

THE COMPARATIVE EVALUATION OF OIL CONCESSIONS CONTRACTS AND JOINT VENTURES*

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Our subject today is the comparative analysis of oil concessions, joint ventures, and exploitation contracts from the point of view of a host government which must somehow decide which form of agreement or which alternative maximises its own interests. Because of the key role which oil revenues play in the economies of the major oil-producing countries, the question is both complex and important. The relative evaluation of oil agreements is not only controversial because of their political overtones, but also because of incompatible tacit assumptions which are frequently made by those discussing the arrangements. Here I would like to speak of some of the limitations or potential pitfalls of the various methods used for analysing oil agreements. I hope that this short discussion may help clarify some of the seeming contradictions and the conflicting claims which have been so apparent in the trade literature.

The analysis will be broken into three parts:

1. Concessionary arithmetic - the interpretation of the profit split.
2. The importance of cash flow analyses and the discount rate.
3. The practical inadequacy of economic analysis: the pivotal importance of the definition of the relevant policy alternative and the estimate of potential offtake levels.

We shall conclude with remarks about the extent to which economic or financial analysis defaults completely when one tries to solve or even identify the most important problem in evaluating an agreement, so it is only appropriate that we begin as well with a note of warning that the

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subsequent discussion is confined strictly to the financial and economic impact of agreements that is we specifically exclude all intangible benefits or political advantages of one deal compared to another. We all recognise that governments may from one instance to another reject undertakings which are eminently profitable in the economic sense, while they may equally well adopt projects which are economically unattractive. Either decision might well be clearly in the country's best interests, depending upon the precise circumstances of each case.

We must recognise, however, that intangible benefits by their very nature virtually defy any quantification which would permit one to attach a price tag to them. For example no one would deny that a joint venture or contractual arrangement can offer much more scope for managerial participation by the national company. Similarly, the experience to be gained from marketing one's own crude may well justify a certain annual level of loss on downstream operations. Nonetheless, even though we recognise the importance of these benefits, we shall restrict ourselves from here on to the mundane, purely financial considerations.¹

Concession Arithmetic: the "Profit Split"

The simplest method which is used for *comparing* a concession with a joint-venture or contract (such as the ERAP contract) is the so-called "profit-split", referring to the share of the total profits which is collected by the host government, versus that fraction of the "profits" which the foreign partner retains. In the case of the NIOC-Pan American joint venture, for example, it was argued that the profit split was 75:25 in favour of Iran, whereas the nominal split in the case of the Consortium is either 50:50 or 57:43. The latter - 57:43 - results from the formal computation where the royalty is fully expensed.

This method of comparing the *pro forma* profit split, however, is quite misleading since even in the simplest cases it does not provide the policy-maker with an accurate standard for measuring the relative financial desirability of a conventional concession versus a joint venture or a contract. The failure of the "profit-split" to provide a true test for

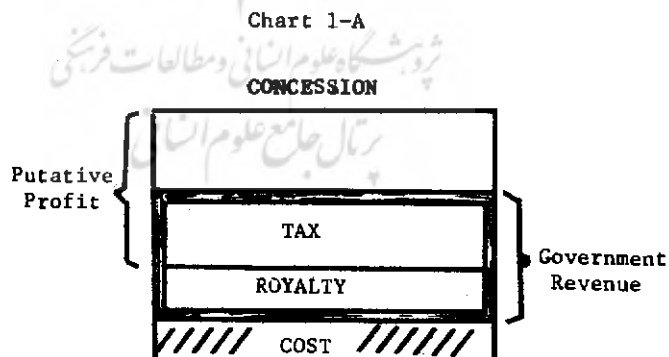
1. It was observed by Dr. Minā that part of Iran's increased revenues in the last decade could be directly attributed to the expertise and experience which NIOC had gained from its independent operations.

the relative advantages of a concession or contract is a consequence of three factors:

1. The reference levels are not the same, i.e., the percentage is not calculated with respect to the same basis in all cases;
2. The simple profit calculation ignores the cost of the country's own equity capital which is invested in either a joint venture or contractual arrangement; and
3. The timing of net cash revenues is ignored. In most instances to date, the revenues from the contract lag behind those from the concession for several years, even though the joint-venture or contract revenues are ultimately greater. If the oil revenues are being used for development investment, this comparative delay represents a real cost to the economy which must some-how be measured and taken into account.

