

## Macroeconomic Analysis

# Positive expectations for the auction of deepwater blocks

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- Oil reservoirs in deep waters will attract the largest amount of investment and will give the biggest boost to the local oil production platform under the Energy Reform.
- We expect that at least 6 blocks from Phase 4 of Round 1 will end up with a winning bid given their production potential and technical challenges for production.
- We anticipate that the four blocks in the Perdido Area will be successfully auctioned. Meanwhile, we anticipate that at least 2 of the 6 blocks from the Saline Basin will be awarded among participating consortia.
- A project financial evaluation of a hypothetical deepwater reservoir in the Gulf of Mexico reveals that the price of an oil barrel would have to be at least USD 60 if the Mexican State wanted to charge a royalty rate of 20%.
- However, at a price of USD 50 a barrel, the project would be profitable as long as the royalty rate were close to zero percent.

## We hope Phase 4 of Round 1 will attract the largest amount of investment and will give the biggest boost to local production of hydrocarbons

In December 2016, ten blocks will be tendered in Phase 4 of Round 1. These are the first blocks of hydrocarbon reservoirs in the deep waters of the Gulf of Mexico. We hope it is possible to successfully bid for at least 6 of them, which could bring an investment of about USD 40 billion over the next few years.

It is noteworthy that 4 of the 10 blocks are in the Perdido Area near the US part of the Gulf of Mexico, where production potential has been proved (sandstone formation is of high quality due to the turbid currents of the Bravo and Mississippi rivers that have deposited sediment over thousands of years). In fact, wells producing up to 100,000 of oil barrels per day have been found, which helps considerably to reduce unit production costs and, consequently, makes this type of projects profitable despite oil prices being relatively low.<sup>1</sup> We expect that all of the blocks in the Perdido Area will be successfully auctioned.

The other six blocks are located in the Saline Basin, several kilometers off the coast of Tabasco. However, there are no studies of exploratory wells revealing the potential of hydrocarbons beneath the seabed in such basin. Additionally, there are thick layers of salt in four of these blocks, which would make it even more costly to construct oil wells.<sup>2</sup> Finally, this region of the Gulf of Mexico has not been benefited by sediments deposited by rivers, which helps us anticipate that sandstone formation might not be of great quality. We estimate that at least 2 of the Saline Basin's 6 blocks will eventually be awarded in the auction.

<sup>1</sup> For more information on the areas which are relatively better for the extraction of hydrocarbons in the Gulf of Mexico per drilled well, please see Leffler *et al.* (2003).

<sup>2</sup> In the article "Brazil's gamble on deep water oil" published on June 25, 2015 in The Guardian, it is mentioned that the cost of an oil well can reach USD 300 million when there are salt layers above the reservoir.

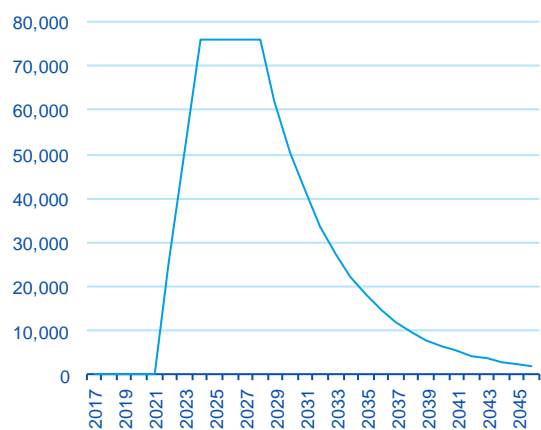
## Formation of consortia to share investment costs and risks in deep waters

It is very likely to see a Phase 4 where the winners of the blocks are consortia that allow for sharing of investment costs at the risk of finding nothing (dry holes) or too little oil during exploration. An example of this is the farm-out Pemex wants to carry out for the Trion field, whose production potential is estimated at approximately 485 million barrels of oil equivalent (at a constant production rate of 50 thousand barrels per day, 27 years of production would be reached). To put this hydrocarbon potential in context, the three previous phases of Round 1 together represent about 500 million barrels. Meanwhile, Pemex estimates investments of USD 11 billion stemming from this deepwater project. If an investment of USD 486 million is met by the consortium winning the tender, Pemex will have a 45% participation in both the project costs and cash flows.

