Briefing Paper

Economic Background to the Coal Dispute

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Summary

This Briefing Paper attempts to explain the economic forces behind the decline of the coal industry. The main findings (presented in the order in which the argument is developed) are:

1 *Coal output has been declining throughout this century. This decline accelerated in the 1950s and 1960s when coal was faced with competition from oil.*
2 *The decline was arrested by the the oil price increases of the 1970s which have allowed coal to establish and maintain a price advantage over alternative fuels. Despite this, coal has not increased its market share over the past decade.*
3 *Because of energy conservation, in response to the price increases of the 1970s, total energy demand has fallen over the past ten years.*
4 *With coal holding a stable share of a static market, the output projections for the industry drawn up in the 1970s including those in the 1974 "Plan for Coal" are now totally outdated.*
5 *Even if total energy demand were to expand, there would not necessarily be increased demand for British coal, which is more expensive to produce at the margin than alternative sources of supply (from the US, South Africa and Australia).*
6 *Home-produced coal enjoys some natural protection from overseas competition because of high transport costs. In addition there is a tax on fuel oil and informal restrictions on imports. These partially insulate the domestic price of coal from changes in the world price.*
7 *The cost of producing coal has risen substantially in real terms since 1973-4, despite a major investment programme. Productivity has risen slightly faster than the national average, but wages and non-wage costs have risen very much faster.*
8 *The upward pressure on costs has come partly from the mineworkers' climb from twelfth to first or second place in the wages' league; and partly from the failure to close non-economic pits fast enough.*
9 *This pressure on costs meant that by 1981-2 less than half of the industry's total output was produced at profitable pits, which employed only 65,000 mineworkers.*
10 *There is a large tranche of marginally uneconomic pits which may be unprofitable one year but profitable another, and there is a strong case for keeping such pits open.*
11 *The number of pits which are profitable at the margin is very sensitive to movements in costs. If mineworkers' wages had risen only in line with the national average for manufacturing over the period 1973-4 to 1981-2, the number of jobs in profitable pits would have been 95,000 rather than 65,000.*
12 *The subsidy per man in the most inefficient pit in 1981-2 was of the order of £14000. The subsidy per man in the marginal pit at break-even point for the industry as a whole was nearly £5000.*
13 *Under a cash limit system every pound spent on subsidising miners is a pound less available to spend elsewhere. Subsidising coal miners is a costly way of preserving jobs compared with alternatives.*

The Price of Coal and the Size of the Coal Market

Since 1973 the dollar price of oil has risen tenfold – a fivefold increase in real terms. Costs have risen very much less rapidly, and the oil industry is extremely profitable, with producers earning large rents. Coal is a close substitute for oil (notably in the electricity-generating industry), so a rise in oil prices increases the demand for coal. In theory therefore the oil shock should have raised coal prices and profits, and led subsequently to an expansion of the industry as new higher cost sources of supply were brought on stream. What we observe in the UK is in stark contrast to this theoretical prediction: a declining industry which continues to make substantial losses. How has this state of affairs come about?

The short answer, which again we know from elementary theory, is that either the price of coal has not increased as rapidly as the oil price and/or the cost of producing coal has increased more rapidly. In fact both of these things have happened.

Chart 1 shows the behaviour of oil and coal prices since 1967. Before the oil price shocks of the early 1970s the two prices moved fairly closely in line. Since then there has been a tendency for coal prices to move up with oil prices, but over the past ten years coal has been some 30-40 per cent cheaper than oil.

The fact that such large variations in relative prices have been possible illustrates a very important point about the energy industry. The response to any change in relative prices is slow. This is because consumption of energy generally requires capital equipment which cannot be changed straight away. If the price of coffee rises, consumers can drink more tea the very next day. But if oil goes up in price, those with oil-fired central heating (or power stations) cannot in general switch to gas or coal overnight. We should not infer from this

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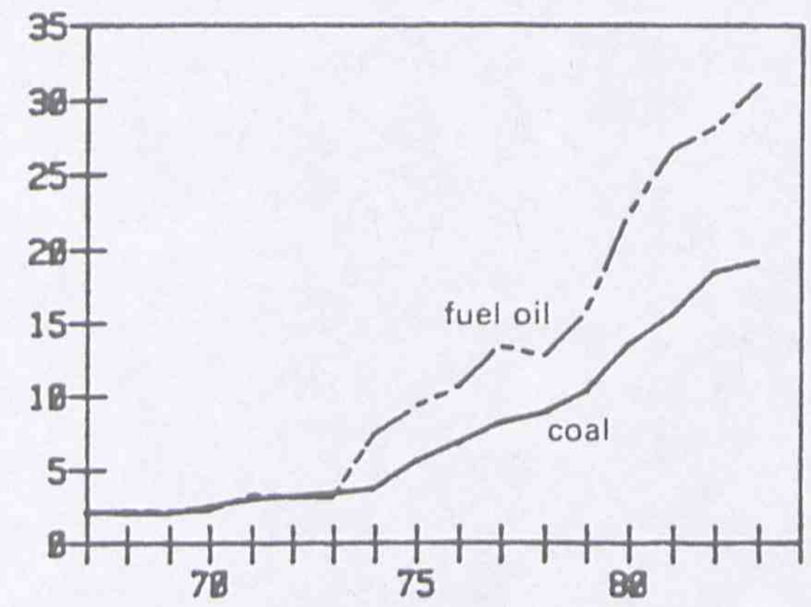
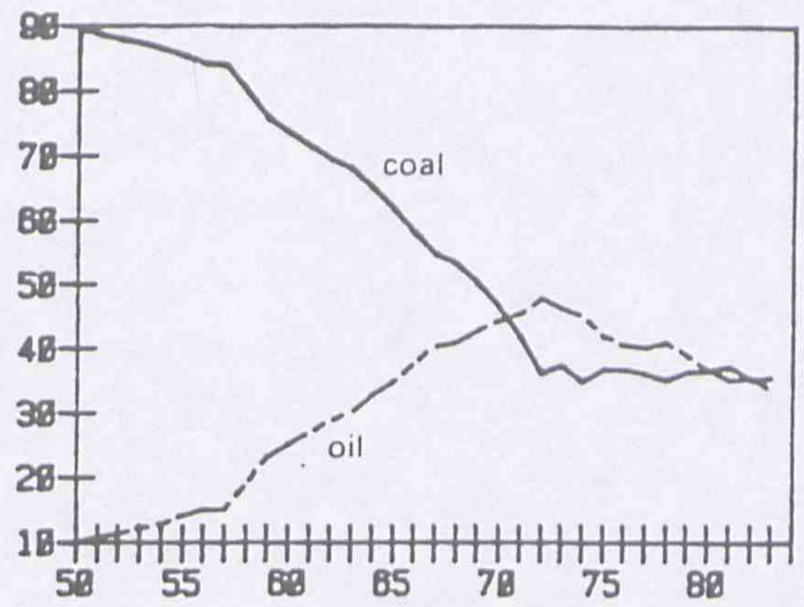
[1] In preparing this *Briefing Paper* I have drawn indiscriminately and without specific acknowledgement on a wide variety of sources. These are listed in the bibliography. I am especially indebted to my colleague Louis Turner who guided my reading and made many valuable comments. Responsibility for errors is mine alone.

