

IRSTI 06.52

M. Issabayev¹, Y. Oskembayev², N. Torekhan²

¹Kazakh-British Technical University, Almaty, Kazakhstan

²Suleyman Demirel University, Almaty, Kazakhstan

MULTIPLE ISSUES IN EXTRACTIVE INDUSTRIES

Abstract. Purpose – the main purpose of this paper is to explain the negotiation on profit sharing from crude oil extraction and local content requirements in the oil industry in Nash bargaining framework.

This paper has applied a simple, user-friendly Nash bargaining model that attempts to understand the negotiation on multiple issues between HG and IOC. We start with the assumption that HG of a resource-rich country aiming to maximize national value at the expense of resource wealth introduces well-designed mandatory local content policy for the IOC.

Key words: oil industry spillover effect, local content, foreign investors, Kazakhstan.

Аңдатпа. Мақсаты - осы мақаланың негізгі мақсаты Нәшайсында мұнай өнеркәсібінің мұнайды табысты бөлу туралы келіс сөздері және жергілікті қамту мазмұнын түсіндіру болып табылады. Мақала авторлары өндіруші үкіметтер және ХМК арасындағы бір қатар мәселелер бойынша келіссөздерді түсіндіруге тырысады. NASH бойынша жүргізілген келіссөздер қарапайым, пайдалануға оңай үлгіні қолдану арқылы ресурстар есебінен ұлттық байлықтың құнын барынша есептеп, ХМК үшін міндетті жергілікті қамту мазмұнның мұқият әзірленген саясат екенін атап көрсетеді.

Кілт сөздер: мұнай өнеркәсібінің жанама әсері, жергілікті қамту, шетелдік инвесторлар, Қазақстан.

Аннотация. Основной целью данной статьи является анализ переговоров NASH о распределении прибыли от добычи нефти и требования к местному содержанию в нефтяной промышленности. В этой статье применена простая, удобная в использовании модель переговоров по NASH, которая позволяет проводить переговоры по нескольким наиболее важным вопросам между HG и IOC.

Авторы исходят из предположения, что HG богатая ресурсами страна, стремящаяся максимизировать национальную ценность за счет богатства ресурсов, которая представляет собой тщательно разработанную политику обязательного локального контента для IOC

Ключевые слова: побочный эффект нефтяной промышленности, местное содержание, иностранные инвесторы, Казахстан.

Introduction

It is not a secret anymore that the main purpose of any resource abundant host country attracting foreign investors is to stimulate the domestic fiscal policy and market condition via spillover effects. One of the ways to benefit from spillover for the host government (HG) is to impose local content requirements on its' foreign partners – International Oil Companies (IOC) – as an additional term in the contract behind the various elements of fiscal policy. It could be procurement of a certain fraction of inputs used in crude oil extraction from local suppliers in the host country. Another example could be investment on education and training of local work force. Certainly, they are all negotiable. Bearing this in mind, the main purpose of this paper is to explain the negotiation on profit sharing from crude oil extraction and local content requirements in the oil industry in Nash bargaining framework.

Despite the abundance of bargaining literature, the application of it, particularly, in the natural resource industry seems to be very limited. To name a few, they are Chavez, McMillan et al and Di Corato [1]. They all share the common arguments recognizing the importance of the bargaining in the upstream phase of this industry. Thereby they mutually highlight that while each prospective investor has the sole purpose of maximizing individual payoff, to some extent each has to consider factors relative to joint surplus in order maximize the effects of bargaining. However, again strikingly they all manage to ignore what can justly be described as a vital item, the matter of «local content requirements» as an additional investment cost contractually imposed on the IOC. Thus, this is yet another inevitable gap for this paper here to fill.

Among the papers mentioned above, the one by Chavez is the closest to our model in exploiting a common Nash framework [2]. Yet his work is different from ours in many respects. First, Chavez's sole purpose was to develop a pure theoretical approach applicable to the oil industry. Hence, to make a better explanation, he added the Edgeworth box which will not be done here. In doing so, he believes that the Edgeworth outline is crucial to the bargaining process. Second, he accounts for the factor of «delay» following an offer and a counter-offer process and the possibility of «risk of breakdown» associated with it in Rubinstein framework as an alternative explanation. With this in mind, another point of distinction is that we find his model to be too general as it considers only certain properties to satisfy particular axioms. In contrary, our contribution is focused more on in depth exploration of the strategic interactions of specific parties, IOC and HG, on multiple issues¹. Finally, paper attempts to analyze under what condition the net payoff of HG will be greater than that of IOC while bargaining simultaneously on multiple issues.

¹ It is useful to notice that the bargaining literature on multiple issues is also limited (See Muthoo 1999). In addition, multiple issues negotiation can be processed both simultaneously or sequentially. For simplicity reason we employ the simultaneous one.

