Balancing Upstream Investment Performance and Government Take: Empirical Evidence of the Mechanics and Impact of Petroleum Fiscal Terms

Adeogun Oyebimpe and Omowumi Iledare
Emerald Energy Institute, University of Port Harcourt
Port Harcourt, Nigeria
adeogunoyebimpe@gmail.com; +2348029078299

Overview:

The perceptions of investors on the attractiveness and performance of upstream petroleum projects, especially in an era of high volatility in oil prices, resource nationalism and control, and the need to maximize both investors and host governments' objectives, are mostly informed through petroleum fiscal systems design. In order to attract investors to a petroleum region, the area must not only be highly prolific in a geologic sense, it must also have a dynamic, efficient, and stable fiscal systems. Dynamic and stable fiscal systems, literally, require surrendering a significant portion of economic rents to investors in order to ensure sufficient rewards in countries with high exploration risk and low geological prospectivelyz. Of course, if exploration risks are low and geologic prospects are high, then the host government can be expected to capture significantly high proportion of the economic rents.

The purpose of this presentation is to facilitate a good understanding of the mechanics and applications of an economic model to analyze the effects of upstream fiscal terms on E&P investment, project economics and government take. Important upstream investment and system performance metrics, such as front loading index (FLI), savings index (SI), internal rate of return (IRR) and host government take (HGT) are estimated to characterize the performance of investment under various kinds of fiscal systems. Further, the presentation shows that intergenerational and international competitions for upstream investments to explore and exploit petroleum resources require balancing prolific geological settings with effective and progressive fiscal terms and instruments. Finally, the presentation demonstrates with empirical evidence that time is everything and everything is about timing when it comes to using fiscal terms and instruments to optimize upstream investment performance and government take!

Method:

Host government of petroleum-producing regions with low exploration risk, high geologic prospects and stable fiscal systems are attracted by investors in the oil and gas industry. A balance between inherent risk and expected reward influences the design of fiscal systems for optimum benefit for concerned stakeholders. Countries with low exploration risk and high geologic prospects have fiscal systems that capture significantly high economic rents, the reverse is the case for countries with high exploration risk and low geologic prospects as the government have to surrender some of her economic rents to encourage investment.

Petroleum fiscal systems are classified under two broad categories namely; Concessionary system (also known as royalty/tax system) and Contractual system. The rent spectrum of a petroleum fiscal system is classified into pre-discovery, discovery and post discovery elements. Pre-discovery rent spectrum covers all rent extractions prior to commercial discovery of petroleum, this includes signature bonus and royalty, which may be negotiated or legislated by the government. Discovery rent extraction is usually in the form of government participation. Post discovery terms are those tied to production of the reserves, examples are production bonus, royalty, crypto fees and profit based rent extraction. The interplay of cost, oil price and efficient fiscal regime are all essential for investment in the oil and gas industry. These are incorporated into a discounted cash flow model as input variables and system performance metrics such as front loading index (FLI), Net Present Value (NPV), savings index (SI), internal rate of return (IRR) and host government take (HGT) as expected output. Mathematically, this can be expressed as follows:

$$NPV(r,t) = \sum_{t=0}^{N} \left(\frac{NCF(t)}{(1+r)^t}\right) = f(Output, Royalty, Cost\ Recovery, Taxation, Profit\ Oil, Product\ Prices) \quad (1)$$

The IRR is simply the discount rate at which the NPV becomes 0. At this discount rate, the net present worth of cash inflows equal the net present value of cash outflows.

$$NPV(r,t) = \sum_{t=0}^{N} \left(\frac{NCF(t)}{(1+IRR)^t}\right) = 0 \text{ ------------------------------ } (2)$$

$$FLI = \frac{Discounted\ Government\ Take}{Undiscounted\ Government\ Take} - 1 \qquad \text{------------------ } (3)$$

Stochastic simulation was carried out to account for risk and uncertainties inherent in the oil and gas industry using @risk, an add-in software on excel spreadsheet

Observation and Conclusion:

Results of the deterministic model showed that using a sliding scale royalty scheme tied to production rate and value impacts the investor and government favourably. Royalty tied to oil price enables the host government share in any of windfall profits that may accrue to the investor when oil price increases astronomically. This is an advantage over the fixed percentage royalty used by some countries in the Gulf of Guinea, examples are Ghana R/T 1997, Nigeria PSC (1993), Nigeria PSC (2000) and Tanzania. Host government should ensure adequate cost benchmarking is put in place to discourage gold plating by investors when r-factor is applicable. R-factor was tied to contractor profit share, royalty and cost recovery.

Conclusively, a dynamic, stable and efficient fiscal system that guarantees a balance between economic rent that accrues to the host government and reward for the investors. Government in regions with low exploration risk and high geologic prospects should design a fiscal system that gives optimum investment reward with mutual benefits for all stakeholders. To achieve this, incentives like reduction in the taxes/royalties on a sliding scale, reduction or elimination of bonuses should be encouraged.

References:

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