CHART 1

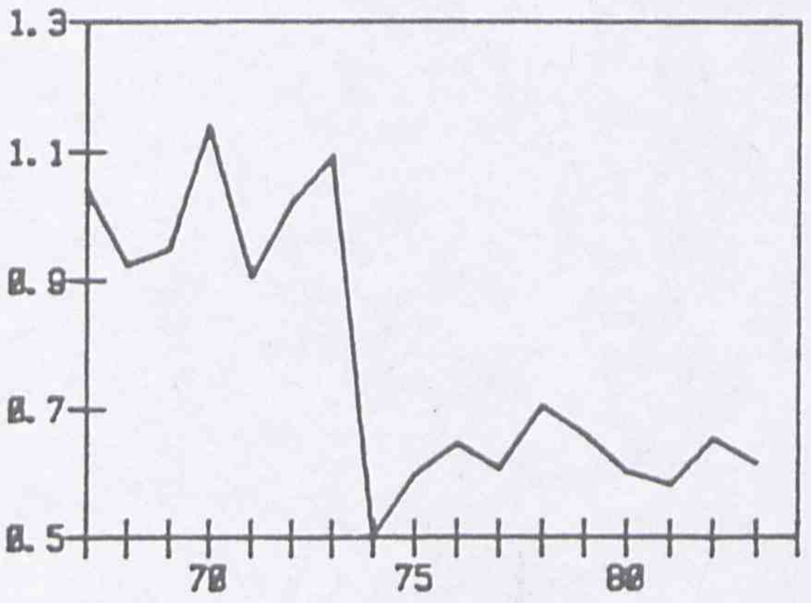


FUEL PRICES
(pence per therm)

CHART 2



PERCENTAGE SHARES OF UK ENERGY MARKET 1950-83



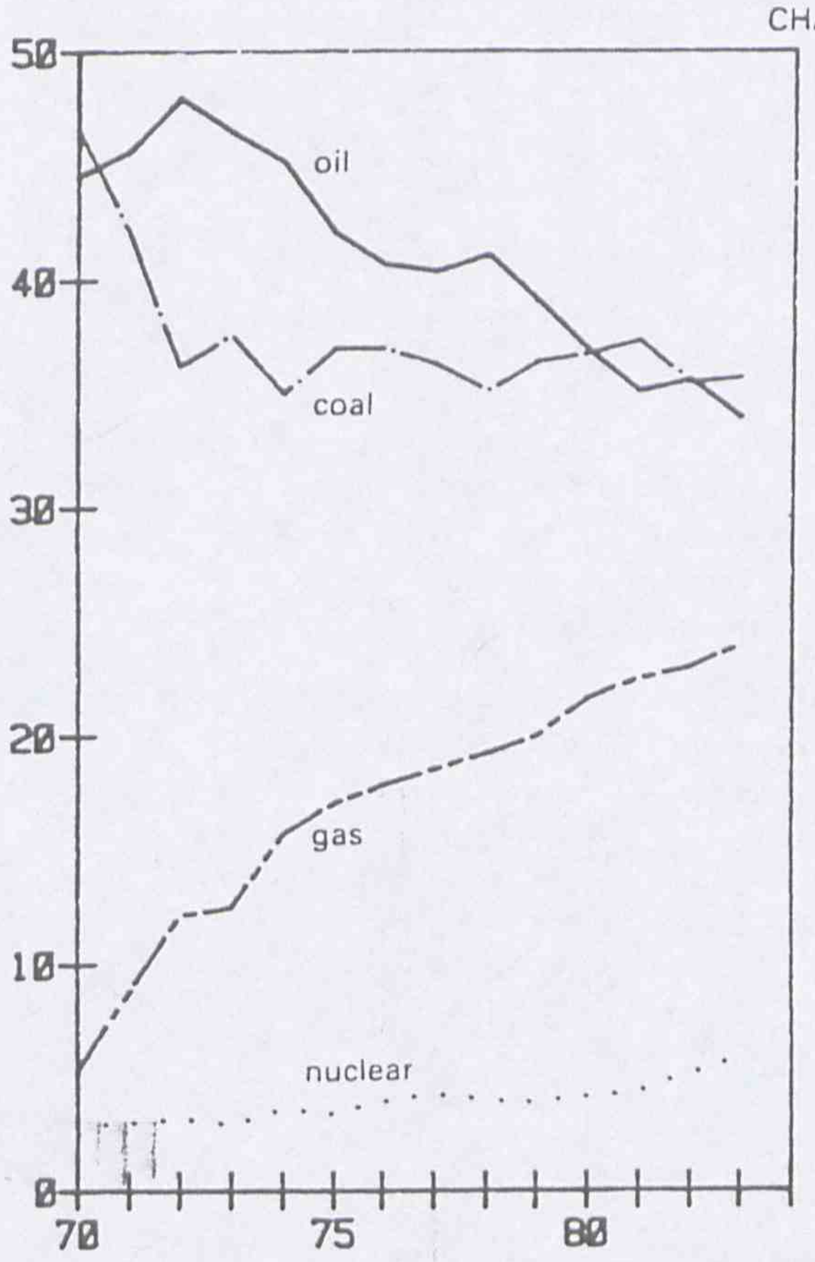
PRICE RATIO: COAL/OIL

however that the long-run price elasticity of demand for different forms of energy is low. If the relative price difference is expected to persist, users will gradually switch in large numbers.

The long-term substitutability of different fuels is illustrated by the post-war history of the energy industry. At the end of the war coal accounted for over 90 per cent of total energy use in the UK. By 1972 that share had declined to only 36 per cent. As long as the price of coal and oil were closely matched, coal lost market share at a rapid and accelerating rate (Chart 2). This is hardly surprising. Compared with oil, coal is bulky, difficult to transport and poses severe waste disposal problems. At the same price per calorie any user would prefer oil. Over time many did in fact switch. And coal's problems were compounded from the late 1960s onwards by competition from North Sea gas, which offered many of the advantages of oil plus greater security of supply.

