CHANGING NORTH SEA PROFITS TAXATION AND THE GAINS FROM OFFSHORE OIL

Chris Rowland

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1. North Sea Tax Changes

"Since my last Budget, world oil prices have increased dramatically. This substantial change has greatly favoured the oil companies. I therefore propose to increase the rate of Petroleum Revenue Tax" and as the "increases in oil prices have greatly strengthened the industry's cash position" to require companies to make advance tax payments. Specifically, a 70% tax rate will be levied for the bi-annual chargeable periods ending after 31st December 1979, and advance payments will be due in the first two months of each chargeable period based on 15% of the higher of the two previous periods liablilities. In this way Sir Geoffrey Howe believes "that the nation as a whole secures a proper share of North Sea profits."[1] These comments, made in the Budget speech on 26th March 1980, are by now the familiar British government response to rising oil prices. With the birth of North Sea oil exploration in the early seventies oil companies received relatively favourable tax treatment. Since then Petroleum Revenue Tax (PRT) was introduced in 1975 following the four-fold increase in oil prices of 1973/74; the PRT rate was raised and the PRT allowances reduced in the wake of the sharp oil price increase induced by Iran cutting supplies late in 1978; and now the North Sea tax structure has been made harsher with the arrival of a $33.75 price for a barrel of North Sea output.

We contend that this government response is an ill-conceived move based on a myopic view of how the oil industry operates, of the factors affecting the oil industry, and of the burdens imposed by the cumbersome North Sea tax structure. A policy of raising extra North Sea tax revenues may help the government to reduce its Public Sector Borrowing Requirement in the immediate future, but such a policy conflicts with longer-run UK oil industry needs. More importantly, if government's myopic view remains unchanged and if government continues to concentrate on short-term objectives at the exclusion of long-run matters, then the benefits of UK oil production to the UK economy may be severely eroded. Perhaps a lack of understanding has led to government myopia, but more probably government understands the issues but either does not appreciate the extent of the damage likely in the 1990's or has chosen to ignore such undesirable long-run consequences of policies with short-term political appeal.

This paper examines the damage to oil industry prospects and confidence from the latest oil tax changes. Here we do not appraise the suitability of the structure of oil taxation nor do we assess the fairness of the split of North Sea related benefits between companies and government - our concern relates to changing the tax structure per se. Although we have argued elsewhere[2] that UK oil profits taxation does not match the peculiarities of the North Sea extraction industry so that UK oil taxation needs to be restructured, the tax changes that have been implemented were not designed to improve the structure but were merely a response to changed industry conditions. These dynamics of oil taxation are discussed in this paper. The evidence presented in the following three sections questions the rationale behind such a response, questions the actual improvement in oil industry conditions and expectations, and questions the justification for such a response with an unsatisfactory tax base. This evidence suggests the tax changes will not just change the split of North Sea benefits between oil company profits and government tax revenues, but will reduce the benefits to both recipients. The final section quantifies the consequent likely reduction in North Sea related economic benefits.

2. Taxing Incentives

2.1 Desirable Effects of Rising Oil Prices

Successive governments do not appear to have grasped the reason why oil prices rise or the rôle of oil company profits. Oil prices have risen because of the shortage of oil worldwide[3] and will continue to rise so long as oil demand exceeds supply. Moreover, in an economy directed by market incentives, rising prices will tend to alleviate the shortage: on the one hand demand will be restrained and on the other hand previously uncommercial supplies will become viable. In the UK oil industry this implies that as oil prices rise the economy will benefit by developing some oilfields that formerly had been considered too costly, instead of buying expensive imports. While rising prices indicate the need for more investment, higher profits will provide the resources for more investment and higher expected profits will give the incentive. In a competitive environment[4], profits direct companies away from industries where the price-cost margin is low into activities where the price-cost margin is more favourable. With higher oil prices oil-related profits are likely to rise relative to non-oil profits and extra resources will be moved into oilfield developments. Such

movements benefit the economy at large, shifting capital and labour away from low value added uses into more rewarding employments, and increasing the net value of aggregate productive activity. We do not assert that market incentives yield an optimal allocation of resources, but at least they reallocate scarce resources in the correct direction when pertinent economic factors change. This desirable reallocation presumes market incentives are allowed to direct resources.

Unfortunately, the UK government appears to be rather short-sighted. It views recent oil company profit increases as "windfall" gains without recognising the long-run changes that such profits induce. A government believing its responsibility is to tax away all or most of the profit increases will tend to break the desirable link between higher prices and increased supplies. With fewer resources and reduced incentives the oil companies will be less eager to develop new North Sea oilfields. Indeed the impact of the latest tax changes on company expectations of government policy could be severe. Companies planning to invest large scale funds are wary of factors that might undermine their revenues in the years ahead. One such factor is the course of government North Sea tax policy. The last Budget together with the history of North Sea taxation is a clear indication that the government (whether Conservative or Labour) is likely to raise North Sea taxation whenever oil prices and profits rise.

Above we indicated how the tax structure has already been changed to the companies' disadvantage and how, although the government has consistently stated a desire to collect a "fair" share of profits, its notion of "fair" has been changing to its own advantage. The precedent is clear and now companies probably expect further tax changes if oil prices continue to rise. Once the private sector begins to expect further government interference one of two undesirable consequences is likely.

2.2 Rapidly Rising Oil Prices But Oil Investment Deterred

(a) Insufficient Aggregate Industry Funds

First if oil prices do rise then there will be little incentive for investment in new fields. Consider the projected aggregate oil company net cash flows from 26 established commercial fields[5] under a central oil price forecast but ignoring the recent PRT changes. Examining aggregate cash flows

is informative because they show the scale of equity sources which might be available for North Sea investment in the 1980's and 1990's (which will be crucially important to the North Sea industry since the more complex, less profitable, future discoveries will find increasing difficulties in attracting outside loan finance) and also because they demonstrate how incentives change for a "typical" UK offshore oilfield. Here our inflation and exchange rate assumptions are held constant to isolate the effects of oil price increases. In the central oil price scenario, oil prices are assumed to grow from $34 per barrel in 1980 at a modest 7% to 8% per year in current value terms[6] - which if world inflation stabilises at around 6% to 7% per year implies slight real oil price growth. Table 1 shows that some £3,000 million to £5,000 million per year would have been earned on these fields until the late 1980's, and then around £2,000 million to £2,500 million until the mid 1990's. These sums would have partly repaid the investors who had risked their capital in the North Sea and partly financed the next generation of oilfields.

Now consider the impact on company cash flows if oil prices rise faster than this forecast - specifically assume 25% jumps in the nominal oil price every fourth year with 5% increases in the intervening years, starting from a 1980 average price of $35 per barrel[7]. Over the next ten years an extra £5,700 million would have been available for company reinvestment and an extra £9,500 million from now to the end of the century. With higher oil prices the North Sea industry would be more profitable and it would have the finance to expand and develop new oilfields. This desirable result, however, ignores recent tax changes and the effect of these changes on company expectations.