Model

We start with the assumption that HG of a resource-rich country aiming to maximize national value at the expense of resource wealth introduces well-designed mandatory local content policy for the IOC. The transaction between the HG and IOC can be modeled in the following way: the direct payment to the HG is considered as a simple share of the IOC's profits from in country operations. The cost of investment in local content promotion may be treated as another oil sector specific charge that HG collects to invest in non-resource sectors, downstream sectors and or regional development.

To provide the starting point for this theoretically complicated scenario, the model is restricted to the world of certainty. With another words, we assume the parties, HG and IOC, bargain for a share of known resource value

(V) underground. More precisely, $V = \int_0^T e^{-\rho t} \pi_t dt$ is the net present value of total rents from crude oil extraction, where $\pi_t = p_t q_t - C(q_t, R_{t-1})$ is a flow of rents over periods and $\rho \in (0, 1)$ is a discount factor. Rent in a single period depends on quantity of crude oil extracted and reserves left from the previous period $(t - 1)$. The HG owns the huge oil reserve, but lacks the requisite skills and human capital to extract it. On the other hand, the IOC has the factors necessary for production, the most prominent of which is specialized or professional experience.

The payoff of IOC from the Production Sharing Agreement (PSA) is $U_{IOC}(\beta, l) = \beta V - l$ and the payoff of HG is $U_{HG}(\beta, l) = (1 - \beta)V + f(l)$ to IOC and HG, respectively. Here, β denotes the equity share of IOC from oil resources and $l > 0$ denotes the investment on local content development by IOC. On the other hand, the payoff of the HG consists of two parts: direct revenue from equity share of oil resources and a monetary value of local contents promotion to the host government, $f(l)$. It is assumed that it is subject to increasing returns to scale: $f'(l) > 0$ and $f''(l) > 0$.

Furthermore, as parties have a choice as to whether to negotiate a deal or not, there is a need to introduce opportunity cost for each player. That is, both players have outside denoted by d_{IOC} and d_{HG} of IOC and HG, respectively. If the IOC refuses to sign the PSA contract, its outside option would be payoffs it could get from an alternative country project. Outside option for the HG could refer to payoffs generated by National Oil Company (NOC). So the optimization problem for both players could be solved as:

$$\max_{\beta, l} (\beta V - l - d_{IOC}) \left((1 - \beta)V + f(l) - d_{HG} \right) \quad [1]$$

From the First Order Condition (FOC) rule we have:

$$(1 - \beta)V + f(l) - d_{HG} = \beta V - l - d_{IOC} \quad [2]$$

$$(1 - \beta)V + f(l) - d_{HG} = f'(l)[\beta V - l - d_{IOC}] \quad [3]$$

Plugging [2] into [3], we get $f'(l^*) = 1$. That is, optimal level of local content contribution is determined at points where the marginal benefit to HG and marginal cost to IOC from local contents promotion are equal. Notice for $l > l^*$ the marginal benefit of local content promotion to HG is higher than the marginal cost of local content promotion to IOC, $f'(l) > 1$. Similarly, for $l < l^*$, the opposite is true $f'(l) < 1$. Plugging the optimal level of local contents into the Nash equilibrium for both players:

$$\beta^* = \frac{1}{2} + \frac{1}{2} \left(\frac{l^* + f(l^*) + d_{IOC} - d_{HG}}{V} \right) \quad [4]$$

and

$$1 - \beta^* = \frac{1}{2} - \frac{1}{2} \left(\frac{l^* + f(l^*) + d_{IOC} - d_{HG}}{V} \right) \quad [5]$$

From comparative statics analysis in [3] it's not difficult to show that the optimal equity share of IOC positively (negatively) depends on outside option of IOC (HG). This is consistent with theoretical hypothesis. Notice that if the outside option of HG too high such that $d_{HG} = l^* + f(l^*) + d_{IOC}$, then both players end up with equal split from the value of resources. Considering the global anecdotes, the HG share from PSA generally ranges from 50% to 60%. As a case study, the successful «equal-split» deal between the Kazakhstan government and the oil company Chevron in the early 1990s can be mentioned². The outside option of Chevron was «Prudhoe Bay» off Alaska that had approximately 2.5 times less reserves than the «Tengiz» oil field in Kazakhstan. To acquire 50% of share, Chevron was required to pay the government bonuses and US\$50 million for regional development under PSA contract. For the IOC to sign a contract with additional obligation of local content contribution leads to conclude that the Kazakh government had a higher bargaining power³ than its foreign partner. Notice if both players' bargaining power were equal, then the equity share of IOC from PSA would be higher than that of HG. That is, $d_{HG} = d_{IOC}$ implies $\beta^* > \frac{1}{2} > 1 - \beta^*$.

This implies that with equal bargaining power, the IOC would not agree to contribute to local content development at the expense of 50% equity share. Hence, to increase the incentive of IOC to invest in local contents the HG must be willing to sacrifice some revenue from the equity share of the resource value. But what will be the net payoff to players? Whose payoff is estimated to

² See <http://www.nytimes.com/1992/05/19/world/chevron-to-spend-10-billion-to-look-for-oil-in-kazakhstan.html> Accessed May 19, 1992.

