

The Canberra Hypothesis

The Economics of the Prescription Medicine Market

Based on a paper delivered by George Teeling-Smith
in January 1975 to the Pharmaceutical Sciences Section
of the Australian and New Zealand Association
for the Advancement of Science at
the Academy of Sciences in Canberra

Introduction

In January 1975 the Director of the Office of Health Economics delivered a paper to the Pharmaceutical Sciences Section of the Australian and New Zealand Association for the Advancement of Science at the Academy of Sciences in Canberra. The burden of this paper was that it was a fundamental misconception to believe that price competition was lacking in the prescription medicine market, at least in the context of the British National Health Service. The 'Canberra Hypothesis', as it could be called, stated that the market success of a prescription medicine would, other things being equal, be affected by its price relative to alternative products on the market. This strongly challenged the earlier conclusions, which had prevailed over the previous 15 years, that the price of a medicine was a matter of indifference to the prescriber. It supported the assertion of those working in the pharmaceutical industry that in pricing a product one had, to be successful, to consider carefully the relative merits and the relative price of the alternatives in the market. The paper argued that price competition operated in the prescription medicine market just as it does in the markets, for example, for cars, clothes, comestibles, consumer durables and cosmetics. This present paper is a development of the Canberra Hypothesis, which has had the benefit of advice and guidance from members of the OHE Editorial Board and in particular from two distinguished economists from the OHE Panel of Advisors, Duncan Burn and Tom Wilson. This paper remains, however, a hypothesis. The evidence on which it is based, although apparently convincing, is still fragmentary and falls short of being a strict theoretical proof that price competition exists for prescription medicines. Nevertheless it calls into question the underlying factor – namely the absence or weakness of price competition for pharmaceuticals – on which price controls, such as Britain's 'Voluntary Price Regulation Scheme', are predicated. The hypothesis also has another topical relevance for Britain in 1975. This is because the government's controversial proposal to reject the Banks Committee's recommendation to repeal Section 41 of the 1949 Patents Act¹ was specifically justified on the grounds that 'competition in the industry is largely based on products and not prices'.² If the Canberra Hypothesis can be proved this statement is incorrect. Thus the government's decision to continue discrimination against pharmaceuticals in British Patent Law, like the 'Voluntary Price Regulation Scheme', would be seen to be based on a false premise.

In fact, at the same time as publishing this paper, OHE has taken steps to see whether the hypothesis can indeed be tested and proved. Duncan Reekie of the Department of Business Studies at the University of Edinburgh, with the approval of his head of department, Norman Hunt, has undertaken to conduct this exercise on behalf of OHE. His starting point will be the working papers for the study of Innovative Activity in the Pharmaceutical Industry which was completed in 1973 by the Centre for the Study of Industrial Innovation on behalf of the Pharmaceutical Working Party of the Chemicals Economic Development Committee.³ This study identified all the new single pharmaceutical chemical entities introduced onto the British market between 1957 and 1970. It evaluated them in terms of their therapeutic significance at the time of introduction and in terms of their subsequent market success. There was, as one would have anticipated, a significant statistical correlation between therapeutic merit and sales value; that is, other things being equal, the most important products in therapeutic terms were also those which sold most successfully. Now Reekie will try to add into the equation, as it were, the cost of the median daily dose for each of these innovations, as compared with those of alternative existing therapies at the time of their introduction. If the hypothesis is correct, there should be once again a significant positive correlation, this time between inexpensiveness and market success. It may be that the sample will be too small or too diffuse to provide this formal statistical proof. The evidence and discussions in this present paper, however, makes it almost inconceivable that Reekie's results would support the reverse proposition – namely that more expensive prescription medicines will, other things being equal, achieve greater market success than their more modestly priced competitors. Yet, as this paper describes, that alternative ill-conceived hypothesis is the one which has reigned supreme in many academic and government circles since the early 1960s.

¹ Section 41 requires the Controller of Patents automatically to grant a compulsory licence against pharmaceutical (and food) patent holders unless he can see good reasons for refusing. For all other classes of goods the applicant for a compulsory licence must prove abuse by the patent holder to be successful.

² Government White Paper on Patent Law Reform (1975); Cmnd 6000, HMSO.

³ National Economic Development Office, (1973). *Innovative Activity in the Pharmaceutical Industry*. HMSO.

