



The Marginal Cost Controversy

R. H. Coase

Economica, New Series, Vol. 13, No. 51. (Aug., 1946), pp. 169-182.

Stable URL:

<http://links.jstor.org/sici?sici=0013-0427%28194608%292%3A13%3A51%3C169%3ATMCC%3E2.0.CO%3B2-D>

Economica is currently published by The London School of Economics and Political Science.

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/lonschool.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is an independent not-for-profit organization dedicated to creating and preserving a digital archive of scholarly journals. For more information regarding JSTOR, please contact support@jstor.org.

The Marginal Cost Controversy

By R. H. COASE

I. THE STATE OF THE DEBATE

I wish to discuss in this article the question of how prices ought to be determined in conditions of decreasing average costs. In particular, I wish to discuss one answer to this question which is by now familiar to most economists and which may be summarised as follows:

- (a) The amount paid for each unit of the product (the price) should be made equal to marginal cost.
- (b) Since, when average costs are decreasing, marginal costs are less than average costs, the total amount paid for the product will fall short of total costs.
- (c) The amount by which total costs exceed total receipts (the loss, as it is sometimes termed) should be a charge on the Government and should be borne out of taxation.

This view has been supported by Professor H. Hotelling,¹ Professor A. P. Lerner,² Mr. J. E. Meade and Mr. J. M. Fleming.³ It has aroused considerable interest and has already found its way into some textbooks on public utility economics.⁴ But despite the importance of its practical implications, its paradoxical character, and the fact that there are many economists who consider it fallacious, it has so far

¹ "The General Welfare in relation to Problems of Taxation and of Railway and Utility Rates", *Econometrica*, July, 1938.

² In his book, *The Economics of Control* (1944). Professor Lerner had earlier set out this view in articles in the *Review of Economic Studies* and in the *Economic Journal*.

³ "Price and Output Policy of State Enterprise," *Economic Journal*, December, 1944. See also J. E. Meade, *Economic Analysis and Policy*, 1936, pp. 182-186, American edition (1938), pp. 195-199.

⁴ See C. Woody Thompson and Wendell R. Smith, *Public Utility Economics*, pp. 271-273, and Irston R. Barnes, *The Economics of Public Utility Regulation*, pp. 586-588. See also Professor Emery Troxel, "I Incremental Cost Determination of Utility Prices," "II Limitations of the Incremental Cost Patterns of Pricing," "III Incremental Cost Control under Public Ownership," *Journal of Land and Public Utility Economics*, November, 1942, February, 1943, and August, 1943; and Professor James C. Bonbright, "Major Controversies as to the Criteria of Reasonable Public Utility Rates," *Papers and Proceedings*, American Economic Association, December, 1940. Professor Bonbright points out that the "extreme social conservatism of most public utility and railroad specialists had prevented" this solution "from gaining wide acceptance, or even from receiving any considerable notice, in the literature of rate theory". However, he thought that it might become a live issue in the next few years (after 1940) as a result of Professor Hotelling's article which Professor Bonbright considered to be "one of the most distinguished contributions to rate-making theory in the entire literature of economics".

received little written criticism.¹ It may have been the sheer quantity of literature in favour of this solution, and the relatively small amount of written adverse criticism which led Mr. J. M. Fleming to claim that it "is not, I think, open to serious criticism" and to lament the fact that it was not more widely understood and accepted "outside the narrow ranks of the economists". But a different solution, which I believe in essentials to be the correct one, had already been suggested by Mr. C. L. Paine in 1937² and by Professor E. W. Clemens in 1941.³ I wrote in 1945 a short note criticising the solution as set out by Mr. Meade and Mr. Fleming,⁴ and a further note by Dr. T. Wilson⁵ underlined the fact that agreement among economists had not yet been reached. I now propose to examine the Hotelling-Lerner solution, as I shall call it, in greater detail and to point out the fundamental defects which I believe it contains.

