
The United Kingdom's Experience with North Sea Oil and Gas

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Introduction

Apart from the Soviet Union, the United Kingdom is the only large, highly industrialised country to have been self-sufficient in oil in recent years. In 1984, the gross value of sales of UK crude oil and natural gas, probably at its peak, was equal to 7.1 per cent, and government revenue based directly on oil and gas production to 3.9 per cent, of the country's GDP at factor cost; clearly important, but on the face of it not overwhelmingly so.

Drilling in the UK sector of the North Sea began in 1964. Gas began to be produced in commercial quantities in 1967, and oil in 1975. The nationalised gas industry has over time converted the whole of its supply from manufactured to natural gas, and the country has latterly imported about a quarter of its gas supply. In 1981, the UK became for the first time a net exporter of oil, and in 1984 net exports represented about 43 per cent of production, then 126 mn metric tonnes. It is now said to be the world's seventh-largest oil producer.

Official estimates [UK Department of Energy 1986:7-12] put the oil reserves remaining at the end of 1985 as between 1,050 and 4,120 mn tonnes, eight to 33 further years' supply at the 1984 rate of production. Remaining gas reserves at the same date were given as between 868 and 2,830 bn cubic metres, which would be 22 to 74 years' supply. Such estimates tend to go on expanding, but it is at least a possibility that UK offshore oil will be virtually finished by the end of the century, especially because the low prices of 1986 may render unprofitable some of the fields that would have been attractive at the high prices of 1980. It would not be surprising if sales and tax revenue never again reach their 1984 levels in real terms.

UK oil came in on the crest of the high-price wave. What is amazing is that, far from bringing rapid growth and prosperity, the oil years have been times of comparative stagnation and of unemployment rates

unprecedented since the 1930s. The years of actual decline in GDP were 1974 and 1975, when commercial production of North Sea oil began, and 1980 and 1981, when the UK became a net exporter, in both cases hard on the heels of an enormous rise in the commodity price. The 1986 drop in the real price back toward the level of early 1973 has been widely thought of as a boost to recovery. The story seems almost like a mirror image of that of Nigeria or Mexico. We may reasonably ask what quirk of circumstance or feat of mismanagement can have turned a bonanza into a misfortune.

Here I shall look first at the policies on release of the deposits and realisation of their value for the nation and then turn to the question of how stabilisation went wrong in the face of the changes which the North Sea riches brought.

Exploitation and Taxation

With some qualifications, it can be said that the UK opened its gas and oil extraction to the private market. The qualifications are that a state-owned body, the British National Oil Corporation (BNOC), was set up by the Labour Government in 1975 as an integrated oil company competing with the private sector and possessing certain privileges, and survived until it was largely privatised and then abolished by the Conservative government over 1981-85. In addition the state-owned British Gas Corporation had certain privileges in purchase, and statutory monopoly powers over domestic sales, of North Sea gas, though these too were restricted by an Act of 1981. At most times allocation of leases to private firms has been discretionary rather than (as in the US Outer Continental Shelf) by auction. [Hamilton 1978, 17ff., discusses the reasons for discretionary allocation and other features of early leasing policy; see also Garnaut and Clunies Ross, 1983; 279-80].

Blocks which are the leasing units in the North Sea are of about 90 square miles each, far larger than in the

US, and another contrast with the US has been that the lessees in any one field are obliged to exploit the field as a single unit; one of the group of firms with leases in a field acts as operator on behalf of them all. This avoids any race among firms on a field to see which can get most out of a common pool, and it also economises on equipment.

There has been no clearly enunciated policy on the rate at which fields will be opened, but it is probably fair to say that the state has been prepared to release areas for exploration and fields for extraction almost as fast as reputable firms have wanted to take them on.

The system of taxation of oil and gas extraction has been one of extraordinary complexity. It is widely recognised as an ideal that taxation of natural resources should aim to recover for the state a large share at least of the property or 'rental' value of the deposits without discouraging (or on the other hand subsidising) investment or altering firms decisions (other than for clear social reasons) over the rate or technique of production [Garnaut and Clunies Ross 1983]. There are two simple principles by which this might be done.

One approach is to auction the rights for a lump sum payable before exploitation begins. This is the method ('cash-bonus bidding') applied by the US Federal Government to offshore and some onshore fields and by some US States and cities and Canadian Provinces [Mead 1977]. If the bidders assume competition and also ignore risk when bidding for a particular block, this method should on the whole provide for the state the most optimistic bidder's estimate of what the net property-value of the lease is. Though these conditions will not always and everywhere be fulfilled, experience, at least until the mid-1970s, suggested that this was a very effective way of recovering the full rent of oil under the circumstances existing in the US [Mead 1977:46-57].

