



Prime Minister

(2)

Nigel Lawson referred

Treasury Chambers, Parliament Street, SW1P 3AG to Mrs at E last
01-233 3000 week: if accepted

19 July 1982 This approach

would mean a

large increase in

electricity EFL's

MCS 20/7

The Rt. Hon. Nigel Lawson, MP
Secretary of State for Energy

Nigel

ELECTRICITY PRICING

(Cooper and Lybrand)

Thank you for your letter of 8 July. As you say, the Report raises some major issues concerning economic pricing and resource allocation, e.g. in relation to coal prices, the correct interpretation of long run marginal costs, and the possibility of adopting different pricing principles for large industrial consumers and other consumers. The report contains some interesting suggestions on these points, but it clearly is not the last word: much more work needs to be done. As you know, even marginal changes in tariff policy would have large public expenditure consequences.

I quite see that you will have to consult the industry before making firm proposals for change after the Recess. However, in my view it could be very damaging to send them the consultants' Report as it stands as the basis for discussion. Even if you were to do so in confidence, there would be a serious risk that some of the consultants' comments, for example on coal prices, as well as their main conclusion that electricity prices are significantly too high, would leak, and that pressure for the Report to be published would grow. This would make it difficult for us to examine the issues dispassionately. Considerations of this kind led us in February not to announce the appointment of the consultants: they point now to your not releasing the report to the industry.

We need in any case to clear our own minds on what options are worth pursuing before going to the industry. I understand that officials in our two Departments have already met for an initial discussion of the issues raised by the Report; I suggest that - perhaps in consultation with the CPRS - they should as a matter of urgency prepare an appreciation of the main issues that need to be resolved on electricity pricing and the proposals put forward by the consultants. This should not greatly delay consultations with the industry on options worth pursuing further. Nor of course would it stop your officials seeking further information from the industry in the meanwhile on detailed methodology and figuring.

/I am

CONFIDENTIAL



I am sending copies of this letter to the Prime Minister and Sir Robert Armstrong.

A handwritten signature in black ink, appearing to be "J. H. Howe", with a horizontal line above and below the signature.

GEOFFREY HOWE



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cc JV
Date ind

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1982 JUL 20

Prime Minister (2)

01 211 6402

To see x

Mus 30/7

The Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
Treasury Chambers
Parliament Street
London
SW1

30th July 1982

ELECTRICITY PRICING

Thank you for your letter of 19 July. Our officials are already in touch about the appreciation you mentioned. I hope we can consider this very soon.

I am grateful for your agreement to my seeking further information from the industry. Time is short if, as we must, we are to take detailed decisions within the timescale for the public expenditure cycle and for setting the industry's next EFL and financial target. I have therefore asked my officials to proceed on the basis you have suggested.

Finally, it may be of help to you to have some idea at this stage of the possible public expenditure consequences in 1983/84 of action on electricity prices arising from Coopers' recommendations - and appropriate action is, I believe, essential. As you recognise, further work remains to be done before precise figures can be arrived at, but the order of magnitude looks like being some £500m, recognising that the final figure could be different.

I am sending copies of this letter to the Prime Minister and Sir Robert Armstrong.

NIGEL LAWSON

30 JUL 1982





10 DOWNING STREET

The Right Honourable
Nigel Lawson, MP,
Department of Energy,
Thames House South,
Millbank,
London, SW1.

19 July 1982

Dear Nigel,

THE COOPER LYBRAND REPORT ON THE PRICING OF ELECTRICITY

I gather from our conversation that you would like me to review generally the report and give a first opinion. I am afraid that I cannot find the time to review it in the detail and depth the report so richly deserves.

My overall view is that it is a good report. Occasionally it does not have the courage of its analysis and conviction, but on many important issues it does. The analysis is usually correct and the conclusion well drawn. (I think the essence is, in short, in para 6.25. This virtually says it all.)