II. ISOLATION OF THE PROBLEM

Any actual economic situation is complex and a single economic problem does not exist in isolation. Consequently, confusion is liable to result because economists dealing with an actual situation are attempting to solve several problems at once. I believe this is true of the question I am discussing in this article. The central problem relates to a divergence between average and marginal costs. But, in any actual case, two other problems usually arise. First, some of the costs are common to numbers of consumers and any consideration of the view that total costs ought to be borne by consumers raises the question of whether there is any rational method by which these common costs can be allocated between consumers. Secondly, many of the so-called fixed costs are in fact outlays which were made in the past for factors, the return to which in the present is a quasi-rent, and a consideration of what the return to such factors ought to be (in order to discover what total costs are) raises additional problems of great intricacy.⁶ These are, I think, the other two problems which usually exist simultaneously with a divergence between average and

¹ It is true that Professor Ragnar Frisch criticised Professor Hotelling's article shortly after it appeared. But, though much of interest emerged in Professor Frisch's note and the subsequent discussion with Professor Hotelling, it appears, at least to the non-mathematical reader, that Professor Frisch's attack was not directed at the foundations of Professor Hotelling's argument but rather to what seemed to him to be defects in its formulation. See Ragnar Frisch, "The Dupuit Taxation Theorem" and "A Further Note on the Dupuit Taxation Theorem" and H. Hotelling, "The Relation of Prices to Marginal Costs in an Optimum System" and "A Final Note", *Econometrica*, April, 1939.

² See C. L. Paine, "Some Aspects of Discrimination by Public Utilities," *Economica*, November, 1937.

³ See E. W. Clemens, "Price Discrimination in Decreasing Cost Industries," *American Economic Review*, December, 1941.

⁴ "Price and Output Policy of State Enterprise: A Comment," *Economic Journal*, April, 1945.

⁵ "Price and Output Policy of State Enterprise," *Economic Journal*, December, 1945.

⁶ See F. A. Hayek, *Collectivist Economic Planning*, the section entitled "The Criterion of Marginal Costs," pp. 226-231.

marginal costs. They are, however, separate or at least separable questions. Thus, the example used by Professor Hotelling, the problem of pricing in the case of a bridge,¹ is in fact an extremely complex case rather than the simple one it appears to be on the surface.

I propose to isolate the question at issue by examining an example in which, although there is a divergence between marginal and average costs, all costs are attributable to individual consumers; in which all costs are currently incurred; and in which, to avoid a further complication which might trouble some readers concerning the meaning of marginal cost, all factors are in perfectly elastic supply.

Assume that consumers are situated around a central market in which a certain product is available at constant prices. Assume that roads run out from the central market but that each road passes only one consumer of the product. Assume also that a carrier can carry on each journey additional units of the product at no additional cost (at least to a point beyond the limit of consumption of any individual consumer).² Assume further that the product is sold at the point of consumption. It is clear that the cost of supplying each individual consumer would be the cost of the carrier plus the cost at the central market of the number of units consumed by that particular consumer of the product. The marginal cost would be equal to the cost of a unit of the product at the central market. The average cost would be higher than the marginal cost and would decline as the cost of the carrier was spread over an increasing number of units.³ The Hotelling-Lerner solution would presumably be that the amount which consumers should pay for each unit of the product should be equal only to marginal cost. The effect would be for consumers to pay for the cost of the product at the central market and for the Government, or rather the taxpayer, to bear the costs of carriage. It is the validity of this solution that I wish to examine. But first it is necessary to turn to a consideration of fundamentals.

III. WHAT IS OPTIMUM PRICING ?

I take a pricing system to be one in which individual consumers have command over various sums of money which they use to obtain goods and services by spending this money in accordance with a system of prices. It is, of course, not the only method of allocating goods and services, or more properly, the use of factors of production between consumers. It would be possible for the Government to

¹ This example was originally used by Dupuit in an article in the *Annales des Ponts et Chaussées* (1844) which was reprinted in *De l'utilité et de sa mesure* (1933).

² An indivisibility must be present in all cases of decreasing average costs. Although I assume that it is not possible to employ less than a carrier, his services may be assumed to be in perfectly elastic supply in that payment will vary proportionately with the time he is employed and that the additional employment of carriers will not raise their price.

