Proposed Brazilian Fiscal System for Pre-Salt Production Projects: A Comparative Study of Gain and Loss of Government and Companies

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Abstract

After the discovery of large oil reserves in pre-salt areas of Santos Basin, the Brazilian government has changed the fiscal regime from royalty/tax system to production sharing system, which is the one already adopted in countries like Indonesia, Colombia, among others. The proponents of this idea say that it is necessary, because after these discoveries the exploration risk in this area is low. The proposed fiscal regime has created an intense debate among professionals, institutions and government. Who will be the winner? Who will be the looser? How much will be the loss or gain? At this moment, there is not clear convergence of viewpoint about the forecasting of the impacts on new investment. The reason for the implementation of production sharing system is because government wishes to capture a larger share of the profits. How? Politicians believe that the following policy could bring more benefits to government: in the bidding to new productions projects, the winner will be the company that offers the largest share of production to government. Then, the main objective of this paper is to investigate the behavior of the proposed fiscal regime in terms of production profile, NPV and risk, etc. In order to carry out this study, first, a typical oil field project from the pre-salt area is selected, whose characteristics are: large reserve, located in deep-water and bellow salt layer. After that, it is carried out an economic evaluation, comparison and risk analysis of a production strategy considering both regimes of concession and production-sharing. It is concluded that, it is not always that production-sharing agreement is superior, since it depends on the share of government in production, investment level, operation cost, among others.

1 - INTRODUCTION

The fiscal regime for oil and gas exploration and production is an important subject in industry game and has attracted attention of many authors – For example, Van Meurs (1993), Johnston (1994) and, Johnston (2004). This subject is important because it is one of the determinants of the attractiveness of Exploration and Production (E&P) of oil and gas.

In Brazil, the oil industry has been growing since 1997 when the Government decided to open the market for competition in the E&P, since many companies believe in the natural endowment of country in its more than 8 million square kilometers. Over the last 13 years, the investment of companies in E&P has increased year by year and the amount government has collected in bonuses has arrived at billion of US dollars – for more information about detailed statistics, see www.anp.gov.br.

The fiscal regime that allowed the exploration effort over the last years is the Royalty and Tax (R&T), in which, companies assume the risk in exploration and, in case of success, pay tax, fees and royalty to government. Under this fiscal regime, huge reserves have been discovered in the Pre-Salt area, mainly Tupi and Iara oil fields, whose estimates are around 7 billion barrels and 4 billion barrels, respectively (these number come from public information in newspapers).

Because of this new scenario of discoveries, many politicians have warned that: 1) the risk of the prospects of Pre-Salt area has decreased; 2) the way money from E&P activities has been distributed among different institutions must change. Then, a new fiscal regime based on Production Sharing agreement has been proposed and is under way for discussions, amendment and approval by Brazilian House of Representatives.

One of the main roles of the fiscal agreements is to allocate the rights for development and operation of specific business
within a country (Campbell, Jr et al, 2001). Different fiscal systems are imposed by the countries to optimize the value of their resources, benefiting in this way, the local citizens. As a result, international agreements vary considerably and the countries seldom follow the same pattern.

Before the implementation of any fiscal regime there is always expectation about the results in practice. In this context, this paper makes a simple comparison of one of the proposed Brazilian fiscal regimes for pre-salt (Production Sharing) with the current R&T, since they influence greatly investment decisions.

2 – THE CONCESSION VERSUS PRODUCTION AGREEMENT CONTRACTS

The concession agreement is a common form for allocating business rights. In this system, the activities are carried out at concessionaire’s own risk, without government interference or control in E&P projects, since the existing regulation is respected. In case, there is a discovery and it is developed, oil and natural gas when extracted, belong to the operators after the payment of royalties and other government take fees under the petroleum law. Companies compete for concession rights in several ways: bonus, royalties, and taxes. The rights are allocated via bonus bidding, given that, the highest bidder wins. Besides royalties, other form of compensation under this agreement is the income taxes. The operating company usually produces, processes and pays the local government a fee, based on the sales price. Examples of this type of fiscal regime comprehend the United States.