The basic argument is that the CEGB is wrong in using long-run marginal costs as the basis for pricing. This is entirely correct. Long-run marginal cost is relevant only when it happens to be equal to short-run marginal cost. I put this point as succinctly as I could almost 20 years ago in The Economics of Road User Charges. Mutatis mutandis it applies also to electricity supply. (Annex A).

In electricity pricing where the authorities accurately predict future output so the optimum amount of capacity is always present, then long-run and short-run marginal costs are the same.* The vast majority of economists, and the CEGB, have blithely assumed such infallibility as a basis for their pricing policies.

One of my main points of disagreement with the Cooper Report is where they accept a "sound economic argument for an LRMC approach in designing most retail tariffs" (para 6.4). Coopers accept the argument that the present price of electricity will influence future consumption when the costs of meeting increment and demand are different from now. But this proposition is quite a general one. Present investment in electrical appliances etc, will depend upon the expected future prices of electricity. The expected future prices, however, need have no relationship at all to present prices. And it is not at all clear why future prices should be determined by present prices, as the report alleges. (After all, such expectations have been dramatically discredited in the Seventies!) Thus, I cannot see the case summarised in para 6.11.

/The argument

*Assuming that there are constant returns to scale.

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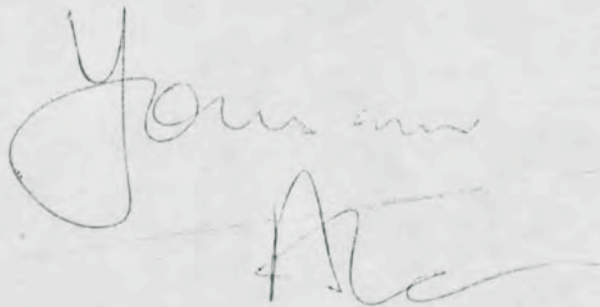
The argument that the tariff based on short-run marginal costs would give rise to insufficient revenue to cover costs is valid under either one of two propositions. Either the investment is optimal, that is to say there is no excess capacity (which for the moment I leave deliciously vague), but there are increasing returns to scale; then there will be a problem of covering the cost. The second possibility is that there are no significant economies of scale but because of the optimistic forecasts we have overbuilt the plant and have too much spare capacity. Then again you will not be able to cover costs. It seems to me quite clear that the latter proposition is the most relevant one.

If one is constrained to raise a certain surplus of revenue over and above costs, or indeed one is constrained to make a loss less than that which would be implied by short-run marginal cost pricing, then the inverse elasticity rule suggested by Coopers is clearly the valid one. It is the analogue of charging what the traffic will bear. I extract a simple proof of the proposition from my book. (Annex B)

As you can adduce, I am, and indeed always have been a proponent of short-run marginal cost pricing. For many years the long-run marginal cost concept, developed largely by infallible French economists, has ruled the roost in electricity pricing. It has always seemed to me to be a grave mistake, but the consequences of such mistakes did not appear while there was an expanding market roughly in accordance with the planned capacity. Now it is different. We are operating well below capacity and SRMC pricing is very different from LRMC pricing.

There remains, however, the revenue question. But this should be tackled on its merits using the inverse elasticity rule. It should certainly not be "solved" by the mystique of allocating by some arbitrary rule the costs over the various tariffs. And even if one attempted to recover to full costs, as with the existing system, the use of the modified short-run marginal costs rule would give a very different tariff from that which at present obtains.

We considered short-run marginal cost pricing in electricity some time ago when David Howell was Secretary of State. I recall that the calculations we then saw were very odd - but it was difficult to challenge them at that time. Now the Coopers report will give a valuable basis for restructuring tariffs.

A handwritten signature in cursive script, appearing to read 'Alan Walters', written in dark ink.