³ The assumption that the total costs consist of two distinct kinds, one of which enters into marginal cost while the other does not, is not essential. We could have assumed that the costs of carriage increased as additional units were carried but that the marginal costs of carriage were below the average. It will, however, aid in exposition if we keep to the original assumption.

decide what to produce and to allocate goods and services directly to consumers. But this would have disadvantages as compared with the use of a pricing system. No Government could distinguish in any detail between the varying tastes of individual consumers (which is, of course, why a "points" system of rationing in wartime is adopted for many items)¹; without a pricing system, a most useful guide to what consumers' preferences really are would be lacking; furthermore, although a pricing system puts additional marketing costs on to consumers and firms, these may in fact be less than the organising costs which would otherwise have to be incurred by the Government.² These are the reasons which would lead an enlightened Government to adopt a pricing system—and we shall see later that they are very relevant to the problem we are considering.

If it is decided to use a pricing system, there are two main problems that have to be solved. The first is how much money each individual consumer shall have—the problem of the optimum distribution of income and wealth. The second is, what is to be the system of prices in accordance with which goods and services are to be made available to consumers—the problem of the optimum system of prices. It is with the second of these problems that I am concerned in this article. The first is partly, though not entirely, a question of ethics. But it is important to realise that there are these *two* problems and that both have to be solved if a pricing system is to produce satisfactory results. As I am in this section dealing with the second only of these problems, I shall assume that the distribution of income and wealth can be taken to be the optimum.

For an individual consumer, the system of prices represents the terms on which he can obtain the various goods and services. According to what principles should prices be determined? The first would appear to be that for each individual consumer the same factor should have the same price in whatever use it is employed, since otherwise consumers would not be able to choose rationally, on the basis of price, the use in which they prefer a factor to be employed. The second would appear to be that the price of a factor should be the same for all consumers since otherwise one consumer would be obtaining more for the same amount of money than another consumer. If the optimum distribution of income and wealth had been obtained, the effect of charging different prices for the same factor to different people would be to upset that distribution. It is a more subtle application of this second rule that the price fixed should be such as to allow factors to go to the highest bidders. That is, the price should be the one which equates supply and demand and it should be the same for all consumers and in all uses.³ This implies that the amount paid for a product should be equal to the value of the factors used

¹ Compare Lerner, *op. cit.*, p. 53.

² See R. H. Coase, "The Nature of the Firm," *Economica*, November, 1937.

³ Compare also Lerner, *op. cit.*, pp. 45-50.

in its production in another use or to another user. But the value of the factors used in the production of a product in another use or to another user is the cost of the product. We thus arrive at the familiar but important conclusion that the amount paid for a product should be equal to its cost. It will be this principle which will enable us to discuss the problems of individual pricing without tracing throughout the economic system all the changes consequent upon the alteration of a single price.

IV. THE ARGUMENT FOR MULTI-PART PRICING

How does this general argument for basing prices on costs apply to the case we are considering—the case of decreasing average costs? The writers whose views I am considering seem to assume that the alternatives with which one is faced are to charge a price equal to marginal cost (in which case a loss is made) or to charge a price equal to average cost (in which case no loss is made). There is, however, a third possibility—multi-part pricing. In this section, I set out the argument for multi-part pricing when there are conditions of decreasing average costs.

It is clear that if the consumer is not allowed to obtain at the marginal cost additional units of products, produced under conditions of decreasing average costs, he is not being allowed to choose in a rational manner between spending his money on consuming additional units of the product and spending his money in some other way, since the amount which he would be called upon to spend to obtain additional units of the product would not reflect the value of the factors in another use or to another user. But for the same reason it can be argued that the consumer should pay the total cost of the product. A consumer does not only have to decide whether to consume additional units of a product; he has also to decide whether it is worth his while to consume the product at all rather than spend his money in some other direction. This can be discovered if the consumer is asked to pay an amount equal to the total costs of supplying him, that is, an amount equal to the total value of the factors used in providing him with the product. To apply this argument to our example, the consumer should not only pay the costs of obtaining additional units of the product at the central market, he should also pay the cost of carriage. How can this be brought about? The obvious answer is that the consumer should be charged one sum to cover the cost of carriage while for additional units he should be charged the cost of the goods at the central market. We thus arrive at the conclusion that the form of pricing which is appropriate is a multi-part pricing system (in the particular case considered, a two-part pricing system), a type of pricing well known to students of

public utilities and which has often been advocated for just the reasons which I have set out in this article.¹

