Title: Case study for Madagascar - Assessment of the attractiveness to explore in the Mozambique Channel

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Motivation of the study

- The Mozambique Channel is an underexplored area that has been the center of significant discoveries. Currently, the recoverable reserve of Mozambique is estimated between 120 – 150 TCF and Tanzania between 20 – 30 TCF.

- In Madagascar, only 6 shallow water drillings were realized and abandoned in the 1970s. The US Geological Survey assessed significant resources comparable to Mozambique's: a probable recoverable resource of 10.8 billion barrels of oil and 167 TCF of gas in the Morondava basin (Madagascar). Nevertheless, there is an important doubt about the attractiveness of Madagascar.

- The Government of Madagascar intends to reform the regulatory framework to promote offshore exploration and plans to launch the fifth bid round

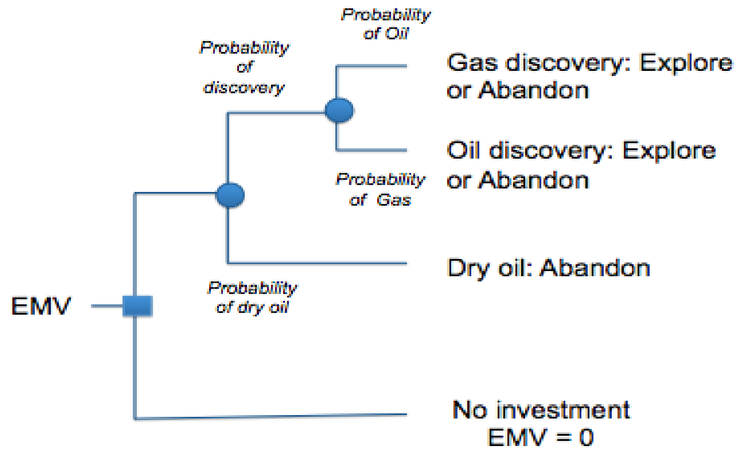
Methodology

Research question: What fiscal incentives can be provided to IOCs to explore in Madagascar ?

Model: Based on an Expected Monetary Value (EMV) model, it captures the uncertainties face by the companies during exploration: geological risk, probability of oil discovery or gas discovery, oil & gas price.

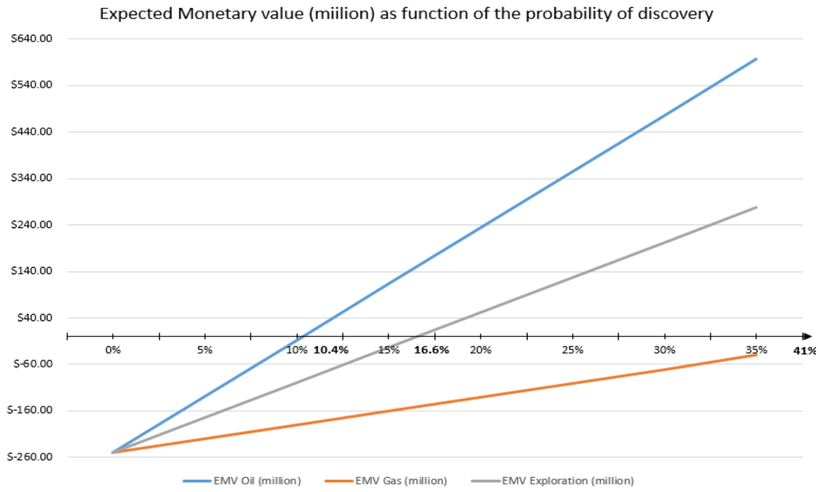
Assumptions: 3 gas fields of 4, 5 and 6 TCF and 3 oilfields fields of 100, 250 and 500 million barrels. The oil & gas prices are assumed for the development (2026).

Decision tree (overview):



Results

The project profitability is determined by the expected findings. As showed in the graph below, the minimum required chance of discovery is less for oil than gas. The minimum probability of discovery required to have a positive EMV is 16.6%.



- The EMV is negatively skewed by the chance of gas discovery. Under assumptions for 2026, the EMV for oil is at $55 million where the EMV for gas is at -$174.4 million and overall -$59.7 million dollar. The Monte Carlo simulation reveals that the probability of estimating a negative EMV is 56% and the expected mean value is at -$3.7 million.

- Analysis revealed that the fiscal regime for gas can be optimized: an increase of the cost recovery allowance, decrease of the royalties and direct taxes on petroleum product make better off the IOCs and the state government. The study advices to increase the cost recovery allowance to 80% and decrease the direct taxes to 17%.

- Further incentives from oil have to be provided to turn the EMV positive: increase the cost recovery allowance to 75% for oil, decrease the direct taxes to 17%. Following the changes, the EMV increases by $57 to -$2.2 million and the government expected revenue decreases by $22 million from $124 to $102 million. Monte Carlo simulation shows that the probability of a negative EMV is now at 46% and the expected mean value is at $33.7 million.

- Political risk consideration results in a reduction of the EMV compared to the base case by $100 million. Nevertheless, the consideration of political risk varies according to the companies judgment. Overall, the state should provide more incentives for exploration as: 'stability clauses' and 'willingness to fight against corruption'.

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