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The first round of licensing in Iraq: *economic evaluation*[1]

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I. Introduction

The initiation of two 'licensing rounds' in Iraq has involved the invitation of pre-qualified oil companies to bid for set-terms in service contracts, to rehabilitate and develop oil and gas fields in the north and south of the country. The first round comprises the currently producing fields, while the second includes mainly discovered but largely undeveloped fields. Both groups of fields have been reserved, by the so-far un-ratified draft of oil and gas law, for a national oil company to have been set-up but so-far held up due to political disagreements. Bids for the first round were carried out on 30 June; the second on 11, 12 December, 2009.

The auctioning of these fields to foreign oil companies, at the time when a national oil company was expected to carry out their rehabilitation and development, has aroused criticism from various quarters, on mainly political but also on economic grounds. The main objections to the rounds can be summarized as follows:

(1) The two rounds offer foreign oil companies control of about 84 billion barrels (73 percent of total proven reserves), for a long time (20 years). Consequently, the two rounds will pave the way for the return of foreign economic and political influence that has long been eliminated by the nationalizations of 1972 (M. Chalabi, 2009).

(2) In the sequel, this would marginalize the South and North oil companies together with a future national oil company (M. Chalabi, 2009).

(3) The absence of a hydrocarbon law and national oil company, the ongoing disputes between the Kurdistan Region and the central government, and disagreements inside the Ministry of Oil itself, all would weaken Iraq's position (Visser, 2009).

(4) The present government has no strong national mandate to counteract international oil companies' economic and political power (Visser, 2009).

(5) In the light of the fact that the supergiant West Qurna 1 has already been included in the first round, then the supergiant West Qurna 2 should not have been included in the second round. Instead, '*it should be put on hold until Iraq develops its own capabilities to the point where it can effectively directly execute the project on its own*', (Al-Khawaja, 2009).

[1] Extended and revised version of article published in the *Middle East Economic Survey*, Vol LII No 34, 24 August 2009.

(6) Accordingly, some writers called for the postponement of the oil rounds until a 'strongly mandated' government is in place (Al-Sabah, 2009).

II. The terms and the results

(1) The full terms of the service contracts offered for bidding in the first round have not been included in one document. They have only become clearer after the date of the first round. Some terms are still not clear enough, though. The bulk, however, can be gathered from the following sources: the Ministry of Oil's (MoO) '*Final Tender Protocol*', FTP, and press release statements (MoO, 2009a, 2009b), Media sources (CNBS, 2009 and MEES, July 6, 2009), the public statements by the Minister of Oil, and our assumptions about unspecified clauses/items in the FTP. Form these sources we can summarize the main terms as follows:

i. The contract is to last for *'an initial duration of up to twenty (20) years from the Contract's effective date"*, Para (a) of (2) in FTP.

ii. After defining the present *(baseline*) production capacity of the field, by the MoO, the contractor is invited to indicate the additional or incremental capacity that it is prepared to develop (i.e. above the baseline).

iii. A joint venture is to be formed between the contractor and the Iraqi side whereby the contractor owns 75 percent of the capital.

iv. The joint venture will be responsible for the rehabilitation, development management, and maintenance of production capacity of the oil fields, during the contract period.

v. Fees and recovery of cost: *'the Contractor is entitled to be reimbursed for both its actual costs and a profit element in the form of Service Fees and Supplementary Fees to be taken in cash or kind*', Para (d) of (2) in FTP.

vi. The MoO offers the contractor a service fee of about $2 to most auctioned fields (except Bai-Hassan; $4/barrel) and unspecified[2] *supplementary fees* for, '… *Incremental Production above a contractually-specified Baseline Production Rate that declines over the life of the Contract….'*, Para (e) of (2) in FTP.

vii. The contractor will be subject to tax. We will take this to mean current income tax of 35 percent.

[2] For West Qurna 1 reported deal, Wells (2009) mentions that signature bonus of $400 million cost is recoverable as Supplementary Fees. Rumaila deal includes a repayable signature bonus of $500 million.

viii. It has come out, in the second round of licensing, that the Iraqi partner in the joint venture is entitled for 25 percent of the after-tax service fee. This is presumably applicable to the first round.

ix. '*Contractors will have obligations with respect to the provision of training, scholarships for higher education and technology transfer, as well as employment of local personnel and the procurement of local goods and services*,' Para (i) of (2) in FTP.

x. Although funding of investment is to be shared in a joint venture, it is taken that the contractor shall fund the whole of investment (including that of the Iraqi side), whereby it will be compensated for.

xi. In light of the entitlement of the contractor to a '*profit element'* according to the FTP, referred to in (v) above, we assume that the contractor desires a net after-tax return on investment that covers *ordinary return* and *commercial, security, political and legal risks*. Accordingly, we believe that 10 percent rate of return, net of tax, would be sufficient. This return includes both service and supplementary fees. This desired rate of return will be compared with the actual rate of return based on the after-tax after Iraqi-partner's share of the service fee.

(2) The auctioned fields in the first rounds are the main producing fields in Iraq. Between them they produce about 90 percent of total oil production. At the time when MoO was expecting the production capacity to increase from 2.1 mbd to about 5 mbd within five years, total offers of bidders, in the first round, amounted to about 8 mbd.