The second approach is to apply a proportional tax *ex post* to positive and negative cash flows, or to discounted cash flows, arising from the extraction. The latter version of this method is the 'additional profits tax' [Goss 1986; Garnaut and Clunies Ross 1983, 97-9] pioneered in Papua New Guinea, and applied in Tanzania and elsewhere (often with the support of the Technical Assistance Group of the Commonwealth Secretariat, or, more recently, of the Energy Department of the World Bank) and latterly on oil in Australia. Since the rate of tax cannot be 100 per cent, this method cannot realise *all* the rent, and it raises problems over fixing the discount rate correctly, but with the right discount rate it will extract a large proportion of the rent without discouraging or subsidising investment.

The UK used the auction method of allotting blocks only in 1971 when 15 blocks (a small fraction of those released during that year) were auctioned and realised £34 mn between them. Its oil-tax system, as introduced in 1975, was largely based on *realised* profit or profitability. There has also, however, been a 12.5 per cent *ad valorem* 'royalty' on oil and gas introduced as part of the contract agreement with each licensee and consequently removable at the Minister's discretion. The removability makes it possible in principle to avoid any marginal disincentive effect that the royalty might present, especially in the later stages of extraction.

Corporation tax (CT) has been applied to oil and gas producers within what has been called a 'ring fence'; the company must treat its North Sea operations separately from its other activities, so that it cannot offset losses on the latter against profits on the former. Before CT is assessed, however, the company is liable for Petroleum Revenue Tax (PRT). PRT is assessed on each field individually, so that there is what might be called an inner ring fence around each field for this purpose in addition to the outer North Sea ring fence which applies to CT. However, *abortive* exploration expenditure anywhere in the UK North Sea can be treated as a deduction. Each company pays PRT according to its share in the field.

Extraction of oil and gas is peculiar in that so much of the cost is incurred before actual production begins, at least unless secondary or tertiary methods of extraction are applied. It is therefore more than usually inappropriate to treat pre-production costs as 'investment' and somehow separate from the costs of extraction.

PRT is framed as if it were based on sales of oil and gas, but it was apparently originally conceived as something like a tax on undiscounted cash flow, with all the costs incurred simply deducted from sales revenue before the latter became subject to the tax. Because of the cost of time and because there may be considerable delay between the occurrence of costs and the sales receipts to which they are directed, this would have been potentially discouraging to some otherwise viable projects.

PRT was accordingly modified, before the proposals became official in February 1975, not by accumulating past expenses at an interest rate for time but by allowing the deduction not only of the expenses themselves but of an additional 75 per cent (later changed to 35 per cent) of the value of most expenditures other than that on fixed assets. This, known as the 'offset', was at best a very crude way of making allowance for the cost of time and thus directing the tax to pure profit or rent, and hence a

further complication was introduced in the form of the 'oil allowance', which was designed to favour differentially the less profitable fields. It was based on the supposition that the smaller fields would generally be the less profitable. The oil allowance exempted from PRT the value of the first 500,000 tons (later 250,000 tonnes) of oil in any half-year, with a maximum on any field of 10 mn tons (later 5 mn tonnes). After all these allowances had been made, the rate of the PRT was originally 45 per cent, but it was raised successively to 60, 70 and 75 per cent over 1979-82.

Though the oil allowance favoured smaller fields, it would not guarantee that a field on which a low but positive discounted value might be realised in the absence of PRT would not become effectively loss-making after the tax. So one further complication was introduced in what was called the 'safeguard'. This provided that the PRT on a field in a year should not exceed 80 per cent of the amount by which the 'adjusted profits' of the year exceeded 30 per cent of total past capital expenditure in the field, the terms being appropriately defined. In other words, the year's profits could be as much as 30 per cent of the investment made without incurring PRT, and PRT could be no more than 80 per cent of the amount by which this 30 per cent 'return' was exceeded.

On the face of it, a simpler way of accomplishing the objective of this elaborate structure would have been to frame the tax as a proportion of the aggregate which the investor was supposed to be maximising. If this was discounted present value of cash flows, then the tax should be a proportion of discounted present value as that was realised. The tax, unless it was at such a high rate as to make marginal net receipts of little account, would then not affect the investor's behaviour, since the actions which would give him the highest net present value before tax would still give him the highest net present value after tax.