The first two considerations may be incorporated into a modification of the most elementary "profit-split" calculation, whereas the problem of evaluating the "cost" of differences in the timing or scheduling of the revenues in a concession versus a contract requires more sophisticated and more complex analysis.

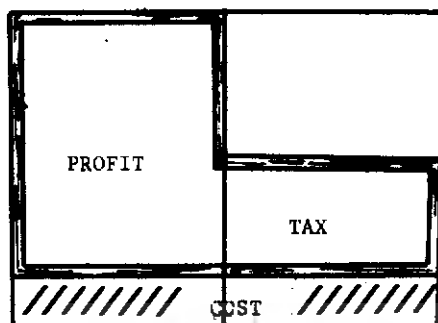
The simple calculation of the 50:50 split under standard concession terms is illustrated in chart 1-A, below:



The accounting cost and royalty are deducted from the posted price, and one-half of that difference becomes the tax. The total revenue to the government, shown between the double lines in the figure, is the sum of the tax and the royalty.

In the case of a joint venture, the 75:25 split is derived as illustrated in the following.

Chart 1-B
JOINT-VENTURE



One-half of the barrel belongs entirely to NIOC, say, upon which it receives the whole profit - 100 per cent - whereas the "profit" on the other is split 50:50 with the foreign partner. One-half plus "one-half of one-half" adds up to three-quarters or 75 per cent of the putative profit for NIOC. Strictly speaking, due allowance for expensing of royalties would mean that 75:25 in this sense is really 78.22, while 50:50 becomes more properly 57:43.²

This calculation implies that the host country receives one-half again as much under the joint venture, i.e. $\frac{75 \text{ per cent}}{50 \text{ per cent}} = 1.5$. This conclusion is manifestly fallacious, and it is for this reason that this procedure for the computation of "profit split" is misleading. The difficulty is illustrated in Chart 2, which has been drawn to scale.

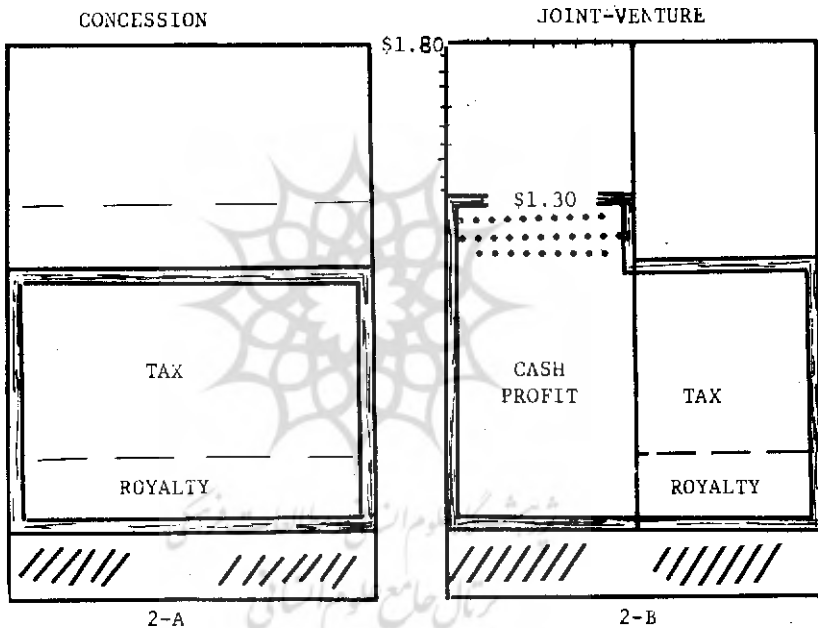
The "barrel" to the left requires little explanation; the tax is computed as half the difference between the posted price of \$1.80 and the production cost plus the royalty: government revenue, shown again as the area bounded by double lines, is the sum of tax and royalty.