(3) The result of the first round ended with most bidders (mainly groupings of European, American, and Asian firms) rejecting the MoO's offer for the service fee, as too low. BP/CNPC, a British/Chinese grouping, however, accepted the offer of $2/barrel for the supergiant Rumaila (17 billion barrels of oil reserves) in spite of the fact that initially the group requested twice as much. BP/CNPC undertook to increase the production capacity of Rumaila fields by 1.84 mbd (from the current 0.96 mbd to 2.8 mbd) within 3-5 years. [3]

III. Comparison with possible production-sharing arrangements

In order to find out whether the BP/CNPC deal offers Iraq a sound return, we will compare the expected return from this deal with other possible production-sharing/concession arrangements. The comparison is carried out for two sets of plateau production targets, PPT. First, the contracted level of 2.8 mbd and second

[3] It was reported, later, in the media, that two fields, of the first round, were offered; Zubair to ENI, in October (service fee, $/2/barrel), and West Qurna 1 to ExxonMobil/ Shell in November, 2009 (service fee, $1.9/barrel). See also Wells (2009).

a lower one of 2.00 mbd. The first implies additional/incremental production of 1.84 mbd while the second about 1.0 mbd. For each of the two PPTs the comparison is also performed for actual and desired rates of return for the contractor. Therefore, there are four sets of comparisons.

We need first, however, to calculate the actual and desired return for BP/CNPC in the Rumaila fields.

(III.1) Actual and desired return for the contractor

It has emerged that BP/CNPC's offer includes investment of $25 billion[4] during the next 3-5 years, to realize additional/incremental production capacity of 1.843 mbd.[5] The recoupment of this investment over 20 years implies a capital cost of about $1.86/barrel. Adding to this actual return of $0.975/barrel (table below) the total cost-plus-return is $2.835/barrel. Annex 1 shows that $0.975/barrel insures 5.3 percent rate of return, only. Calculating the cost-plus-return to include a desired 10 percent return on investment would result in cost-plus-return of $3.82/barrel over the 20 years. This means that the contractor desires a $1.96/barrel as return on investment ($1.96=$3.82 minus $1.86) in contrast to the actual $0.975/barrel. Actual and desired net returns for the two levels of plateau production targets, PPTs, are calculated as follows (for the recoupment calculations see Annex 1):

	$/barrel		
		Desired Return	
	Actual Return	***Case 1 BP/CNPC's PPT, 2.8mbd***	***Case 2 Alternative PPT, 2.0mbd***
Net-of-tax service fee = $2 × (1-tax rate35%)	*1.30*	*1.30*	*1.30*
Share of the Iraqi partner in the joint venture (25%)	*0.32*	*0.32*	*0.32*
Supplementary fees		*0.98*	*2.80*
Total: Net-of-tax contractor's return on investment	***0.98***	***1.96***	***3.78***
Investment, $ billion		*25.0*	*23.3*

[4] Mr. Shehristani, the Minister of Oil, mentioned the figure of $25 billion in an interview on the *Iraqia satellite channel* on 27 July, 2009.

[5] Para (e) of (2) in FTP, implies that the contractor will be compensated for a level of production above the additional 1.84 mbd. This is due to the expected decline in the baseline capacity in Rumaila (0.957 mbd) over time. If we assume a 4 percent annual decline rate then the contractor would be compensated for about 1.88 mbd (1.843 + 4% × 0.957 mbd) rather than 1.84 mbd. Nonetheless, even if the 1.88 mbd is used instead of the 1.84 mbd, in our comparisons, the same results will hold.

(III.2) Expected return for Iraq: comparison with possible production-sharing arrangements

Let us assume a situation in which various production sharing arrangements, *PSAs*, are possible in Iraq. We assume further that, for PSAs, the applicable income tax and royalty rates are similar to those used in the region; mainly 16.7 percent royalty on the partner's share of production, and 65 percent income tax on the partner's net income, instead of so-far undefined royalty rate and a current income tax of 35 percent in Iraq (see calculations, assumptions, and equations in tables 1-4).

III.2.1 Case 1: Plateau production target, PPT, of 2.8 mbd

Desired rate of return of 10 percent for the foreign contractor

Under the assumption that the desired rate of return of 10 percent for the foreign contractor will be realized, diagram (1), below, depicts the sensitivity analysis (carried out in table 1) for all possible shares for the Ministry-of-Oil/National-Oil-Company, *MoO/NOC*, in PSAs, which start from 0 percent (concession contract) to 100 percent (service contact, *SC*) and values in-between (production-sharing) and for a wide range of crude oil price ($25, $50, $75, and $100)/barrel.

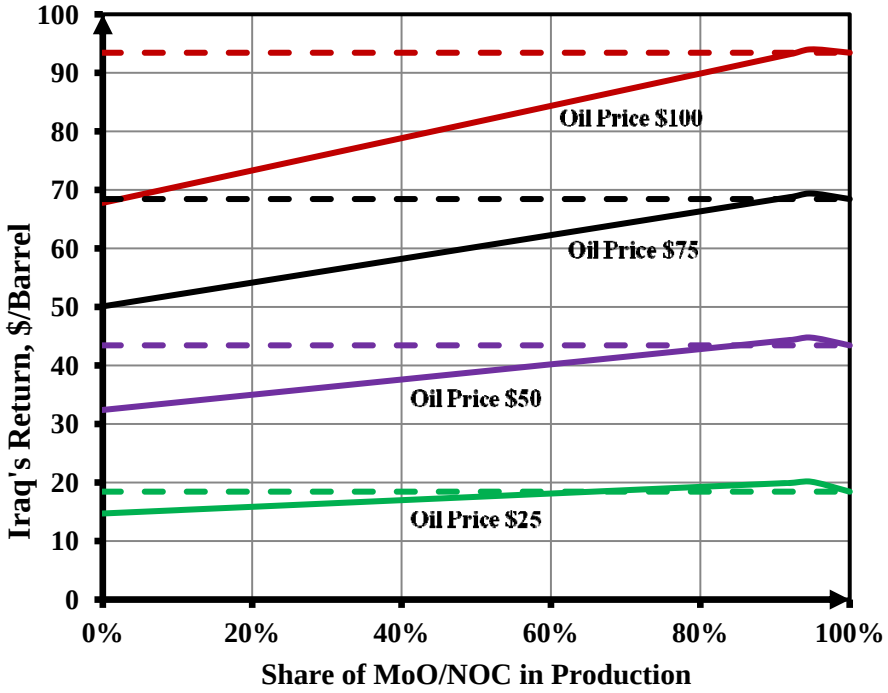

Figure (1), Case 1: Net Return for Iraq from Production-Sharing
(Desired rate of return for contractor 10%; $1.96/barrel)