Historical background

The pharmaceutical market as it exists today dates back only to the 1950s. Before then, most prescribed medicines were based on natural compounds usually of animal or vegetable origin and they frequently consisted of elaborately formulated mixtures. It is only since the subsequent therapeutic revolution that prescription medicines have been characterised by the now familiar man-made compounds. These are usually patented, sold under the manufacturer's brand name and increasingly consist of a single active chemical entity with a more or less precise therapeutic action. It was the emergence of this new and more expensive type of pharmaceutical preparation which led to anxiety about the effectiveness of price competition in the prescription medicine market. Britain was one of the first countries to have problems in this area. From the start of the National Health Service in 1948, politicians were obsessed by the idea that the new style of pharmaceutical manufacturers might be able to 'overcharge' as a result of the protection afforded to them by their patents and brand names. The fear arose particularly because of the tripartite nature of the relationships involved. The doctor prescribed; the manufacturer supplied; and the government paid. Understandably – although as we now know mistakenly – it was suspected that the normal market forces, which should ensure fair and reasonable prices, would have been weakened or eliminated by this special situation. To allay this suspicion the British pharmaceutical industry eventually agreed in 1957 to a Voluntary Price Regulation Scheme. Under this, prices to the National Health Service were to be regarded as reasonable if they were no higher than the prices in export markets where the patient usually still paid in the normal way for his own medicine. The results of introducing this scheme bitterly disappointed those who had hoped that it would bring dramatic savings to the National Health Service. There were practically no price reductions. All that the Scheme did was to demonstrate that the prices being paid by the British health service were already generally lower than those in other countries. The manufacturers, evidently, had not been taking advantage of the NHS in the way that they had been accused of doing.

The critics' bewilderment at this unexpected revelation soon appeared to be resolved, however, when Senator Estes Kefauver appeared on the American scene with a succession of hearings in which his witnesses purported to expose the true nature of the industry's supposedly draconian behaviour. His hearings introduced a second

fundamental misconception which has been allowed to influence attitudes towards the market for prescription medicines almost unchallenged over the intervening 13 years. This was the accusation that pharmaceutical prices even in a free market were 'administered' by the manufacturers rather than being determined by competition. This was implicit in the title of the Kefauver Report, 'Administered Prices', and was explicit in its text.⁴ Kefauver's justification for reaching this conclusion rested on two issues – the apparent collusion between manufacturers in setting prices and the fact that production costs were quite evidently unrelated to selling prices.

Few people today would still be concerned about the obvious discrepancy between the manufacturing cost and the sales price for pharmaceuticals produced by a research-based company. Ingredient costs are recognised to be largely irrelevant in judging the reasonableness of pharmaceutical prices and profits, in much the same way as it would be nonsense to decide whether a watch was reasonably priced by looking at the cost of the metal used to make it. However, Kefauver's second reason for concluding that prices were relatively unaffected by competition – the apparent collusion in pricing – is still generally accepted as being valid. There is still a common belief that pharmaceutical prices are 'administered' in the sense that manufacturers can collectively maintain excessive prices because the normal pressures of competition are absent from the market. This belief depends on the fact that prescription medicines are exceptional in that the prescriber (who effectively makes the buying decision) is not the person who pays. Thus it has been assumed that the mechanism of price competition in establishing reasonable prices does not operate for prescription medicines. It was this assumption which resulted in the philosophy which lies behind the later Voluntary Price Regulation Schemes in Britain. These Schemes have been conceived on the principle that direct negotiations over prices and profits are necessary because otherwise the manufacturers would be able to 'administer' prices at unreasonably high levels. Without such negotiations, the situation is assumed to be analogous to that in which the restrictive practices of IATA allows it to 'administer' airline fares on some routes at levels far above those which would prevail if there were open competition between the airlines.

⁴ Administered Prices: Drugs, (1961). Report of the Committee on the Judiciary, United States Senate, made by its Subcommittee on Antitrust and Monopoly pursuant to S. Res. 52. Eighty-seventh Congress, 1st Session.

In the prescription medicine market the presumed lack of price competition has been taken to be responsible principally for two evils. First, prices and profits are said to be higher than would be possible under effective competition. Second, these higher prices which are made possible by the protection of brand names and patents are said to allow companies to spend excessively on sales promotion. This in turn is believed to strengthen the manufacturers' already entrenched market positions, creating unnatural barriers against would-be new entrants. The high price of medicines, leading to high profits and 'excessive' sales promotion, are, therefore, considered to represent an antisocial form of market exploitation and a consequent misuse of the scarce resources available for health care.