It would be desirable that a tax system should be responsive enough to changing circumstances that its rules would not themselves need to be changed. This was not so with the PRT. In the face of the second round of huge oil-price rises it was made progressively more severe in 1979, 1980 and 1981. In 1981, an additional tax, supplementary petroleum duty (SPD), was added, something like a 20 per cent additional *ad valorem* duty on gross revenue, collected before PRT and CT but subject to an exemption corresponding to the oil allowance. This applied over 1981 and 1982 only, and it was in the wake of the 1981 budget that the complaints of the oil industry were loudest. Estimates setting the average rate of tax in total on oil income at about 85-86 per cent and the top marginal rate as just over 90 per cent were given for 1981-82 [Dafer

Financial Times, 1982:23]. From the 1982 Budget there was progressive mitigation of the rigours of the tax system. Under the 1983 Budget certain new fields were given exemption from the royalty and for PRT purposes a doubled oil allowance.

Despite what may seem the clumsiness of the tax provisions applying to oil and gas, they could hardly be regarded as disastrous. From 1981 to 1985, they realised for the state from 49 to 52 per cent of gross sales revenue. Moans from the industry were not plaintive except in 1981 and 1982, and capital investment associated with oil and gas was maintained, according to official estimates, surprisingly well at between £2 bn and £3 bn nominal each year from 1978 to 1985, with the real fall in 1985 fairly modest, and the investment representing generally 20 per cent or more of the country's fixed capital formation for the year (UK Department of Energy, various years).

It is not clear why auctioning of rights was never extended beyond the 15 blocks put up for bidding in 1971. That experiment did not give any clear indication that the practice was harmful or worthless, and there would have been no inconsistency in combining auctioning with an *ex post* tax based on profitability. In fact quite a large number of companies have North Sea interests, and the early wish to favour the UK-based majors [Hamilton 1978:17ff.] has probably disappeared by now.

The policy of exploiting the oil almost as fast as companies are prepared to take it out might be questioned, but the uncertainties of the scale of remaining reserves and their commercial value makes that approach tempting, and apart from some of the richest Arab producers few governments if any can have resisted it.

Since stabilisation in the years of high oil revenues was highly unsuccessful, as discussed below, it is natural to wonder whether defects in the tax or leasing arrangements were responsible. For the tax system this can hardly have been so. Though its many changes probably created uncertainty for investors, there is no evidence that this seriously disturbed investment, which continued surprisingly steady, even in 1981-82. Government revenue from oil has always been less than 10 per cent of total government outlays, with the peak approached gradually; even if it were to disappear entirely over say three years, the disturbance would not be disastrous; and the trouble so far in the economy has been associated with rising, not falling, revenue.

It may be, however, that if fields had been released for exploitation much more slowly the economy would have enjoyed a smoother course. The plausibility of

this view depends on the question, discussed below, of the reason for the very large rise in the UK's real effective exchange rate to 1980. If this was due mainly to changes in actual trade flows, then it seems likely that slower exploitation would have been less disturbing, but it is not clear how far that is so.

Stabilisation

In a small developing country, for which the sales of some primary commodity make up a large part of GDP, the government is likely to expand its activities, feeding a boom in the economy, when the price is high, only to be faced with the need to contract, which is difficult and painful and leads to recession, when the price falls.

This was not the case in Britain, which since 1974 has slumped in times of rising oil prices and if anything recovered somewhat as real oil prices fell.

The paradox is partly explained by the fact that oil did not have anything like the relative importance that it had in the economy of, for example, Nigeria or Venezuela, and hence the general world slumps that followed the two rounds of oil-price rises outweighed any direct boost from the price rises in their effects on the economy. Commercial production of UK North Sea oil did not begin after all until 1975 when the first recession was already well under way.

However, that cannot be the whole story. The UK, though not particularly early in entering the 1974-76 slump, rather led the field into that of 1980-82. The government that came to power in mid-1979 was committed to a policy of price-deflation by rigorous monetary restraint, and that must have been important in precipitating the 1980 slump in the UK.