Recalculating company cash flows with the 70% rate of PRT and advance tax payments and with the modest scenario for oil price growth shows lower but still substantial sums will be available for dividend payments and for reinvestment in the North Sea - some £53,500 million in total. The final column in Table 1 demonstrates the effect of rising prices on company cash flows with the assumption that after recent PRT changes the oil companies expect oil price increases to induce oil tax increases. Table 1 assumes, with the oil price scenario of 25% increases every fourth year, after the first 25% price rise companies might reasonably expect the PRT "uplift" to be removed and advance payments based on 50% (rather than 15% at present) of last period's PRT liability; after the next oil price rise a 5% increase on the rate of Royalty and tapering based on 15% (rather than 30% at present) of accumulated capital costs might be legislated; after the next oil price rise the PRT rate might be

Table 1 : Projected Post-Tax Aggregate Company Cash Flow from 26 Established Commercial Oilfields and the Effect of Higher Oil Prices

	As evaluated before the Budget		As evaluated after the Budget	
	Modest oil price growth with no tax changes	The effect of rapidly rising oil prices*	Modest oil price growth with recent tax changes only	The effect of rapidly rising oil prices and further assumed tax changes
	(£'000 million in current values)			
1980	5.7	+0.2	5.5	+0.3
1981	4.8	-0.1	4.0	-0.2
1982	3.3	+2.0	2.6	+1.9
1983	3.3	+0.1	2.9	-0.6
1984	3.5	+0.3	3.2	+0.3
1985	4.9	+0.3	4.7	+0.5
1986	4.5	+2.6	4.0	+1.7
1987	3.1	-0.2	2.8	-0.7
1988	2.6	+0.3	2.5	0
1989	2.7	+0.2	2.6	-0.2
1990	2.5	+2.2	2.5	+1.5
1991	2.1	-0.3	2.1	-2.9
1992	2.2	+0.1	2.3	-0.4
1993	2.0	0	2.0	-0.8
1994	2.1	+1.4	2.1	0
1995	2.0	-0.3	2.1	-1.0
1996	1.7	0	1.6	-2.3
1997	1.5	-0.1	1.5	-1.1
1998	1.4	+1.1	1.5	-0.5
1999	0.9	-0.3	0.9	-1.2
2000	0.2	0	0.1	-0.2
Totals				
1980-89	38.4	+5.7	34.8	+3.0
1980-2000	57.0	+9.5	53.5	-5.9

* Despite higher oil prices, negative values may appear in this column because tax increases are paid roughly one year later than the corresponding profit increase. For example, a pre-tax profit increase of around £250 million

Table 1 (contd)

in 1980 might invoke an extra tax liability of around £200 million to be paid in 1981, although 1981 pre-tax profits might be only £100 million higher.

Source: Author's estimates

raised to 80% and the "oil allowance" scrapped; and after the next oil price rise the "tapering and safeguard" clause in PRT might be abandoned and the Royalty rate increased to 20%. Although these assumed tax changes are highly speculative, given the history of North Sea taxation they are conceivable[8] and can be used to illustrate changed company expectations. Now, even if oil prices do rise company cash flows are not improved. Indeed over the next twenty years the earnings from the 26 established commercial fields might be £5,900 million lower than earnings would be if oil prices do not increase rapidly. Funds available for North Sea investment would be reduced and the expansion in UK oil supplies which would be beneficial would not be forthcoming.

(b) Insufficient Project Incentives

A field-by-field analysis for a typical range of possible new discoveries emphasises this conclusion. Table 2 analyses the effects for five possible exploration prospects in a variety of geological and geographic settings[9]. Ignoring the tax changes, expected after-tax real internal rates of return might rise by around 5% to 6% points with faster oil price growth - rises in expected returns which would probably be sufficient to encourage more intense exploration. However, changing the tax structure to include the latest PRT changes and the assumed changes in company tax expectations (exactly as outlined above) shows a different result. If oil prices rise rapidly then much smaller increases and some decreases in profitability are likely. Increases in expected returns from higher oil prices, are, for the the three largest prospects, more than offset by recent and assumed expected tax changes. Despite higher taxation, higher oil prices would benefit the smaller prospects, but not by nearly as much as higher oil prices were expected to improve returns prior to the last Budget. Exploration enthusiasm will be dampened and some of the additional supplies that would benefit the UK economy in the event of rapid oil price growth will not be produced.

2.3 Modest Oil Price Growth But Oil Investment Deterred

(a) Reduced Resources and Lower Expected Profits

A second alternative but still undesirable consequence of governments raising taxes in response to higher oil prices could occur even if oil prices do not rise. We have shown that oil price rises may no longer bring forth additional UK oil supplies by investigating how company after-tax cash flows

Table 2 : Real Post-Tax Internal Rates of Return and the Improvement due to Higher Oil Prices for a Range of Future Oil Prospects

	As evaluated before the Budget		As evaluated after the Budget	
Potential field size*	Modest oil price growth with no tax changes	The effect of rapidly rising oil prices	Modest oil price growth with recent tax changes only	The effect of rapidly rising oil prices and further assumed tax changes
(Million tonnes)	(% per year)	(percentage points)	(% per year)	(percentage points)
12.5	14.5	+6.0	14.3	+2.0
25	19.9	+6.2	19.6	+0.7
35	16.7	+5.4	16.1	-1.0
45	14.4	+4.8	13.9	-1.8
80	16.5	+4.9	16.1	-1.6

* These prospects represent possible sites for immediate exploration drilling, which if discovered would lead to appraisal and delineation in 1981 with production starting 4 to 6 years later. We have deliberately considered only the medium to less profitable prospects here.

Source: Author's estimates

and after-tax field rates of return may not improve with higher oil prices. Tables 1 and 2 also suggest that, in the event of prices following our modest oil price growth scenario, North Sea production may not be as great as it would have been if there were no recent tax changes. Comparing columns one and three in each table shows how the Budget has already lowered company cash flows and rates of return under the central oil price assumption. Whether the decline in these after-tax cash flows and expected profit rates will deter oil company involvement in the North Sea, or whether the cash flows and profit rates are still sufficient to attract enough private sector investment, is a familiar but debatable issue. The issue centres around the split of North Sea profits between oil companies and government - the issue considered by Sir Geoffrey Howe when he spoke of the "balance between the nation's claim to a share in profits, and the right of those in the risky business of exploration to a fair return on their efforts"[10,11] - and we do not wish to pursue it here. However, tables 1 and 2 suggest a further disincentive that will affect North Sea supplies and that apparently the Government has ignored or considered unimportant.