Now it is, I think, extremely significant that none of the advocates of the Hotelling-Lerner solution should have examined the possibilities of multi-part pricing as a solution of the problem they are considering. They write as though the only possible method of pricing is to charge a single price per unit and that the problem they have to solve is what that price should be. It may be that their reason for not examining multi-part systems of pricing was that they were sure they had in fact found the optimum system of pricing. We must therefore compare the results of adopting the Hotelling-Lerner solution with those of using multi-part pricing.

V. MULTI-PART PRICING COMPARED WITH THE HOTELLING-LERNER SOLUTION

The Hotelling-Lerner solution, if adopted in the case of my example, would mean that the cost of the goods at the central market would be paid for by consumers but that the cost of carriage would be borne out of taxation. My objections to this solution as compared with adopting a two-part system of pricing fall under three heads: first, that it leads to a maldistribution of the factors of production between different uses; second, that it leads to a redistribution of income; and third, that the additional taxation imposed will tend to produce other harmful effects.

First, the Hotelling-Lerner solution would appear to remove the means whereby consumers make a rational choice between the use as carriers and the use for some other purpose of the factors which enter into the cost of carriage. In this use, the factor would be free; in another use (provided that it entered into marginal cost) it would have to be paid for. Similarly, this solution would mean that consumers would choose between different locations without taking into account that the costs of carriage vary as between one location and another.

The answer which the supporters of the Hotelling-Lerner solution would make to this objection would appear to be that the Government should estimate for each individual consumer in my example whether he would buy the product and also what location he would prefer,

¹ See H. F. Havlik, *Service Charges in Gas and Electric Rates*, and references therein. See also Barnes, *op. cit.*, p. 388. Havlik himself appears to support the view that costs which are attributable to individual consumers should be charged to those consumers. He does, however, use a variant of the Hotelling-Lerner solution when dealing with the case in which what he terms marginal customer costs, "the additional costs of taking on a customer and maintaining the connection, without actually supplying him with electricity," are less than average customer costs. In this case, "revenues from a customer charge would be less than total customer costs" and it would be "justifiable" for the Government "to give a subsidy" (pp. 92-93). Havlik does not discuss how the subsidy ought to be raised. In this article I am, however, concerned simply with the case in which all costs are attributable to individual consumers and to this case Havlik's variant of the Hotelling-Lerner solution, which is concerned with common costs, does not apply.

if he had to pay the total cost.¹ Only if the consumer would thus have been prepared to pay the total cost of supplying the product to a given location will provision for supplying it to that location be made under the Hotelling-Lerner scheme. Professor Hotelling points out that to decide whether the demand was sufficient to warrant the costs of building a bridge "would be a matter of estimation of vehicular and pedestrian traffic originating and terminating in particular zones, with a comparison of distances by alternative routes in each case, and an evaluation of the saving in each class of movement".² If it were possible to make such estimates, at low cost and with considerable accuracy and without knowledge of what had happened in the past when consumers had been required to pay the total cost, this would be likely to lead, in my opinion, not to a modification of the pricing system but rather to its abolition. The pricing system, as I pointed out earlier, is a particular method of allocating the use of factors of production between consumers and the arguments for its adoption derive their main force from the view that such estimates of individual demand by a Government would be very inaccurate. It should be noted here that neither Professor Lerner nor Mr. Meade in fact make any considerable claim for the accuracy of these estimates. Indeed, Professor Lerner in an earlier section of his book argues for a pricing system on precisely the grounds that it is impossible for a Government to make such estimates.³