On the other hand, the sharing system is the opposite of the concessionary system. It is used in countries with large reserves and low exploratory risk. The government retains ownership of the asset. Governmental review of the development and operating plans is required. In these contracts, the company that executes the activities assumes the exploratory risk. In case of success, the company has their investments and costs compensated in oil, known as oil-cost, that is, the payment is made in product (oil). The return of the activity results from deduction of investments and production costs from total revenue. When converted in oil, this value is known as oil-profit, which will be shared between the company and government, in variable percentages.

Production sharing began in Indonesia, with the decision to split production between the operator and the government. Other countries include Libya, Egypt, Vietnam, etc.

Regardless of the fiscal system utilized, what cares to investors is the economic-financial matter. The investor wants to know how the costs will be recovered and the gains shared, and this leads to the heart of the theory of taxation and the concepts of government take and company take (Barbosa and Bastos, 2001). Table 1 summarizes the type of fiscal regime for some countries.

Table 1: Fiscal Regimes

<table>
<thead>
<tr>
<th>Country</th>
<th>Concession Fiscal Regime</th>
<th>Production Sharing Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Indonesia</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Libya</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Norway</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>United States</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Vietnam</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: Johnston (1994) and Campbell, Jr (2001)

Figure 1 presents a summary of fiscal regimes, where the fundamental difference between them is the ownership of mineral resources.
In summary, in the concession system, it is allowed private ownership of mineral resources, whereas, in the systems contract, the Government retains the ownership of such resources. The difference between both types of contractual systems is the mode of payment: currency (service) or product (sharing). The base used for payment of service contracts may be the profit of the venture (risk) or a mere remuneration agreed (pure service) (Barbosa and Bastos, 2001).

3 – THE PROPOSED PRODUCTION SHARING MODEL FOR THE PRE-SALT

Until 2008, the Brazilian government has been adopting a fiscal model based on Royalty and Tax (R&T) for oil and gas production fields. But with the discovery of the reserves in the pre-salt area in water-depth of around 7000 meters, the government has decided to change the fiscal regime from R&T (also known as concession) to a production sharing agreement (PSA). Other changes in the regulation are under way:

- Creation of a State-owned company named Petro-Sal to carry out all activities related to E&P in the area of pre-salt under way now and in the future;
- Construction of a Social Fund of Savings (“Fundo Soberano”) with money from operations of production of oil reserves from Pre-Salt oil and gas reserves;
- Concession to PETROBRAS (giant Brazilian State-Owned company) the right in some specific areas of the Pre-Salt up to 5 billion barrels;
- Massive capitalization of PETROBRAS in order to finance new project to produce oil and gas from Pre-Salt huge deposits;

Basically, in Brazil there will be 3 fiscal regimes: 1) concession for oil reserves that are previously in production; 2) production sharing agreements for some of the reserves of Pre-Salt area and 3) “Cessão Onerosa”, which means that to PETROBRAS will be granted some reserves and the company must pay the government.

The new fiscal regime in Brazil has not yet been completely defined and is at the House of Representatives for examination, discussions, amendments and approval. A common question in Brazil is: why to change the fiscal regime from R&T to PSA? Some of the common answers are:

- The concession fiscal system was designed to find reserves, that is, for exploration. In this system, the government carries out bids to offer blocks for private companies that, in turn, assume the investment risk and in case of success will have a part of the cash flow of the project;
- Because the risk in Pre-Salt area is much lower after the huge discoveries, the Government Take (GT) must be higher and there is an understanding of politicians that the distribution of resources among States, Municipalities and Union must change. For these two reasons, especially for the last one, the only way to implement it, is by changing the actual fiscal regime to PSA and “Cessão Onerosa”.

The PSA has been applied to countries where there are large reserves and low exploratory risk. In 1950, Bolivia used this system and lately Indonesia has designed PSA for extraction of its oil reserves. Currently, this system has been used in many countries in Middle East, South America and Central Asia – roughly, 80% of the global oil reserves are extracted under the
regime of PSA or some similar one.

The proposed project of law 5938/2009 includes the following modifications on the actual legislation:

- The Royalty must be paid and is not included in the oil cost, that is, the payment of cost must be done net of the cost of royalty that goes directly to government.
- The cost recovery limit is still not defined, but must be specified by new regulations that are under way now in Brazilian House of Representatives.
- The company share must be determined by a bidding process, so that the winner will be the company who allows the Government the highest share.