The steady conversion to oil came to an end with the first oil crisis. The sharp rise in oil prices permitted the coal industry to find a price at which users are broadly indifferent between coal and oil. With a price advantage of around 30-40 per cent, the coal industry has arrested the catastrophic fall in its market share. However it has not *increased* its share since 1974. The

CHART 3



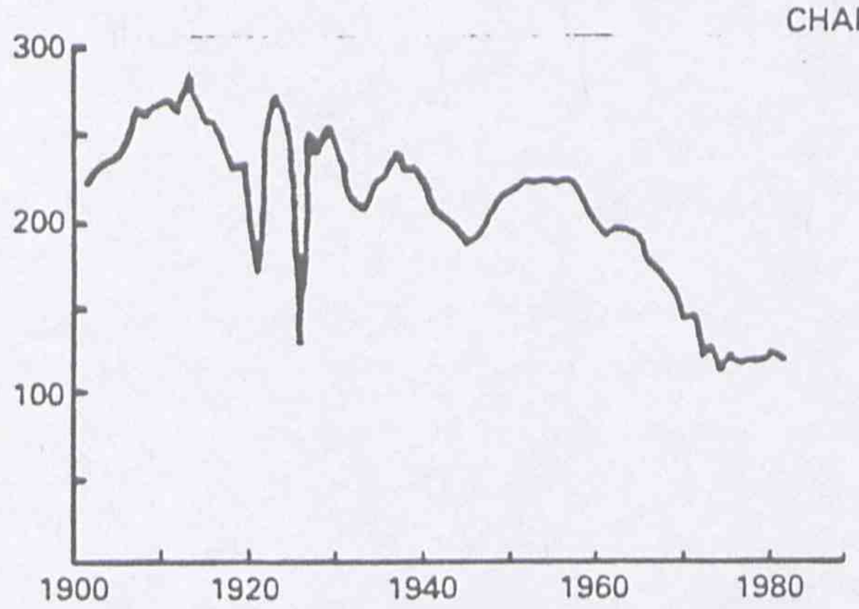
PERCENTAGE SHARES OF UK ENERGY MARKET 1970-83

markets lost by oil have been replaced by gas (mainly) and nuclear energy (Chart 3). Clearly the oil price rise has not permitted a previously healthy coal industry to make super-normal profits. It has rescued a chronically uncompetitive industry from a state of terminal decline.

Chart 4 places this decline in historical perspective. There is nothing new about pit closures. Coal output has been falling intermittently for most of the century and particularly steeply and continuously since the mid-1950s. The period of stable output in the 1970s stands out in sharp contrast against this historical

background. But, as Chart 5 shows, there is an even sharper contrast between the post-war decline in coal demand and the projections of future demand on which official policy has been based since the mid-1970s. What was the basis for such optimism?

CHART 4



UK COAL PRODUCTION SINCE 1900
(m tonnes)

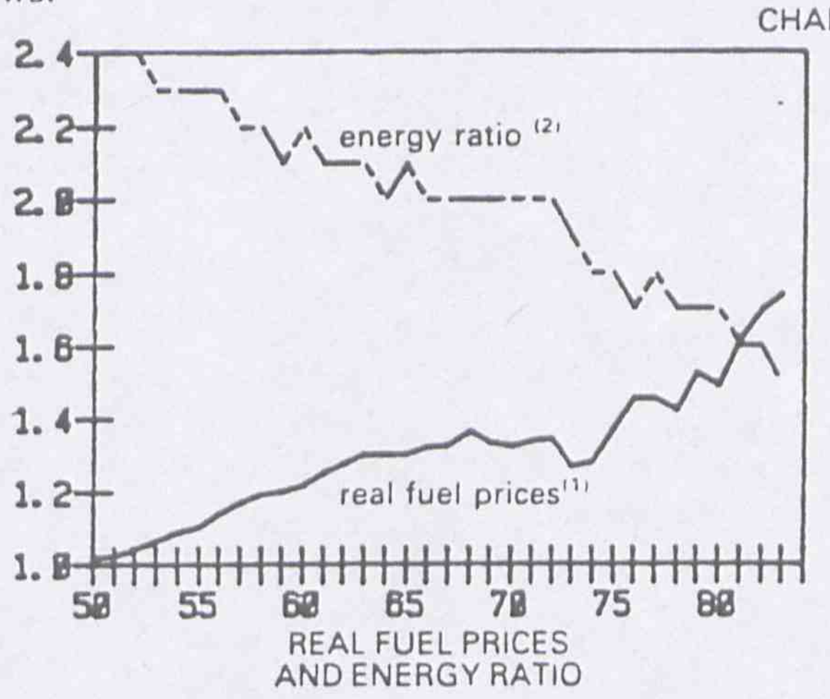
Source: Digest of UK Energy Statistics, Ministry of Power Statistical Digests.

Demand for coal depends on total demand for energy, and the share of that market taken by coal – which depends in turn on its relative price. Because of the long lead times which are a feature of the industry – it takes many years to prospect for oil, dig a new coal mine or construct a power station – energy experts spend much time endeavouring to forecast energy demand 10-15 years ahead. As we have seen in public enquiries (Vale of Belvoir, Sizewell) the case for a new coal mine or a new nuclear power station stands or falls on the size of the energy market in the 1990s, and on the prices and demand elasticities for different fuels.

Over the period since 1974 evidence has accumulated to suggest that the *long-run* price elasticity of demand for energy is much higher than the short-run elasticity. We have already noted that the substitution of one kind of energy for another is a long process, requiring capital expenditure, so that the response to price changes is slow. Precisely the same arguments apply to energy as a whole. We can make do with less energy and still enjoy a high standard of living, but the adjustment process takes time. We can insulate our houses, design more fuel-efficient cars, move closer to our places of work, give up 'industrial' products in favour of services. None of this happens overnight, but if the price signals are strong and persistent (as they have been), these changes inexorably occur. The demand for energy is extremely price inelastic in the short run, but the experience of the last ten years has shown that the longer-run price elasticity is nevertheless quite high. Capital equipment reaching the end of its productive life, is being replaced today with more energy-efficient equipment in response to price changes that occurred ten years ago: and many of the effects of the second oil price shock have still to be felt.

The point is illustrated by Chart 6 which shows the behaviour of the energy ratio in the UK since 1950. The energy ratio relates total consumption of energy to gross domestic product and this ratio has been falling steadily over the post war period. Up to 1973 this simply meant that energy demand, though rising, grew less rapidly than GDP. Since then output growth has been slower and the decline in the energy ratio more rapid. Consequently we have seen an absolute fall in total energy consumption in this country – as Chart 7 shows.

