
Feature Article

SOMBRE REFLECTIONS ON THE NORTH SEA OIL TAX SYSTEM

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The tax system on British North Sea oil and gas has altered in each of the five years since 1979. It was stiffened considerably in that year, further in 1980, and again quite considerably in 1981 when a whole new tax with its own rules added further complications to the existing maze. Then in 1982 the new tax was dropped from the end of that year, some other rearrangements were made, and again this year there was a further relaxation, though mainly relating to new leases. The general outline of the system was established only in 1975 as the first oil was due to start flowing. So there have altogether been six changes in nine years. If certainty in the fiscal treatment is to be desired as an encouragement to investors, then this record is a rather gloomy one. Admittedly other oil-producing nations also changed the rules repeatedly in the 1970's. Such was the case with the United States and Australia. The Americans also introduced a new oil tax in 1981. Yet the United Kingdom starting virtually afresh after the snock of the first oil crisis, and, since it was free of many of the political constraints that hamstrung oil policy in America, might have hoped to build a set of arrangements that could last.

The immediate reason for the frequent changes was obvious: the erratic course of world oil prices since the early 1970's. But is it inevitable that the rules should change each time the prices change, with new taxes coming out like new models of cars? Is there not some way of making rules that themselves take account of changes in the price of the product? This article will suggest that the solution to the puzzle lies in a combination of indexation and a discounted-cash-flow basis for the tax, while auctioning of extraction rights would provide a very useful supplement. A brief discussion of principles is needed to make the point clear.

Some Principles

Like much of the rest of the world, this country leaves most of the risks, and most of the management, of oil extraction to private enterprise. There are good reasons for this, albeit there may also be good reasons for having a public corporation as one competitor-participant (in the style of BNOc during its brief heyday). The risk-taking and the management have their price; in other words the private extractors require a certain level of return. Unless they believe that they can on balance expect that return, they will not show much interest. However, the state will quite reasonably aim to take as much as possible of the surplus earnings of the extraction beyond what is necessary to reward the extractors for what they provide. This surplus arising from exploitation of any oilfield may be regarded as the property value of the field, its value abstracted from whatever other resources may be applied to it. This value will in practice vary with circumstances and expectations, but, such as it is at the time, the

authorities may properly and justly aspire to recover it. This value is sometimes referred to as the "rent" of the oilfield by analogy with the rental value of a piece of agricultural land. The difference between the two cases is that the agricultural land with proper husbandry will continue realising its rental value indefinitely while a mine or oilfield will realise it all over a period of, say, twenty years.

As with all taxation it is desirable to disturb the investor's decisions as little as possible unless there is some clear special reason for doing so. The investor can be presumed to be planning and operating in such a way as, according to his own perceptions, to maximise the excess of the value of what is produced over the cost of producing it. Unless there is a clearly identifiable reason why the value or the cost to him differs from the value or the cost to the commonwealth, he should be allowed and encouraged to do just that. How the surplus is distributed is a subsequent question. Failing some such grounds for altering the context of the investor's decisions, the tax system should as far as possible leave them unchanged; in the technical jargon, it should be **neutral**. If it is more profitable to exhaust a particular field over 25 years rather than over 15, then the tax system should not, without some special reason, have the effect of inducing the investor to concentrate the extraction into 15 years. If in the absence of tax it would be profitable to go on lifting oil from a particular hole, then the tax system should not **prima facie** have the effect of rendering it unprofitable.

If a tax system were to have the effect of denying an extractor the prospect of the minimum returns that he would require from a particular investment (when in the absence of tax he would be able to expect them), then the tax system is eliminating what would otherwise **prima facie** be a socially valuable investment. Conversely if the tax system, as they sometimes do, renders an investment profitable that would not otherwise be so, it is in effect subsidising what failing other evidence must be regarded as a socially wasteful outlay.

This requirement of "neutrality" and the requirement for extracting the whole of the "rent" of an oil field would appear to be consistent with each other. Leave the investors the minimum return that they require but collect the rest, and in principle it would seem that both requirements would be met. The principle is sound and in essence it follows from the 160-year-old analysis of David Ricardo. It is the foundation for the land-tax policy advocated by the followers of Henry George. The question simply is how, if at all, this approach can be pursued over oil extraction and other types of mining.

Some Experience

There are two broad approaches, which could be called **before** and **after**.

The **before** method has been used by the U S federal authorities since 1954 for appropriating the mineral rent of offshore oil and gas. It has also been used by some American states and Canadian Provinces. It consists of allocating extraction rights by auction for a sum payable in advance, and it is called in America "cash-bonus bidding". Exponents of this approach argue

that payment or what is bid at auction cannot affect the pace or extent or techniques of extraction since it is water under the bridge by the time decisions on these matters are made. It will also not deter any project that would otherwise be undertaken, since no bidder will presumably bid more than he regards it as worthwhile to pay.