Since the modifications are not yet finished, it is possible that new topics may be included in the new fiscal regime, whereas other may be removed. Then, the fiscal regime developed in this paper is from public information and may become old-fashioned in the future in case of many modifications.

## 4 – A COMPARATIVE ANALYSIS OF CONCESSION AND PRODUCTION SHARING MODEL APPLIED TO A PRE-SALT OILFIELD

In order to carry out a comparison study of the main features of R&T and PSA, we select a production curve that is believed to be typical from the pre-salt reserves, which is shown in Figure 2.

![Production curve of a potential pre-salt oil reserve](source: www.oglobo.com.br)

This reserve has a life of around 22 years, ranging from 2013 until 2035. The plateau phase will have 6 years with yearly production of more than 600,000 barrels. It is assumed that the decline in production curve can be modeled with an exponential curve with a constant rate of 8% from time-to-time. It is important to note that the total reserve will be around 7.75 billion barrels, one of the largest oil field over the recent years.

In order to carry out the analysis we assume the following for the R&T system:

- The oil price is assumed in US$ 40/bbl, even that we are aware that it is the main uncertain variable for the next years because of a number of variables: new energy sources, behavior of demand, etc.
- The opportunity cost of capital is assumed to be around 12%, which is much higher than the actual cost of capital of Petrobras at this moment. But, because in this case the risk of project is different of the risk of the company, this conservative value is selected.
• From public sources, the operating cost (Opex) for oil fields such as Marlim and others is around US$ 9.00/bbl. In this case, we assume an Opex of US$ 12.00/bbl because the work conditions of water-depth and other are much heavier.
• The capital cost (Capex) of this project is assumed to be US$ 18 billion and this number, as others in this model, comes from public information from newspapers.
• The Royalty of 10% is applied over gross revenue of oil production, as commonly used in other oilfields in Brazil, such as Marlim, Roncador, and others.
• The Special Participation fee is applied to those oil fields with huge production and, in this case, we have made a simplified assumption that its value is 40% (ceiling value).
• Other taxes as PIS/COFINS and Income taxes are also included in the model in the very same way they appear in the Brazilian fiscal regime.

These assumptions and some others used to develop a cash flow model for R&T and production sharing agreements are presented in Table 2.

Table 2. Fiscal and market assumptions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Concession</th>
<th>Production Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Price (US$/bbl)</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Opex (US$/bbl)</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Corporate Tax (%)</td>
<td>38%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Other Corporate Taxes (%)</td>
<td>3.65</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Royalties (%)</td>
<td>10%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Special Participation fee (%)</td>
<td>40%</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Discount rate (% per year)</td>
<td>12%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Investments (US$ billions)</td>
<td>18</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Linear depreciation (years)</td>
<td>10</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Cost recovery limit (%)</td>
<td>-</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Government Share (%)</td>
<td>-</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Company Share (%)</td>
<td>-</td>
<td>40%</td>
<td></td>
</tr>
</tbody>
</table>

It is important to note that, the opportunity cost of capital for both fiscal regimes is assumed to be the same, that is, 12% and we don’t consider that the fiscal regime itself changes the risk profile of the business. We assume that for Pre-Salt operations, the depreciation will be possible in 5 years. The cost recovery limit is assumed here to maximum of 50% which is common on other countries, but at this moment, this is not decided in the Brazilian Production Sharing model.

In the Brazilian model of bidding for Pre-Salt oil-field extractions the winner will the one who gives to the government the highest share of net production. At this moment, since there is no bidding yet, in this paper we assume that company share is 40% and government share will be 60%.
With these inputs, we run a cash flow calculation for both R&T (concession) and Production Sharing for the very same oil reserve. The result for company-take and government-take are in Table 3.

### Table 3: Comparative analysis of the application of two systems on the same reserve

<table>
<thead>
<tr>
<th>Shareholders</th>
<th>Concession (R&amp;T)</th>
<th>Production Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Undiscounted</td>
<td>Discounted</td>
</tr>
<tr>
<td>Government-take</td>
<td>70.97%</td>
<td>80.44%</td>
</tr>
<tr>
<td>Company-take</td>
<td>29.03%</td>
<td>19.56%</td>
</tr>
</tbody>
</table>

Note that, both, company-take and government-take are increased by discounting the cash flows from operations. Government-take increases from 70.97% to 80.44% in case of R&T and from 74.29% to 86.00% in case of Production Sharing. This dependence of government-take on discount rate makes it difficult to make comparisons among countries. Other important information is that the government-take of the proposed Production Sharing is much higher than in case of R&T system.