³ Here we treat bargaining power to be a part of outside options. Otherwise, theoretically it can be added as another parameter.

be larger in this big picture ? Without providing simple assumptions it's not easy to make unilateral conclusion. For simplicity, let's again assume the HG has greater bargaining power than IOC. Then plugging [4] into the HG payoff we get:

$$U_{HG}(\beta^*, l^*) = (1 - \beta^*)V + f(l^*) \quad [6]$$

This further simplifies to $U_{HG}(\beta^*, l^*) = \frac{1}{2}V + f(l^*)$. The corresponding optimal payoff to its foreign partner is $U_{IOC}(\beta^*, l^*) = \frac{1}{2}V - l^*$. Comparing these two we can see that $U_{HG}(\beta^*, l^*) > U_{IOC}(\beta^*, l^*)$. This is possible only if the HG possesses a higher bargaining power than its foreign partner.

Conclusion

This paper has applied a simple, user-friendly Nash bargaining model that attempts to understand the negotiation on multiple issues between HG and IOC. More precisely, the players bargain on how to optimally split the crude oil revenue and how to optimally invest on local contents to be employed in the extractive industries. Based on this simple model we conclude that in order for the HG to benefit more from its resources underground, the HG must possess a greater bargaining power than its foreign partner.

The analysis here is elementary in that it didn't capture other instruments of fiscal policy such as royalty, corporate income tax. For every instrument of tax regime would affect the incentives of an IOC in developing and extracting the resource base. In contrary to our assumption of certainty world, a ubiquitous feature of natural resources is uncertainty due to world oil prices and time inconsistency depending on successful discovery as a result of exploration efforts by IOC in the early stage of upstream. This in turn leads to the «threat of nationalization» by HG [5]. To count for the discounting factor, one may want to consider the negotiation on multiple issues using Rubinstein model. Therefore, there still remain a number of other concepts to be incorporated into the applied theoretical model to fully comprehend existing methodology herein.

References:

- 1 Chavez, R.M. Lujan. The Bargaining Process and the Risk of Breakdown in a Model About Negotiation: A Theoretical Approach for the Oil Industry. Central Bank of Bolivia, Oruro, Bolivia (Unpublished working paper). – 2010; Di Corato, L. Profit Sharing Under the Threat of Nationalization. Resource and Energy Economics. -2013. - № 35, 295 – 315; Mc Millan M., Andrew, R. Waxman and Shang-JinWei. Profit Sharing Between Governments and Multinationals in Natural Resource Extraction: Evidence from a Firm-Level Panel // Brookings Trade Forum, Foreign Direct Investment, 2007. - pp. 149 – 175.
- 2 Nash John F. Jr. The Bargaining Problem. Econometrica, 1950. - Vol. 18, No. 2, pp. 155 -162.

3 Issabayev, M. FDI Spillover in the Oil Industry. Mimeo The George Washington University, 2015.

4 Kazzazi, A., Nouri, B. A Conceptual Model of Local Content Development in the Petroleum Industry // Management Science Letters. - 2012. Vol.2 Issue 6. Pp. 2165 – 2174.

5 Muthoo, A. Bargaining Theory with Applications. Cambridge University Press, 2010.

IRSTI 06.52

N. Torekhan¹

¹Suleyman Demirel University
Almaty, Kazakhstan

FOREIGN EXCHANGE RATE REGIMES IN KAZAKHSTAN

Abstract. The work investigates the main affecting factors to domestic currency volatility and also provides an extensive analysis about the relationship of oil prices and nominal exchange rate of tenge against US dollars. The paper discusses the relationship between oil prices and exchange rate of KZT vs. USD and measures the marginal effect of oil prices on domestic currency through the Vector Error Correction Model (VECM).

It examines about the affecting factors to domestic currency, exactly nominal exchange rate of KZT vs. USD according to the Inflation Report of NBK. The analysis, made by the Vector Error Correction Model (VECM) for time series data. Popular model because it allows for the existence of an underlying or fundamental link between variables (the long run relationship) as well as for short run adjustments (i.e. changes) between variables, including adjustments to achieve the cointegrating relationship.

Key words: oil industry ,local content, exchange rate, Kazakhstan.

Аңдатпа. Мақалада мұнай бағасының және АҚШ долларына қатысты теңгенің номиналдық айырбас бағамының өзара қарым-қатынасы ауқымды талдау жүргізіледі. Вектор қателерді түзету моделі (VECM) арқылы мұнай және мұнай бағасының бағасына, сондай-ақ ұлттық валютаны АҚШ долларымен өлшеп шекті әсеріне қарсы теңге бағамының арасындағы қарым-қатынасты талқылайды. Отандық валютаны, ҚҰБ инфляция баяндама сәйкес АҚШ долларына қатысты теңгенің дәл номиналдық айырбас бағамы әсер ететін факторлар қарастырылады.

Уақыт сериясы деректер үшін қате векторын түзету арқылы (VECM) модельді талдау жасалған. Бұл танымал модель, айнымалы (ұзақ