The reason that the industry has never decisively countered this type of criticism is because the exact nature of its price competition has never been clearly described. The Kefauver Report in 1961, and subsequently the Sainsbury Report⁵ in Britain in 1967, confused the concept of classical 'perfect' competition (which is certainly absent in pharmaceuticals) with the concept of competition by innovation and substitution which is that appropriate to the pharmaceutical market. The classical theory of perfect competition applies appropriately only to undifferentiated commodities such as grain, copper or unrefined petroleum. The theory describes how a free market between competing suppliers forces prices down because an efficient supplier can maximise his profit by lowering price to increase his market share. The functioning of the market in this 'perfect' form requires the competing goods on offer from each manufacturer to be undifferentiated in design, quality and performance. In a well-informed market place, price, therefore, becomes the sole determinant of where such goods will be purchased. That is the classical theory.

However, in 1933, two economists, Joan Robinson⁶ of Cambridge and Edward Chamberlin⁷ of Harvard arrived independently at the conclusion that this theory failed to describe adequately the market behaviour in respect of most goods then on offer. They described an alternative competitive process which they called respectively 'imperfect' competition and 'monopolistic' competition. This recognised that, by the twentieth century, goods were normally differentiated by features such as design, performance and reliability, and that these differences were deliberately highlighted by the use of brand names and advertising. This description of the situation was, of course, correct. However, the

economic theory which Chamberlin and Robinson developed from it had severe limitations. Their publications correctly underlined the irrelevance of perfect price competition to twentieth century markets, but they failed to provide a general explanation for the alternative patterns of market behaviour. In essence, they assumed a static market situation, in which the competing goods on offer were assumed to remain unchanged while the manufacturers competed with each other through advertising to increase their individual market share for their own particular, often trivially, differentiated product. The two economists had failed to recognise the crucial role played by innovation in 'imperfect' or 'monopolistic' competition.

It was not until 1942 that the American economist J A Schumpeter suggested a more valid explanation of market behaviour under this new form of competition, in his book *Capitalism, Socialism and Democracy*.⁸ He saw clearly that competition in the twentieth century depended on innovation as well as on brand names and advertising. He described it as 'the competition that counts' and as 'creative destruction'. The concept was later developed by Clark,⁹ who used the phrase 'workable competition', and emphasised the dynamic rather than the static nature of innovative markets. Other authors have continued to develop the same theme¹⁰ and all of them recognise that if price alone were still to be the cornerstone of competition, progress would be stifled because no one could afford to improve or to innovate. Thus in markets as far-ranging as heavy engineering, vehicles, consumer durables, household materials, clothes or food and drink, classical 'perfect' price competition can no longer appropriately apply.¹¹

5 Report of the Committee of Enquiry into the Relationship of the Pharmaceutical Industry with the National Health Service, 1965-67. (1967) Cmnd 3410, HMSO.

6 Robinson J, (1933). *Imperfect Competition*. Cambridge University Press.

7 Chamberlin E H, (1933). *The Theory of Monopolistic Competition: A Re-orientation of the Theory of Value*. Harvard University Press.

8 Published by Harper and Row.

9 Clark J M, (1961). *Competition as a Dynamic Process*. Brookings Institution.

10 See for example: (i) Bain J S, *Chamberlin's Impact on Microeconomic Theory* in R. E. Kuenne; *Monopolistic Competition Theory: Studies in Impact*. Wiley, 1967. Pages 147-76. (ii) Jacoby N H, 1973. *Corporate Power and Social Responsibility*. MacMillan. Pages 139-40. (iii) Kirzener I, 1973. *Competition and Entrepreneurship*, Chicago.

11 The use of the term 'perfect' competition, particularly in juxtaposition with the term 'imperfect' competition, is particularly unfortunate in implying that the former is desirable and the latter undesirable. As the discussion explains, the existence of 'perfect' price competition in the classical sense would be economically damaging and highly undesirable in the field of innovation. Hence the new alternative terminology suggested in the next section and used subsequently in this paper.

Brand names, patent protection and advertising have become essential and desirable features of the market. Competition between products is now a multi-vectored dynamic process. The potential customer takes price into account as only one factor among many in making a purchasing decision. A product representing an exceptional advance over those already on the market can command a correspondingly high premium price. In addition, competition within a particular market is no longer homogeneous; distinct sub-markets exist which are delineated by marked differences in price; the Rolls Royce, for example, does not compete in a meaningful way with the Volkswagen although both are motor cars.