(b) One-Sided Risks

Before an oil company undertakes an exploration or development project in the North Sea it goes through a complicated process evaluating the factors that may affect the profitability of its investment. One part of this process will concern the highly uncertain course of world oil prices. The fast growth oil price scenario described above might constitute an upper bound for foreseeable oil prices, but at the lower bound it is conceivable that real oil prices may decline moderately over the next few years (for example caused by significant worldwide oil destocking and a series of mild winters[12]) before stabilizing at a price in real 1979 values of around $25 per barrel[13]. A central expectation on oil prices probably rests on the modest growth scenario described above.

Table 3 shows expected after-tax net present values for a range of potential exploration prospects under each of these three oil price scenarios, both as evaluated immediately before the Budget and as evaluated since the Budget. Prior to the Budget most of these prospects would have probably been commercially attractive. Although an oil price decline would have created expected losses of up to £44 million on the projects, this outcome would have seemed fairly remote and would have been more than offset by the chance of earning from £23 million

Table 3 : Project Viability - Post-Tax Net Present Values for A Range of Future Oil Prospects under Different Oil Price Scenarios

	As evaluated before the Budget			As evaluated after the Budget		
	No tax changes			Recent tax changes only		Recent plus further assumed tax changes
Potential field size*	Limited oil price decline	Modest oil price growth	Rapidly rising oil prices	Limited oil price decline	Modest oil price growth	Rapidly rising oil prices
(million tonnes)	(£ million in 1979 terms using a 15% discount rate)					
12.5	-35	-2	23	-35	-3	5
25	-10	28	65	-11	26	26
35	-21	11	52	-22	7	0
45	-44	-6	41	-45	-10	-22
80	-44	22	97	-47	15	-6

* see note to table 2

Source: Author's estimates

to £97 million profits if oil prices rose rapidly. Since the Budget, however, although the remote chance of an oil price decline would still yield large losses for the companies involved in the prospects, the chance of earning substantial profits has been removed. Incorporating the recent tax changes and the assumed tax expectations (as detailed above) alters the financial risks of developing an oilfield to something like the risks shown in columns five, six and seven of Table 3. Oil companies in the British sector of the North Sea face a very one-sided future - a future where there is a chance of possible oil price falls and associated losses but there no longer seems to be much chance to gain from oil price rises. Even if oil prices do not rise rapidly, the Budget changes make it unlikely that companies will explore as intensely or develop as many North Sea fields as they might otherwise have done.

2.4 Government Interference

A government policy of continually meddling with oil taxation adds to long-term company planning further uncertainty that will reduce North Sea investment and consequently North Sea oil supplies. Government does not seem to be aware of the long-run damage caused by interfering with the profit incentive.

3. Oil Profits and Inflation

3.1 Recent Changes That Have Affected Expected UK Oil Profits

Second the government has a myopic view of the factors affecting oil profits and investment. Consider the changes in events pertinent to the oil industry that occurred between Sir Geoffrey Howe's two Budgets. On the international scene oil prices rose rapidly to levels that no one foresaw, and now higher prices seem to be firmly established. Whereas one year ago a central expectation of North Sea oil prices was probably based on a price of around $24 per barrel in 1980 with rises in line with world inflation (maintaining a constant real price) thereafter[14], today a $34 per barrel 1980 average with modest real price growth relative to world inflation throughout the 1980's and 1990's is a more common forecast[15].

Meanwhile, general pessimism arose over long-run domestic inflation prospects, reinforced by higher than expected current inflation. Former hopes

for single figure wholesale price inflation in the early 1980's and for a decline to around 6% per year in the mid-1980's and beyond, must now be considered optimistic. Instead a central expectation might now be for double figure inflation over the next few years with longer term prospects for around 9% inflation per year[16].

3.2 Changed UK Oil Industry Prospects

Both higher expected oil prices and higher expected domestic inflation have affected the prospects for the UK oil industry. Comparing our central estimate of the aggregate industry position today with those expectations of about one year ago shows the benefit of increased oil prices outweighs the depressing higher inflation expectations when measured in current value terms. Figure 1 - based on a company-by-company assessment of twenty-six established commercial, seventeen potentially commercial and over thirty assumed new discoveries[17] - shows how the industry's expected net cash flow would have improved if the tax system at the start of 1980 remained unchanged (the dotted lines). In current value terms, despite inflated costs, higher oil prices would have been expected to strengthen the industry's annual cash flow by around £1,000 million in the early and mid 1980's and by up to £4,400 million in the late 1990's. The change measured in real 1979 values would have been much less favourable, with roughly only £250 million per year extra in the mid 1980's. Indeed, higher expected UK inflation would have been likely to negate the benefit of higher dollar oil prices so much so that the real net value of North Sea production in the 1990's would not have increased. Resources generated from offshore oil would still have been sufficient to cover new field development costs, but recent events do not seem to have boosted the level of real resources for oil company reinvestment in the 1990's. The total net improvement over the 20 year period would have amounted to some £2,400 million in real 1979 values.

3.3 Scope for Extra Taxes?

The government, however, apparently ignored the effect of higher inflation and saw ample room for extra tax revenue from the oil industry. Even though North Sea tax revenues would have risen without PRT changes the government wanted more. The continuous line of Figure 1(a) shows

..... Extra cash flow due to higher oil prices and faster inflation but without tax changes.