The diagram shows four schedules (curves); each associated with a given crude oil price. Let us start with oil price of $25/barrel. At this price Iraq gets a net

return of $18.4/barrel from the service contract. This is shown from the intersection of the horizontal dashed line, associated with curve $25, with the vertical axis. In PSAs, the net return to Iraq (i.e. the return from the MoO/NOC's share in production, net of cost, plus 65% tax and 16.7% royalty) as shown by the *Oil Price $25* curve, would be $14.7/barrel when the MoO/NOC's share is zero (a concession contract). Then, it increases gradually with the rise in the production share until it reaches $18.4/barrel at 65 percent share (equaling the SC's return). It increases further when the share of MoO/NOC rises above 65 percent. This means that at oil price of $25, so long as the share of MoO/NOC is 65 percent and less in PSAs then the SC is better than PSAs. By the same token, at 25$ oil price, the PSAs would be better than the SC whenever MoO/NOC's share is higher than 65 percent. At oil price of $50, Iraq gets a net return of $43.4/barrel from SC. This is shown from the intersection of the horizontal dashed line associated with curve $50 with the vertical axis. In PSAs, the net return to Iraq would be $32.4/barrel when the MoO/NOC's share is zero. Then, it increases gradually with the rise in the production share until it reaches $43.4/barrel at about 85 percent MoO/NOC's share (equaling the SC's return). It increases further when the share of MoO/NOC rises above 85 percent. This means that at oil price of $50, so long as the share of MoO/NOC is 85 percent or less, then the SC is better than PSAs. In other words, at oil price $50 the PSAs would be better than the SC whenever MoO/NOC's share exceeds 85 percent. At oil prices $75 and 100$, the SC's net return would be $68.4 and $93.4/barrel, respectively, as indicated by the intersection of the horizontal dashed lines associated with the two curves, $75 and 100$, with the vertical axis, respectively. In PSAs the two curves show that Iraq's per-barrel return would increase with the rise in MoO/NOC's production shares, at both prices. However, they stay below the SC's return, for production shares between 0 percent and 90 percent. This practically implies that at oil prices$50, $75, and $100 the PSAs do not offer better return for Iraq than the service contract.[6]

Actual rate of return of 5.3 percent ($0.975/barrel) for the foreign contractor

When the foreign contractor's net fee is 0.975/barrel, which is equivalent to 5.3% rate of return on investment (see Annex), diagram (2) below shows far better picture for Iraq. Most production-sharing curves fall below the straight lines; i.e. alternative production-sharing schemes are largely inferior:

[6] Foreign companies, in general, do not accept shares in PSAs less than 25-30 percent. Therefore, the proposition that at oil price $50 production-sharing would be better for Iraq whenever the MoO/NOC's share in production is 85 percent or more is not practical, because this implies a share for the foreign partner of 15 percent or less.

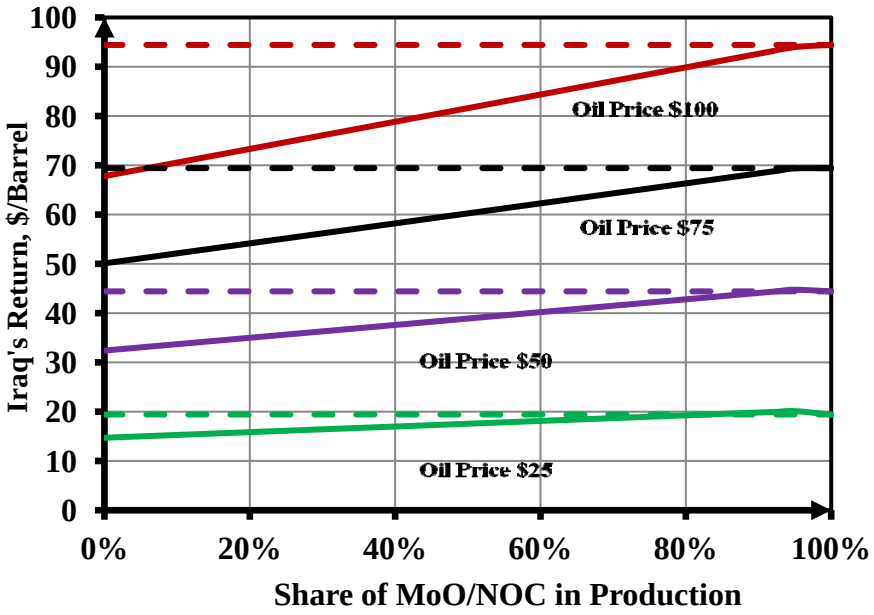

Figure (2), Case 1: Net Return for Iraq from Production-Sharing
(Actual rate of return for contractor 5.3%; $0.975/barrel)

III.2.2 Case 2: Lower plateau production target ,PPT, of 2.00 mbd

In this section we evaluate the Rumaila deal with a lower PPT than announced in the deal. Wells (2009) has indicated that a conservatively estimated sustainable PPT for West Qurna 1 (with reserves of 8.7 billion barrels) is 1.0 mbd rather than the reportedly announced 2.32 mbd. He further calculates that to sustain this level (1.0 mbd), production capacity of 1.3 mbd is needed. If we use the same proportions, then Rumaila, with 17 billion barrels of reserves, entails PPT of 2.0 mbd and production capacity of 2.6 mbd. Moreover, current production will increase gradually to the plateau over ten years (2020) then remains at this level till 2030. From there it declines back to 1.0 mbd in 2040. This means that over thirty years, total production will average about 1.74 mbd and incremental production at 0.74 mbd. Given the conservative estimates indicated above, however, we assume that it is possible to achieve a better result such that production will average at 2.00 mbd (rather than the 1.74 mbd) over the thirty years. This implies additional production of 1.0 mbd (compared to 1.843 mbd in section III.2.2). Furthermore, consequent upon the reduction of production capacity from 2.8 to 2.6 mbd, we assume that investment expenditures decline from $25 billion to $23.2 billion.