When we turn to the joint venture case, the situation becomes slightly more complicated; this is illustrated on the right-hand side of Chart

2. See the appendix. If one calculates the percentage capture of the producer's rent, then 50:50 is in fact much closer to 91:9. More specifically, referring to the calculation in the appendix, if the production cost (in accounting terms) is 20 cents and the cost of capital is 10 cents per barrel, the "rent" is \$1.00 per barrel, out of which the OPEC concession provides the government with 91.3 cents.

2. The profit calculation consists of two parts, the first relating to the foreign partner's one-half share of the production, while the second part is the profit obtained by the national company (NIOC, for example) on its one-half share of each barrel produced.

Chart 2



The country's revenue on the half-barrel produced for the account of the foreign partner is exactly equal to that which is calculated for the concessionaire,³ and the two lines are of equal height in both halves of Chart 2. For the case of the national company's share of the output, however, the revenue is not based upon one-half of the national price of \$1.80; rather, the revenue for NIOC's own half-barrel is equal to the market price for the crude as realised upon arm's length sales - \$1.30 being

3. This assumes that the joint-venture agreement provides for a royalty payment, which is not the case for those arrangements signed in Iran. Thus for Iran, the effective benefit would be less by 5.6 cents per barrel (11.25 cents on each barrel attributable to the partner).

the best estimate which is currently available - less the cost of 20 cents, i.e. a net revenue of \$1.10 per barrel on that half.

Here is illustrated the first of the false assumptions which invalidate the simple "profit-split" calculation. The 50 per cent is calculated upon a basis of a putative profit per barrel which is equal to \$1.60 (if we forget the royalty for the moment), while the 100 per cent of the profit which the national company receives on its half-barrel is computed on the basis of \$1.10. Thus 50 per cent of \$1.60 is 80 cents, to which is added one-half of the royalty, making a total of 91.3 cents, whereas the 100 per cent of \$1.10 leaves \$1.10. The average revenue per barrel becomes $\frac{91.3+1.10}{2}$ or \$1.016; accordingly, when the profit share is doubled, the real revenue is only increases by some 10 per cent and the inherent flaw in the "profit-split" calculation is revealed.

The source of this discrepancy may again be illustrated directly: see Chart 3.

Chart 3

	National Company's Share	Partner's Share
Non-Realisable Profit	XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX	
	Profit	Tax
		Royalty
	////// CO	ST ////

The area shown crossed represents the difference between the market realisation and the posted price on the half-barrel belonging to the national company. The concessionary partner pays his "taxes" to the host government as if he really earned that income, whereas the national company actually realises cash sales revenues per barrel at the prevailing market price, which is at present about fifty cents per barrel less.

There still remains point two: we have not yet taken into consideration the fact that the national company, and hence the host country, has invested equity capital of its own in the joint-venture enterprise.⁴ No such capital outlay is involved in any concession, so we must duly take account of the equity capital which the national company provides before the two cases become comparable in any useful way.

The equivalent charge for equity capital may be determined as follows: the production cost which was assumed 20 cents per barrel, is roughly equivalent to an investment of \$365/barrel/day.⁵ The "cost" to the country of providing that capital can then be computed two ways:

1. Amortisation of a loan at 7 per cent over 6 to 8 years; this assumes a loan under commercial terms.

2. Direct charge for the opportunity cost of foregone developmental investment at between 10 and 15 per cent per annum; this assumes no borrowing, but a diversion of available capital.

It may be demonstrated that both approaches yield an estimate of the "cost" of such capital investment which is approximately 8 to 12 cents per barrel; we shall settle here upon a figure of 10 cents per barrel.

It is therefore necessary to subtract 10 cents per barrel from each barrel sold by NIOC in order to correct for its equity capital invested in the venture. This calculation is shown in numerical form in the appendix; while in Figure B the dotted area on the right-hand side represents the amount of "profit" which in fact is not profit at all but the "cost" of the national capital which had been committed per barrel of output. This must be deducted from gross receipts as an economic cost in this context. Consequently, the *effective* per barrel revenue on the national company's share drops to \$1.00, compared with 91.3 cents from the concessionaire (under 50:50) or from the foreign partner in the joint venture. The weighted - average, effective net revenue, therefore, is 95.7 cents from the joint-venture versus 91.3 cents from the standard concession, where royalties have been fully expensed.⁶

4. Even where the operation is ostensibly self-financing, capital is still implicitly invested by comparison with the revenue foregone from the concession as alternative.