Neither Professor Hotelling, Professor Lerner nor Mr. Meade give in my view sufficient weight to the stimulus to correct forecasting which comes from having a subsequent market test of whether consumers are willing to pay the total cost of the product. Nor do they recognise the importance of the aid which the results of this market test give in enabling more accurate forecasts to be made in the future. Professor Hotelling says: "Defenders of the current theory that the overhead costs of an industry must be met out of the sale of its products or services hold that this is necessary in order to find out whether the creation of the industry was a wise social policy. Nothing could be more absurd". This, he says, "is an interesting historical question".⁴ And he adds later: "When the question arises of building new railroads or new major industries of any kind or of scrapping the old, we shall face, not a historical, but a mathematical and economic problem".⁵ Nowhere in Professor Hotelling's article does one find recognition of the fact that it will be more difficult to discover whether to build new railroads or new industries if one does not know whether the creation of past railroads or industries was

¹ See Lerner, *op. cit.*, pp. 186-199 and Meade, *loc. cit.*, pp. 324-325. And it would seem that Professor Hotelling's mathematical formulation comes to much the same thing, see *loc. cit.*, p. 262 and p. 268.

² *Loc. cit.*, pp. 247-248.

³ *Op. cit.*, pp. 61-64.

⁴ *Loc. cit.*, p. 268.

⁵ *Loc. cit.*, p. 269.

wise social policy. And it is certainly not absurd to take into account the fact that decisions are likely to be better made if afterwards there is some test of whether such decisions were wise social policy than if such an enquiry is never made.

I do not myself believe that a Government could make accurate estimates of individual demand in a regime in which all prices were based on marginal costs. But it may be well to consider what would be likely to be done if a Government attempted to carry out the Hotelling-Lerner policy. Consider the example I have been discussing. Certain consumers would have to be designated as able to buy the product. The Government would then undertake to pay whatever costs for carriage were incurred on behalf of these consumers. A Government would have a difficult task in deciding where to draw the line. If it adopted a narrow view of the qualifications required of those allowed to consume this product, consumers who really preferred to use the factor employed in the carriage of the product in this way, would be prevented from doing so. If on the other hand it was liberal in its view, many would find that they were no longer deterred from consuming the product or living at a greater distance from the central market by the cost of the factor used in carriage, that is, by its value in alternative uses or to an alternative user. It would, of course, be possible for the Government to follow a liberal policy to one class of consumers and a narrow policy to others at the same time. It is not easy to guess what policy a Government would be likely to follow. But in Great Britain I suspect that it would tend to err on the liberal side and that there would consequently be too great an employment of the factor used in the carriage of the product.¹

But even if the Government were able to estimate individual demands accurately, the Hotelling-Lerner solution would be subject to another objection. The Government is supposed to estimate which consumers would be willing to pay the cost of carriage (and we shall assume for the moment that it estimates correctly). But it does not in fact ask these consumers to pay this sum. This money is then available for these consumers to spend on some other commodity. Consumers who buy products which are produced under conditions of decreasing average costs will therefore obtain products for any given expenditure embodying a greater value of factors than those who do not. There is a redistribution of income in favour of consumers of goods produced under conditions of decreasing average costs.²

There would not, I think, be any dispute that what is equivalent to a redistribution of income does in these circumstances take place. Professor Hotelling is, however, the only one of the writers whose

¹ All the essentials of this argument have been set out in another connection by Cannan, in his *History of Local Rates in England* (Second Edition). See Chapter VIII, "The Economy of Local Rates" and especially his remarks on p. 137.

² This assumes that the taxes from which the loss is made good do not fall entirely on consumers of goods produced under conditions of decreasing average costs. This is, of course, so because it is proposed that the taxes to be used should be income and similar taxes.