_____ Extra cash flow due to higher oil prices, faster inflation and recent tax changes.

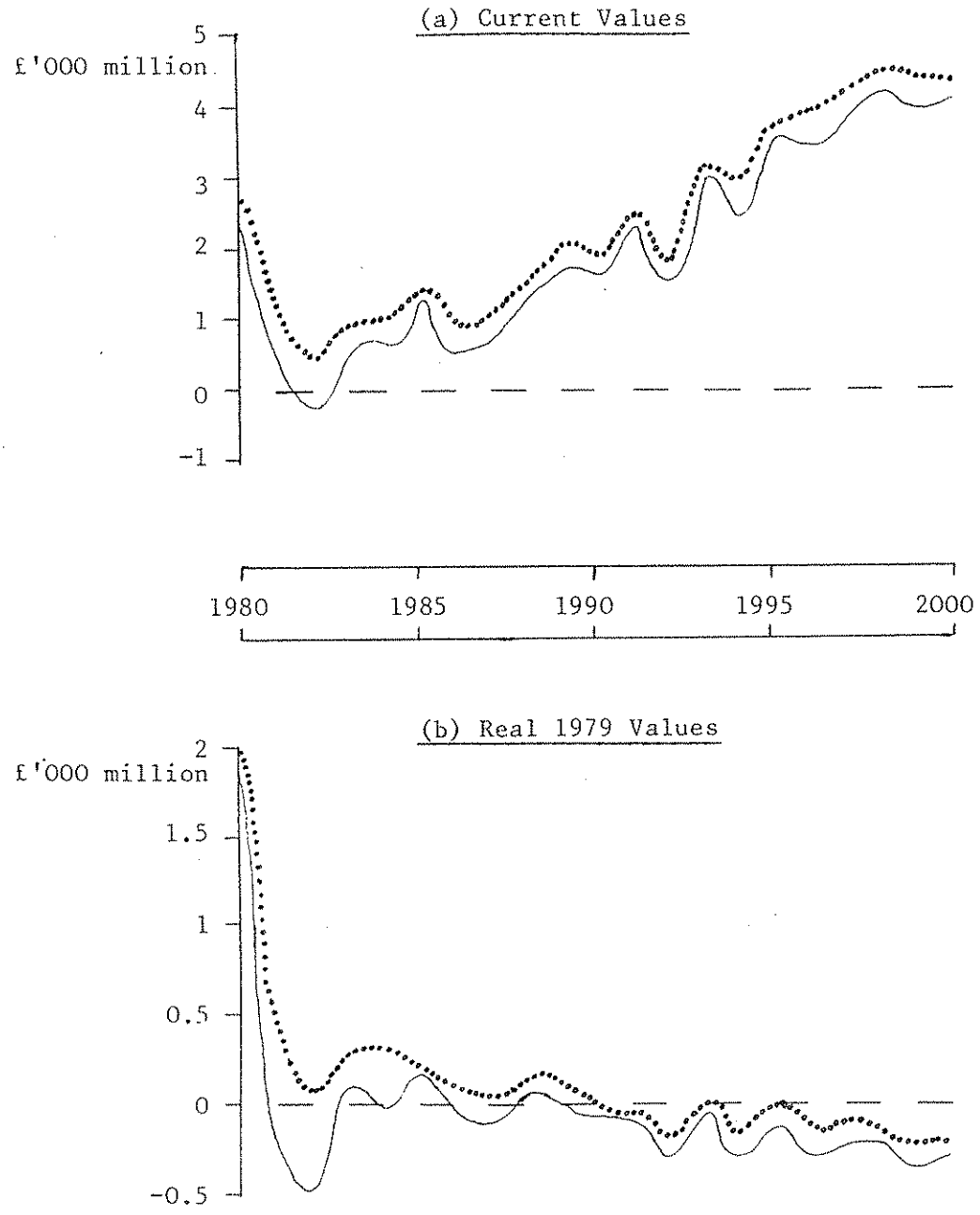


Figure 1 : Recent Changes to Central Expectations of Industry's Annual Post-Tax Cash Flows

Source: Author's estimates

that the tax changes in the last Budget appear to make little difference to the boost to industry cash flow measured in current value terms. In real 1979 terms Figure 1(b) shows that the net effect on profits, after higher oil prices, faster inflation and the recent tax changes, leaves the industry almost £2,000 million richer in 1980 but about £700 million poorer in the next two year period. For the rest of the 1980's the industry is expected to be roughly neither better nor worse off than expected one year ago - the losses from higher expected inflation and harsher PRT roughly offset the gains from higher oil prices. But in the period from 1990 to the end of the century recent events and tax changes leave the expected real aggregate cash flow more than £2,000 million lower.

Over the twenty year period the tax changes reduce the industry's expected profits by some £3,100 million (in real 1979 values) even though higher oil prices and inflation would have left the industry only £2,400 million (1979 values) richer. The government apparently responded to the false changes depicted by current values rather than the more accurate picture of real profit changes. As the government's response was ill-conceived the new situation leaves the oil producers on balance some £700 million poorer. We have already noted that an industry wary of erosions to its profits by tax changes will lose interest in new projects. It now appears that the government is not increasing taxes in response to real profit gains but in response to anything apparently favourable to the industry (for example oil price increases) without reference to events that undermine company profits (for example faster cost inflation). The result is that UK oil producers are left with fewer funds at a time when oil prices are rising and we would like to see an expansion in this extraction industry. Either the government misunderstands the determinants affecting the oil industry or it is concerned only for short-term tax revenues. In either case its tax policy seems likely to lessen North Sea production and to harm the UK economy.

4. Additional Tax Burden Field-by-Field

4.1 Ineffective PRT Allowances

Third the government may not realise the burdens it imposes on the industry through the combination of Royalties, PRT and Corporation Tax. Apparently the government, tempted by the enhanced returns forecast for the

more rewarding oilfields, feels justified in raising the PRT rate and in requiring advance tax payments since the PRT allowances are believed to offer sufficient protection for the less rewarding discoveries. However, it has been shown elsewhere[18] that the allowances do not protect the returns on the fields most needing protection, and that the North Sea tax structure burdens the less profitable finds while giving relatively favourable tax treatment to the richer oilfields. The PRT changes do nothing to rectify this misplaced tax burden.

4.2 Recent Events and Field-by-Field Profits

Moreover, an analysis of the way the latest PRT changes offset the field-by-field benefits of recent events shows some quite alarming consequences. The impact of the changed central oil price and inflation expectations (outlined above) has been quantified in Table 4 for twenty-six established commercial fields. The table ranks the fields by their pre-tax present values per barrel of recoverable reserves[19], with the better prospects at the top of the table. Except for Auk, all of the best finds would have enjoyed rates of return increases of at least 2 percentage points in real terms if there were no tax changes, with Buchan and Fulmar enjoying increases of about 7.5 and 6.5 percentage points respectively. For this group of the established commercial fields real net present values would have risen by on average over £100 million, ranging from under £20 million extra for the two short-lift projects (Argyll and Auk) up to over £400 million for the massive Forties discovery. These increases are offset by harsher PRT, so the overall increase in internal rates of return on most of these fields lies between 1 and 2.5 percentage points. The tax changes collect on average slightly more than half of the extra net present values. Compared to one year ago all the most profitable established commercial fields have higher expected profits, despite faster expected inflation and despite harsher PRT. Expected profits on the established commercial fields in the middle rank of profitability are similarly improved. However, prospects for the poorest category of established commercial fields are not so favourably enhanced. For the two least profitable fields (Cormorant North and Magnus) the depressing effect of higher inflation on rates of return and net present values outweighs the advantage of higher oil prices. Moreover these fields also suffer as they are not protected from the tax changes. At least half of the fields in this group are expected to be less profitable than expectations of one year ago. Real net present values on Hutton, Beryl North, Brae, Hutton Northwest, Cormorant North and Magnus are either approximately unchanged or lower.

Table 4 : Recent Changes to Central Post-Tax Profit Expectations on 26 Established Commercial Oilfields

The oilfields are listed in order of their pre-tax present values per unit of production.