5. If one-half of the production cost is depreciation, and if the depreciation schedule is ten years, then 10 x 10 cents equals one dollar. One dollar per annual barrel is equivalent to \$365/daily barrel.

6. By the time any production might materialise from agreements which

The results of this section are summarised in the table below:

Comparative Benefits to Host Government

	Concession	Joint-venture	Ratio
Profit share	50%	75%	1.50
Unit revenue	91.3	95.7	1.05

We see that the increase in profit share from 50 to 70 per cent under the joint-venture produces an increase in the effective, disposable per-barrel revenues of only 4.4 cents. In other words, an increase of one-half in the profit-share which the government purportedly collects from 50 to 75 per cent, yields an increase of only 5 per cent in the government's disposable revenues, that is an increase from 91.3 to 95.7 cents per barrel.

The same analysis can be carried through for contracts such as that signed in 1966 between NIOC and ERAP; but the details are more complex.

Assuming that NIOC develops the national reserve itself without delays, which is the revenue-maximising option, 80 per cent of the production is then for NIOC's account, while ERAP purchases only 20 per cent. On this basis, NIOC's gross revenues become:

$$a. \text{ NIOC sales } 0.80 \times 1.30 = 1.040$$

$$b. \text{ ERAP purchases } 0.20 \times [.52 \times 1.30 \times .10] = 0.155$$

$$\text{Total } \$1.195$$

From the gross figure, however, we must subtract the production cost of 20 cents and the capital charge of 10 cents, which leaves a net, *effective* "profit", of \$0.895/barrel. In other words 90 per cent of the "profit" yields 2 cents per barrel less than 50 per cent of the profit. Of the production cost, however, 10 cents is a non-cash charge (depreciation), so that the *effective* cash receipts to the government are 99.5 cents/barrel, or 9 per cent greater than in the 50:50 case.

Even after allowing for the national reserve, however, we find that Iran actually receives less in accounting terms from the proclaimed 91.5

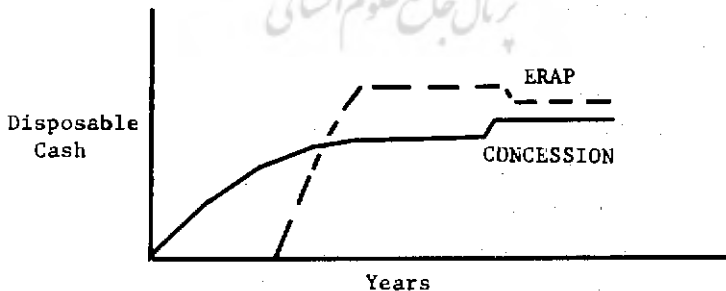
are currently being negotiated, the existing discounts may be presumed to have vanished. Again, it is to be noted that the joint-venture agreements in Iran do not provide for a royalty, so that the comparable return would be 90.1 cents, or less than that from a standard concession. However, full comparability of these results requires consideration of any bonuses, land rentals, or offtake agreements which might be involved in specific cases.

per cent of the "profit" than it would from the 75 per cent or even from the 50:50 split as computed above. This is a consequence of the especially favourable price at which ERAP will be permitted to obtain its share of the oil produced under the contract. Both examples illustrate clearly the inability of a simple "profit-split" calculation to provide adequate insight into the financial performance of concessions, joint-ventures, or contracts.

Discounted Cash Flow Analysis

In the preceding section we saw how the very simple concept of profit-split could be modified to incorporate the effects of realised prices and equity capital investment. We must now extend the discussion to allow for differences in the timing of the cash receipts under the various alternatives. The consideration is of particular importance when a contract is compared with a concession because the concession revenues are *greater* in the earlier years, appreciably *less* for some years thereafter, and ultimately are not much different in the later years of the operation. The final difference, however, is greater for lower-cost oil.