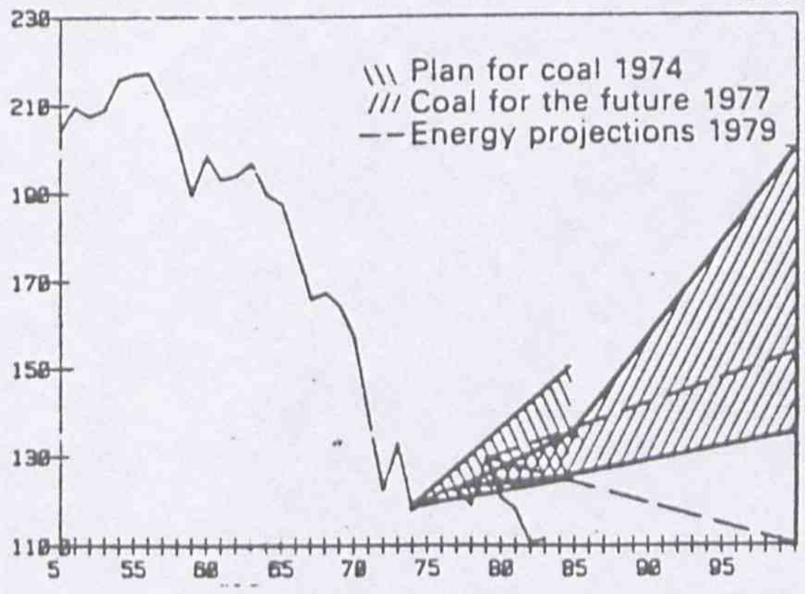
CHART 6



REAL FUEL PRICES
AND ENERGY RATIO

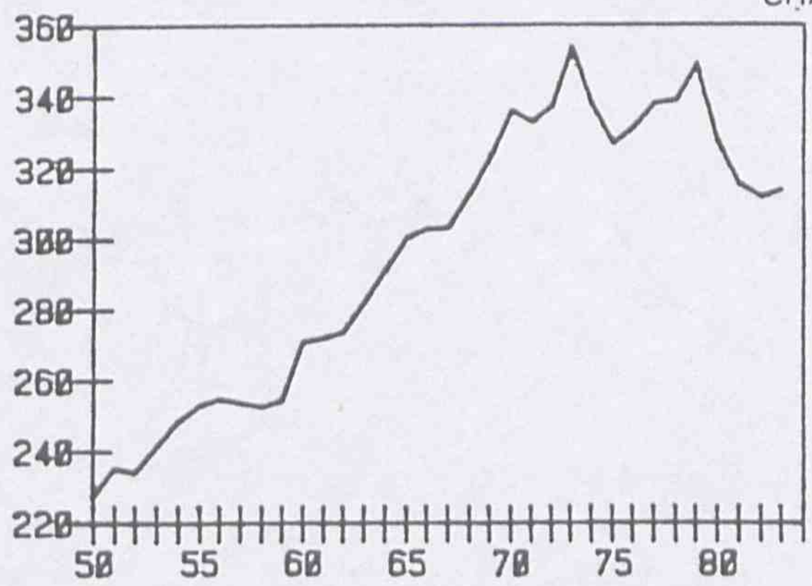
(1) Retail price of fuels divided by total retail prices
(2) Tonnes of coal equivalent per £1000 of GDP at 1980 prices.

CHART 5



COAL OUTPUT
(m tonnes)

CHART 7



UK ENERGY CONSUMPTION
(tonnes of coal equivalent)

This brief excursion through the recent history of the energy industry – and the position of coal within it – enables us to answer the question raised at the outset, namely why is coal not a profitable and expanding industry. Part of the answer is that although there has been a considerable improvement in coal's competitiveness vis-a-vis oil since the first oil crisis, the starting point in the early 1970s was so uncompetitive that the improvement was insufficient to carry coal into an era of expansion. The other half of the answer lies in the demand for energy as a whole, which has proved much lower than was anticipated. Since 1973 we have witnessed the exercise of consumer sovereignty. There is a normal downward-sloping demand curve for energy. A monopoly supplier can fix the price at any chosen level, but he does not thereby repeal the laws of supply and demand. The consumer will determine the quantity sold at any given price. When the price of energy went up, demand fell.

The adjustment to higher energy prices is slow and probably far from complete. The resumption of growth in the economy since the 1980-81 recession has barely stabilised the demand for energy, which fell sharply during the recession. There is little reason to expect a substantial increase in energy demand in future, as the effects of resumed growth will be largely offset by the continuing drive towards economy in energy use that has been brought about by the steep rise in real energy prices of the past decade. If total energy demand is stable, there is little prospect that the coal industry, which at present relative prices cannot increase its market share, will see a growing demand for its products. There can be no doubt that the plans to expand the coal industry in the aftermath of the energy price shocks of the 1970s – including the Plan for Coal – are now totally outdated.

The Costs of Producing Coal

Although the coal industry was not able to match the rise in the oil price in the 1970s, coal prices nevertheless rose sharply. Between 1972-3 and 1981-2 the price of deep-mined coal rose from just under £7 per tonne to over £35 per tonne. Allowing for the rapid inflation over that period, this represented an increase in real terms of 54 per cent. However, even with this increase in prices the Coal Board continued to make a loss on its deep mining operations. The reason is that costs also rose substantially in real terms. And although costs increased less rapidly than prices, the improvement was insufficient to eliminate the large losses that were being made in the early 1970s.

Table 1, which is calculated from data given in the Monopolies and Mergers Commission (henceforth MMC) report on the National Coal Board published in June 1983, illustrates the problem. Since 1970 miners' wages have moved from below the average manufacturing wage to substantially above it (Chart 8), taking them from twelfth position in the earnings league to first or second place. Although mining productivity also grew faster than in manufacturing between 1972-3 and 1980-81, real unit costs in mining increased by 49 per cent compared with only 2 per cent in manufacturing. Had mining wages grown in line with manufacturing wages over that period the industry would have been in surplus by 1981-2.

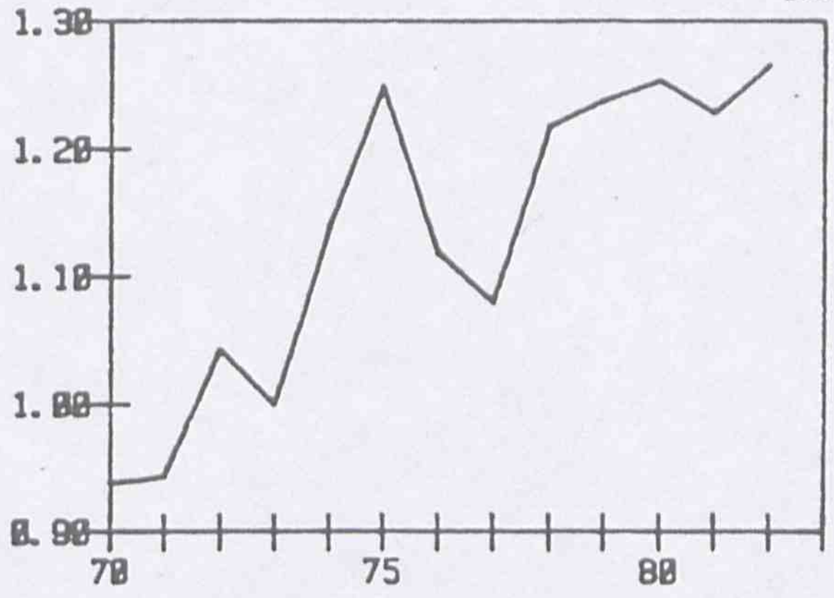
Table 1
NCB deep mines, unit operating costs and revenues
(£/tonne at 1980 prices)

	1972-3	1981-2	% change
Revenue	20.3	31.2	54
Costs:			
labour	11.8	17.6	49
depreciation	1.3	1.9	44
other*	9.1	15.1	65
total	22.3	34.6	55

*overheads, materials, repairs, power, heat and light. *Excludes* interest charges.