	Real Internal Rates of Return (% per year)			Real Net Present Values (£ million in 1979 terms using a 15% discount rate)		
	Change due to higher oil prices and faster inflation	Additional change due to 1980 Budget	Current central expectation	Change due to higher oil prices and faster inflation	Additional change due to 1980 Budget	Current central expectation
Auk	+1.4	-0.1	35.5	+17	0	136
Piper	+3.5	-1.6	47.7	+195	-101	890
Forties	+2.3	-1.4	29.1	+411	-281	1759
Claymore	+5.1	-2.6	31.3	+123	-77	332
Buchan	+7.4	-1.9	35.6	+52	-16	120
Argyll	+2.2	0	29.1	+10	0	50
Dunlin	+4.2	-2.4	27.2	+135	-95	329
Thistle	+2.7	-1.3	18.6	+124	-60	162
Fulmar	+6.4	-4.2	40.0	+98	-91	346
Ninian	+2.6	-1.5	18.0	+216	-130	248
Tartan	+5.1	-2.4	29.4	+53	-32	145
Brent	+1.8	-1.1	15.3	+253	-158	43
Beatrice	+3.3	-1.4	25.2	+26	-13	83
Cormorant	+3.8	-0.8	17.9	+41	-9	31
Maureen	+3.4	-1.9	21.3	+25	-15	43
Beryl	+1.8	-0.6	18.5	+57	-22	109
Montrose	+3.9	-0.9	12.9	+56	-13	-34
Murchison UK	+2.8	-1.9	17.6	+54	-39	47
Heather	+3.6	-0.8	14.5	+52	-13	-8
Statfjord UK	+2.2	-1.2	16.6	+38	-27	26
Hutton	+1.8	-1.8	21.1	+15	-15	44
Beryl North	+2.5	-2.2	28.1	+15	-18	75
Brae	+0.4	-0.9	14.6	+9	-22	-10
Hutton Northwest	+0.1	-0.9	13.1	+2	-11	-23
Cormorant North	-0.5	-0.4	8.8	-5	-15	-220
Magnus	-0.4	-0.1	9.6	-3	-6	-185

Source : Author's estimates

4.3 Indiscriminate Taxation and Future Oil Projects

The indiscriminate nature of the extra tax burden imposed in the last Budget is most unwelcome. Fields that have benefited little in recent times and can least afford to pay more tax are penalised just as heavily as the more prosperous fields which benefited greatly over the past year. While raising extra taxes from the profitable fields reduces the funds for North Sea investment and while the last Budget dissuades North Sea investors by threatening future profits, fields such as Piper, Forties or Claymore may be able to afford higher taxes and still be commercially attractive projects. Unfortunately, the generation of such rewarding discoveries ended several years ago and the oil industry now feels that future finds will be mainly small size deposits in deeper and remoter waters. The next generation of fields is likely to comprise projects similar to Brae or Magnus which earn barely the returns necessary to induce their development.

Consider the effect of recent changes on a group of potentially commercial fields. These are the fields which have been discovered but do not yet have development plans. Although their cost estimates are even more speculative than the established commercial field estimates, we have quantified the impacts of recent events (higher oil price and inflation expectations) and of the latest PRT changes in Table 5. Although the combination of higher oil prices and faster inflation may have been enough to convince companies of the viability of virtually all these projects, the recent PRT changes in the majority of cases have an equal or greater impact on profits, so that positive development decisions seem much less likely.

4.4 Prerequisite to Oil Tax Changes

If and only if the tax structure can discriminate between rich and poor fields should the government consider raising extra North Sea revenues from the existing tax system. As the burden of PRT, Corporation Tax and Royalties is badly misplaced, and as the changed PRT serves only to accentuate the unfair tax distribution, the tax changes seem ill-advised. An indiscriminate additional tax burden is not only unfair but also dangerous to the economy. For if the profits from the more complex, more risky and more costly fields are taxed away, companies will have no incentive to develop these reserves, North Sea investment will decline, and potential North Sea output will have to be replaced by expensive imports. The government seems clearly to be raising

Table 5 : Recent Changes to Central Post-Tax Profit Expectations on 17 Potentially Commercial Oilfields

The oilfields are listed in order of their pre-tax present values per unit of production

	Real Internal Rates of Return (% per year)			Real Net Present Values (£ million in 1979 terms using a 15% discount rate)		
	Change due to higher oil prices and faster inflation	Additional change due to 1980 Budget	Current central expectation	Change due to higher oil prices and faster inflation	Additional change due to 1980 Budget	Current central expectation
Andrew	+2.2	-1.4	21.2	+10	-6	27
Tern	+1.1	-0.9	20.0	+8	-9	43
Block 21/2	+1.0	-1.4	15.2	+2	-3	0
Mabel	+0.7	-0.6	15.9	+2	-2	3
Block 30/17	+0.4	-1.0	16.5	+3	-10	14
Crawford	+0.4	-1.5	13.6	+4	-17	-16
Lyell	+0.9	-1.6	19.9	+5	-10	26
Thistle North	+1.4	-0.7	18.0	+6	-3	15
Toni*	+0.1	-0.8	13.2	+3	-11	-25
Renee	+1.1	-1.1	20.5	+4	-4	18
Beryl West	+1.2	-0.5	19.9	+3	-2	10
Block 23/26	0	-0.5	17.5	0	-3	9
Alwyn	+0.3	-0.7	14.2	+2	-5	-6
Block 2/10	+0.6	-0.9	13.9	-6	-7	-9
Block 3/28	0	-0.7	12.6	0	-3	-11
Josephine	0	-0.1	16.6	0	0	4
Block 15/23	-0.7	-0.7	6.5	-7	-7	-131

* includes Thelma and Tiffany discoveries

Source: Author's estimates

too much of its extra tax revenue from the fields that barely give the companies sufficient commercial incentive, and as a result the UK economy will suffer.