ALAN WALTERS

the consequences in detail in the next chapter. What must be emphasized here is that there is no economic rationalization for "balancing the road budget"—although, as we shall see, a case may be argued in terms of the consequences of alternative policies. Each policy must stand or fall by the consequences and not by any abstract *obiter dicta*. If it be thought that the roads should bear higher taxes than those which emerge from our economic analysis—then let the case be argued in terms of the alternatives, such as running a budget deficit, or reducing government expenditure or increasing running a budget deficit, reducing government expenditure or increasing other taxes. The balanced road budget is, to the economist, merely a graven image.⁴⁸

6. Concepts of Cost and Their Difficulties

The Unit of Cost Analysis

114. Some exponents of the theory of road pricing have argued that the long-run marginal cost is the appropriate value for fixing prices. In this study, however, we have stressed that the short-run marginal cost and not the long-run marginal cost is always the appropriate concept for pricing purposes. It is easy to show that the long-run marginal cost is efficient only when three conditions are met. The first requirement is that traffic be growing and expected to grow, so that there is no question of simply making the best use of a road that is too big; all roads must be enlarged. The second condition is that there be no indivisibilities and joint-product relationships in the supply of roads. In other words, the highways should be described appropriately by a putty model. The third condition is that the government always carries out the efficient investment program; it never lags behind in building new roads when they are desirable and it never makes mistakes by overbuilding.

115. If these three conditions are present, the long-run marginal cost will provide an appropriate measure of the efficient user charge. It is important to see why under these conditions the long-run marginal cost pricing policy

⁴⁸ Since there is a complete theoretical symmetry between the deficits arising from the use of the consumer surplus criterion and the profits that may arise from congestion levies, they should be treated symmetrically. Both are rents—the former are negative rents and the latter positive rents. Administrators are much more concerned about negative rents than about positive rents. Yet if one is concerned about too little money being extracted from private persons for government schemes in the first case, should one not, in the positive rent case, be equally concerned about *too much* resources being siphoned off to the public sector? Administrators rarely evince any concern of the second kind—largely because they are under pressure to provide a tax base for government schemes. Whether governmental expenditure is "better" than the private expenditure it displaces is another, rather large matter.

is correct. For it is *only* when these three requirements are met that the long-run and short-run marginal costs are equal. In other circumstances they will generally be different. Thus the long-run marginal cost is useful as a criterion for user charges *only* when it is equal to short-run marginal cost. When the long-run differs from the short-run cost, the long-run concept is the wrong basis for pricing policy. The short-run marginal cost is *always* the appropriate value at which to fix the user charge.

116. Any concept of cost must be associated with the decision to which it is related. The concept of cost used throughout the whole of this study comprehends solely the escapable cost as one course of action is selected rather than another.⁴⁹ In any well specified situation there are a number of feasible alternative courses of action; and also a set of circumstances which one cannot change. Taking the latter as given, we calculate the value of the resources used up if we adopt different courses of action. There is therefore an infinity of concepts of cost—but each one is uniquely related to the decision specified in each situation.

117. Which concept of cost is relevant for the user charge policy of the road authority? For this purpose we must inquire into the role of price in the budgets of consumers and firms that use the highways. Clearly each user takes the price (user charge) as given and "buys" highway services so that the additional satisfaction derived from the last unit of highway service just equals the price he has to pay. Since the consumer of highway services can buy units of highway services as small as he likes, the relevant unit for pricing purposes is the "small" increment in road service which the consumer may buy. The appropriate cost concept is therefore uniquely defined as the marginal cost of supplying an additional (small) unit of the road service—and the marginal cost is "the value of the resources which would be saved by not supplying a (small) unit of road service."

118. It is quite wrong to imagine that this concept is arbitrary. It is not. It is determined by the nature of the "commodity"—it is possible to use a road in very small units at a time⁵⁰—and by the fact that the decisions of

⁴⁹ It will also be recalled that, in the extreme simplified model of Figure 3 marginal cost was defined to include rent. We return to this problem below.