Source: Monopolies and Mergers Commission Report Appendix 3.3 (vol 2 p 25).

CHART 8



EARNINGS IN COAL INDUSTRY
RELATIVE TO MANUFACTURING

However, Table 1 shows that wages were not the only problem – not even the major problem. Other costs rose even faster. This highlights a particular problem of the coal industry which is that costs have a built-in tendency to rise. The older the mine the further is the seam of coal from the pithead and the greater are the geological difficulties and costs of extraction. For any particular mine costs are rising all the time. This means that the industry as a whole can only remain profitable by closing down high-cost capacity and opening new lower-cost mines.

One problem in the 1970s was that there had been inadequate investment in the 1960s, so an insufficient number of new coal faces were brought into operation. But it also seems probable that an insufficient number

of old pits were closed down. Pit closures present many problems. One little recognised technical difficulty is that the costs of extracting coal in a particular pit can vary sharply over time – an annual variance of 15 per cent is the norm for the industry. Under these circumstances it would clearly be wrong to close a pit just because it makes a loss in one particular year. Against a background of overoptimistic demand forecasts the temptation to give a loss-making pit another chance must have been strong – especially as closure always imposes severe disruption for the workers and families involved. But whatever the reason, it is clear (with hindsight) that the failure to close uneconomic pits sufficiently quickly has been an important factor in the industry's chronic problems.

To keep the industry competitive it is necessary not just to close old pits but also to invest in existing and new pits. If management blames the unions for resisting closures, the miners in their turn blame management for inadequate or ill-chosen investment. It is extremely difficult to judge from aggregate figures whether investment in coal has been adequate, but Table 2 shows that investment per man has been greater in the mining industry than in manufacturing industry as a whole, and has risen more rapidly. This investment has not always produced the returns expected of it, partly because output (and hence productivity) in the new and more efficient mines has been held back because of general oversupply. Pit closures would thus lead to productivity gains in the newer pits and better returns on past investment.

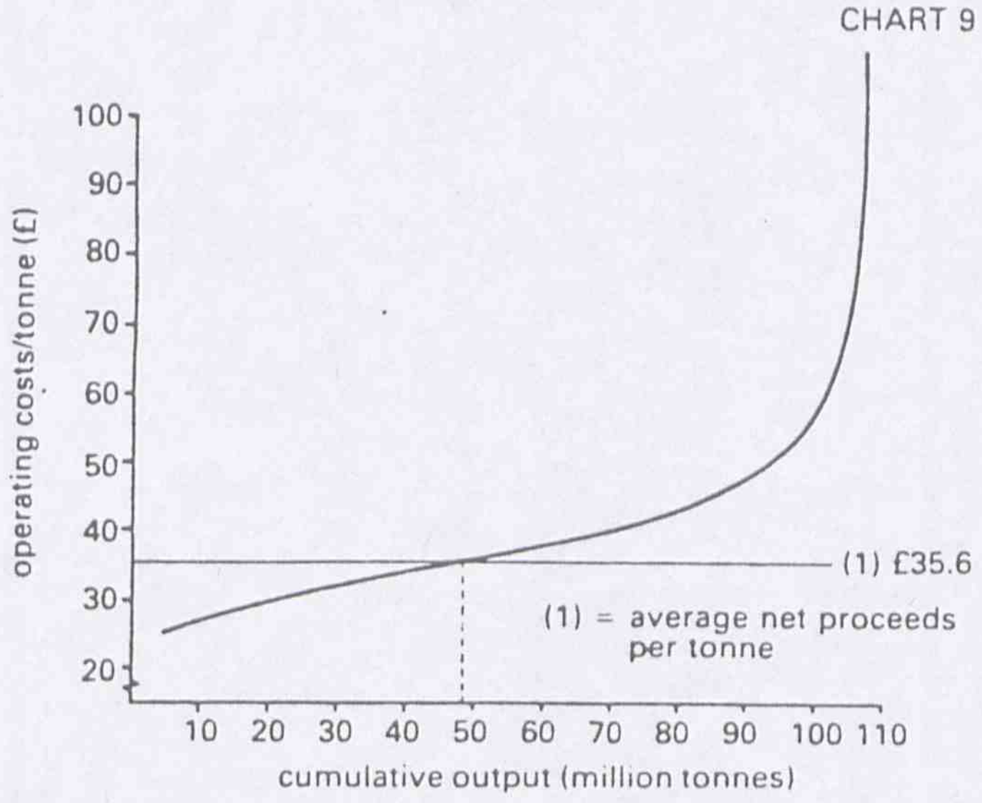
Table 2
Investment per employee
(£ man at 1980 prices)

	Coal Industry	Manufacturing Industry
1974/5	1158	597
1975/6	1744	618
1976/7	1901	666
1977/8	2087	747
1978/9	2608	811
1979/80	3203	856
1980/1	3387	857
1981/2	3311	932

Source : MMC Report Appendix 3.14 p 64 and National Income Blue Book.

The problems that are created when uneconomic pits are left in operation too long are revealed starkly in Chart 9, which shows the supply curve for the industry in 1981-2. The curve is constructed from data on individual pits from the MMC report, ranked in order of cost. It shows how the output of the industry can be increased by moving up the supply curve, bringing into production successively higher-cost pits to the point at which the (marginal avoidable) cost of the marginal pit is just equal to the price of its output. As Chart 9 shows there is a large tail of pits where costs are far in excess of any likely return.

CHART 9



DEEP-MINED PRODUCTION: UNIT OPERATING COSTS AGAINST CUMULATIVE OUTPUT, 1981-82

Source: MMC from NCB information

The Role of Imports

In Chart 9 there is a horizontal line which represents the price at which coal can be sold. Why a horizontal line rather than a downward sloping demand curve? Because the UK coal industry can be considered as one relatively small supplier of coal to the world coal market. Under the classical assumption of perfect competition the market price cannot be affected by the action of a small producer, who simply takes the price as given and regulates his output accordingly.

This text book model is a reasonable approximation to the facts (though some important qualifications emerge below). But if this is an accurate representation of the position of the British coal industry, it follows that all the expansionist plans of the 1970s, drawn up in the wake of the oil price hikes, contained not one but two fundamental flaws: not only has the demand for energy in general and coal in particular proved more price-sensitive than was assumed; but also the benefit to *UK* producers is far less than was assumed. The rise in price has not only reduced total demand: it has also increased competing supplies. As the price of coal has risen, the industry has expanded – but it is the low cost producers in the United States, Australia and South Africa who have benefited, not the high-cost marginal British producers.

