

## Modeling OPEC Fiscal Break-even Oil Prices: New Findings and Policy Insights

*This commentary by Ali Aissaoui, Senior Consultant at APICORP, is published concurrently in the Middle East Economic Survey (MEES) dated 29 July 2013. The views expressed are those of the author only. Comments and feedback may be sent to <a>aissaoui@apicorp-arabia.com</a>.*

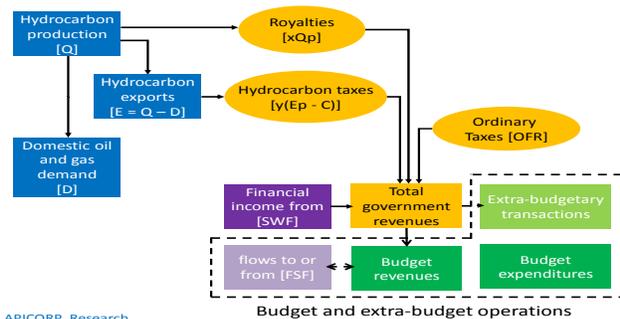
1. New evidence confirms what well-informed OPEC observers have contended for some time, that member countries are pursuing expansionary fiscal policies. The group’s combined budget is set to grow by 7% in 2013, maintaining government spending at about one-third of aggregate GDP in nominal terms. On average, petroleum fiscal revenues are projected to amount to 76% of total income. According to official sources and guesstimates governments are thought to have based their budgets on slightly higher oil prices than in 2012, ranging from \$37 (sic) to \$95 per barrel. Yet whenever given the opportunity to address the issue, OPEC ministers hint at the use of significantly higher prices in their budgetary calculations. This suggests that OPEC’s ‘preferred prices’ may be based on a much broader concept of fiscal break-even analysis.

2. In this commentary we revisit and refine our model for determining fiscal break-even oil prices, update previous findings in light of budgetary changes and move the discussion to the policy insights these findings provide when prices are expressed as a ‘fiscal cost curve’. The focus is on the short term, since the issue of long-term fiscal sustainability, although remaining critical, does not need to be reopened.<sup>1</sup> The commentary is in three parts: modeling, new findings and policy insights.

### Modeling

3. In its simplest definition a fiscal breakeven price is the oil price that balances an oil-exporting country’s budget. However, as simple as it sounds, its determination involves many different parameters. Production and export volumes are the key determinants of the revenues governments receive from royalty and petroleum taxes. As shown generically in Figure 1, these revenues are complemented by ordinary (non-hydrocarbon) fiscal receipts as well as investment income from current account surpluses managed through a sovereign wealth fund (SWF). All or part of the revenue is spent on public goods through budgetary and extra-budgetary operations, or transferred into a fiscal stabilization fund (FSF).

**Figure 1: A Generic OPEC Government’s Fiscal Sector**



<sup>1</sup> Aissaoui, A. “Fiscal Break-Even Prices Revisited: What More Could They Tell Us About OPEC Policy Intent?”, APICORP’s *Economic Commentary*, August-September 2012.

4. Therefore, our model starts with the identity that government’s expenditures should equal hydrocarbon fiscal revenues (HFR) plus ordinary fiscal revenues (OFR) plus any transfer from a SWF or an FSF, as expressed in Equation 1 (box below). For the sake of convenience, royalties collected on the portion of production delivered to the domestic market is calibrated on an export-based opportunity cost. This is tantamount to taking the corresponding domestic energy subsidies out of the model. We have also omitted the exchange rate effect, except for the sensitivity analysis on Iran. It is worth noting in this regard that hydrocarbon exports, from which derive the bulk of fiscal revenues, are generally denominated and paid for in dollars, while government budgets are run in national currencies. Therefore, the exchange rate should not be ignored when its effect on balancing the budget is significant.