Added to this, the exchange rate rose from 1977 to 1980 by 33 per cent against the dollar, and by 19 per cent against a trade-weighted basket of currencies. But British wages and prices were at the same time rising much faster than the average of industrial countries. The net effect of these two movements has been estimated as raising the 'international' cost of manufacturing labour in relation to that in competitor countries (one version of the 'real exchange rate') by 51-55 per cent over those three years, so that for the UK to remain equally competitive in manufacturing labour productivity would have needed to rise in relation to that in other countries by about a half. This, together with the high nominal interest rates introduced by the monetary restraint, dealt a blow of quite extraordinary severity to manufactures. The UK's balance of trade in manufactures (in 1980 prices) fell from an average of £6.3 bn a year over 1977-78 to an average of £1.0 bn a year over 1981-82, and in fact

to £0.1 bn in 1982. Manufacturing output fell by four per cent altogether over 1973-79 and by 14 per cent over 1979-82.

Since manufacturing generally has a much higher labour component than oil-extraction, this change alone goes some way to explaining the rapid rise in the unemployment rate: from 4.6 per cent in mid-1979 to 11.1 per cent in mid-1983. North Sea oil has been estimated to have generated only about 100,000 jobs, and these were probably almost all in place by 1979. The subsequent fall in the trade-weighted exchange rate (back by 1984 to slightly below the 1977 level) has not to any great extent restored the manufacturing output lost: understandably, since the real effective exchange rate measured as above by international labour-cost comparisons left British labour costs in 1984 still 32 per cent (or in another estimate 45 per cent) above those of 1977, (figures from *IMF International Financial Statistics*, Cost and Price Comparisons for Manufacturing). In any case a manufacturing sector is perhaps more quickly destroyed than restored, especially in an environment of great uncertainty about the future of real exchange rates. Manufacturing output in 1984 was still eight per cent lower than in 1979.

Why did the pound's real exchange rate rise so markedly from 1977 to 1980? How far can oil and how far can policy be held responsible? There is no general agreement on how exchange rates are determined in a free market, but it seems quite likely that at least three factors, and possibly a fourth, were relevant. One was the marked change in external trade as the country moved from being a large net importer of oil (still about 43 mn tonnes in 1978) to become a net exporter by 1981. A second was the high nominal interest rates maintained over much of 1979, 1980 and 1981. [For outline and explanation of the policies, see Keegan 1984, chs. 4, 5.] A third factor was the view, hinted at whenever the term 'petrocurency' was used, that, because the UK was to become an oil exporter at a time when historically high real prices for oil were commonly thought likely to continue, its currency was a secure haven, especially when the country had a tough deflationary government. A fourth possible element was the doubt by 1980 about the economic control exercised by the Carter government in the US. Thus, how far the rise in exchange rate can be attributed directly to oil, how far to largely false expectations generated by oil, and how far to quite other factors, is hard to disentangle.

Re-running the 1980s

One lesson that has been widely drawn from the UK's unhappy experience of the early 1980s is that some stability in the real effective exchange rate should have

been maintained. The wild fluctuations of dollar, yen and pound against each other have contrasted with the more orderly adjustments of the currencies within the European Monetary System. But, apart from joining the EMS in order to reinforce other policies for stability, what ought the UK to have done in the extraordinary circumstances of 1979-82?

The Thatcher government was preoccupied with the rate of growth of the domestic price level as a target variable and at first with the public's holdings of money as the sole important instrument of macroeconomic control. The government seems to have started with the belief that there was a unique and stable relationship between the money supply and the price level complicated only by an unreliable time lag between the two. In controlling the money supply but leaving all particular prices uncontrolled, it was believed, the government would not only control the general price level but also ensure, as far as macroeconomic policy could do so, that all other variables of major concern (employment, the exchange rate, foreign payments) would reach the best levels available. The exchange rate was a price like any other and it could be relied on, if left to itself, to find its own proper level. The same was held to apply to wage rates provided price expectations could be stabilised. As a subsidiary objective, the government wanted to decrease the size of the public sector.

The government's unreadiness for what was to happen in 1980 was enhanced by the fact that everyone was used to a 'weak' pound, that is one whose tendency, if left to the market, was to fall in value. The appreciation of the currency, when it came, was at first accepted by some associated with the government as a dictate of the market and welcomed by others as a factor tending to reduce the rate of inflation. Some officials realised, but others were too slow to accept, that the combination of wage and exchange-rate rises might kill off much of the manufacturing sector [Keegan 1984:158-65].

As a general rule, where a commodity of fluctuating price or limited life is important, the government must 'lean against' the destabilising effects, even where they seem to be pleasant. While not dissipating the benefits that the commodity brings, it must ensure that good times do not lead to habits and expectations that can not be sustained in bad times, and that other assets are not despoiled. This general rule is as relevant for Britain or the Netherlands as it is for Mexico or Libya or Norway, but the applications are different.