This description is an oversimplification, because of yet another important special characteristic of the coal industry: transport costs – especially over land – are a substantial proportion of the total cost of a tonne of coal delivered to its point of use. This means that it is

impossible to say, in the abstract, whether or not imported coal is cheaper than domestically produced coal. It may be cheaper for a coastal power station to buy imported coal, but not cost effective for an inland power station – especially one located near a coal mine. Since over three quarters of total coal output is used to generate electricity, the competitiveness of imports over the medium term depends crucially on where new power stations are located.

Although high import costs effectively give UK producers a local monopoly of supply in some parts of the country, the potential for coal imports does loosely link UK coal prices to the world price. For Thames-side power stations imports are always a viable alternative to domestic supplies, and though the Coal Board can and does charge different prices to different users in different parts of the country it must, like any other business, avoid offending its (in the short-term) captive customers, who otherwise will make the investment necessary to switch to alternative sources of power.

The Monopolies Commission study shows 'the' price of coal (average proceeds per tonne) in 1981-2 at £35.6, with sterling standing on average at 1.91 to the dollar. It might be imagined that the industry's prospects have subsequently improved dramatically as sterling fell below $1.20 in October of this year, pushing up the sterling price of imported coal. However there have been a number of developments in the world coal market in the intervening years to offset the effect of currency movements. Additional capacity has come into production in South Africa and America; Polish output, interrupted for a while by the political unrest, is back on stream; and this has coincided with a large reduction in coal demand from France as new nuclear plant has become operational.

These developments illustrate vividly the huge uncertainties surrounding the prospects for coal. Given the industry's marginal cost curve, the level of output and employment depends on two factors: the price at which coal can be sold; and the willingness of the authorities to subsidise marginal high-cost production. At a given level of subsidy, the number of jobs in the industry depends ultimately on the sterling price of internationally-traded coal. In the short term this is affected by currency movements, but in the longer term, it is the cost of overseas production that determines job prospects for the miners. The world coal market is currently in glut and this, like the potential oversupply of oil which has intermittently made headlines this year, could be part of a wider pattern pointing to a long-term fall in energy demand and price.

UK industrialists frequently argue that they are handicapped, in competition with trading partners, by electricity costs that are higher than those prevailing abroad. The high cost of coal, the major primary energy source for electricity generation, is blamed. These claims are only partly justified for it should be borne in mind that electricity costs are held down by the relatively high proportion of coal (which is cheaper than oil) used to generate electricity in this country compared with abroad. However the UK coal industry is undoubtedly protected by the tax on fuel oil. And there is also evidence of informal official restraints on the Central Electricity Generating Board when they have tried to burn more imported coal. This kind of protection preserves jobs in the coal industry at the expense of jobs lost in manufacturing. And Table 3 suggests that there is only a loose connection between world prices and UK prices, with the consumer yet to feel the benefit of the fall in world coal prices that has occurred since 1982.

Table 3
Average price of coal (£ per tonne)

	Used by the electricity industry	Rotterdam spot price	% difference
1979	25.32	22.15	14.3
1980	31.84	23.33	36.4
1981	37.43	34.66	8.1
1982	40.21	34.57	16.3
1983	42.49	31.58	34.5

The Case for Subsidy

The Coal Board is at present making a loss. To any economist who believes in the role played by markets in allocating resources between competing claims this is an important signal, which suggests that the coal industry ought to contract. The resources absorbed by the marginal loss-making pits can be put to better use making or doing things that people will buy *without* being subsidised.

However the issue is not as simple as this. There are many instances of democratically elected governments subsidising loss-making operations for many years. What are the arguments for doing so? And do they apply in the case of coal?

Agriculture is subsidised around the world. One historical reason has been to ensure security of supply in case of war. Another has been the supposed amenity value of agricultural land. A third has been the problem of variable supply conditions. Maintaining agricultural production capacity such that there is *always enough* food (even under the worst possible conditions) means that on *average* there will be *too much* food produced. The subsidy paid to the marginal producers in good years can be regarded as an insurance against starvation in bad years.

Coal mining resembles agriculture in having variable costs of production from one year to another. Given this variability, it is not sensible to close a pit just because it makes a loss in one year. A loss-making pit this year may be profitable next. There is a strong case for keeping the most efficient tranche of loss-making pits in production in any given year if there is a

reasonable chance that they will make a profit in future. But it is obvious that the coal industry has no amenity value, while subsidising domestic production does nothing to increase security of supply.

Although the variability of costs and revenues is a good argument for keeping open pits at the margin of profitability, it is not these pits which are at the centre of the present debate. The Coal Board wishes to close a number of pits which are making substantial losses. The case for closing these pits in strict accounting terms, is overwhelming. But it is by no means obvious that a wider public interest is served by closure. If public spending is not cash-limited, it is worth closing the pits if the costs incurred do not exceed the benefits. The costs are not limited to the lost income and production of the miners themselves. Miners wages are spent in the local community, generating additional income and employment. When these multiplier effects are taken into account the increase in unemployment resulting from pit closures is likely to be more than the jobs lost in the pits themselves.

Against these wider costs must be set benefits, of which the chief (stressed by market economists) is the alternative output produced by resources freed from the uneconomic pits. However these benefits cannot be taken for granted. Most of the marginal coal mines are located in areas of industrial decline with high average rates of unemployment. Moreover, most mining communities are extremely cohesive and offer a quality of life to the inhabitants which is not easily obtained elsewhere. Miners who become unemployed have little chance of finding alternative employment in their own communities and may choose to remain unemployed in their home town rather than seek work outside.

Given these social realities it must be recognised that the benefits of closing pits, in terms of alternative output, will be slow to appear. Moreover as miners drift away from their communities they will incur additional social costs. The infrastructure in mining communities (housing, schools, roads, hospitals) will be underutilised, with corresponding pockets of congestion in the areas to which the miners move. The cost of adapting the social infrastructure to the new pattern of employment should be set against the benefits obtained from the extra output.

If a given marginal pit is kept open none of these social costs is incurred. Moreover the pit will continue to produce a known quantity of coal with a definite market value. These are two large items to throw into the balance against the prospective benefits from closure – a stream of alternative output which may be very slow to materialise. These conclusions suggest that a pit would have to be *very* uneconomic before a full social cost-benefit analysis would show it to be worth closing.

The Case against Subsidy

No economist, however great his faith in market processes, can dismiss these arguments lightly. However there are powerful counter arguments. Those who resist closure of uneconomic pits because of the disruption involved must admit that these disruption costs will be incurred eventually, if only through geological exhaustion. Putting off closure reduces the present value of these costs, but this has to be weighed against the (often sharply rising) costs of keeping an increasingly uneconomic pit open.