But will the cash-bonus bid realise the whole or most of the property value of the oil lease? That is not so easy to decide *a priori*. Advocates of cash-bonus bidding claim that each bidder will offer something close to his estimate of the full rental value of the lease for which he is bidding, since otherwise he may lose it to a competitor. Yet, unless they are aware of lively competition, oil companies may not bid the full amount that they would be prepared to pay. Moreover there is great uncertainty about the value of any particular lease at the time that it is put up for auction, indeed until operative drilling actually begins. And there is a measure of uncertainty partly because of variation in the price of the product until the end of the lease's working life. There is also political risk, the possibility that authorities will make further imposts on the investor's earnings or nationalize assets without compensation. Thus it would seem that an investor may be very conservative in the estimate of a lease's value that he is prepared to submit as a bid. In that case only a part of the true property value of the leases offered may typically be realised at auction.

Evidence from early US federal sales of off-shore leases, until the early 1970's, seemed to belie these gloomy assessments. The realised returns to the companies over large areas of off-shore fields released in the mid-1950s appear in fact to be lower after the cash-bonus bid and all taxes were deducted than in US industry as a whole, which suggested that the winning bidders had in fact paid more altogether than the total property value of their leases (Mead, 1977: 53-56). To explain this result we can say that the auctioning may give some upward bias to the sums recovered in relation to how the market values the lease in that the winning bidder is the most optimistic, not the one that gives the mean bid. For practical purposes there does seem to have been active competition for the federal off-shore leases, since a very large number of companies bid at some time or other and thus were **potential** bidders at an auction that was and is conducted with sealed bids. Further, large companies may have blocks in a number of different fields and so spread their risks, which may mean that they do not feel the need of estimating value very conservatively in their bids for particular leases. It was also probably assumed (though not correctly as it turned out) that the US authorities would not alter the rules. Finally much of the period in which the early federal off-shore leases were being exploited experienced falling oil prices.

It is correspondingly when oil prices rise unexpectedly that cash-bonus bidding allows windfall profits to accrue to the oil companies. This was realised in the US from the time of the first oil crisis, and a number of more or less unsatisfactory devices have been introduced in order to prevent the companies from getting away with too much. Cash-bonus bidding would seem to be an excellent system for extracting residual rent from oil fields if (1) prices are stable, (2) a large number of companies are known to be interested, many of them large enough to spread their risks widely, and (3) the companies trust the government not to alter the rules. Since at least the first of these conditions does not hold at all, and the second may not, and the third will not, be commonly true outside the US, it would be wrong to rely on this device as the sole rent collector.

The second approach to neutral collection of mineral rent is to assess it **after** rather than **before**, to base the government's take on what has actually been realised. If there is a way of judging what the realised rent or surplus actually is, then a large slice of it can be creamed off by the authorities without impinging upon the investor's decisions. Neither of the two common tax devices, the royalty depending on the value of the product and the conventional income or profit tax, is based at all closely on the surplus or rent as the investor is likely to perceive it. The **ad valorem** royalty is related entirely to gross receipts and not at all to costs. The income tax, though complex in its assessment, derives from a concept of income appropriate enough to farming or nail making but quite out of place in mining.

In fact it seems likely that oil or mining-company executives will judge the prospective success of a project by some form of discounted-cash-flow estimate. If they follow the standard advice of the schools, they will discount prospective cash flows by a discount rate that reflects the minimum return that they require. If the discounted sum is positive with some required degree of confidence, they will judge the project eligible, and any positive present value can be regarded as a surplus: it goes beyond what is necessary to induce them to invest. It seems to follow that, if the authorities could guarantee that the tax they collected would represent a constant fraction of that surplus, never impinging on the receipts necessary to meet the investor's minimum requirements and at the same time never abating the tax for additional costs except so far as is necessary to meet the investor's minimum requirements for covering those costs, the tax would be neutral. It would neither deter nor subsidise any investment or other outlay. At the same time it could take a large proportion of the surplus.

There is an important reservation to these statements. The tax could not stand at 100% of the surplus. Otherwise the investor would lose every incentive to economy. In practice it should not be at a rate very close to 100%, for fear of encouraging what is called "gold plating", namely outlays which, though they reduce profit, reduce it so little after tax that they are likely to be authorised if they have a consumer value for the executives of the investing company: over-elaborate offices, lavish entertaining, or anything that makes life easier or more glamorous. It is not possible to say at what marginal tax rate these socially wasteful outlays are likely to become important. Probably rates over 90% are hazardous. Oil men probably require the possibility of occasional spectacular coups to make them accept the risks of the business at all, and perhaps the knowledge that they can keep at least 15 or 20% of the surplus is a desirable sweetener.