The purpose of this paper is first to give an account of how this new form of competition functions in practice in determining competitive prices. It then goes on to present some of the empirical data which suggest that the same mechanism seems to operate in determining the price of prescription medicines. Before leaving the general theoretical discussion of the nature of competition, however, it is worth noting that the original Chamberlinian theory of the market is still often taught as having general validity despite its neglect of the role of innovation. The standard and popular text by Lancaster,¹² for example, contains only one reference to research in its index and this refers to a trite comment on the option a firm may have to invest in research rather than in capital goods. The advanced text by Malinvaud,¹³ as another example, contains no reference to research or related topics in its index. Yet Baumol¹⁴ has clearly spelled out that Chamberlin's theory of monopolistic competition, ignoring the role of both oligopoly and innovation, now refers principally to 'cases that differ from pure competition only in terms of the distinctiveness of wares handled by different sellers'. Thus even in fields where the theory of pure competition has been properly discarded it has all too often been replaced by another theory which is equally irrelevant to innovative competition between large firms. This may perhaps compound the confusion surrounding the nature of competition in the prescription medicine market which this paper will later discuss.

¹² Lancaster K, (1969). *Introduction to Modern Microeconomics*. Rand McNally International, Chicago.

¹³ Malinvaud E, (1972). *Lectures on Microeconomic Theory*. North Holland.

¹⁴ Baumol J, *Models of Economic Competition*, in Langhoff P, *Models, Measurement and Marketing*. Prentice-Hall, 1965. Pages 143-68.

The basis of pricing

The essential principle of pricing under the new form of competition is that there must be an element of incentive and reward for useful novelty, improved reliability, better design, high quality and superior performance. In order to achieve this, patents and trade marks give the manufacturer an element of exclusivity for his own product. He is deliberately sheltered from unbridled competition from mere copyists who could, for example, pirate his designs or undercut his quality. As a corollary the concept of price competition is radically extended. It could now be described as 'price and performance' competition instead of the classical 'common commodity' competition.¹⁵ Suppliers compete by offering rival goods or services to potential customers who will weigh up their relative merits, assessing the reasonableness of their prices in relation to the performance they have been led to expect from each.

Thus, price has by no means become irrelevant although its unique market significance has been undermined. The manufacturer must price his product with two basic considerations in mind. First, bearing in mind its specific properties it must not be priced so high that potential customers will consider it to be 'too expensive'. This is often described disparagingly as 'charging what the traffic will bear' but in practice it is a perfectly rational economic practice. Generally, it will involve pricing the product in relation to the alternatives already on the market. In some cases, however, when the product is unique the pricing decision becomes more subtle. Here it involves a highly subjective judgement of what price will yield the greatest profit. This situation would have arisen, for example, when colour television was first introduced. The first manufacturer into the market could have chosen to sell as cheaply as he could afford to, based on a reasonable estimate of production volume. Alternatively, he could have charged very considerably more, estimating that the initial status value of possessing a colour television would encourage people happily to pay a price quite out of proportion to production costs or to the price of black and white television. Only later would he have needed to reduce price significantly in order to create a mass market, moving as it were out of the Rolls Royce end of the market into the Volkswagen one.

These alternative innovatory pricing policies which were first referred to by Dean in 1951¹⁶ have been extensively described and discussed in the economic literature. The high initial pricing policy is often described as 'skimming', that is being able to pick up the cream of the market at a high price by

being first in. The alternative policy of entering the new market with a very low price has been described as 'penetration' pricing. An individual supplier must decide how to price his unique innovation in the range between these two extremes depending on such factors as the anticipated economies of scale in production and his assessment of the extent of his innovatory lead over potential competitors.

The following Technical Appendix prepared by Dr Duncan Reekie is inserted here because it develops the welfare implications of 'skimming' as opposed to 'penetration' pricing policies. Non-economists wishing to follow only the main thread of the Canberra Hypothesis should at this point continue with the main text on page 10.