Secondly the value of the marginal tonne of coal produced by an uneconomic pit is extremely hard to assess. At the limit it may have to be stockpiled or dumped on the export market, and is worth very much less than the market value of an 'average' tonne of coal. At present it certainly replaces an extra tonne of coal that could be produced at much lower cost from one of the efficient pits, which have been running at less than full capacity because of surplus production in the industry as a whole. This argument suggests that the loss of output from closing marginal pits would be much smaller than on conventional cost-benefit calculations.

Thirdly it is extremely difficult to apply cost-benefit analysis to major economic, social and technological changes, where the benefits are typically spread very thinly over whole societies, and endure for many years, while the costs fall heavily on comparatively few people and for a relatively short period of time. A cost-benefit analysis of the introduction of the railways, taking into account the likely disruptions to existing communities and to the coach trade, could well have shown the enterprise to be unviable on social grounds. Or, to take a more contemporary example, many of the redundancies that occurred in the manufacturing recession of 1980-81 could have been avoided by public subsidies justified on cost-benefit grounds. There can be no question that a society which resists change because of its high social costs will in the short run be a more comfortable place to live. But in the long run it risks becoming a backwater.

Fourthly, given the extreme difficulty of agreeing on the appropriate criteria for cost-benefit studies (length of time horizon, appropriate discount rate) and the equally great difficulty of actually evaluating all the costs and benefits (about which no two economists, notoriously, would ever agree) the rough justice of the market place has an undeniable attraction.

Finally, if a case for subsidising mining employment can be made, then it can be generalised to all other threatened industries, in the private or the public sector. Mineworkers would have to take their turn, and given the high cost of keeping a marginal pit open they would not be at the front of the queue.

This last argument acquires particular force if the cost-benefit framework of analysis is abandoned in favour of an overall limit on public spending (which may be justified on other grounds, e.g. the need for lower taxes to improve incentives or for lower public borrowing to control inflation and reduce interest rates.) In these circumstances the (opportunity) cost of subsidising miners is the cash that is not available to

spend elsewhere, for example in subsidising jobs in the private sector or creating jobs in the NHS or in education. Within this framework, subsidising inefficient collieries, viewed as a job creation scheme, is not at all cost-effective: the subsidy per man in the least efficient pit in 1981-2 was £14000. For this amount of money it would have been possible to meet the full salary cost of an extra two jobs at the average wage or to preserve more jobs in less capital intensive industries by subsidising marginal employees.

The Marginal Costs and Savings of Closing Uneconomic Pits

This brief consideration of the case for subsidy shows how the debate about pit closures quickly raises larger issues which are beyond the scope of this Briefing Paper. The dispute has assumed enormous political importance precisely because it raises those issues. But in the end the dispute will be settled: a number of pits will or will not be closed. And the closure of pits will be crucially determined by the *marginal* costs of keeping those pits open or of closing them. Too much of the debate has so far been conducted in terms of broad aggregates – the total cost of subsidising the Coal Board, the average price of coal, and the average cost of producing it. But these averages are not what will, in the end, determine pit closures.

At the margin the government faces a choice between subsidising the Coal Board to keep miners at work in uneconomic pits or subsidising the miners directly through the unemployment benefit. Obviously any consideration of the marginal costs and savings which arise from pit closures must be based on the appropriate measure of cost. Part of the Coal Board's overall loss is attributable to sunk costs, notably interest charges, which have to be paid whether or not a particular pit is closed. Any proper assessment of the savings from closing a particular pit should ignore such costs. Thus if a pit is profitable taking into account only the *avoidable* costs incurred by keeping it in operation (wages and salaries, power, heat and light, necessary maintenance) it should be kept open, even if it appears *unprofitable* when made to bear its share of the unavoidable costs of the industry as a whole.

Fortunately there is in the MMC Report (Appendix 3.3-3.5) data on colliery operating costs which comes close to this definition of avoidable costs. Drawing on this data it is possible to construct a cost curve for the industry based on marginal avoidable costs. The idea can be explained most easily in terms of a concrete example. In 1981-2 according to the MMC Report the least efficient pit produced 62,000 tonnes of coal and made a loss of £104.8 per tonne. The total loss was thus nearly £6.5 million. The pit employed some 450 people, so the cost of keeping those men in work was nearly £14,000 per job (Table 4). Clearly at these rates of subsidy it is sensible to close the pit since the money saved is far greater than any possible combination of unemployment pay and lost taxes.

Consider on the other hand a marginal colliery, where total losses in 1981-2 were £2.7 m, with an implied subsidy of £3760 per man to keep over 700 miners in employment. If the colliery were closed the government would save some £3760 per man in subsidies. But it would also lose the revenue from taxes and social security on the miners' income, and it would have to pay unemployment benefit and/or supplementary benefits to the miners as long as they stayed out of work.

Any government concerned to control *total* public spending would have to think twice about closing such a pit even though the Coal Board might need to do so in order to hit its external financial limits.

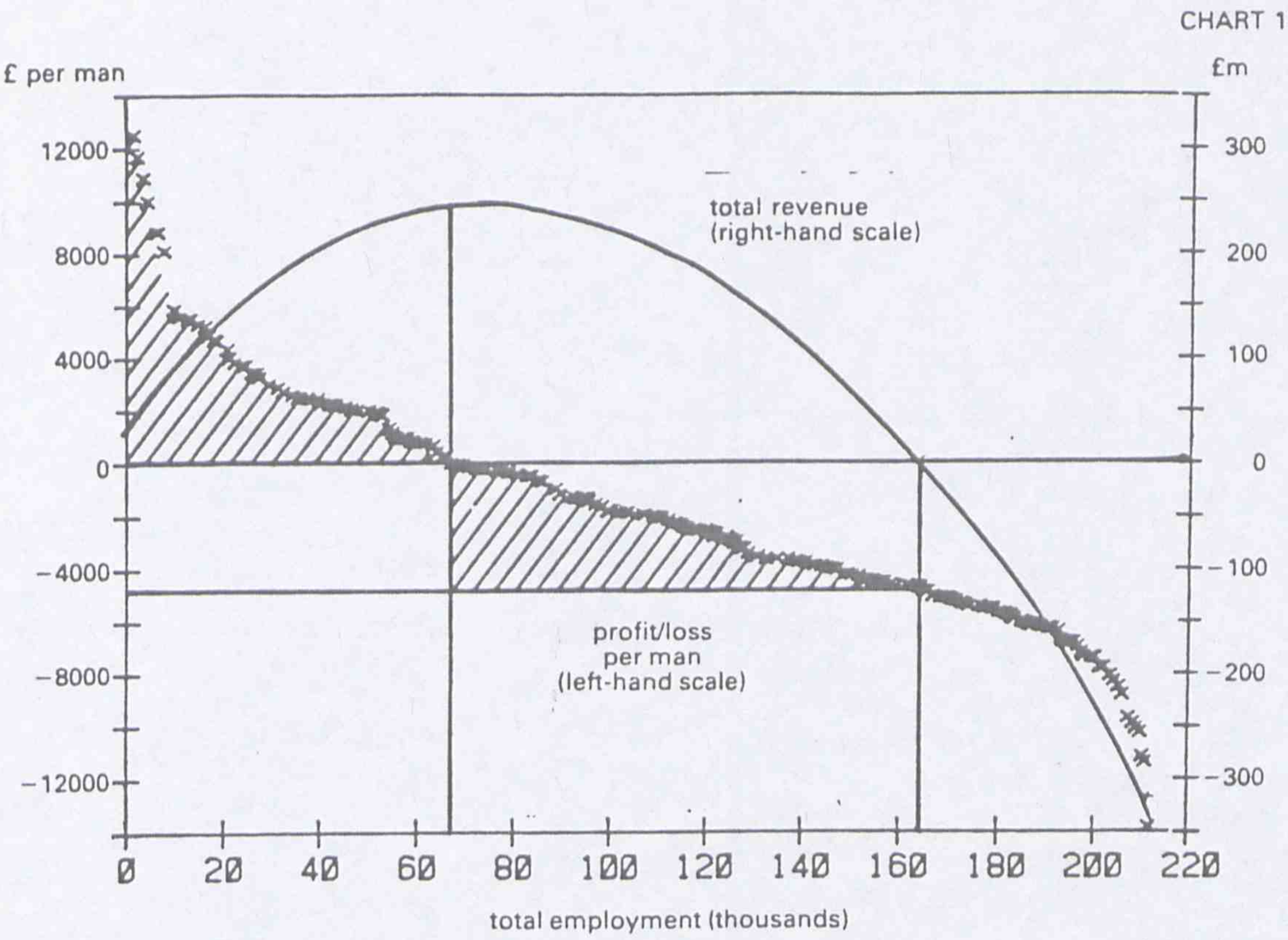
What is clear from the example of the two pits shown in Table 4 is that the variations in subsidy from pit to pit is so large that any debate about the future of "the industry" conducted in terms of national averages is liable to be highly misleading. Each pit has to be treated on its merits and any discussion of "the industry" has to centre on its marginal cost curve.