To tax the surplus and nothing but the surplus in this way requires the tax to be based on cash flow rather than "income" if in fact it is cash flow that the investor himself is assessing. The idea of a cash flow base for business taxation is one that has been much discussed, but I believe that it has not been consistently applied except in mining and oil and on those industries only within a few less developed countries and only since the mid-1970s. The cash-flow base eliminates several of the disturbing complexities required by an income base: notably over depreciation and stock appreciation and the distinction between capital and recurrent outlays. It does, however, present two alternative difficulties in practice when applied to a discrete project. Either the tax authorities must subsidise negative cash flows as they occur at the same rate at which they tax positive cash flows, or else they must apply a discount rate for time to balance the negative cash flows of one period against the positive cash flows of another. If they choose the latter course, they should, by the reasoning already given, apply a discount rate equal to that used by the investor.

Too low a discount rate will run the hazard of deterring eligible outlays; too high a discount rate may subsidise ineligible ones.

The trouble is that the authorities will not know exactly what discount rate an investor will apply. Different investors may use different rates, and the oil investor may apply one rate implicitly to exploration, another to major investment outlays, and yet another to subsequent outlays once the project is in operation. If the authorities decide to use a cash-flow test it may be appropriate to apply slightly different discount rates to different industries and even to different project stages. Since the probability of investment distortion on account of use of the wrong discount rates is higher the higher the jump in tax rate once a given return is achieved, the best compromise for meeting the remaining uncertainty over discount rates may be to use, say, three discount rates to cover the range of those considered to be possible for the investor. Once the costs had been covered at each of these discount rates, an individually modest additional tax could be applied to the surplus. A practical proposal for applying just this kind of tax (which I shall call a "resource rent tax"), has been made for United Kingdom oil and gas by a Committee for the Institute for Fiscal Studies (IFS), chaired by Sir Antony Part, at the end of 1981.

A further complication needed in order to make this tax fulfil its purposes is to index cash flow for general price changes. Presumably companies make their projections in real terms. To define the surplus as they see it, the authorities must therefore index the cash flow for tax purposes. In practical approximation this means accumulating or discounting for each period by the sum of the inflation rate and the real discount rate.

If a resource rent tax (RRT) of this kind were to be introduced, no harm and some good would arise from adding on a cash-bonus bid for the purpose of allocating leases. The UK authorities have on occasion used auctioning experimentally and in those cases have simply added the bid to existing levies. The advantages are that the auctioning of licences allows a given proportion of the rent or surplus to be collected with a lower rate of resource-rent tax and hence with less hazard that distorting effects may arise from not fixing the discount rates precisely right. The combination of cash-bonus bidding and resource-rent tax (say at a top rate of 85% or 80%) would provide a resilient system. There would be no need felt to alter it when prices rose unexpectedly or a field turned out to be especially rich (because the 4/5 or more of any abnormal gain would be realised as tax). There would also be no need to alter it when prices fell, since the system would guarantee to collect no tax at all from the companies (other than what they had offered and pre-paid themselves) until a minimal return had been achieved. Because of the transparent simplicity of such a scheme, its implications for any investment or production decision are readily perceived, and the investor himself has a reasonable assurance that it is unlikely to be changed. By contrast investors in the UK North Sea (especially since 1979) have had no guarantee at all that the rules would not be radically different next year from this.

The UK System to Date

The existing regime is built on several inappropriate devices: an **ad valorem** royalty of 12.5% (abatable at discretion), a conventional income tax (but assessed separately on any company's North Sea operations), and the Petroleum Revenue Tax (PRT), which in its original conception seems to have been a tax on undiscounted cash flow assessed by field. The royalty would render some projects and much marginal extraction ineligible: the income tax (corporation tax), though much less objectionable, could in its simple form either tax projects that would never be profitable or leave considerable windfall profits. The PRT aimed to remedy this last defect, but the base of undiscounted cash flow could not be left like that; the positive cash flow of one year has to be set against the negative cash flows of the preceding periods before we can say that it represents any taxable surplus. So the PRT in its original 1975 form was armed with various elaborations designed, like the pre-Copernican epicycles, to make one model appear to fit requirements that could only be consistently satisfied with another. The "uplift" provision takes account in a crude way of pre-production expenditures; the "oil allowance" favours small fields on the supposition that by and large they will be the less profitable ones; and the "safeguard" provides that PRT for any one year should not exceed 80% of the excess "profit" of the period, that is of a "profit" in excess of 30% annually of certain accumulated expenditures that can roughly be described as investment. The PRT became a kind of Roslin Chapel of a tax; too clever by half and too complex by several orders of magnitude.