views I am examining who deals explicitly with this point. I shall therefore examine his reasons for thinking that this objection is of little substance. First of all, I believe that Professor Hotelling considers this objection to be largely irrelevant because the initial distribution of income, at least in the United States, is not in fact the optimum. He does not directly say this but it is evident from his whole approach to the question.¹ When he argues that the loss resulting from an application of the marginal cost rule should be borne out of income taxes, inheritance taxes and taxes on the site value of land, he is, I think, partly doing so because he believes that the wealthy and the landlords already have too large a share of the total wealth and income. But why should consumers of goods produced under conditions of decreasing average costs be the only ones to benefit from this redistribution? The reason why Professor Hotelling sees little harm in using pricing policy partly as a means of redistributing income is, I think, that he does not consider the distinction between consumers of products produced under conditions of decreasing average costs and consumers of products produced under conditions of constant or increasing average costs to be of great importance. He argues that a Government carrying out his policy would undertake a great variety of public works. "A rough randomness in distribution would be ample to ensure such a distribution of benefits that most persons in every part of the country would be better off by reason of the programme as a whole".² This comes to saying that in a regime of marginal cost pricing, all consumers will buy goods produced under conditions of decreasing average costs; that what is lost by any particular consumer in the redistribution involved in one scheme will be offset as a result of the redistribution following on another scheme; and that as a consequence, the significant redistribution would be from the wealthy and landlords to all others. It would be indeed pedantic to object to the achievement of a desirable aim merely because it is done in an unusual way. But this argument stands or falls by the assumption that there will be no significant redistribution as between consumers of different kinds of products. There is no reason to assume that this will be so. The gain which individual consumers would derive from the Hotelling-Lerner policy would depend on the extent to which they were willing to pay the total cost for products produced under conditions of decreasing average costs (given their initial income); and on the absolute divergence between marginal and average costs in the case of these goods; and on the extent to which the additional income derived as a result of the Hotelling-Lerner policy was spent on goods produced under conditions of decreasing average costs; and on the absolute divergence between marginal and average costs in these cases. It would be possible to appraise the character of the redistribution only

¹ See, for example, his remarks, *loc. cit.*, p. 259.

² *Loc. cit.*, p. 259.

after a detailed factual enquiry. There seems, however, no reason to suppose that it would be a negligible redistribution.

The public utility industries provide some of the most striking instances of products supplied under conditions of decreasing average costs. Let us assume that they are the only industries in which these conditions are found. Consumers who live in regions of low density of population would probably not be willing to pay the total costs of supply of public utility services which in their case would be very high, and would consequently gain nothing as a result of the Hotelling-Lerner policy because they would not be given the services. Consumers who live in cities would find their gains limited because, equipment there being relatively intensively used, the divergence between marginal and average cost would probably be much less than elsewhere; while since they probably already use all the public utility services, the additional income would be likely to be spent on other than public utility services. It would be those living in small towns, which have some but not all the public utility services and where the divergence between marginal and average cost was great, who would, I think, tend to gain most from the Hotelling-Lerner policy. I see no reason to suppose that there would not be some redistribution, possibly very considerable, as a result of this policy if it were generally applied. Professor Hotelling admits this possibility but claims that by a subsequent redistribution a situation could be produced in which everyone was better off than before.¹ He does not describe how this redistribution would be effected. But it would obviously be an inferior arrangement to adopting a multi-part system of pricing which makes it unnecessary to have subsequent redistributions of income at all. I am, however, at a loss to understand how ordinary taxation procedures could be used to redistribute income from consumers of goods produced under conditions of decreasing average costs to all other consumers. An attempt to do this might be made by means of a tax on the consumption of goods produced under conditions of decreasing average costs. But this would either be equivalent to introducing multi-part pricing (if a lump sum tax was levied on consumers) or, if a tax per unit of consumption is imposed, would bring about a divergence between the amount paid for additional units and marginal cost, a result which it is the object of the Hotelling-Lerner solution to avoid.