5. Destroying The Gains From Offshore Oil

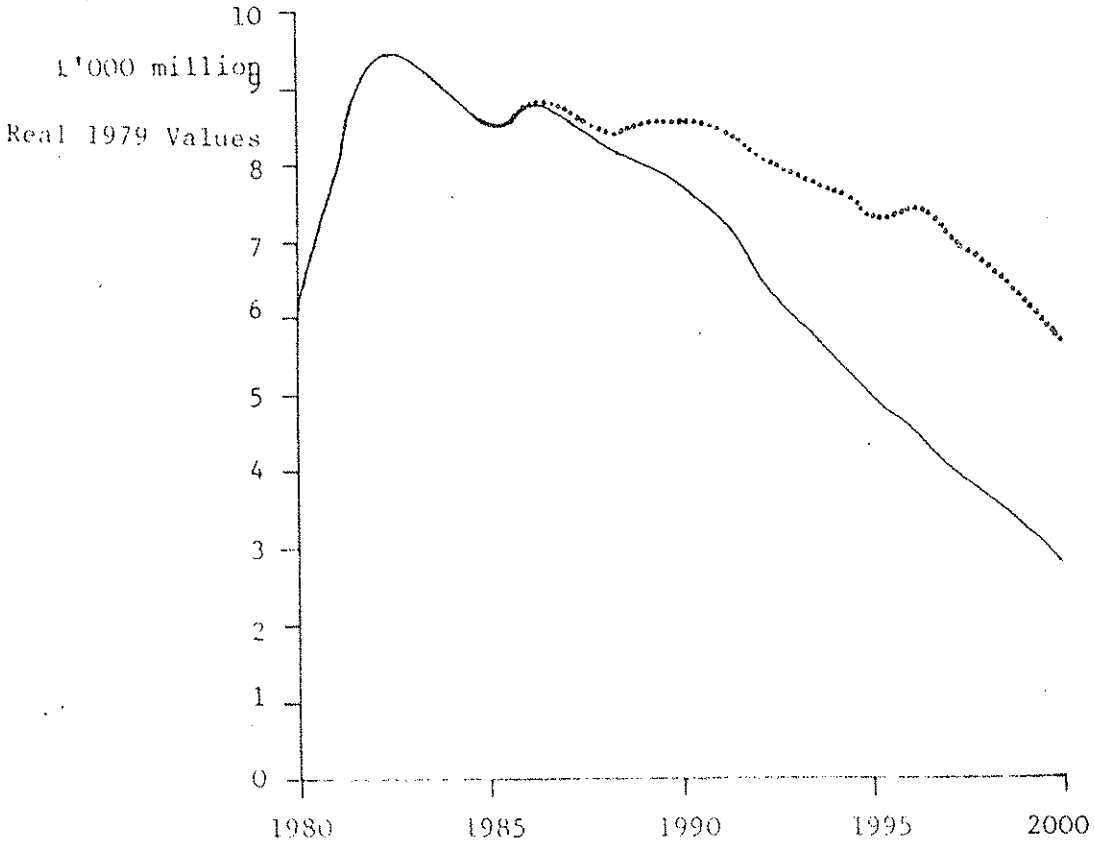
5.1 Estimating Government-Induced Damage

We now attempt to quantify the damage that present government attitudes towards North Sea taxation may do to the economy by deterring oil investment and the development of fields that would have benefited the UK. One way to measure the North Sea boost to the economy is by its contribution to the balance of payments current and long-term capital accounts[20]. The government induced damage may then be estimated by the contribution foregone because certain fields are not developed. Although there are many difficulties in estimating the damage - not only is it difficult to predict events pertinent to the North Sea (for example future oil prices, changes in technology, and government policies) but it is also difficult to pinpoint the exploration and development projects that will be deterred - the following illustrations demonstrate how great the damage may be.

5.2 Central Estimates of the Possible Damage

Consider North Sea oil's contribution to the balance of payments under the central scenario described above[21], presuming some twenty-six established commercial, seventeen potentially commercial and over thirty assumed new discoveries are developed[22]. Here the contribution to the balance of payments in constant 1979 values (Figure 2) would peak in the early 1980's at over £9,000 million per year, dropping thereafter to around £8,000 million in the late 1980's, to £7,000 million in the mid 1990's and to under £6,000 million by the end of the century. Implicit in this prediction is continual private sector interest in North Sea exploration and development undeterred by government tax policies. However, government tax attitudes demonstrated in recent policies make it likely that companies will no longer have the resources or the incentive to pursue such a level of activity. It is likely that new discoveries containing less than 25 million tonnes will not be sufficiently attractive to outweigh their costs, taxes and potential tax changes[23], and hence exploratory wells will be deterred and fewer new fields will be brought

Figure 2 : Estimated Damage to the North Sea Annual Balance of Payments Contribution - Central Expectations