A typical pair of time profiles for net, disposable revenues, to a government is shown below, computed under both alternatives:



The somewhat unexpected relationship between these two curves requires explanation; in the first few years after the beginning of commercial production, the terms of the ERAP contract require that the national company refund all or almost all of the invested capital, plus accrued

interest.⁷ The rapid amortisation of these loans, together with start-up costs and the last stages of the capital construction, consumes all of the disposable cash produced from marketing the output, so that the national company realises no net disposable cash whatsoever in the first few years of commercial production.

During the second phase, once the loans from the French have been paid off, the disposable revenues from the contract arrangement rise rapidly and exceed those from the concession quite appreciably; even though the contractor is able to buy his share of the output at a very low price - circa 80 cents, including production costs - the low income on that fraction is compensated by the higher realisations on the national company's direct sales. Finally, in the third stage, once the initial block of capital assets has been fully depreciated, the country's income from the concession rises, reflecting the lower costs which are deducted from taxable income, while the income under the ERAP contract actually decreases somewhat.

We have assumed implicitly thus far that the choice facing the petroleum ministry is the selection of either a concession or a contract where both would be expected to make the same investments and achieve the same production levels. Under this assumption, therefore, the country indeed "loses" revenue in the early years if it does adopt the ERAP contract, even though it actually expends no cash whatsoever. This follows because of the presumption that there existed the alternative of a conventional concessionaire who would have performed in exactly the same way. The country might have had the other level of revenue in those early years, hence it is appropriate to discount both cash streams at whatever is believed to be the opportunity cost of capital for the country, that is whatever the country achieves on the average in its development programmes.

The specific choice of a discount rate is difficult, and there is little relevant theory. Roughly speaking, the greater are the opportunities for productive investment in the domestic economy and the more efficient is the Ministry of Economy or the planning body, the higher should

7. Dr. Mina pointed out that if the National Reserve were regarded as incremental production which otherwise would not be obtained from a concessionaire, this diagram would be appreciably different. This case is discussed in the next section.

be the rate of discount. Conversely, where there is scant possibility for extensive domestic investment, as in Kuwait, or where the absorption capacity of the economy is being approached, as in Libya, the discount rate ought to be perhaps set at only one-half point greater than the prevailing interest rate in the Eurodollar market.⁸

In any event, once a discount rate can be chosen, the present values of the two streams must be compared in order to determine which is greater, where both are discounted at a rate which reflects the productivity of investment capital in the host country. If the two present values are close together, or if the values cross within the range of discount rates which is relevant, then the two alternatives may be interpreted as being indistinguishable or equivalent for practical purposes. The choice between them may then quite comfortably be made strictly on grounds of intangible considerations.

At this point nothing more can be said in general. The relative assessment varies from case to case and depends upon the specific terms of the agreement to be analysed; the specific numbers are decisive. Nonetheless, thus far, all of the arrangements which I have examined are either less favourable financially than a standard concession or, at best, are approximately comparable, unless one presumes that a second Burgan field is found. The one partial exception is the deal which was recently (1968) signed in Libya between Lipetco and the French, although any calculation there is obscured by a host of complications which successfully elude useful quantification (for example, the agreement area was unnecessarily large in relation to the bonuses).

We conclude this section with the remark that it perhaps ought not be surprising that none of the contracts or joint ventures provides greater direct economic advantages than the conventional concession. If we revert to the bidder's viewpoint for the moment, we realise that he has little incentive to offer more than the market "value", measured in

8. Alternatively, the minimum discount rate may be geared to policy targets of the government. For example, if the avowed goal of the government is an annual increase in the per capita GNP of 7 per cent, while the rate of population increase is, say, 3 per cent, the minimum rate of return on the weighted mix of projects must be $7 + 3$ or 10 per cent. It may be shown that this consideration is equivalent to specifying a discount rate of no less than 10 per cent for the evaluation and selection of investment projects.

tax-paid equivalent terms, since most normal bidders have the option of meeting their requirements through purchases, long-term or short-term, at some economic price. Hence, a bidder could offer a host country *significantly* more than a potential concessionaire only by exceeding the "real" price. In practice, therefore, such new bidders have quite predictably offered somewhat less.