**Modeling the Fiscal Break-Even Price**

B1. Using the framework described in Figure 1, we derive government budget revenues (GBR) as:

$$GBR = xQ\alpha p + y[Exp - C] + OFR + rSWF + \Delta FSF \quad [1]$$

Where:

- Q is marketed production of hydrocarbons;
- E is hydrocarbon exports;
- C is the hydrocarbon industry’s full-cycle cost;
- OFR is ordinary (non-hydrocarbon) fiscal revenues;
- r is the return on SWF;
- SWF is the value of financial assets invested abroad;
- ΔFSF is the flow to and from a fiscal stabilization fund;
- x is hydrocarbon production-weighted royalty rate;
- y is the average rate of hydrocarbon taxation;
- p is the average oil export price.

B2. Assuming returns from SWFs are re-invested and ignoring, as justified in the text, DSF, we derive the fiscal oil break-even price, from equation 1, as:

$$p = \alpha^{-1} (EXP - OFR + yC) / (xQ + yE) \quad [2]$$

Where:

- EXP is budget and extra-budget expenditures
- α is a price-differential adjustment factor relative to the value of OPEC basket of crudes.

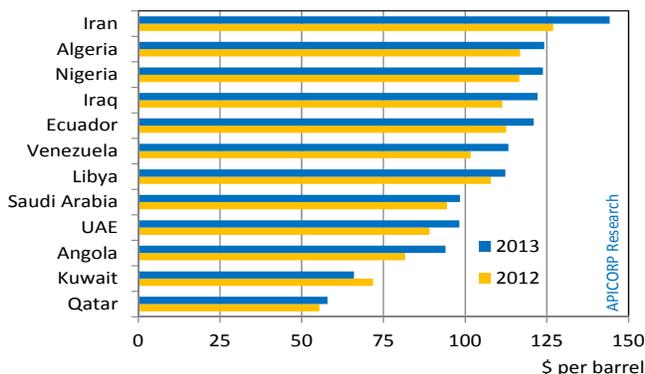
5. Furthermore, assuming SWF returns are re-invested and budgets are balanced (no flows to and from the FSF) leads to limiting budget revenues to hydrocarbon fiscal revenues and ordinary taxes. Accordingly, the break-even price is reduced to a quotient of two elements as expressed in Equation 2. The numerator is the algebraic sum of government expenditures, ordinary fiscal revenues and the portion of costs incurred by the hydrocarbon industry together with a pro-rata share of taxes. The denominator is the sum of pro-rata share of royalty and taxes of respectively production and exports. As the break-even price is expressed in terms of the value of the OPEC basket of crudes, an adjustment factor α is introduced to factor in the differentials between that value and the export prices of relevant products (oil, natural gas and natural gas liquids). In the current market context α has been found to vary from 1 for non-natural gas exporters such as Saudi Arabia, to 0.78 for Algeria and 0.67 for Qatar.

6. Despite these simplifications, feeding the model with the appropriate data remains fairly challenging. Fiscal evidence is tied to the tracking of budget revisions found in supplementary and complementary budgets. They further depend on the degree of transparency of extra-budgetary transactions that prevailing institutional arrangements fail to capture entirely.<sup>2</sup> Just as the difficulty with intermediary data stems from the need to develop full-cycle costs of production as well as calibrate estimates of petroleum royalty and tax rates.

### New findings

7. With the exception of Kuwait, whose production cost has come down due to declining investment, 2013 estimates of fiscal break-even prices have increased for all countries, mostly however for Venezuela, Iran and Angola (Figure 2). Prices vary from \$58 per barrel in Qatar to \$144 per barrel in Iran, compared with \$53 and \$127 respectively in the 2012 estimates. In between, Saudi Arabia's break-even price has increased from \$94 per barrel in 2012 to \$98 in 2013. Accordingly, OPEC output-weighted average has risen from \$99 per barrel in 2012 to \$105 in 2013. In addition to inter-country differences, intra-country sensitivity analysis continues to reveal substantial variability. The former stem from differences in the structure and cost of the hydrocarbon industry and the degree ordinary fiscal revenues contribute to balancing budgets. The latter reflects revenue and spending uncertainty and, in the case of Iran, the falling value of the local currency.