⁵⁰ It is easy to sketch (but perhaps hard to imagine) the conditions under which the relevant pricing unit would be much larger. Suppose, for example, that the road authority decided to sell road journeys in "blocks" of 1,000 vehicle-miles, and that subcontracting (or retailing road services to third parties or trading in any units smaller than 1,000 vehicle-miles) was declared to be illegal with very high (prohibitive) penalties. Then the only possible unit of contract is the 1,000 vehicle-miles of road service, and this is the relevant unit for the analysis of cost. But it is misleading to talk about the marginal cost of these large units. We shall analyze all cases with "sticky" prices in the next subsection.

tal stock of roads will be growing quadratically. All the oscillations in net investment are fully reflected in this measure of costs, whereas a figure reflecting the true value of resources used would be much smoother.⁸⁸ If there were no oscillations in investment, and if investment increased at the same steady rate for a very long time, then the incremental cost would grow at the same rate as the development and long-run marginal cost. For any given year, however, the incremental cost would be higher than either the development cost or the long-run marginal cost. With steady growth the incremental method has the effect of shifting the responsibility for cost to an earlier period in time.

90. This is analogous to calculating the cost *as if* the roads were all used up in the year in which they were built. Thus in years where investment is a large fraction of the capital stock of roads, the convention of the incremental method will overestimate the cost of the roads used up, whereas in periods when the investment in roads is a relatively small fraction of the capital stock, the Incremental Method will underestimate the value of the roads used up. Thus the Incremental Method is a particularly misleading measure of costs when investment varies considerably over time and when the ratio of investment to the capital stock of highways changes greatly from one period to another. This is a serious disadvantage of the incremental concept.

91. If one accepts the political and administrative reasons for "covering the costs" however, the incremental cost does seem to be the least bad definition available. It has the additional advantage that the increased taxes may stimulate saving to match the increase in road investment. There is, as it were, a built-in stabilizer. This has a great appeal to development economists faced with the problem of mobilizing resources for development.

92. The main purpose of this chapter was to examine the case for departing from the *EUC* principle and to decide whether road charges should cover the costs of the highway system. The main conclusion is that, although one may justify some departure from *EUC*'s in certain practical cases, there is no *economic* argument for balancing the road budget.

ANNEX: MATHEMATICAL NOTE*

93. We can show that if a budget constraint is imposed on the roads the formal solution is for the road authority to recoup its costs where the

⁸⁸ Note that if the investment follows a *sine* curve the capital stock will follow a *cosine* curve—i.e. the oscillations will have the *opposite* movements over time.

* I am very grateful to Professor William Vickrey who found an error in a draft of this note.

elasticities are lowest, i.e. to charge in proportion to what the traffic will bear.

Let benefits be B and the costs C for n road services, the quantities of which are denoted by $x_1, x_2, \dots, x_i \dots x_n$. Each of the services is sold at a price $p_1, p_2, \dots, p_i, \dots, p_n$. The condition that the budget be balanced is then

$$C = \sum_i p_i x_i$$

To find the best price system we maximize the net benefits $\underline{B} = B - C$, subject to the condition that total costs are recovered. With Ψ as a Lagrangean multiplier, we have:

$$\underline{B} = B - C - \Psi(\sum p_i x_i - C)$$

Stationarity conditions are given by finding:

$$\frac{\partial \underline{B}}{\partial x_i} = \frac{\partial B}{\partial x_i} - \frac{\partial C}{\partial x_i} - \Psi \left(p_i + \sum_j \frac{\partial p_j}{\partial x_i} \cdot x_j - \frac{\partial C}{\partial x_i} \right)$$

and equating to zero, i.e.

$$0 = p_i - \frac{\partial C}{\partial x_i} - \Psi \left(p_i + \sum_j \frac{\partial p_j}{\partial x_i} \cdot x_j - \frac{\partial C}{\partial x_i} \right)$$

or we might write it as:

$$p_i - \frac{\partial C}{\partial x_i} (1 - \Psi) = \Psi \left(p_i + \sum_j \frac{\partial p_j}{\partial x_i} \cdot x_j \right)$$