This can be drawn from data on individual pits, as Chart 9 showed, but Chart 9 does not help in the present debate since it shows profits or subsidies in £ per tonne. Since the crucial issue is employment and the required *subsidy per man*, the data used to construct Chart 9 have been transformed to produce a demand curve for labour in the coal industry. This is plotted in Chart 10 which shows, on the vertical axis, the cost per job of subsidising miners in different pits in 1981-2, ranging from the most economic (where the cost was negative – i.e. the pit was profitable) to the least economic, where the cost was as much as £14000 per job. The horizontal axis shows the number of jobs so that we can read off from the chart the employment available at each level of subsidy. The zero line shows what total employment would be if all pits were

Table 4

	Output ('000 tonnes)	Output per shift (tonnes)	Employment	Loss (£/tonne)	Total loss (£m)	Subsidy per job (£)
Least efficient pit	62	0.64	470	104.8	6.5	13,825
Typical loss-making pit	261	1.77	715	10.2	2.7	3,723

CHART 10



MINING EMPLOYMENT AND PROFIT/LOSS PER MAN
IN 1981-2

required to make a profit.

The merit of Chart 10 is that it enables us to quantify the costs of employing workers in the coal industry *at the margin*. It reveals the interesting fact that in 1981-2 the number of miners employed in deep mines collieries that were actually profitable was only 67,000. However the chart also shows that the losses made on the next tranche of collieries were relatively small. Given the variation in costs from year to year it is probably worth keeping many of these collieries open. The chart shows that, by using the surplus from the profitable collieries to subsidise the losses made by the most efficient of the unprofitable ones, the Coal Board could in 1981-2 have employed 165,000 miners, without requiring any outside subsidy. But note that even if the industry had been cut back to this break even point of 165,000 jobs, the subsidy to workers in the marginal colliery was £4745 per man in 1981-2. In other words even if the mining industry as a whole is not receiving any subsidy, the cross-subsidy within the industry is very large – some very efficient pits are subsidising some very inefficient ones. This point is presumably not lost on the miners of Nottinghamshire, where a high proportion of the profitable pits are located.

A particular feature of Chart 10 is that the slope of the job curve is relatively flat on either side of the zero line. This implies that a relatively small change in profitability (and hence in the required subsidy per job) has a large influence on employment. Since profitability is itself the difference between two much larger figures for costs and revenues, any change in costs has a proportionately much larger effect on profit.

Table 5 illustrates the point with a calculation of the effect on the required subsidy per tonne of holding mining wage increases over the period 1973-4 to 1981-2 in line with the national average. The reduction in wage costs by 1981-2 would have been some 14 per cent and the reduction in total costs around 7 per cent. The effect is to reduce the net subsidy required from £3.89 per tonne to £1.14 per tonne. There is thus a very large percentage change in subsidy per tonne, which also translates into a large reduction in the implied subsidy per worker of the order of £1500 per man. A reduction in costs of this order would have had a dramatic effect on the number of pits which were profitable at the margin, increasing the number of jobs requiring no subsidy by some 28,000. In other words a reduction in real wages of 14 per cent would have increased the level of profitable employment by over 40 per cent.

From an up-to-date version of Chart 10 (which could presumably be constructed by the Coal Board), it would be possible to carry out two kinds of calculations. One, as illustrated above, relates employment to wage restraint and shows that a considerable increase in the number of profitable jobs could be secured by (e.g.) a freeze on real wages over the next few years. The other compares the level of subsidy in existing pits with the PSBR costs of closing those pits. These costs include redundancy and social security payments and lost taxes and, like the subsidies, vary enormously from

Table 5
Effect on coal cost (£/tonne in 1981-2) of wage restraint

	Actual	Lower wages	% difference
Net proceeds	35.59	35.59	
Operating costs			
wages etc	20.10	17.34	−13.7
other	19.38	19.38	−
Total	39.48	36.72	−7.0
Required subsidy	3.89	1.14	−70.7

pit to pit. Social security benefits depend on the family situation of the miners: redundancy payments depend on how long they have been in the industry. There is a time dimension which raises all the usual difficulties about the appropriate horizon and rate of discount. The speed with which redundant mineworkers become re-employed will vary from area to area. These problems make it difficult to produce meaningful figures, even illustrative ones, for the cash costs of closing an 'average' pit. But such calculations could be carried out for individual pits and it is hard to see how any national solution to the dispute can be found without such information.

Conclusions

The aim of this *Briefing Paper* has been to clarify the issues, not to propose solutions. If there is a single moral it is that the coal dispute is not (and should not have been allowed to become) a national dispute. Pit closures are a microeconomic issue which should be settled by marginal analysis on a case-by-case basis. Such an analysis might provide some justification for subsidies within the framework of the government's Medium Term Financial Strategy. But the marginal approach also shows that wage restraint could be an important factor in increasing the number of profitable (and hence secure) jobs within the industry.

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