I now turn to the third objection to the Hotelling-Lerner solution. The loss incurred is, it is said, to be made good by increased taxation. The taxes which Professor Hotelling and the others who support this solution have in mind are income taxes, inheritance taxes and taxes on the site value of land. Let us assume for the time being that the form of tax used to make good the loss is an income tax. But income taxes are usually so framed that marginal units of income are taxed and therefore an income tax will have the same unfortunate

¹ *Loc. cit.*, pp. 257-258.

effect on consumers' choice as a tax on goods and will produce results similar in character to those which follow from charging an amount for additional units of output greater than marginal cost. After the appearance of Professor Hotelling's first article, he seems to have had his attention drawn to this point by Professor Lerner. Professor Hotelling says in the discussion with Professor Frisch which followed his original article that "an income tax of the usual kind is a sort of excise tax on effort and on waiting, as well as on other less defensible ways of getting an income. An income tax is to some extent objectionable because it affects the choice between effort and leisure and the choice between immediate and postponed consumption. Thus some of the same kind of loss attaches to an income tax as to excise taxes proper. How serious this effect may be is a question for factual research; but there is some reason to suppose an income tax superior to excise taxes on individual commodities in this respect . . .".¹ Professor Hotelling does not give any reasons why he thinks income taxes will tend to be less harmful in this respect than excise taxes. It may be so but it is obviously desirable to know what the circumstances are in which income taxes are less harmful and when they are likely to be found before applying the Hotelling-Lerner solution—if, that is, this policy would lead to increases in income taxes.² Professor Hotelling attempts to avoid this difficulty by suggesting that "the public revenues, including those required to operate industries with sales at marginal cost, should be derived primarily from rents of land and other scarce goods, inheritance and windfall taxes, and taxes designed to reduce socially harmful consumption".³ This is not a very satisfactory solution. First of all, it assumes that such taxes will be sufficient to raise the sum required. Secondly, it assumes that the disturbance to the distribution of income and wealth due to the additional taxation on those who derive their incomes in these ways is better than the loss which would occur if the additional taxation was spread more evenly over people in the country. Alternatively, Professor Hotelling's suggestion involves the assumption that the optimum distribution of income and wealth has not already been achieved and that those who derive their incomes in these ways have not been taxed enough in the past. But, of course, if this is so, this further taxation is desirable quite apart from questions of pricing policy and there is little need to link it to the problem of pricing under conditions of decreasing average costs. Furthermore, the question would still remain of how the pricing problem should be solved

¹ *Econometrica*, April, 1939, pp. 154-155. I would add that income taxes also affect the choice between doing a job for oneself and employing some one to do it for one and in consequence an income tax dissipates some of the advantages of specialisation. See F. W. Paish, "Economic Incentive in Wartime," *Economica*, August, 1941, p. 244.

² This problem seems to have been overlooked in the theory of public finance. The usual discussion of the burden of indirect taxation assumes that the alternative is a lump sum payment. See for example, M. F. W. Joseph, "The Excess Burden of Indirect Taxation", *Review of Economic Studies*, June, 1939. Compare also J. R. Hicks, *Value and Capital*, p. 41.

³ *Econometrica*, April, 1939, p. 155.

when the optimum distribution of income and wealth was achieved. Professor Hotelling's suggestion for avoiding the loss which would result from increased income taxes is one of limited validity.

In this section, I have compared the results of using a multi-part pricing system with those which would follow from the Hotelling-Lerner policy. I have shown that the Hotelling-Lerner solution would bring about a maldistribution of the factors of production, a maldistribution of income and probably a loss similar to that which the scheme was designed to avoid, but arising out of the effects of increased income taxes. These results would be avoided by the use of a multi-part system of pricing.

VI. AVERAGE COST PRICING COMPARED WITH THE HOTELLING-LERNER SOLUTION

Professor Hotelling, Professor Lerner, Mr. Meade and Mr. Fleming do not seem to have realised that many of the problems which they were trying to solve could have been dealt with by means of multi-part pricing and that this system of pricing would in fact have produced results not open to the objections which could be brought against the Hotelling-Lerner solution. But in fairness to them it must be pointed out that their attack was directed against charging a single price which was based on average cost and not against multi-part pricing. Is the argument valid in this case? If multi-part pricing is not possible, is it not preferable to adopt the Hotelling-Lerner solution rather than to adopt pricing based on average costs?