Actual rate of return of 3 percent ($0.975/barrel) for the foreign contractor

For this case, actual net return of $0.975/barrel corresponds to 3 percent rate of return on investment (see Annex). Based on calculations in table (3), figure (3) shows a picture comparable to figures (1) and (2), in that for most production-sharing, the BP/CNPC deal is superior.

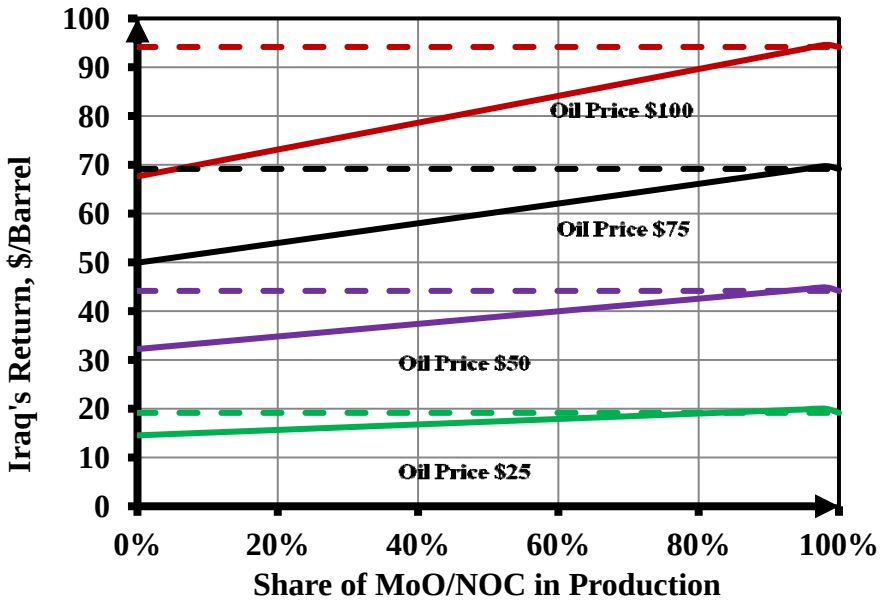

Figure (3), Case 2: Net Return for Iraq from Production-Sharing
(Actual rate of return for contractor 3%; $0.975/barrel)

Desired rate of return of 10 percent for the foreign contractor

For the desired 10 percent which is equivalent to $3.78/barrel (Annex 1), however, figure (4), based on calculations in table (40), indicates that for oil price of $25/barrel, production sharing is superior when the share of MoO/NOC is 35 percent or more and for oil price of $50/barrel when the share is 72 percent and more. For oil prices $75 and $100/barrel production-sharing, is practically inferior.[7]

[7] It is worth mentioning that offering the contactor $1.96/barrel (similar to case 1's 10% rate of return) instead of his desired $3.78/barrel (Case 2's 10% rate of return) would produce a situation similar to figure (1) where production-sharing is largely inferior.

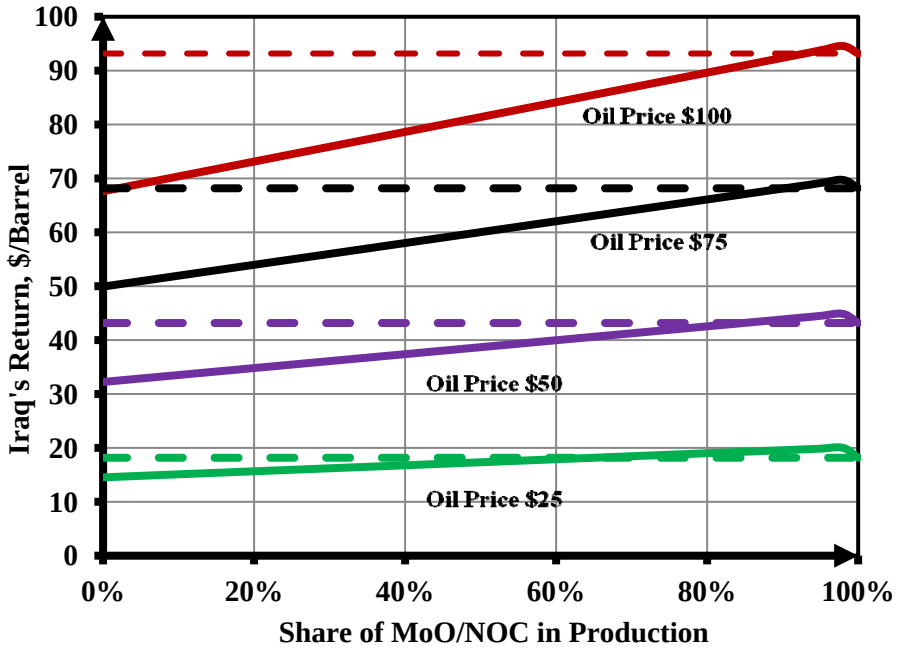

Figure (4), Case 2: Net Return for Iraq from Production-Sharing
(Desired rate of return for contractor 10%; $3.78/barrel)

IV. Evaluation

(1) Access to huge reserves (17 billion barrels), together with the possibility of insuring minimum after-tax net return on investment, could go a long way to explain the acceptance of BP/CNPC of MoO's service fee, which was half its original bid. Access to such reserves, especially by the Chinese, for the next 20 years, at a time of expected future tightness in the supply conditions, is very attractive. Together with the other oil deals, this would insure security of supplies for extended period of time. Furthermore, lower upstream returns could be enhanced by higher profitability in the downstream operations by the integrated oil companies[8].

