I(1)	1
Qatar	I(1) or I(0)	I(0)	1
Libya	I(1)	I(1) or I(0)	1
Angola	I(1)	I(1)	1
Argentina	I(1)	I(1)	1
Colombia	I(1)	I(1) or I(0)	1
Egypt	I(1)	I(1)	1
Iraq	I(1) or I(0)	I(1)	1
Canada	I(1)	I(1)	0
USA Alaska	I(1)	I(1) or I(0)	0
Norway	I(1)	I(1)	0
Venezuela	I(1)	I(1)	0
Algeria	I(1)	I(0)	0
Trinidad	I(1)	I(1) or I(0)	0
Mexico	I(1)	I(1)	0
Nigeria	I(1)	I(1)	0
India	I(1)	I(1)	0
UK	I(1)	I(1)	0
Ecuador	I(1)	I(1)	0
Iran	I(1)	I(1)	2
Russia	I(1)	I(1)	2
Bahrain	I(1)	I(0)	2

## First Differences Model

$$\Delta Q_{it} = \alpha + \sum_{j=1}^{p-1} \beta_j \Delta Q_{it-j} + \sum_{j=1}^{p-1} \sum_{k=0}^K \gamma_j \Delta Oil_{it-j} F_{it-j,k} + \varepsilon_{it}$$

## Results

Q	FD1	FD2	FD3	FD4	FD5
d.L.Q	-0.309***	-0.310***	0.310***	-0.307***	-0.294***
d.L2.	-0.071***	-0.071***	-0.071***	-0.068***	-0.052***
d.L3.	0.008	0.008	0.008	0.008	0.017*
d.L.Oil	-0.011*	-0.002**	-0.002	-0.002	-0.003
d.L2.	0.006	0.021**	0.022**	0.022**	0.021**
d.L3.	0.010	0.014***	0.015*	0.014	0.014*
d.L. Fund		-0.013**	0.049	0.005	0.017
d.L2.		-0.028*	0.079	-0.023	-0.027
d.L3.		-0.003**	-0.014	-0.008	-0.019
d. L.Accum				-0.035*	
d.L2.				-0.011	
d.L3.				0.013	
d.L1. φ					-0.0004*
d.L2.					-0.0001
d.L3.					0.0002
d.L1.reference oil price					-0.001
d.L2.					0.0002
d.L3.					0.0009
Constant	0.017***	0.017**	0.017***	0.018***	0.018***
R-sq within	0.09	0.099	0.099	0.098	0.093
Between	0.99	0.996	0.995	0.996	0.986
Overall	0.08	0.089	0.089	0.089	0.083
Wald chi2	1175***	1180***	1168***	1114***	993***

## Summary and Conclusion

Recently become very popular among oil rich countries to establish Oil Revenue Funds. **Are Oil Revenue Funds effective? And if yes what makes them effective?** Testing the effect of Funds' existence and their rules on stabilization of exchange rates.

### We found that:

- The existence of an Oil Revenue Fund alone does not guarantee a reduction in the correlation between exchange rates and oil revenue;
- Funds which follow revenue based accumulation rule are more effective than Funds following expenditure based accumulation rule;
- Funds accumulating greater share of oil revenue are more effective.

**For further research** one can include the following variables:

- tax rates on oil (royalty);
- share of investment in foreign assets in total;
- funds' withdrawal rules.

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Main Reference: J.Davis, R. Ossowski, J.Daniel and S.Barnett, 2001, "Stabilisation and Saving Funds for Nonrenewable Resources", IMF Occasional Paper No.205