## The financial evaluation of a deepwater oil project: key to guide expectations regarding Phase 4 of Round 1

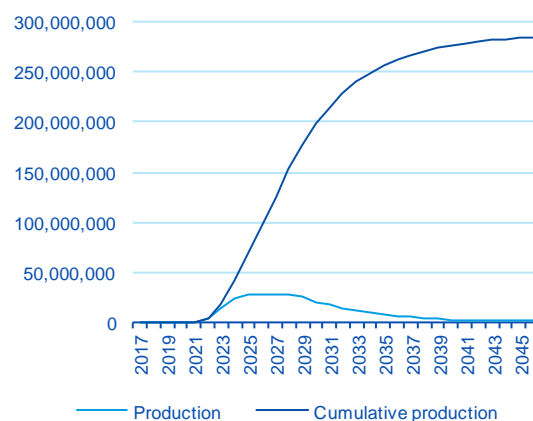
To have a better understanding of the economic factors that could be behind the decisions of companies to participate in deepwater oil projects, we carried out a financial assessment of a project under the following assumptions: (i) an investment (capex) of USD 4 billion; (ii) operating costs (opex) of USD 11 per barrel on average and adjusted with an annual increase of 5%; (iii) a production potential of 285 million barrels of oil to be commercially developed; (iv) production beginning in the year 2022 following a linear increase in the first three years, reaching a maximum of 76 thousand barrels per day that will be maintained for the next four years and will decrease exponentially toward the year 2046; (v) royalties rates at 0%, 5%, 10%, 15% or 20%; (vi) an average price of an oil barrel that might be USD 50, 60, 70, 80, 90 or 100; and (vii) a 10% minimum expected rate of return (hurdle rate).<sup>3</sup>

Figure 1  
**Estimated oil production from a deepwater reservoir (Barrels per day)**



Source: BBVA Research

Figure 2  
**Estimated oil and cumulative production from a deepwater reservoir (Barrels per year)**

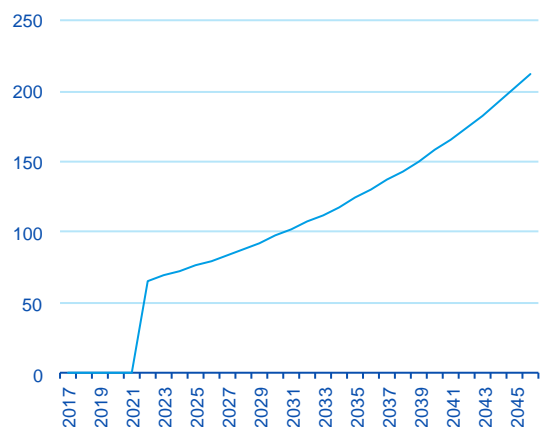


Source: BBVA Research

<sup>3</sup> The assumptions in (i) and (ii) are very similar to the data found for the Big Foot project in the deep waters of the Gulf of Mexico. For more information, please see the document "Trends in U.S. Oil and Natural Gas Upstream Costs" of the U.S. Energy Information Administration, March 2016.

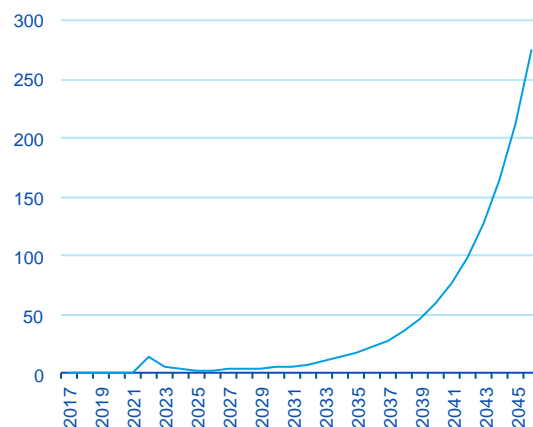
The evolution of operating costs over time will be a key piece of information to determining the year in which net cash flows will become negative. Given the assumptions listed above for the profile of these costs, this point in time will mainly depend on three factors: 1) annual oil production; 2) the price of an oil barrel; and 3) the percentage of royalties charged by the State.