(2) The calculations and comparisons of section (III) have indicated that the offer of an average after-tax net fee of 0.975/barrel (consequent on a gross $2-service-fee/barrel) results in net return for Iraq higher than what is possible from PSAs over a wide range of production shares and oil prices. Furthermore, this result still holds even if the after-tax (and after Iraqi partner share of the fee), for the contractor, is raised to $1.96/barrel.

(3) Would the co-management with BP/CNPC of the Rumaila fields influence negatively production decisions? Let us note first that the higher the production

[8] I owe Fahdil Mehdi for raising this point.

the higher the fees and the faster the recoupment of capital cost. This gives the contractor a strong motive to influence production levels. Had the contractor been rewarded fees for delivering *production capacity* rather than actual production it would be less motivated to influence production levels. This would not be a serious problem when Iraq intends to push for higher production. However, there will be situations when restraining production becomes desirable (e.g. within OPEC). The resolution of this problem would depend on the ability of the Iraqi side to pay for the contractor's investment return and cost, on the one hand, and to monitor, inspect, and follow-up the technical, administrative and financial working of the contractor, on the other.

(4) The increase in production capacity to be effected through the BP/CNPC deal has offered Iraq time to reconsider the methods, set-ups, and ways to develop the other fields included in the first and second rounds.

(5) The charge that offering oil fields to foreign companies would compromise Iraq's economic and political independence and sideline Iraqi oil institutional set-ups should motivate the *Council of Representatives* to accelerate the process of ratifying the draft law of oil and gas (after relevant amendments) and that of the long-awaited *National Oil Company*[9] and the *Council of Ministers* to speed-up the formation of the latter. It is worth noting that the draft of oil and gas law reserves all presently producing and explored oil fields (the fields included in the first and second rounds) for the intended *National Oil Company*.

(6) Possible production capacity, in the coming ten years, consequent on the deals so far announced, in the two licensing rounds, could amount to 8-10 mbd. Proportionate production will most likely lead to mounting financial surpluses/assets in access of the need of the economy (i.e. balance of payments and budgetary requirements). In addition to such question as oil depletion, the transparent utilization and management of financial surpluses present formidable economic and governance problems. The setting-up of stabilization/saving fund is a necessary step for the transparent and efficient utilization of these surpluses/assets.

[9] It is reported that the *Council of Ministers* has approved , on 28 July 2009 '*the Draft Law of the National Oil Company and its sending to the Council of Representatives*", cited in the Internet homepage of the *Council of Ministers*, accessed 29 July 2009.

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Annex

The net return on the contractor's investment

The per-barrel return, on investing $25 billion over five years ($5 billion annually), net of operating and capital costs and tax, *k'*, to realize PPT of 2.8 mbd, which implies incremental production of 1.843 mbd, in case 1, is calculated using the following equations[10]:

$$k(r) = \frac{\$5{,}000}{(1.843 \times 365.25)} \times \frac{(1+r)^{T+M-N}\,[\,(1+r)^{N} - 1\,]}{(1+r)^{T} - 1}$$

$$k'(r) = k(r) - k(0).$$

Where:

k(r): per-barrel investment cost, including a return on investment (at *r*).

[10] *k(r)* in the first equation, in the text, is a solution for the following net-present-value equation:

$$\frac{\$5{,}000}{(1+r)} + \ldots + \frac{\$5{,}000}{(1+r)^{N}} = \frac{1.843 \times 365.25}{(1+r)^{M+1}}\,k(r) + \ldots + \frac{1.843 \times 365.25}{(1+r)^{T+M}}\,k(r)$$

k'(r): per-barrel net-return on investment (at *r*).

r: rate of return (discount rate).

T: 20 years, the duration of the contract.

N: 5, number of years over which $25,000 million is spent (evenly).

M: the gestation period, in years, after which the additional capacity becomes available.

1.843: mbd, the additional production capacity in Rumaila fields.

365.25. days; average length of a year within the 20 years.

The gestation period, *M*, is estimated to be 3 years. However, point (e) of Paragraph 2 in MoO's '*Final Tender Protocol*' (MoO, 2009) stipulates, '*all Service Fees are payable from 50% of the Contract Area's revenue attributable to Incremental Production above a contractually-specified Baseline[‘s] Production Rate that declines over the life of the Contract. Supplementary Fees are payable from a proportion of remaining revenue from the Contract Area.*' This implies, according to our assumptions, (section *III.1* in the text), that part of the net return on investment is paid out of current (baseline) production. Accordingly, we will assume *M*, in the following calculations, to be 1.5 instead of 3.

Calculations for case 2, to realize PPT of 2.0 mbd, which implies incremental production of 1.0 mbd, is similar after using the relevant values of this case in the above equations. The calculations for both cases are presented in the following table.

Rate of return	**Case 1 PPT 2.8 mbd, incremental 1.84 mbd, total investment $25 billion**		**Case 2 PPT 2.0 mbd, incremental 1.0 mbd, total investment $23.3 billion**	
	Investment cost, including return on investment, *$/barrel*	**Net return on investment *(k') $/barrel***	**Investment cost, including return on investment, *$/barrel***	**Net return on investment *(k') $/barrel***
r	*k(r)*	*k'(r)= k(r) - 1.86*	*k(r)*	*k'(r)= k(r) -2.12*
0.0%	1.86		2.12	
3.0%	2.38	0.53	3.09	0.98
5.3%	2.83	0.98	3.96	1.84
5.6%	2.90	1.04	4.08	1.96
10.0%	3.82	1.96	5.90	3.78
12.0%	4.25	2.39	6.74	4.62
15.0%	4.91	3.05	8.00	5.88
20.0%	6.00	4.14	10.04	7.92
Time-Span	20 years		30 Years	

Table (1) Sensitivity Analysis for Iraq's Per-Barrel Return from Different Types of Contracts