In this case, the argument for the Hotelling-Lerner solution is considerably strengthened—and this in two respects. First of all, it is clear that if consumers are not allowed to buy additional units at marginal cost, there is a maldistribution of the factors of production. The nature of the gain which would accrue in this respect through the adoption of the Hotelling-Lerner solution has already been discussed in earlier sections.¹ The second respect in which the argument for the Hotelling-Lerner solution is strengthened concerns the effectiveness of average cost pricing in providing a market test of the willingness of consumers to pay the total costs. In the previous section, I pointed out that multi-part pricing furnished such a test. How does this apply to the case of average cost pricing? The fact that consumers are willing to buy at a price which covers average costs certainly shows that they prefer to obtain that value of factors in that form rather than in any other which is open to them.² The difficulty is, as Professor Hotelling points out, that the reverse is not true. It has long been known to economists that in cases in

¹ It might be thought that if all goods were priced on an average cost basis, since all prices would be raised above the marginal cost level, the choice of the consumers would be unaffected. But this would be true only if the rise in price were proportionate to marginal cost and this is most unlikely to be true. See the discussion between Professor Frisch and Professor Hotelling in *Econometrica*, April, 1939.

² Compare Wicksteed, *The Common Sense of Political Economy*, pp. 675-676.

which the demand curve lies at all points below the average cost curve, it may be possible, by means of price discrimination, to raise the average revenue sufficiently to bring it up to average cost. If therefore pricing is on an average cost basis, there will be certain cases in which consumers would have been willing to pay the total cost but in which, owing to the limitations of this particular method of pricing, this would not be possible. Production could be undertaken in such cases if the Hotelling-Lerner policy was followed.

These are the advantages of the Hotelling-Lerner solution as compared with average cost pricing. But the disadvantages which were examined in the previous section still remain. These have to be balanced one against the other. The first advantage which the Hotelling-Lerner solution possesses as compared with average cost pricing is that it allows a better choice at the margin in consumption. But this advantage would be reduced and might be offset by the loss which would result if the Hotelling-Lerner solution involved increased income taxes. The second advantage was that a Government could undertake production in cases in which consumers would be willing to pay the total cost but which could not be undertaken with average cost pricing. But it has to be remembered that this policy is one in which the Government estimates individual demands and is therefore subject to the limitations which we discussed in the previous section. Not all cases in which production would not be undertaken with average cost pricing ought to be undertaken. A Government which made many errors in its estimates of individual demands could easily offset any good such a policy might produce. Average cost pricing may prevent some things from being done which perhaps ought to be done but it is also a means of avoiding certain errors in production, some of which would inevitably be made if the Hotelling-Lerner policy were followed. As I indicated earlier, I do not myself believe that it is reasonable to assume that the Government could make accurate estimates of individual demands if all prices were based on marginal cost. Finally, there is the redistribution of income and wealth which the Hotelling-Lerner solution would involve and which, as I pointed out in the previous section, would appear to be difficult to rectify in the absence of multi-part pricing, without reintroducing the kind of tax which would prevent that rational choice at the margin which the Hotelling-Lerner solution aims to achieve.

It will be seen from the discussion in this section that the question of average cost pricing as against the Hotelling-Lerner solution does not present any clear-cut case. The claim which is made for the Hotelling-Lerner solution as inevitably superior to average cost pricing must therefore be rejected.

VII. THE PROBLEMS THAT REMAIN

In this article, I have been examining the problem of pricing under conditions of decreasing average costs. I have, however, confined

myself to one particular case, that in which all costs are attributable to individual consumers and in which all costs are currently incurred. Given these assumptions, I showed that the Hotelling-Lerner solution was inferior to a multi-part system of prices and that as compared with average cost pricing the balance of advantage was not clear. The next steps would appear to be to examine the problem of pricing when there are common costs. If there are costs which cannot be attributed to individual consumers, does the Hotelling-Lerner solution then come into its own, as Mr. H. F. Havlik has suggested?¹ Should such common costs be borne out of taxation? Or is the right approach to discover some basis in accordance with which these costs should be allocated between consumers? Finally, there is the question of expenditures which have already been incurred for factors. Are these costs to be borne out of taxation? Or should they be borne by consumers? If the analysis in this article is accepted, these would seem to be the next questions to be examined.

¹ See footnote 1 on page 174.