THE VALUE OF BEING AN OPERATOR OF OIL AND GAS JOINT VENTURES: AN EVENT STUDY APPROACH

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Overview

The oil and gas development business is characterized by high-risk, high-return, capital intensive and long payback period. Accordingly, oil and gas projects have commonly been implemented in a form of joint venture composed of various companies to facilitate risk management. Most joint ventures are made up of an operator, who are in charge of the operation of a field with a relatively high stake, and non-operators who focus on investment with a relatively low stake. Even though an operator and non-operators both make decisions through the board, but the operator has the right to propose a work plan across the project and obtains the project experience and know-how. As a result, operator might have a premium over non-operators. In this study, we intend to quantitatively calculate the value of being an operator in oil and gas projects using event study methodology used to determine the existence and scale of the announcement effects.

Since Fama et al. (1969) introduced the method, it has been widely used for empirical studies not only in financial, accounting but energy sector (Demirer and Kutan, 2010; Yoo et al., 2013; Sabet and Heaney, 2016). In fact, there are quite a few researches on the value of operating rights, however, among these, research using event study or conducted in terms of oil and gas joint venture is none. Globally, when a joint venture agreement between large oil and gas companies are announced, the stock prices of these companies fluctuate over a period of time. In order to capture this effect, we set up the event window and estimation period based on three different events considering the features of oil and gas industry: start of production date, announcement date and approval date of development of joint venture from 1997 to 2017. Companies used for the analysis are listed in "World's 25 Biggest Oil & Gas Companies In 2017" from Forbes, such as ExxonMobil, BP, Shell, Chevron and Total. Based on this, we calculate the premium for operator by comparing the normal return and the abnormal return from the fluctuation of stock prices between the operating and non-operating companies. If the comparing companies are listed in different stock market, the representative indices of each market are regarded as an exogenous variable reflecting the characteristics of the stock market. After that, we average the abnormal returns and cumulate them during the event window so that we obtain cumulative average abnormal return (CAAR) of operators and non-operators. As a final step, we test the significance of model with null hypothesis that CAAR during the event window is zero.

Methods

Event study is a method of measuring the abnormal return using the fact that the occurrence of an event is reflected in the stock price according to an efficient market hypothesis. We first defined the start of production date of a joint venture as an event. Estimation period and event window are chosen as 90 days (-95 to -6) and 11 (-5 to +5) days, respectively. Abnormal return can be estimated as the difference between the observed return of the stock and the normal market return, which is defined as

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

where $AR_{i,t}$ is abnormal return of firm i at time t, $R_{i,t}$ is observed return of firm i at time t, $R_{m,t}$ is market return at time t, α_i and β_i are parameters of estimation. Next, we average these abnormal returns and sum them up to derive cumulative average abnormal return. Using iteration structure, we analyse abnormal return with 33 start of production dates. Test statistics, t is defined as

t = (CAAR in event window) / (standard deviation of CAAR)

where null hypothesis that CAAR during the event window is zero. Through this process, we determine whether the result has statistical significance or not.

Results

We categorized the time of events based on the changes in the structure of the international oil price such as Asian financial crisis (1997), September 11 attacks (2001), global financial collapse (2008) and OPEC production quota unchanged (2014). The result for each period between these events is shown in Table 1.

	Period 1	Period 2	Period 3	Period 4	Total
Operators	0.04172	0.02289	-0.00498	0.00855	0.006404
Non-operators	0.01288	0.01797	-0.01281	-0.00444	0.001374
Difference	0.02884	0.00492	0.00783	0.01299	0.00503

Table 1. Comparison of the cumulative average abnormal return in each period

Period 1 to 4 are categorized periods between the 5 time points, which are four events above and current time. The difference between CAAR of operators and non-operators in each period is 2.88%, 0.49%, 0.78%, 1.3%, respectively. Yet, the significance of the test result is not satisfactory. In order to improve the significance level, we decided to change the event to the joint venture announcement data and now data gathering is on progress. Also, to take the announcement effect into account more effectively, we are planning to apply the event study method on independent oil and gas companies. Because major companies may have less effect from the event than independent companies which are relatively smaller in size. We expect the significance level of the test result would increase by this correction.

Conclusions

In this study, we estimated the value of being an operator in oil and gas projects using event study methodology. As a result of comparing the CAAR according to whether they are an operator or not, CAAR of operators was higher than that of non-operators. Test statistics has not yet shown significance, however, we would soon be able to affirm the significance of the test result by making various changes on events. If it turns out to have significance, it means that there is a premium for an operator. The premium measured in this way can be used as an indicator in securing the driver's seat when new joint ventures are formed. For independent oil and gas companies that started as a second mover, this result can indicate how important becoming an operator is. From a policy perspective, the countries where natural resources are scarce such as Korea and Japan, may utilize the measured premium to solve their energy supply problems. In order to secure energy resources stably, it is necessary to have experience and know-how in the resource development business. In that sense, once the value of being an operator is quantified, it can be used as a basis for policy support. Furthermore, if a country has world-class companies in relevant fields and let them collaborate on oil and gas projects, considerable synergy effects can be expected nationwide. In conclusion, it is expected that there actually are premia for operators in oil and gas projects and the measured premium can be utilized as a reference index by the negotiators in companies or policymakers who want to make the best use of the operator's position.

References

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