Case 1: PPT 2.8mbd; Incremental Production, 1.843 mbd (5% Rate of Return for Contractor)

Contract Type	*Oil Price (P)* →	*$100*	*$75*	*$50*	*$25*
	Average MoO/NOC Production Share (α)	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**
Concession	**0%**	67.8	50.1	32.4	14.7
Production-Sharing	**10%**	70.6	52.1	33.7	15.3
	20%	73.3	54.2	35.0	15.8
	35%	77.5	57.2	36.9	16.7
	50%	81.6	60.2	38.9	17.5
	65%	85.7	63.3	40.8	18.4
	75%	88.5	65.3	42.1	19.0
	85%	91.1	67.2	43.4	19.5
	88%	92.1	68.0	43.8	19.7
	90%	92.6	68.4	44.1	19.8
	93%	93.4	68.9	44.4	20.0
	95%	94.0	69.4	44.7	20.1
Service	**100%**	94.4	69.4	44.4	19.4

Givens:	*Production, mbd, (Q)*	*Royalty Rate (μ)*	*Production-Sharing Income-Tax Rate (τ)*	*Net Service-Contract's Fees, $/Barrel*	*Operating & Capital Cost: $/Barrel*
	1.843	***16.7%***	***65.0%***	***0.975***	***4.61***

Notes on costing, assumptions, and equations:

(i) The methodology in this table is quite general. Calculations are, however, tied to additional production capacity of 1.843 mbd. The comparison in the table is between the delivery of this capacity through the BP/CNPCs *service-contract* or through alternative PSAs.

(ii) In this table when the share of the Ministry-of-Oil/National-Oil-Company, *MoO/NOC*, is zero percent, then this represents a concession contract. When it is 100 percent, then this is a service contract. Other values; i.e. more than 0 and less than 100 percent, indicate production-sharing contracts.

(iii) In the case of production shares (for MoO/NOC) of less than 100 percent the royalty rate is assumed 16.7% and income tax 65 percent, both rates are used, currently, in the MENA area. In the service contract case (100% share for MoO/NOC) the income tax used is the currently applicable rate in Iraq of 35 percent. In service contracts, there is no royalty to pay.

(iv) The cost used in this table is $4.61/barrel. It is divided as follows: operating cost of $2.75/barrel and capital cost of $1.86/barrel. The operating cost is, in turn, divided into operating cost in the fields to southern loading terminals of $2.5/barrel, and a possible $0.25/barrel, representing transport cost and dues, when (small) part of Rumaila oil is exported via Syria or Turkey, through the strategic pipeline. The $1.86/barrel capital cost is a distribution of the estimated $25 billion investment over 1.843 mbd over the 20 years of the contract (see the annex).

(v) Shaded cells in the table indicate the cases at which production-sharing (at the shares indicated for MoO/NOC) is better (i.e. higher per-barrel return) than a service contract.

(vi) Iraq's total net return, Y_t, and per-barrel return, y_t, from production-sharing, are calculated using the following equations, *(1)* and *(2)*:

Net value of MoO/NOC's share in — *Tax and royalty paid by the foreign partner* (*Tax on net income*; *Royalty*)

$$(1)\ Y_t = \alpha\, Q_t\,(P_t - 4.61) + \tau\,\{(1-\alpha)(P_t - 4.61)\,Q_t - R_t\,P_t\} + R_t\,P_t, \qquad \text{for } \alpha < 100\%,$$

$$R_t = \mu\,(1-\alpha)\,Q_t,$$

$$(2)\ y_t = Y_t/Q_t.$$

Where: Y_t: Iraq's net return from production-sharing plus tax and royalty.

Q_t: Quantity of oil production.

P_t: Price of crude oil.

y_t: Iraq's net per-barrel return .

α: Share of MoO/NOC in production-sharing.

μ: Royalty-rate on the partner's share of production.

τ: Income tax-rate on the net income of the foreign partner.

(vii) Iraq's net per-barrel return, y_t, from the service contract is calculated using the following equation:

$$y_t = (P_t - 4.61) - 0.975.$$

Where: $0.975/barrel: The return (i.e. service fee net of tax and Iraqi partner's share in the fee) on investing $25 billion (by BP/CNPC),that results in an after-tax rate-of-return on investment of 3.0 percent (see section III.1 in the text and the annex).

Table (2) Sensitivity Analysis for Iraq's Per-Barrel Return from Different Types of Contracts

Case 1: PPT 2.8mbd; Incremental Production, 1.843 mbd (10% Rate of Return for Contractor)

Contract Type	*Oil Price (P)* →	*$100*	*$75*	*$50*	*$25*
	Average MoO/NOC Production Share (α)	Net Return (y_t) $/Barrel	Net Return (y_t) $/Barrel	Net Return (y_t) $/Barrel	Net Return (y_t) $/Barrel
Concession	0%	67.8	50.1	32.4	14.7
Production-Sharing	10%	70.6	52.1	33.7	15.3
	20%	73.3	54.2	35.0	15.8
	35%	77.5	57.2	36.9	16.7
	50%	81.6	60.2	38.9	17.5
	65%	85.7	63.3	40.8	18.4
	75%	88.5	65.3	42.1	19.0
	85%	91.1	67.2	43.4	19.5
	88%	92.1	68.0	43.8	19.7
	90%	92.6	68.4	44.1	19.8
	93%	93.4	68.9	44.4	20.0
	95%	94.0	69.4	44.7	20.1
Service	100%	93.4	68.4	43.4	18.4

Givens:	*Production, mbd, (Q)*	*Royalty Rate (μ)*	*Production-Sharing Income-Tax Rate (τ)*	*Net Service-Contract's Fees, $/Barrel*	*Operating & Capital Cost: $/Barrel*
	1.843	*16.7%*	*65.0%*	*1.96*	*4.61*

Notes on costing, assumptions, and equations:

(i) The methodology in this table is quite general. Calculations are, however, tied to additional production capacity of 1.843 mbd. The comparison in the table is between the delivery of this capacity through the BP/CNPCs *service-contract* or through alternative PSAs.