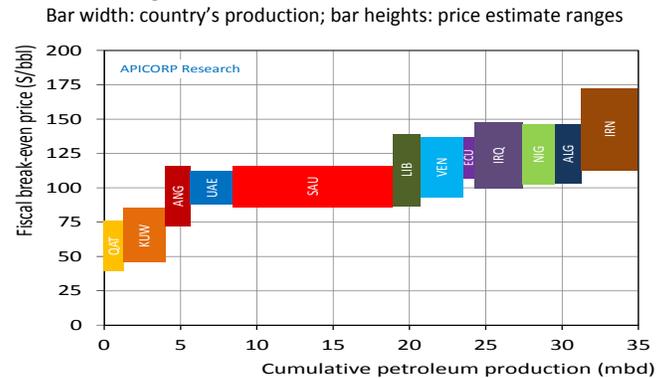
**Figure 2: Fiscal Break-even Prices for 2012 and 2013**



8. Since a fiscal break-even oil price can be interpreted as a cost, a fiscal cost curve (FCC) can be drawn using the above results. As shown in Figure 3, a reasonable approximation to such a curve is obtained by ranking each OPEC country's petroleum output, from lowest to higher prices. Because it is a fixed cost, a fiscal breakeven price cannot be interpreted as a reservation price: no OPEC country would likely withhold production until its 'preferred price' is met, although there may be cases where a major producer could lower its production to bring OPEC output below the residual world demand in order to realize its own 'preferred price', particularly if this is consistent with a policy of leaving oil in the ground for future generations. More generally, however, policy behaviors and intents will differ among countries depending on the distribution of their fiscal break-even prices along the FCC and on either side of the current market price. Insights into these policies are explored next.

<sup>2</sup> Richard Allen and Dimitar Radev, "Extrabudgetary Funds", IMF, Technical Notes and Manuals, Fiscal Affairs Department, June 2010.

**Figure 3: OPEC Fiscal Cost Curve for 2013**



### Policy insights

9. The FCC sheds light on the saving opportunities and the spending challenges facing OPEC countries. Under current market conditions, 'low fiscal cost' countries – those at the low end of the fiscal break-even price range – are likely to post substantial fiscal surpluses, which can be invested upfront in the domestic economy or abroad for future financial returns. These countries can also funnel more funds to defense, checkbook diplomacy, or ever more generous welfare programs. Conversely, 'high fiscal cost' countries – those at the high end of the fiscal break-even price range – are more likely to run deficits and thus incur debt, unless they have an FSF to draw from. Otherwise, they need to either reduce expenditure or increase production (assuming they have the potential to do so and that can be done without affecting market prices). Obviously, under current sanctions Iran has few options but to reduce subsidies and increase taxes.

10. The FCC also reveals the difficulty for OPEC of having to act cohesively. The fact that Saudi Arabia's fiscal break-even price lies near OPEC's output-weighted average price does not necessarily imply that the group's average can constitute a common predictor of price preferences. The FCC rather casts doubts on the ability of OPEC to act as a group of peers: there is simply no one-price-fits-all! Countries whose fiscal costs are higher than the market price would try and persuade the opposite side to lower the aggregate production ceiling, thus adjusting individual output quotas. The expectation would be for market prices to increase to meet their higher break-even prices. However, it is difficult to see 'low fiscal cost' countries accepting a redistribution of quotas in favor of 'high fiscal cost' countries as a legitimate form of policy. Certainly, OPEC's statute gives due regard to "the necessity of securing a steady income." But even if this could be construed as achieving a fiscal revenue objective, there is no statement of principles that suggests that output should be allocated to support high fiscal cost producers' budgets.

11. The ultimate point is that no OPEC member can expect to set expenditures which depend on other members surrendering market share. Countries would be more likely to spend what they could afford. High spenders have no escape but to adjust their fiscal policies and bring their spending closer to their revenues. As a matter of fact, our findings suggest that OPEC 'preferred prices' are more an indication of member countries' preferred spending than any price they are likely to achieve in the marketplace.<sup>3</sup>

<sup>3</sup> The fiscal cost interpretation and resulting policy insights have benefitted from a discussion with John Mitchell, Associate Fellow at Chatham House.