ENERGY RESOURCES & DEVELOPMENT: A CASE STUDY OF THE GULF OF GUINEA REGION

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Overview

The GoG is endowed with both fossil and renewable energy resources and ranks among the top five percentile of petroleum provinces for Exploration and Production (E&P) investment worldwide. According to the 2014 BP statistical review, GoG accounts for about 86% of Africa's proved reserves and its primary energy consumption is just about 3.5% of Africa's fossil energy requirements as at 2013. Angola, Equitorial Guinea, Gabon, and Nigeria holds about 90% of the region's proved reserves while Cameroun, Ghana, Sao Tome and Principe, and Cote D'Ivoire accounting for the remaining 10%.

The world is witnessing a state of transition with the emergence of unconventional hydrocarbons – shale, tar sand. Nations and regions are re-strategizing, re-aligning – Russia and China, for example – and the geopolitics of oil is stiffening. The advent of unconventional shale production – especially from the United States (US) – and the US becoming a net energy supplier, thereby cutting down on its reliance on petroleum imports from the Nigeria, opens a new chapter for the region. Low oil price is leading to harsh economic conditions in nations with significant dependence on oil for governance expenditures.

Keeping in perspective the emerging energy supply/demand mix and landscape, it is pivotal to analyze the economic development and energy security implications of the emerging trend in the energy landscape on resource-based economies in Africa. How does the region meet its quest for energy and guarantee energy self sufficiency? What will drive its reserves growth and improve its production? What strategic role will GoG play in the world's geopolitics of oil? What future petroleum needs? What appropriate oil and gas export for the region? The paper examines the above questions and helps to enlighten on what appropriate energy security policy to adopt and economic incentives that would help optimize GoG resources.

Methods

The discounted net cash flow (DNCF) economic modelling approach similar to that adopted by Mian (2002), Johnston (2003) and Iledare (2010) is used in this study. A typical DNCF begins with forecasted production profile with field development plan. In the analysis of the effect of fiscal systems on energy resources and its development in this study, DNCF economic model is developed for the deep water of Gulf of Guinea. 12 different fiscal terms (Iledare and Echendu, 2013) for Angola (2), Equatorial Guinea (2), Gabon (1), Nigeria (3), Ghana (1), Cote d'ivoire (2), and Cameroun (1) modeled. The approach addresses the industry structure, conduct and performance of fiscal regimes of countries in the Gulf of Guinea.

For economic analysis, the DNCF model is adopted and preferred to other models like financial profit model and tax profit model, because it produces net cash flow and it places the timing of funds to and fro projects more accurately (Mian, 2002; Johnston, 2003). Net cash flow (NCF) is simply revenue (cash received) less expenditure (cash spent) during a period usually one year and projected over the economic project life.

A wide range of profitability indicators were used in the economic evaluation decision of this work such as Government Take (GT), Contractor Take (CT), Net Present Value (NPV), Internal Rate of Return (IRR), Savings Index (SI), Growth Rate of Return, and Return on Investment (ROI). This avails investors, governments, petroleum economists and so on, great options of economic performance indicators in decision making. It is also found that as the risk in deep water investment increases with water depth, return on investment rises significantly too in the Gulf of Guinea, ceteris paribus.

Results

The model results show that the measure of incentives for keeping technical costs low have an average SI of 0.38. This means for every dollar saved by lowering technical cost, the investor could keep an average of 38 cents within the region, ceteris paribus. The least SI within the region is an average of 22 cents per dollar in Angola and as much

as 56 cents per dollar saved for Equatorial Guinea. Nigeria has a mean of 36 cents for the three fiscal terms modeled, while Ghana has 49 cents. Gabon and Cameroun have an average of 30 cents per dollar saved from lowering technical costs.

The estimated return on every dollar investment in projects within the GoG region is an average of 28%, ceteris paribus. The IRR level is relatively higher than the assumed discount rate of 12.5%. Prolific nations like Angola and Nigeria have an average of 23% and 26% respectively for the consolidated fiscal terms studied. Their lower rates – below the overall mean – attest to the less risky terrain and maturity of their reserves. Higher IRR of 35% is observed for both Ghana and Equatorial Guinea. The above results show that the earning power of investment in the GoG is quite favourable, given assumed variables.

Evidence from the GRR modeled indicates IRR is sufficiently greater than the GRR that has an average of 17%. Given the assumed variables, distinct comparison between IRR and GRR shows IRR greater than GRR in all cases. Angola has an average GRR of 0.15 as against an IRR of 0.23. Gabon, Nigeria, and Cote d'ivoire have mean GRR of 0.16 against mean IRR of 0.26. An average GRR of 0.17, 0.18, and 0.19 as against an average IRR of 0.28, 0.35, and 0.35 are expected for Cameroun, Ghana, and Equatorial Guinea respectively.

A reflection of total profit or return relative to value of investment (ROI) shows an average ROI of 0.69. As much as a mean ROI of 1.21 is expected from Equatorial Guinea fiscal terms, with 0.98, 0.47 and 0.65 expectations for Ghana, Cote D'Ivoire and Cameroun respectively. Martured provinces still accounts for averages as high as 0.35, 0.48, and 0.71 for Angola, Gabon, and Nigeria respectively, ceteris paribus.

Conclusions

The emergence of unconventional hydrocarbon development and the geopolitics of oil have created a new energy supply/demand landscape and GoG nations have to re-focus and re-strategize to guarantee energy security and advance the prosperity of their economies. Adequate incentives could help to attract the much needed technology and investment to the region. The strategic placement of the region geographically, also gives an edge in terms of energy supply sources as traditional key energy players re-route their energy demands. Strengthening of the NOC is very important for energy security, capacity development, and resource development.

The viability of investments flow into projects within the GoG is quite favourable with the economic indicators result obtained from the model, ceteris paribus. With a mean ROI of 0.69 and IRR of 0.28 as against an assumed hurdle rate of 0.125, investments in project is quite encouraging. These profitability indicators portend that, despite the uncertainties, profit will be made on investments in the GoG under the existing fiscal terms, that is to say NPV will be favourable. However, governments within the region could still do more by reexamining their terms and designing progressive terms that could be tied to both oil price and geology, such as with royalty.

The GT estimates from our analysisof the GoG fiscal system show a competitive statistics when compared to other regions. Takes statistics of 75% & 79%, on the average, for Nigeria and Angola, respectively, depict the importance of progressive fiscal terms in order to attract investors. Nigeria's take stastistics show a progression of take statistic as the fiscal regime changes. This shows that progressive terms will attract investment that would lead to reserves growth cum assets.

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