For the latter group the important impact of the commodity earnings is on public finance, and, difficult as it is politically, the rule must be to keep public spending to a 'permanently' sustainable level in line

with the level of 'permanent' revenue, and to accumulate any surplus into reserves that can be drawn down when earnings fall. Needless to say, such a discipline requires the enshrinement of 'best guesses' about the medium-term future, and in the case of oil since the early 1970s these have been notoriously hard to make with accuracy. Stabilisation policy always has to be a mixture between reasonable provision against what is likely to happen and response to what has actually happened.

For the former group, in which the commodity does not bulk so large and the country's currency is widely held internationally, the need, as the UK has learned, is to achieve some stability in the real effective exchange rate. As with the other group, this may require some way of holding, as internationally negotiable but not highly liquid reserves, the abnormal receipts which in this case would otherwise exert an upward movement on the value of the currency if they were not immediately spent on goods and services.

The UK's objective clearly should have been to maintain 'full' employment and therewith to retain those tradeable-goods industries which, even if they might seem to an extent dispensable when oil earnings were high (in that those employed in them might instead have been engaged in public-sector activities for which the oil earnings would have sufficed to pay), would be needed when the oil receipts fell.

How could this be done? Suppose for a start that money wages had behaved precisely as they actually did and that money supply figures too had been as they actually were. It might have been possible to maintain full employment by fiscal expansion, specifically by maintaining tax rates as they were but expanding government services and construction, financing the increment through domestic borrowing. This, however, beside being contrary to the government's ideology, would have raised the interest rate even higher, and quite possibly (though by no means certainly) also left the exchange rate even higher than it was. The decline of manufacturing might have proceeded more or less as it has actually done, and, though life would have been more pleasant for many people in the meantime, the infrastructure by now better and real national income higher, there would still have been a seemingly unnecessary disruption of occupational patterns and depletion of productive capacity by 1986 when the oil earnings had fallen off.

Alternatively, the authorities could have abandoned the money-supply targets and allowed for substantial expansion of domestic credit so as to keep interest rates and consequently the exchange rate down, the latter possibly to around the real effective level of

1977. If the usual methods of expanding the money supply seemed inadequate or inopportune, the authorities could presumably have released pounds specifically onto the foreign exchanges by buying up securities issued by foreign governments and the debentures or shares of foreign companies, thus immobilising the additional earnings in the form of reserves which would represent longer-term claims on the rest of the world. On the given-money-wage assumption, keeping the exchange rate low would have left real wages somewhat lower and the price level somewhat higher in the middle of the period than was actually the case. But much of the 22 per cent (1.6 mn jobs) of manufacturing employment that disappeared in fact between 1979 and 1983 would have been preserved. Moreover a readiness to expand into export markets, which seems in many cases to have been blunted by the experiences of the last few years, might have persisted and developed.

But is it unrealistic to assume that the expansion of domestic credit would have left money wages unchanged? The government would certainly argue that it was. If lower exchange rates would have meant proportionately higher wages this benign alternative story would not have been possible.

Money-wage levels in the UK, as in most highly industrialised countries, are determined mainly in processes of bargaining between large employers or associations of employers on the one side and more or less powerful trade unions on the other. There is no regular national organisation and rationalisation of these bargaining processes as in Japan, Sweden or Austria. Governments, however, have tried for much of the 1960s and 1970s to introduce principles of restraint, but usually by fairly simple formulas which have several times collapsed in strikes and political embarrassment.

The Thatcher government has remained committed against any wage policy, partly from reaction against the failings of these experiments, partly out of doctrine.

Yet, without some control of the general level of wages, achievement of the other main objectives of policy cannot be demonstrated as possible. The

government's original view that money-supply targets can be maintained and that then all will fall into place has not been borne out by seven years of experience. Money-supply targets have been difficult or impossible to achieve and in spite of the attempt wage-rates and exchange-rates have moved perversely. Coherent alternative approaches, that rely on matching the number of instruments to the number of targets and are concerned to promote the three targets of full employment, price stability and a certain mix between market and non-market activities in an internationally open economy, are almost inevitably obliged to look to wage control as one of the instruments, along with fiscal policy and monetary policy.

Such control may or may not itself be possible. If it is not, however, the capacity of the UK to maintain a stable growth path in the face of such disturbances as the oil crises and its own oil bonanza must be doubtful. If on the other hand such institutionalised control of the general rate of wage settlements is possible, we can at least gain some idea with hindsight of how this combination of events might have been satisfactorily handled.

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