The government-take and company-take are dependent on the cost recovery limit, which, in this paper is assumed to be 50% of the revenue in a given year. In Figure 3, there is a graph of sensitivity analysis of the Government-Take to cost recovery limit in the range of 10% up to 100%.

![Figure 3: Sensitivity of government take to cost recovery limit for production sharing model](image-url)
Note that Government-Take decreased with the increase in cost recovery limit, that is, the quicker the company recovers incurred operational and capital costs, the higher will be the Company-Take. In addition, one can see that, the path of discounted and undiscounted Government-Take is perfectly correlated with cost limit recovery.

Other important variable in the game of fiscal regimes and impacts on Government-Take and Company-Take is the dynamics in oil price over time. In Figure 4, there is a sensitivity analysis of the impacts of oil price in both discounted and undiscounted Government-Take for Production Sharing system.

![Figure 4: Sensitivity of government take to oil price per barrel: discounted and undiscounted government take for PSA](image)

An increase in oil price will reduce the Government-take to around 70%. But, it is interesting that, for oil price between US$ 40.00/bbl and US$ 85.00/bbl, the curve of Government-take becomes approximately flat. This is important and the decision must be taken with care. For example, since in a situation of low oil price the Government-Take is much higher, does this mean that lower oil price is better for Government or that the system is designed to be stronger under low price? The correct answer is no. Actually, what Government desires is a large amount of money, not only a high fraction of cake that may be small.

In Figure 5, there is a display of the Government-Take of both R&T and Production Sharing sensitivity to variation in oil price over the time of the production of the oil field.

An increase in oil price will reduce the fraction of the Government-Take to around 70%, in case of R&T system and to around 80%, in case of Production Sharing. As discussed over the last paragraph, this does not mean that this system is designed to scenarios of low price, because what really matters is the amount of money captured with the fiscal regime.
Figure 5: Sensitivity of government take to oil price per barrel: R&T and PSA

From Figure 5, we see that the Production Sharing agreement can increase the Government-Take by, an average 7% over the case of R&T system. An immediate question is: could not Government increase its share in profits by increasing rates of the different type of tax in the current R&T system? The answer is maybe. This is because these figures are found after considering a cost recovery limit of 50% and that company share will be 40%. Both cost recovery model and company share are at this moment yet undefined in the Brazilian legislation. Then, by changing any of these figures may imply in an average increase in Government-Take of much more than 7% over the case of R&T system.

In this context, one can ask: what is the break-even in terms of cost recovery limit so that Production Sharing system is more beneficial for Government? In Figure 6, there is a graph comparing Government-Take to cost recovery limit of the two systems.

Figure 6: Impact of cost recovery limit on the government take of both R&T and Concession systems
Note that, if it is allowed to the company, a cost recovery limit of more than 50% of the revenue, than R&T system can be more beneficial. Nevertheless, the difference between the two is not very high, in the range from 50% to 80% cost recovery limit.

Once again, these results must be interpreted with care, because they can change with oil price, discount rate, production profile, operating cost and others. But, even with all simplifications and limitations of this model, it allows concluding that the difference between the two models under the viewpoint of Government-Take will depend fundamentally on two variables: company share and cost recovery limit, which will be known only during the bidding process for the extraction of oil-fields.

5 - CONCLUSIONS

- The financial result of the decision of the Brazilian Administration to the fiscal regime from R&T to Production Sharing will depend heavily on two variables: company share and cost recovery limit. Depending on the specific values of these parameters the new system can generate more benefits or not.

- The Government-Take for the example of this paper is on the order of 80%, which even at this level can still be attractive for companies, since what really matters is the amount of money as return, risk of competing opportunities, etc.

- The Government-Take is dependent on oil price. An increase in oil price will reduce it, whereas a decrease will increase it heavily.

- For all other parameters constant, we found that if cost recovery limit is more than 50%, the Production Sharing system may generate a lower Government-Take than the R&T system currently in use in Brazil.

Acknowledgement

The authors would like to thank to PETROBRAS, CEPETRO, UNISIM and CMG for the technical and financial support.

REFERENCES