Technical appendix

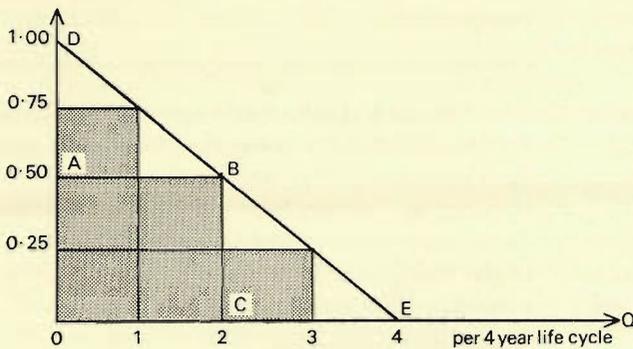
It is now widely accepted that businessmen frequently price on a 'cost-plus' basis. This notion lies behind the 'base-price' concept subsequently referred to in the main paper. The margin to be charged will vary with market conditions, the firm's relative need for a rapid repayment of cash investment, what is deemed to be 'appropriate' and a variety of other variables. This is far removed, or apparently so, from the economist's view that profit maximising (marginal revenue equals marginal cost) pricing behaviour will be followed. The dilemma, of course, is resolved in that the economist's model states the conditions which will hold after the businessman has performed his calculations, it makes no pretence to indicate how the businessman arrives at such decisions. The economist's model is there to predict, explain and evaluate, it is not primarily a management tool¹⁵. The economist views skimming pricing as a form of price discrimination. How does he evaluate the impact of skimming pricing on society?

Price discrimination is not a pejorative term. It indicates merely that a product (or similar products) is (are) being sold at different (non-marginal cost related) prices. Skimming pricing is a form of price discrimination¹¹ in that the same product is being sold at different points in time at different prices. It can be justified on welfare grounds in that it enables a firm to appropriate to itself 'consumers' surplus' and so increase producer's profits.

¹⁵ These two phrases representing the two radically different forms of price competition could be abbreviated to 'pp competition' and 'cc competition' respectively. Many readers will remember that 'cc' was used in Britain during the Second World War to identify the Government-sponsored range of 'Utility' goods. As these 'cc' goods were deliberately manufactured to standard undifferentiated specifications by different manufacturers, the letters could appropriately have stood for the words 'common commodity' in exactly the context in which the phrase is being used in this paper.

¹⁶ Dean J, (1951.) *Managerial Economics*. Prentice-Hall. Pages 419-21.

This is economically desirable where marginal costs are very low (as pointed out to be so in pharmaceuticals) or are zero. In such a situation the profit available to a firm which did not discriminate by 'skimming' could be inadequate to pay for the innovative investment required for a new pharmaceutical product. Consider the following diagram.



DE represents the demand curve for a pharmaceutical product with a four-year life span. We will assume zero marginal cost. The profit maximising price and output level for the firm is £0.5 and 2Q units spread over four years. At this point $MR=MC$ (since with a linear demand curve MR always bisects a horizontal line drawn from the £ axis to the demand curve at its mid-point). With a zero discount rate the firm would have sales revenue equal to ABCO, provided this exceeds the costs of innovative investment (R & D and the like) the firm would develop the product and sell it as described. Consumers would additionally receive, 'free' as it were, welfare benefits equal to the consumers' surplus triangle ABD.

There are two welfare defects in this situation, however. First, if the innovative investment costs exceed ABCO (i.e. £1 million) the drug would not be developed, despite the fact that at output level C total (consumers' surplus plus producer's revenue) welfare equals ODBC (£1.5 million). Second, total possible gross consumer welfare is not restricted to ODBC but is equal to the whole area under the demand curve, ODE (£2 million). A simple, non-skimming, profit maximising price of £0.5 results in a 'deadweight-loss' of BCE. No firm will produce 4Q units in four years under such circumstances. The firm would produce 4Q units, and would invest up to £2 million in R & D, however, if it could practise price discrimination of the skimming variety. This is because, say, given equal annual outputs of 1Q unit, it sold at £0.75 in year 1, £0.50 in year 2, £0.25 in year 3 and a price approaching zero in year 4, then it would earn a revenue equal to the shaded area of the diagram. This is an area exceeding OABC and tending to approach ODE, or £2 million.

This analysis is a minor variant of the well-known

arguments put forward by Dupuitⁱⁱⁱ, the father of modern welfare economics, when he attempted to justify the construction of a bridge which a non-price discriminating, toll charging monopolist would consider to be a bad investment. The ability to price discriminate depends, of course, on the presence of a degree of innovative monopoly protected by patent or other legal arrangements.