..... Possible North Sea payments contribution

_____ Likely North Sea payments contribution with existing government tax attitudes

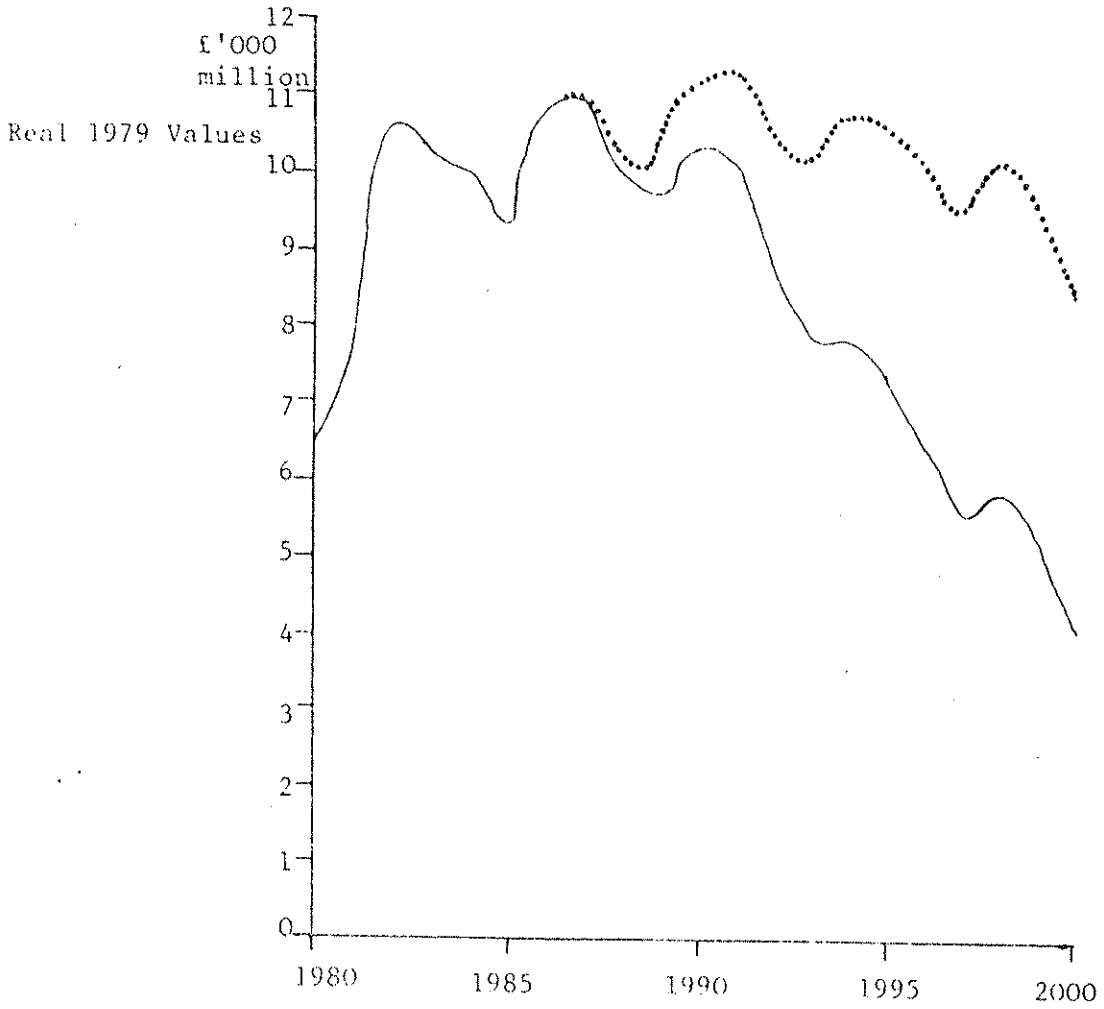
Source: Author's estimates

into production. Aggregate oil supplies might be only a few million tonnes lower in 1990 but might be around 35 million tonnes per year lower in 1995 and almost 50 million tonnes lower in the year 2000. The North Sea payments contribution would be significantly reduced, as shown by the lower line in Figure 2. In real 1979 terms the annual North Sea contribution might be about £1,000 million less in the early 1990's and nearer £3,000 million less by the end of the 1990's. From the late 1980's to the end of the century over one-fifth of the potential boost of the UK economy might be lost (approximately £25,000 million in real 1979 values) and in the second half of the 1990's when the greatest damage occurs, over two-fifths of the potential payments gain might never be realised because of government North Sea tax attitudes. Even if oil prices rise more rapidly than depicted in the central scenario, it is likely that companies would still be reluctant to develop fields of around 25 million tonnes or less[24]. With existing government tax attitudes, counterbalancing the advantage of higher oil prices, companies will fear the familiar government response of harsher PRT and new projects will not be taken on so readily. For example, presume the same central scenario as above except that nominal oil prices rise by around 25% every fourth year with small 5% rises in the intervening years[25]. Without the small new discoveries the North Sea contribution to the balance of payments might suffer as shown in Figure 3. Overall roughly one-fifth of the potential gain might fail to materialise, representing a total loss in real 1979 terms of around £45,000 million by the end of the century.

5.3 A More Extreme Illustration

Perhaps it needs emphasising that these estimates of the harm felt by the UK economy are far from extreme possibilities. The estimates are central projections of the potential damage that might be a consequence of foolish government attitudes to North Sea taxation. A more extreme, but still conceivable, estimate of the damage would occur in the following future. Despite rapidly rising oil prices (25% every fourth year) real pre-tax expected profits are negligibly improved since domestic inflation continues at around 12% per year and since exchange rates rise reflecting the petro-currency status of sterling[26]. The government - prompted by fast growth in the nominal dollar oil price - sees the North Sea solely as a source of extra tax income and intermittently raises the PRT rate or reduces the PRT allowances. The private sector, faced by falling real sterling oil prices and disappearing profits, loses interest in North Sea exploration and no longer considers

Figure 3 : Estimated Damage to the North Sea Annual Balance of Payments Contribution - Faster Oil Price Growth



..... Possible North Sea payments contribution

_____ Likely North Sea payments contribution with existing government tax attitudes

Source: Author's estimates

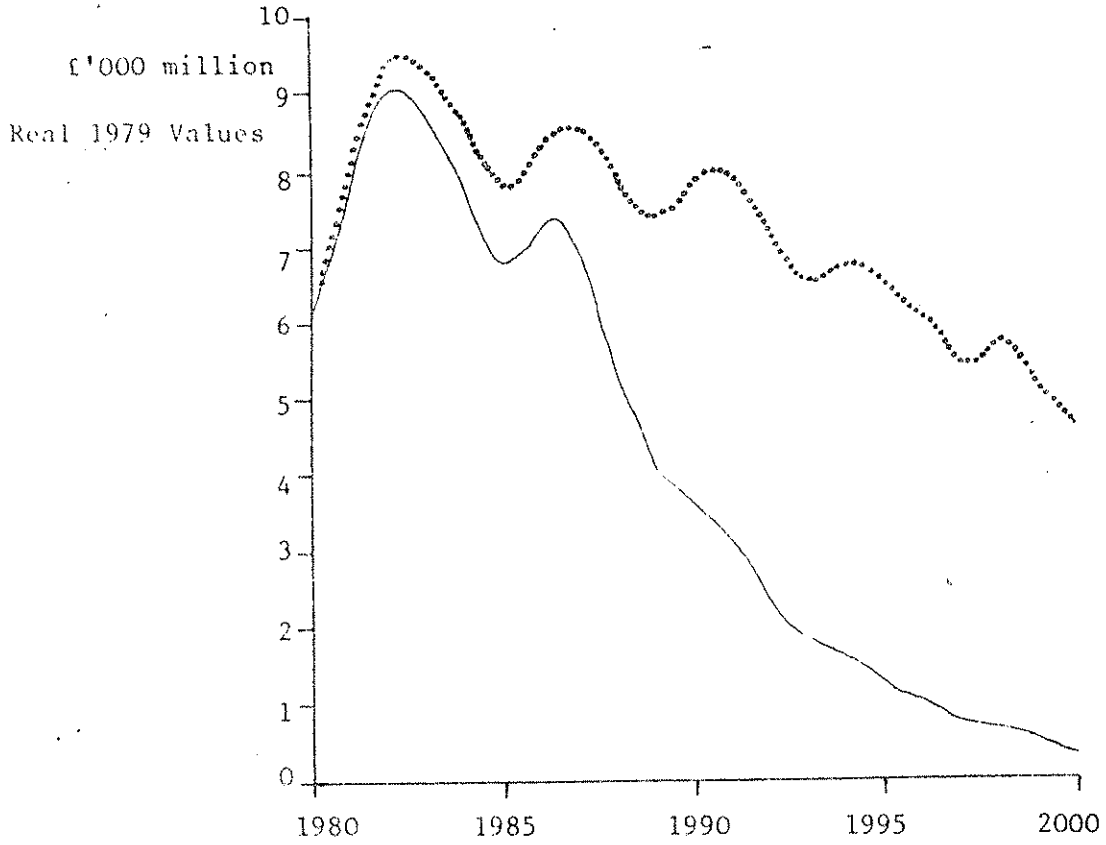
developing the potentially commercial discoveries as post-tax returns are never expected to be sufficiently attractive. The only fields that benefit the UK economy are those where the majority of capital costs has been (or in a couple of years will have been) committed, that is the fields already in production or in development (the established commercial fields), Figure 4 demonstrates how large the difference can be between the North Sea payments contribution with existing government tax attitudes and the North Sea contribution with more responsible government attitudes. By 1990 over half of the contribution might be dissipated, over three-quarters by 1995 and over 90% by the end of the century. A loss over the twenty years analysed of about £65,000 million in real 1979 terms might result if government North Sea tax attitudes do not improve - that is, a loss equivalent to over one half of last year's UK Gross Domestic Product or to about 3% on the annual growth rate in the 1990's. The government could quite easily destroy the benefits of North Sea oil at a time when they are most needed.

6. Is It Too Late To Seek A Remedy?

If the UK is to reap the full advantages of indigenous oil production the government should refrain from tampering with the North Sea incentive structure. We have shown how the distortions caused by the tax structure and by tax changes could so easily whittle away North Sea related potential balance of payments benefits. To avoid such an impending disaster the government must radically and immediately rethink its policy towards North Sea taxation.