Now the bracket on the right-hand side of this equation measures the marginal revenue which the authority obtains by expanding its service x_i by a small amount and maintaining constant all other services. (Prices must adjust so that the same x_k , ($k \neq i$), are bought.) The natural interpretation is therefore to define the right hand bracket as follows:

$$p_i + \sum_j \frac{\partial p_j}{\partial x_i} \cdot x_j = p_i \left(1 + \frac{1}{\epsilon_i^*} \right),$$

where ϵ_i^* is defined as the total elasticity of demand for the i^{th} service. This total elasticity takes into account the indirect effects, on the prices of other services, of expanding the i^{th} service on the revenue of the authority. Thus we obtain the simple result:

$$\frac{p_i - \frac{\partial C}{\partial x_i}}{p_i} = \left(\frac{\Psi}{1 - \Psi} \right) \left(\frac{1}{\epsilon_i^*} \right)$$

Thus the "mark-up" of price above marginal cost should not be constant but should vary in inverse proportion to the total elasticity of demand for the service.

A particularly simple case of this rule is where:

$$\sum_{j \neq i} \frac{\partial p_j}{\partial x_i} \cdot x_j = 0$$

and so the cross-effects on demand cancel out. Roughly interpreted, substitute road services are as important as complementary road services. Then the rule becomes:

$$\frac{p_i - \frac{\partial C}{\partial x_i}}{p_i} = \left(\frac{\Psi}{1 - \Psi} \right) \left(\frac{1}{\epsilon_i} \right)$$

where ϵ_i is the partial elasticity of demand for the i^{th} service.³⁹ The proportional "mark-up" of price above marginal cost is inversely proportional to the partial elasticity of demand for each service.⁴⁰

94. In examining the road/rail problem the same approach can be used. The first practical question is, supposing that the railway is constrained by the requirement of a balanced budget, would it be a good idea also to so constrain the road authority? Clearly no such general presumption can be deduced. Indeed it is always true that one can find an optimum policy for roads, given the rail budget constraint; and that policy will only accidentally give rise to a balanced road budget. Thus when the balanced road budget is imposed it is either unnecessary or harmful.

95. Given the fact that the railways are required to break even, a balanced road budget may be better than the simple EUC on the roads. But one can always achieve at least as good a solution, and in the vast majority of cases a better one, by adjusting the EUC's in some other way—for example one would adjust only those road prices that were competitive or complementary to rail, leaving the others at the EUC.

³⁹ A sub-case is the much more restrictive case where:

$$\frac{\partial p_j}{\partial x_i} = 0 \text{ for all } j \neq i \text{ cases}$$

This is where demands are independent.

⁴⁰ It would perhaps be more relevant if we took the prices of the services, other than the i^{th} , as fixed and considered the net benefits as the p_i is varied with consequential variations in the x_j to maintain the same prices p_j ($j = i$). Such an approach however causes complications in the analysis of costs and has not been pursued here.

not End

cc JV

Prime Minister (2)

This ^{would} mean a reduction in electricity

prices - but an increase

8th July 1982

in public borrowing.

MCS 8/7

MG

CONFIDENTIAL

01 211 6402

The Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
Treasury Chambers
Parliament Street
LONDON SW1

Handwritten signature: Sir Geoff

ELECTRICITY PRICING

I have just received a draft from Coopers and Lybrand of their confidential report on the Electricity Council's review of the CEBG's Bulk Supply Tariff (BST). The report is critical - it suggests that the CEBG's theoretical approach to setting marginal cost prices needs modifying, and argues that a number of the Board's cost estimates are too rough and ready. It concludes that an economically defensible BST would probably yield significantly less revenue than does the present one.

I shall need to discuss the report, urgently and in confidence, with the industry. But it clearly raises some major issues of economic policy concerning economic pricing in the public monopoly sector, resource allocation, counter-inflation and industrial costs. We shall need to discuss the report's implications collectively and I shall put a paper to E Committee with my specific proposals as soon as possible after the Recess. Meanwhile, my officials will of course keep in close touch with yours and with the CPRS, both of whom have the papers.

I am copying this letter to the Prime Minister and to Sir Robert Armstrong.

NIGEL LAWSON

8 JUL 1967

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