(ii) In this table when the share of the Ministry-of-Oil/National-Oil-Company, *MoO/NOC*, is zero percent, then this represents a concession contract. When it is 100 percent, then this is a service contract. Other values; i.e. more than 0 and less than 100 percent, indicate production-sharing contracts.

(iii) In the case of production shares (for MoO/NOC) of less than 100 percent the royalty rate is assumed 16.7% and income tax 65 percent, both rates are used, currently, in the MENA area. In the service contract case (100% share for MoO/NOC) the income tax used is the currently applicable rate in Iraq of 35 percent. In service contracts, there is no royalty to pay.

(iv) The cost used in this table is $4.61/barrel. It is divided as follows: operating cost of $2.75/barrel and capital cost of $1.86/barrel. The operating cost is, in turn, divided into operating cost in the fields to southern loading terminals of $2.5/barrel, and a possible $0.25/barrel, representing transport cost and dues, when (small) part of Rumaila oil is exported via Syria or Turkey, through the strategic pipeline. The $1.86/barrel capital cost is a distribution of the estimated $25 billion investment over 1.843 mbd over the 20 years of the contract (see the annex).

(v) Shaded cells in the table indicate the cases at which production-sharing (at the shares indicated for MoO/NOC) is better (i.e. higher per-barrel return) than a service contract.

(vi) Iraq's total net return, Y_t, and per-barrel return, y_t, from production-sharing, are calculated using the following equations, *(1)* and *(2)*:

Net value of MoO/NOC's share in — *Tax and royalty paid by the foreign partner: Tax on net income* — *Royalty*

$$(1)\ Y_t = \alpha\, Q_t\,(P_t - 4.61) + \tau\,\{(1-\alpha)(P_t - 4.61)\,Q_t - R_t\,P_t\} + R_t\,P_t, \qquad \text{for } \alpha < 100\%,$$

$$R_t = \mu\,(1-\alpha)\,Q_t,$$

$$(2)\ y_t = Y_t/Q_t.$$

Where: Y_t: Iraq's net return from production-sharing plus tax and royalty.

Q_t: Quantity of oil production.

P_t: Price of crude oil.

y_t: Iraq's net per-barrel return .

α: Share of MoO/NOC in production-sharing.

μ: Royalty-rate on the partner's share of production.

τ: Income tax-rate on the net income of the foreign partner.

(vii) Iraq's net per-barrel return, y_t, from the service contract is calculated using the following equation:

$$y_t = (P_t - 4.61) - 1.96.$$

Where: $1.96/barrel: The return (i.e. service and supplementary fees net of tax) on investing $25 billion (by BP/CNPC),that insures an after-tax rate-of-return on investment of 10 percent (see section III.1 in the text and the annex).

Table (3) Sensitivity Analysis for Iraq's Per-Barrel Return from Different Types of Contracts

Case 2: PPT 2.0mbd; Incremental Production, 1.0 mbd (3% Rate of Return for Contractor)

Contract Type	*Oil Price (P)* →	*$100*	*$75*	*$50*	*$25*
	Average MoO/NOC Production Share (α)	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**
Concession	**0%**	67.6	49.9	32.2	14.5
Production-Sharing	**10%**	70.4	51.9	33.5	15.1
	20%	73.1	54.0	34.8	15.7
	35%	77.3	57.0	36.7	16.5
	50%	81.4	60.0	38.7	17.3
	65%	85.5	63.1	40.6	18.2
	75%	88.3	65.1	41.9	18.7
	85%	91.0	67.1	43.2	19.3
	90%	92.4	68.1	43.8	19.6
	92%	92.9	68.5	44.1	19.7
	95%	93.8	69.1	44.5	19.9
	98%	94.6	69.7	44.9	20.0
Service	**100%**	94.2	69.2	44.2	19.2

Givens:	*Production, mbd, (Q)*	*Royalty Rate (μ)*	*Production-Sharing Income-Tax Rate (τ)*	*Net Service-Contract's Fees, $/Barrel*	*Operating & Capital Cost: $/Barrel*
	1.000	***16.7%***	***65.0%***	***0.98***	***4.87***

Notes on costing, assumptions, and equations:

(i) The methodology in this table is quite general. Calculations are, however, tied to additional production capacity of 0.743 mbd. The comparison in the table is between the delivery of this capacity through the BP/CNPCs *service-contract* or through alternative PSAs.

(ii) In this table when the share of the Ministry-of-Oil/National-Oil-Company, *MoO/NOC*, is zero percent, then this represents a concession contract. When it is 100 percent, then this is a service contract. Other values; i.e. more than 0 and less than 100 percent, indicate production-sharing contracts.

(iii) In the case of production shares (for MoO/NOC) of less than 100 percent the royalty rate is assumed 16.7% and income tax 65 percent, both rates are used, currently, in the MENA area. In the service contract case (100% share for MoO/NOC) the income tax used is the currently applicable rate in Iraq of 35 percent. In service contracts, there is no royalty to pay.

(iv) The cost used in this table is $5.6/barrel. It is divided as follows: operating cost of $2.75/barrel and capital cost of $2.12/barrel. The operating cost is, in turn, divided into operating cost in the fields to southern loading terminals of $2.5/barrel, and a possible $0.25/barrel, representing transport cost and dues, when (small) part of Rumaila oil is exported via Syria or Turkey, through the strategic pipeline. The $2.12/barrel capital cost is a distribution of the estimated $23.3 billion investment over 1.00 mbd over the 30 years of the contract (see the annex).

(v) Shaded cells in the table indicate the cases at which production-sharing (at the shares indicated for MoO/NOC) is better (i.e. higher per-barrel return) than a service contract.

