PETROLEUM FISCAL SYSTEM PERFORMANCE ANALYSIS UNDER A SUSTAINED LOW OIL PRICE REGIME: A CASE STUDY OF DEEPWATER E&P IN NIGERIA

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Overview:

Innovations and rapid advancements in exploration, drilling and completion technology in the last several decades, have made the search for and development of oil and gas resources in the Gulf of Guinea. The region has become a key focus area for international oil and gas companies. There is, however, an increased concern for investors with respect to contractual terms and instruments in the fiscal arrangemnts governing the bidding and exploration processes and the development and exploitation of discovered petroleum resources in this Golden Atlantic region, especially in Nigeria deep offshore. The international operators typically demand stable fiscal terms and instruments that are effective and efficient with respect to capital cost recovery specifications and profit sharing mechanisms between representatives of the host governments and investors. This paper reviews deepwater E&P fiscal systems in the offshore Nigeria and investigates whether changes in low economic conditions in terms of falling oil prices do matter significantly and differentially in balancing the risk of investments with the reward systems.

Method:

The model framework adopted for this paper is based on the generic discounted cash flow modeling framework with considerations for risk and uncertainty using Monte Carlo simulation management:

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

E&P investment measures such as internal rate of return (IRR) and systems take statistics such as discounted govern take or front-end loading index (FLI) are derived by solving equation (1) iteratively in a coded excel spreadsheet model. To account for uncertainty and risk associated with some of the cash flow variables such as product prices, reserve estimates, exploration and development costs, and other stochastic variables in equation (1), a probabilistic risk analysis is performed using @Risk program on the spread sheet model. The estimated parameter (IRR and FLI) from solving equation (1) and simulation results are used to compare fiscal systems performance in the Gulf of Guinea.

Observation and Conclusion:

The key objective of this study is to determine whether changes in fiscal system terms and instruments do really matter to the extent that it can significantly impact deep offshore industry performance a sustained crude oil price dynamics. Using estimated responsiveness measures, the paper investigates how to adjust PSC fiscal terms and instruments to make investing in E&P ventures in deep offshore Nigeria offers satisfactory returns than low price. The significance of the impact of fiscal agreement terms and instruments using Monte Carlo simulation provides a framework to compare the performance of deepwater projects in the Golden Atlantic with different price scenarios and fiscal term adjustments..