Figure 3  
**Expected path for the operating costs of a deepwater reservoir (USD million)**



Source: BBVA Research

Figure 4  
**Expected path for the operating costs of a deepwater reservoir (Cost per barrel in USD)**



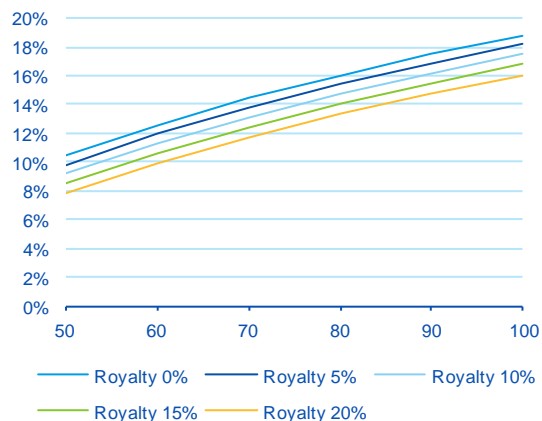
Source: BBVA Research

As you can see from Figure 4, operating costs per barrel will exceed USD 100 since year 2043. That is, even if the price of a barrel were USD 100, the project would stop being profitable in 2043, or even one year earlier if the royalty rate made net cash flows negative in 2042.

The results of the financial evaluation of the deepwater hypothetical oil project are presented in terms of the Internal Rate of Return (IRR) and the Discounted Return on Investment (DROI).<sup>4</sup> Figure 5 shows the financial evaluation results according to the IRR criterion, and Figure 6 shows such results using the DROI concept. From these figures, we can highlight the following conclusions: 1) the IRR and DROI increase when oil prices rise and/or there is a low percentage of royalties; 2) if the percentage of royalties imposed by the State were 20%, then the price of an oil barrel would have to be at least USD 60 for the DROI to be positive or the IRR greater than 10%; 3) at a price of USD 50 per barrel, an IRR greater than 10% or a positive DROI would only be possible with royalty rates close to zero.

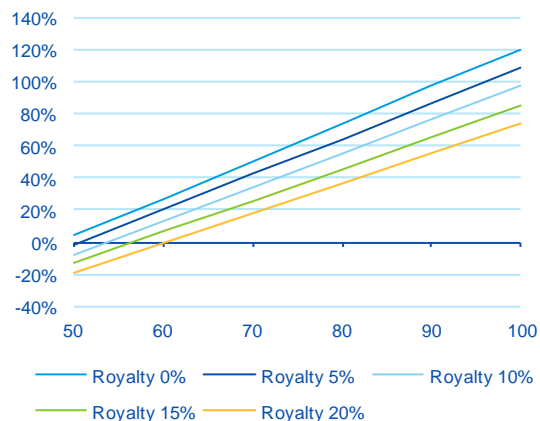
<sup>4</sup> The IRR is used as a criterion to rank projects from the highest to the lowest profitable project. The higher this indicator is, the faster the project's costs will be recovered. The other criterion is the DROI (Present value of net cash flows/Investment), which could render a different rank order than the IRR criterion because it considers the total net present value. That is, more substantial net cash flows could occur much later during the life of the project.

Figure 5  
**Internal rate of return on a deepwater reservoir (%)**



Source: BBVA Research

Figure 6  
**Discounted return on investment from a deepwater reservoir (%)**



Source: BBVA Research

## Conclusions

Phase 4 of Round 1 will offer a great opportunity to venture into the production of oil and gas from deep waters for the first time in the country's history. The proved great production potential in the US region of the Gulf of Mexico, as well as the fewer technical challenges in the Perdido Area, will serve to offset the relatively low price of an oil barrel. However, the lack of exploration and major technical complexities in the Saline Basin will hinder successful auctions in that area. Meanwhile, the results of the financial evaluation of a hypothetical project in the deep waters of the Gulf of Mexico show that the price of an oil barrel would have to be at least USD 60 if the Mexican State wanted to charge a 20% royalty rate. Finally, it is important to take into account that the production of hydrocarbons from reservoirs in deep waters will take several years to materialize. This will imply even greater payback periods for investments made in these projects.

## References

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- Seba, R.D. (2008). Economics of Worldwide Petroleum Production. Third edition. PS.
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