(vi) Iraq's total net return, Y_t, and per-barrel return, y_t, from production-sharing, are calculated using the following equations, *(1)* and *(2)*:

Net value of MoO/NOC's share in — *Tax and royalty paid by the foreign partner: Tax on net income* — *Royalty*

$$(1)\ Y_t = \alpha\, Q_t\,(P_t - 4.87) + \tau\,\{(1-\alpha)(P_t - 4.87)\,Q_t - R_t\,P_t\} + R_t\,P_t, \qquad \text{for } \alpha < 100\%,$$

$$R_t = \mu\,(1-\alpha)\,Q_t,$$

$$(2)\ y_t = Y_t/Q_t.$$

Where: Y_t: Iraq's net return from production-sharing plus tax and royalty.

Q_t: Quantity of oil production.

P_t: Price of crude oil.

y_t: Iraq's net per-barrel return .

α: Share of MoO/NOC in production-sharing.

μ: Royalty-rate on the partner's share of production.

τ: Income tax-rate on the net income of the foreign partner.

(vii) Iraq's net per-barrel return, y_t, from the service contract is calculated using the following equation:

$$y_t = (P_t - 4.87) - 0.975.$$

Where: $0.975/barrel: The return (i.e. service fee net of tax and Iraqi partner's share in the fee) on investing $23.3 billion (by BP/CNPC),that results in an after-tax rate-of-return on investment of 3.0 percent (see section III.1 in the text and the annex).

Table (4) Sensitivity Analysis for Iraq's Per-Barrel Return from Different Types of Contracts

Case 1: PPT 2.0mbd; Incremental Production, 1.0 mbd (10% Rate of Return for Contractor)

Contract Type	*Oil Price (P)* →	*$100*	*$75*	*$50*	*$25*
	Average MoO/NOC Production Share (α)	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**	**Net Return (y_t) $/Barrel**
Concession	**0%**	67.6	49.9	32.2	14.5
Production-Sharing	**10%**	70.4	51.9	33.5	15.1
	20%	73.1	54.0	34.8	15.7
	35%	77.3	57.0	36.7	16.5
	50%	81.4	60.0	38.7	17.3
	65%	85.5	63.1	40.6	18.2
	75%	88.3	65.1	41.9	18.7
	85%	91.0	67.1	43.2	19.3
	90%	92.4	68.1	43.8	19.6
	92%	92.9	68.5	44.1	19.7
	95%	93.8	69.1	44.5	19.9
	98%	94.6	69.7	44.9	20.0
Service	**100%**	91.4	66.4	41.4	16.4

Givens:	*Production, mbd, (Q)*	*Royalty Rate (m)*	*Production-Sharing Income-Tax Rate (t)*	*Net Service-Contract's Fees, $/Barrel*	*Operating & Capital Cost: $/Barrel*
	1.000	***16.7%***	***65.0%***	***3.78***	***4.87***

Notes on costing, assumptions, and equations:

(i) The methodology in this table is quite general. Calculations are, however, tied to additional production capacity of 0.743 mbd. The comparison in the table is between the delivery of this capacity through the BP/CNPCs *service-contract* or through alternative PSAs.

(ii) In this table when the share of the Ministry-of-Oil/National-Oil-Company, *MoO/NOC*, is zero percent, then this represents a concession contract. When it is 100 percent, then this is a service contract. Other values; i.e. more than 0 and less than 100 percent, indicate production-sharing contracts.

(iii) In the case of production shares (for MoO/NOC) of less than 100 percent the royalty rate is assumed 16.7% and income tax 65 percent, both rates are used, currently, in the MENA area. In the service contract case (100% share for MoO/NOC) the income tax used is the currently applicable rate in Iraq of 35 percent. In service contracts, there is no royalty to pay.

(iv) The cost used in this table is $5.6/barrel. It is divided as follows: operating cost of $2.75/barrel and capital cost of $2.12/barrel. The operating cost is, in turn, divided into operating cost in the fields to southern loading terminals of $2.5/barrel, and a possible $0.25/barrel, representing transport cost and dues, when (small) part of Rumaila oil is exported via Syria or Turkey, through the strategic pipeline. The $2.12/barrel capital cost is a distribution of the estimated $23.3 billion investment over 1.00 mbd over the 30 years of the contract (see the annex).

(v) Shaded cells in the table indicate the cases at which production-sharing (at the shares indicated for MoO/NOC) is better (i.e. higher per-barrel return) than a service contract.

(vi) Iraq's total net return, Y_t, and per-barrel return, y_t, from production-sharing, are calculated using the following equations, *(1)* and *(2)*:

Net value of MoO/NOC's share in — *Tax and royalty paid by the foreign partner* (*Tax on net income*; *Royalty*)

$$(1)\ Y_t = \alpha\, Q_t\,(P_t - 4.87) + \tau\,\{(1-\alpha)(P_t - 4.87)\,Q_t - R_t\,P_t\} + R_t\,P_t, \qquad \text{for } \alpha < 100\%,$$

$$R_t = \mu\,(1-\alpha)\,Q_t,$$

$$(2)\ y_t = Y_t/Q_t.$$

Where: Y_t: Iraq's net return from production-sharing plus tax and royalty.

Q_t: Quantity of oil production.

P_t: Price of crude oil.

y_t: Iraq's net per-barrel return .

α: Share of MoO/NOC in production-sharing.

μ: Royalty-rate on the partner's share of production.

τ: Income tax-rate on the net income of the foreign partner.

(vii) Iraq's net per-barrel return, y_t, from the service contract is calculated using the following equation:

$$y_t = (P_t - 4.87) - 3.78.$$

Where: $3.78/barrel: The return (i.e. service and supplementary fees net of tax) on investing $23.3 billion (by BP/CNPC),that insures an after-tax rate-of-return on investment of 10 percent (see section III.1 in the text and the annex).