Yet as we have seen these elaborations did not equip the system for matching its revenue closely to profitability in changing circumstances. 1979 saw a rise in the rate of PRT from 45% to 60% and a reduction of the benefits provided to the investor by the "uplift" and the "oil allowance". 1980 saw a further rise to 70% and a weakening of the "safeguard". 1981 introduced a further additional tax, the Supplementary Petroleum Duty (SPD), which lay somewhere between an additional slice of PRT and an extra royalty. This in the view of financial journalists raised the average rate of tax on the average project to something like 89% and led to rumblings of revolt from the two associations of off-shore investors. Simulations (Kemp & Cohen; 1980) appeared to show that, even in the 1979 version, the tax system might easily switch real present values, discounted at a reasonable rate, on an actual North Sea field, from positive to negative. The SPD ceased from the end of 1982 in exchange for a rise of the PRT rate to 75% and an "advanced" payment of PRT. From 1983, all exploration and appraisal expenditures will be immediately deductible for PRT, and certain new areas of exploration will not be subject to royalty and will enjoy a doubled oil allowance. Advance PRT, introduced only last year, has begun to be phased out, which will presumably relieve cash flow difficulties. Oil companies seem to be appeased, whether or not they have much faith in the consistency of their future treatment.

The IFS Committee Proposals

The IFS Committee, reporting at the peak period of oil company disillusionment in 1981, proposed that the whole edifice (royalty, corporation tax, PRT and SPD) should be cleared away and replaced by one "petroleum profits tax" (PPT) of the form described above as a resource-rent tax, a tax on realised discounted present value. Their tax would have three tiers coming into effect when expenses had been covered at the rates of 15%, 25% and 35% respectively. Where all three tiers of tax were in

operation the marginal rate on cash flow would be 85%. The Committee showed, by rough simulations on hypothetical fields, that the system proposed might be expected on average to raise an amount of revenue rather similar to what would be collected under the 1980 system. They believed that it would qualify for creditability in the US. Kemp & Rose (1982) apply a similar system (with somewhat higher, that is more lenient, threshold rates of return, but a slightly higher top rate of tax) to a number of actual fields. They too find overall revenue yield similar to that of the 1981 regime but distributed differently: heavier on the more profitable fields but leaving the marginal fields with a tolerable return (1982 :42)

The idea seems an excellent one, but as presented it has two main faults. One is that it does not allow for the very important element of unpredictable inflation. If the general price level were roughly stable for most of the next 20 years, the discount rates proposed could let new investors get away with very substantial rents at only 50% or 30% taxation (the lowest tiers respectively on the two systems of rates that the Committee suggest). If on the other hand the typical inflation rate were around 20%, the system could in the event be quite penal. Neither possibility can be ruled out. On the other hand, fixing the discount rates in real terms and using a standard price index to convert to money terms is extremely simple and could overcome this uncertainty, which in fact destroys the main intended strong point of the system.

The second criticism is that the actual choice of discount rates seems to ignore the risk of distortion that arises from having them too low or too high. If a 10% inflation rate is assumed, the three discount rates work out in real terms at about 4%, 13% and 22%. While 13% in real terms might approximate to the minimum rate of return that oil companies might require in an established oil sector within a stable democracy, no-one would expect them to be satisfied with 4% real or to demand as much as 23% real. If the desire is to avoid distorting oil company decisions, real rates of 12.5%, 15% and 17.5% say might be more appropriate. On the sample project used by the Committee and under 6.7% inflation, these threshold rates would give slightly more revenue (undiscounted), both real and nominal, than the Committee's system with the same three tax rates, and would give negligibly more in real present value if discounted at 7.8% real (the equivalent of 15% nominal at 6.7% inflation).

The addition of the auctioning of rights would not in any way disturb a system of the type proposed by the IFS Committee, and it might add significant additional revenue. One North Sea block realised £24 million in current prices during a brief auctioning experiment in the early 1970s.

My impression about oil company objections to the IFS proposal is that they derive partly from the fear that it would make their profit position too clear and might encourage further turning of the screws. There might be ways of allaying this fear, which is based on political judgement of a perhaps rather muddled kind. Partly they derive from the actual discount and tax rates proposed, the failure to deal with inflation, and the uncertainty about how the system might be introduced. This last is not clarified in the Committee's report. The best way of dealing with existing projects might be to put the onus on the companies to show that they had not recovered their expenses at the specified (real) rates. Failing this demonstration they would be taxed on future net cash flows at the top rate. Alternatively, as a way of keeping faith, existing projects could be allowed to choose to remain on the existing system, or (at any time) to switch to

the new one. Keeping faith has not played a large part to date, but, as and if companies on mature reflection chose to change, there would be a good advertisement thereby provided for the reasonableness of the new system.

The United Kingdom cannot afford to deter oil investment or to curtail extraction from existing wells by uncertainties and anomalies. It can also not afford to subsidise oil investment, or to hand over a large part of the value of the oil resources to the companies who do the extraction. A simple and rational tax system is the best way of ensuring that it does none of these things.

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