Limitations of Concession Analysis

Our discussion thus far has rested entirely upon one central assumption, which now must be itself scrutinised and tested. We have quite clearly assumed that both the concessionaire and the joint-venture partner would proceed to develop the area or block in question at precisely the same rate; moreover, we have further assumed that the national company, similarly, would develop an area under a contract arrangement at that same rate. This assumption is clearly untenable, and we have in fact really been asking the wrong question. Instead of calculating "how much per barrel", we should have enquired instead: "how many barrels?"

The revenue equation contains two variables: firstly, the unit revenue and, secondly, the production level itself. The differences, in the present value of the revenue streams under the concession, contract, etc. are completely outweighed by comparatively small differences in the production patterns when one relaxes the unrealistic assumption that all bidders would exploit the acreage at the same rate. Even though the "value" of ERAP terms might be 10-15 per cent less than that of a standard concession, the ERAP package would nonetheless be more lucrative if one were certain that ERAP, say, would produce 20 per cent more oil than some other bidder and do so more rapidly.

In this context, therefore, we must recognise explicitly that there are two distinct levels of comparison in analysing oil agreements:

- A. Comparison of the fiscal regimes.
- B. Comparison of the aggregate revenue impact.

The dominant factor, therefore, is the level of production or off-take which one may reasonably expect from the various bidders, since it is all but certain that they would not all be the same. The financial features of the various packages actually play a rather subordinate role

unless the terms are outrageously meagre, and we are thus led directly to the real dilemma in the assessment of contracts or concessions - the analytical apparatus functions superbly if we know the future level of off-take, yet it is precisely this variable which cannot be predicted by any existing economic technique.

In the long run, once all the producing countries are competing with one another through the vehicle of their national companies, it is clear that no extra volume can be gained in this fashion, since the sum total of the efforts by each producer will be the displacement of one barrel of concessionary oil for each barrel produced ostensibly at the margin by a "non-concessionary" enterprise. Accordingly, in the long-run, an increased market share can be won only via discounting, a process which, once commenced, would undermine the whole artificial structure which protects the producing countries' monopolist's profits. In the long-run, therefore, the assumption of equal offtake patterns does hold, albeit somewhat perversely.

The problem does persist, however, in the short run, and there seems to be no simple guideline for the policy maker who ultimately must decide in any given instance which alternative ought to be chosen. An economic or financial solution exists conveniently for the easy problem of direct comparison of alternatives, but economics abdicates when faced with the more important question of estimating the likely production levels to be expected under the various alternatives, provided that price or tax-discounting is excluded as a certain device for permitting control over off-take levels.

In conclusion, then, it has been demonstrated that the "profit-split" does not give the policy-maker a valid basis for selecting between an oil concession or an oil contract, for example. The crucial variable is not the revenue per barrel, even when calculated correctly, but instead, the expected number of barrels.⁹ A financial analysis is indispensable, and the ministry of petroleum or the national company must have performed the

9. Dr. Mina commented that the most relevant framework within which to assess oil agreements is that of "Level B", above, where one can be assured in the short and medium-run that incremental output will result from either joint-ventures or contracts. For the national company access to additional reserves and the freedom to exploit them permits penetration into markets which concessionaires, whose global interests are widely ramified, would otherwise either avoid or even defend.

exercise, but in the last analysis, the choice must hinge upon the minister's best estimate of who will produce the most.

Nonetheless, just as mathematics is the handmaiden of the physical sciences, economics is only the handmaiden of national policy it may serve, but it ought not to be expected to rule. The dominant considerations are either non-economic or cannot be successfully analysed economically, so that the final assessment of the terms of various oil agreements is in essence subjective, and the responsibility for choice must necessarily reside within the political process, transcending the strictly economic framework.

APPENDIX

	<u>Concession</u>	<u>Joint-Venture</u>	
		<u>A. Iran's half</u>	<u>B. Partner's half</u>
Posted Price	1.80	0	1.80
Market Realisation	(1.30)	1.30	(1.30)
Cost	.20	.20	.20
Royalty	.225	0	.225
Tax	.688	0	.688
Government revenues			
1. Tax & royalty	.913	0	.913
2. Crude sales (net)	0	1.10	0
3. Charge for equity capital	0	.10	0
4. Net realised revenue	0.913		0.957