Although the tax structure needs drastic changes to enhance its progressiveness and to protect the commercial viability of the less profitable discoveries, perhaps the first step for government is to ensure stability for North Sea investors. Instead of concentrating on the North Sea as a source of tax revenues, government should pay greater attention to long-term industry needs and be more aware of the long-term economic benefits which are endangered. It is clear that if more responsible government attitudes do not emerge soon it will be too late - too late to reverse damaged industry confidence and too late to develop the North Sea to anything close to its full potential.

Figure 4 : Estimated Damage to the North Sea Annual Balance of Payments Contribution - Faster Oil Price Growth, Sterling Appreciation and Uncontrolled Inflation



..... Possible North Sea payments contribution

_____ Likely North Sea payments contribution with existing government tax attitudes

Source: Author's estimates

N O T E S

1. Sir Geoffrey Howe's Budget speech of 26 March 1980, quoted from HMSO (2) columns 1464 and 1465.

2. See Rowland (12) and Robinson and Rowland (8).

3. The cause of the shortage is not relevant to the responses one would wish to see in UK oil demand and supply, so long as the shortage is presumed to persist. If the shortage is only temporary then one may wish to dampen the demand and supply responses and thus avoid costly changes in energy using equipment or in new supply developments. It is, however, widely recognised that oil will become increasingly scarce towards the end of the century and that, during the transition to a non-oil based era, shortages will persist. Ray and Rowland(5) comments on this scarcity.

4. The competitive nature of the UK oil extraction industry is reviewed in Robinson and Rowland (9).

5. These 26 established commercial fields are listed in Table 4.

6. This scenario is consistent with the following North Sea Oil prices in current values at the UK coast ($/barrel, average for year):

1980	34
1985	48
1990	71
1995	104
2000	153

Except where otherwise stated (section 5.3) we assume a constant exchange rate throughout the 1980's and 1990's of £1=$2.20. The rationale for this oil price scenario and for the other price forecasts used in this paper are in Robinson and Morgan (6) and in Robinson and Rowland (7).

7. This scenario represents the following future for North Sea oil prices in current values at the UK coast ($/barrel, average for year):

1980	35
1985	53
1990	96
1995	146
2000	222

8. A guide to the North Sea tax structure is shown diagramatically in Rowland (12) and a more detailed description is in Haylhar and Pleasance (1). The assumed future tax changes may appear to be severe, but in comparison to the changes since 1975 they are quite mild. The severity of the assumed tax expectations can be demonstrated by calculating expected real after-tax profits under the high oil price scenario (note 7) but using different tax structures. This has been done for the five future projects introduced in Section 2.2(b) - column A shows the profits as if the tax structure introduced in 1975 remained unaltered, column B shows how profits have fallen with all the tax changes to date and including the last Budget, and column C shows the decrease to profits from the assumed tax changes:

Potential field size	A 1975 tax structure	B Changes between 1975 and 1980	C Assumed changes between 1980 and 2000
(Million Tonnes)	(real net present values, £ million with a 15% discount rate)		
12.5	40	-18	-17
25	102	-45	-31
35	91	-52	-39
45	84	-59	-47
80	169	-98	-77
	(real internal rates of return, % per year)		
12.5	23.8	-3.6	-3.9
25	30.2	-5.4	-4.5
35	25.8	-5.2	-5.5
45	22.7	-4.9	-5.7
80	24.8	-4.9	-5.4

Since the expected tax changes assumed over the next twenty years depress profits by the same order of magnitude as the tax changes implemented in the last 5 years, our assumptions are far from severe.

9. Robinson and Morgan (6) describe the geological and geographic settings as well as the technology that would be used to develop such assumed new discoveries.

10. Quoted from HMSO (2) column 1464. See also chapter 8 in Johnson (3) "The delicate balance of taxation" and Kemp and Crichton (4).

11. The (comparative statics) question of whether the nation is best served by transferring oil profits to the government via taxation, or whether the nation would benefit more if the profits were left in the private sector, is outside the scope of this paper. Some comments can be found in Robinson and Morgan (6) and in Rowland (10).

12. These and other factors that are likely to influence oil prices over the next few years are examined in Ray and Rowland (5).

13. This limited oil price decline would give the following North Sea oil prices in current values at the UK coast ($/barrel, average for year):

1980	33
1985	37
1990	52
1995	73
2000	103

14. We assume last year's central expectation was for the following North Sea oil prices in current values at the UK coast ($/barrel, average for year):

1980	24
1985	31
1990	44
1995	61
2000	86

15. See the oil prices in note 6. Some forecasters may consider this oil price prediction to be too low to reflect current opinion. However, the previous section demonstrated that faster oil price growth would be unlikely to benefit the UK oil industry, as taxes would probably rise to leave company cash flows more or less unchanged. Just as higher oil prices would not benefit the industry so higher oil price forecasts

would not affect the following analysis of industry prospects. We could adopt either higher oil prices with tax changes in the 1980's and 1990's or a more modest oil price forecast without tax changes supplementary to the last Budget - we chose the latter.

16. Specifically the following wholesale price inflation is assumed for the output of all manufacturing products in the UK (home sales, % per year):

	as expected last year	contemporary expectations
1980	11	18
1981	8	15
1982	7	13
1983	6	11
1984 and later	6	9

The relevance of inflation to the calculation of North Sea benefits is noted in Rowland (11).

17. The established commercial fields are listed in Table 4 and the potentially commercial fields in Table 5. The assumed new discoveries are presumed to fall into the range of field sizes introduced in Table 2, with many more of the smaller field sizes than the larger sizes, but with the larger sizes discovered first.

18. See Rowland (12) and Robinson and Rowland (8).

19. The ranking criteria is used only to segregate fields into the most profitable, the moderately profitable and less profitable categories, and is of no great significance. We could have adopted other criteria (for example, the present value of gross revenues divided by the present value of all costs) but the ranking would not have altered greatly.

20. The reasons for adopting this measure, and the methodology behind the calculations, can be found in Robinson and Morgan (6) and in Robinson and Rowland (7).

21. Portrayed by the oil prices in note 6 and the higher inflation estimates in note 16.

22. See note 17.

23. Some of the specific future prospects considered here would have internal rates of return and net present values as shown in Table 2 column 3 and Table 3 column 5 respectively.

24. Net present values for some such fields under these circumstances are shown in Table 3 column 6.

25. That is, the oil price scenario in note 7.

26. Specifically we adopt the oil price scenario in note 7, the following wholesale price inflation for the output of all manufacturing products in the UK (home sales, % per year):

1980	18
1981	18
1982	16
1983	14
1984 and later	12

and a rise in the exchange rate to £1 = $2.40 by 1982, staying constant thereafter.

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