***AN ANALYSIS OF RISK AND RATE OF RETURN TO INTERNATIONAL OIL COMPANIES FROM IRAN'S BUY-BACK SERVICE CONTRACTS:***

***THE CASE OF SOROOSH AND NOWROOZ***

Abbas Ghandi, Institute of Transportation Studies, University of California at Davis, One Shields Avenue, Davis, CA 95616, United States. Email: aghandi@ucdavis.edu. Phone: 1-530-8488059

C.-Y. Cynthia Lin, Agricultural and Resource Economics, University of California at Davis, One Shields Avenue, Davis, CA 95616, United States. Email: cclin@primal.ucdavis.edu

## Overview

 This paper assesses the risks and rate of return to International Oil Companies (IOC) in Iran's oil and natural gas buy-back service contracts. A buy-back service contract is the primary framework that the National Iranian Oil Company (NIOC) uses to engage IOCs in the development of Iran's oil and natural gas fields in order to benefit from the IOCs' expertise and investment. In these contracts, once the fields reach contractual full production level, the operation of the developed fields is transferred to the NIOC, and the IOC recovers its cost plus additional remuneration fees through an allocation of the developed fields' produced crude based on an agreed-upon targeted rate of return (ROR).

 A few studies that discuss Iran's buy-back service contracts could be categorized in three groups. The first group, which includes Bindemann (1999) and Marcel (2006), provide basic definitions and some general characteristics of buy-back service contract. Both studies consider this contract with characteristics between a service and a production sharing contract. The studies that fall under second type, which cover more aspects of a buy-back contract, include Shiravi and Ebrahimi (2006) and Van Groenendaal and Mazraati (2006). Shiravi and Ebrahimi (2006) discuss the terms and a history with a brief overview of some possible risk factors for the IOCs in these contracts. Van Groenendaal and Mazraati (2006) further the discussion over risk factors by analyzing two of the risk factors effects on the IOC's rate of return. Based on their model of cash flow of a natural gas buy-back service contract, they show the potential of oil price fluctuations and delays in reducing the IOC's rate of return. However, they limit the scope of the study on just these two risk factors with a limited range of possibilities. Ghandi and Lin’s (2011) approach to studying Soroosh and Nowrooz buy-back service contract falls in a third distinct group of buy-back related studies. Based on dynamically optimal oil production models, they show that the National Iranian Oil Company has not reached contractual goals, nor has it achieved optimality in either profit maximization or cumulative production maximization.

## Methods

 The unique nature of buy-back service contract, and the fact that the IOC does not share in the profit, raise the question of how much the inherent risk due to the nature of buy-back service contract could affect the IOC’s actual ROR. To conduct such an analysis, , we model Shell Exploration's contractual and actual cash flow in its Soroosh and Nowrooz buy-back service contract as a case study. Based on our models of cash flow, we also analyze the buy-back specific contributing risk factors that lead to reduction in the IOC’s rate of return. These risk factors include capital cost, percentages of capital cost spending, operating and maintenance cost, oil price fluctuations, delay in construction, deviations from the contractual production level, LIBOR rate reduction, and finally the remuneration not being realized.[[1]](#footnote-1) As a further step, we also propose modifications to buy-back service contract based on our risk-sharing cash flow models in order for the IOC to face a lower degree of risk.

## Results and Conclusion

 Our contractual cash flow model of Soroosh and Nowrooz buy-back service contract suggests that Shell signed the contract with a 14.44% rate of return. However, our actual cash flow model reveals that Shell has ended up with an actual rate of return of 0.53%, which is significantly lower than the contractual rate of return. This finding clearly suggests that the IOC in a buy-back service contract may face very high degrees of risk.

 In order to analyze the risk factors in buy-back service contracts, and in order to capture every possibility in these contracts, we define various scenarios that include entire range of possible values for the parameters. In general, we find that all the risk factors are capable in reducing the IOC’s rate of return, and therefore, we indeed recognize them as risk factors with different potential of effects on the rate of return. In addition to reducing effects, we also study the parameters' effects in increasing the ROR even though in the buy-back service contract, the IOC does not benefit from increasing the ROR. We do that in order to show the potential of parameters' effects in increasing the ROR and to support our risk-sharing cash flow modification proposal.

 As mentioned, the risk factors include capital cost, percentages of capital cost spending, operating and maintenance cost, oil price fluctuations, delay in construction, deviations from the contractual production level, LIBOR rate reduction, and finally the remuneration not being realized. For the capital cost, we study scenarios with 20 and 50% increases and decreases in the capital cost level. We find that capital cost overrun has large effects on the IOC's rate of return. Therefore, we conclude that capital cost overrun is probably the most important risk factor in buy-back service contract.

 While in reality, the engineering of the fields is usually the one aspect that determines the capital cost spending in each year, we compare several possible option plans and their effects on the rate of return. We find that the changes in the capital cost percentages could affect the IOC's rate of return. Therefore, capital cost percentage is a risk factor. However, we also find that IOC will benefit with a higher ROR by spreading the capital cost from the initial years of the contract or by postponing the spending towards the later years of development.

 We also investigate the effects of operating and maintenance cost on the IOC's ROR in two groups of scenarios: fixed and fluctuating cost. We find that higher operating and maintenance cost will decrease the IOC's rate of return. However, the rate of return of our fluctuating operating and maintenance cost scenarios, including contractual, optimal and actual plans, are close to each other. As a result, we could consider operating and maintenance cost as a source of risk due only to the possibility of wrong contractual cost estimates in the contractual cash flow and not due to the cost fluctuations.

 For the other parameters including the oil price, production and LIBOR, we study their small changes' effects on the rate of return as well as the timing effects of those changes. We find that the changes in the parameter are capable of reducing IOC's ROR. However, the timing of the changes is important. In particular, we find that the start of the repayment year is the most important year of the amortization period. This suggests that even though we consider these three parameters as risk factors, their effects on the rate of return are contingent upon the timing of the changes in the value compared to the contractual values.

 Shell's low actual ROR implies a potential threat to the IOC’s presence in Iran's oil and natural gas industry through buy-back service contract framework. However, in this study, our model of risk-sharing cash flow, suggests that there is a potential for modifying the contracts to better share the risk, while still remaining in the framework of buy-back service contract. In particular, we show that when a buy-back service contract faces cost overrun or delay, the NIOC could reduce the risk for the IOC by letting the remuneration to increase proportionally with the capital increase and by bearing the interest of the delay period and covering the additional cost. By modifying the contracts to share the risk, the IOC could face an actual ROR closer to the contractual ROR even if the contract faces cost overrun or delay, and yet still keep the actual ROR from exceeding the maximum contractual ROR the NIOC is willing to give. If the NIOC wants to continue using the buy-back framework, such modification is vital in order to avoid deterrence of the IOCs from large investments in Iran's oil and natural gas industry.

## References

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1. We do not consider other risks including geology, geopolitical, sanctions, domestic economical and political instability and inflation/recession related effects. [↑](#footnote-ref-1)