

RESERVES AT RISK: PLANNING WITH DEEP UNCERTAINTY AND HIGH COMPLEXITY

Umberto Perna: Eni S.p.A. and CNR-ISC (Istituto Sistemi Complessi),
Phone: +39 02 520 62734, email: umberto.perna@eni.com

Vanessa Ulivieri: Eni S.p.A.,
Phone: +39 02 520 61333, email: vanessa.ulivieri@eni.com

Overview

The purpose of the work is to improve value creation for investors of E&P Companies (but applicable to all commodity producers) by estimating more accurately the risk profile of their own developed and undeveloped assets under the exposure to rare, extreme or otherwise “unforeseen” events [1]. The improved understanding of the fragilities hidden within the portfolio derived from achieved through well-known techniques employed outside the industry will lead to improved planning, resource allocation and low-cost implementation into already existing corporate processes.

Method

The measurement of riskiness of reserves is based upon widely adopted methods in Finance to measure exposure to adverse events. By exploiting Extreme Value Theory [2], we assess the Expected Shortfall, over given time horizons in the actualized value of hydrocarbon reserves of a diversified E&P company, subject to varying exposure to movements in the oil price, technical setbacks, and atmospheric events. The model would also allow taking into account other above-surface risk factors like geopolitical events.

Results

Under the analysis performed by the model, the valuation of assets in company portfolio would be generally lower than those presently accounted for. These would however provide to be more consistent during the commodity cycle, allowing for more efficient capital allocation through time and promoting quality-over-quantity of assets and the returns of present and future production. It may reduce the perceived riskiness of the better performing companies as they focus their efforts on the most profitable assets, adsorb and invest capital more efficiently and reduce coordination complexity. Inefficiencies in capital expenditure are computed by taking into account longer development time for new large projects, when the future cash inflows are discounted by more accurate risk measures and the likelihood of delays and cost overruns increases non-linearly with size. The optionality value in contract arrangements regarding the development of reserves can also be derived consequently, allowing for the economic assessment of widely spread PSA arrangements [3] in “abnormal” business times. The analysis is based on plausible synthetic input data, with the model allowing for the assessment of peculiar geological and geographical settings, offering flexibility in the calibration of parameters based on the nature of real-world assets.

Conclusions

The model advances improved measurement of uncertainty and risk of the economic value of assets in the industry by promoting the adoption of more advanced mathematical methods successfully employed in other industries. It recognises the more difficult operating environment with increased volatility in the price of energy commodities and the threat posed by alternative sources of energy. The new approach will avoid the “Overpricing” and “Overbooking” of reserves [4], improving the protection of shareholders and other stakeholders in E&P companies. A schematic implementation of the model within established corporate Enterprise Risk Management processes is put forth.

References

- [1] McVay, D. A., & Dossary, M. N. (2014).
The value of assessing uncertainty.
SPE Economics & Management, 6(02), 100-110.
- [2] Longin, F. M. (2000).
From value at risk to stress testing: The extreme value approach.
Journal of Banking & Finance, 24(7), 1097-1130.
- [3] Wood, D. (2013).
Upstream Petroleum Fiscal and Valuation Modeling in Excel: A Worked Examples Approach.
John Wiley & Sons.
- [4] Olsen, G. T., Lee, W. J., & Blasingame, T. (2011).
Reserves overbooking: the problem we're finally going to talk about.
SPE Economics & Management, 3(02), 68-78.