The alternative strategy of penetration pricing does not involve discrimination of the type outlined above. It will take place in situations to be described in the main paper, for example if R & D costs are relatively low, and so variable costs relatively high; if new alternative competition is an immediate threat, and so on. In conclusion it should be pointed out that stable drug prices over time need not represent either rigidly high monopolistic prices, nor conversely low penetration profit maximising prices. In the context of inflation and upward shifting curves of marginal costs (over time) a stable price level may well indicate that a penetration policy has been adopted. (By adopted, of course, we mean that this is what is happening in a descriptive sense. The business firm in question may well have no knowledge of the concept of penetration pricing, but may merely be practising cost-plus pricing, intuitively reducing, or accepting a reduction in, the plus margin as the product life cycle proceeds. See paragraph 1 of this appendix.)

i For a fuller discussion on these points see Friedman M, 'The Methodology of Positive Economics' in Essays in Positive Economics, Chicago 1974.

ii See Scherer F M, Industrial Pricing, Rand McNally, 1970, page 129.

iii Dupuit J, 'De la mesure de l'utilité des travaux publics', Annals des Ponts et Chaussées, 1884. Cited by Donald Dewey, Microeconomics, Oxford, 1975, pages 216-18.

This brings one to the second factor, apart from customer reaction, which the manufacturer must take into account in setting the price for his innovation. He must also consider his competitors' probable behaviour. If they see his product selling well at the high price, they are likely to assume that they can for a time share the growing market with him at that attractive price level. They will, therefore, have no motive to undercut him. However, at some point one of the competitors may decide to sell at a much lower price. He may do this in the hope of giving himself a price advantage over his competitors. Alternatively, he may judge that the time has come when he can maximise his return by increasing his sales volume as a result of expanding the total market by a significant price reduction.

The first entrant into the market with a unique product must remember that if he sets a very high price he will limit his sales volume and provide

ample scope for successors to undercut him. On the other hand, if he sets a very low price, he may quickly achieve a high volume of sales. His resulting economies of scale will mean that even his low price yields him profitable sales. However, subsequent close competitors, without his initial advantage of a high sales volume, may have little prospect of covering their costs at his price. Hence, because they would have to charge a higher price, they would be unable to enter the market with any hope of success.

It is this sort of price competition between manufacturers selling clearly differentiated but nevertheless effectively alternative products which under 'price and performance' competition eventually establishes a base price level below which no other innovative manufacturer can afford to cut further. Whether this 'base price' is set from the start by the first entrant selling cheap, or whether it is reached by later competitive price reductions from an initially higher level, this is the effective competitive price. However, the price at which a company can 'afford' to sell in this context must obviously take account of the total cost of the company's activities. In a research-based company producing original specialty products these will be very different from the costs of a mere copyist. It is for this reason that the 'sheep' of the innovators must be protected by patents and trade marks from competition by the 'goats' of the non-innovators. It is an important characteristic of such a market that 'price leadership' or 'parallel pricing' is likely to occur. Once a single manufacturer has substantially cut his price his competitors with broadly similar products will usually quickly follow suit if they can afford to do so. Indeed if a company's commercial intelligence is good it may cut its price ahead of a planned move by a close competitor; alternatively the prices of competing goods may come down together. This behaviour is not the result of collusion but occurs because neither manufacturer wishes the other to have more than the briefest possible spell with a price advantage. In other cases, if none of the manufacturers perceives an economic advantage for himself in a price reduction, all the competitors' prices will remain at much the same level. It is still, of course, open for any other innovator to come in at a lower price if he can afford to do so in order to get a share of the market, but it has been pointed out that this may often be impossible.

Recently, the Monopolies Commission in Britain examined this typical 'parallel pricing' behaviour because there was anxiety that it might be against the public interest. The Commission concluded that

there would have to be special circumstances,¹⁷ which the economists Polanyi have shown not to apply in pharmaceuticals,¹⁸ for this to be the case. In general, therefore, parallel pricing is accepted as a normal and economically rational practice under 'price and performance' competition. It is in principle no different from the corresponding 'parallel pricing' of undifferentiated commodities under 'common commodity' competition. Not all markets, of course, behave in the same way as would be typical of colour television. In that case many manufacturers throughout the world had comparable levels of technical know-how, so that significant inter-company 'price and performance' competition quickly came into existence. By contrast there have been some outstanding cases where a single company has had a head start over all potential rivals. In these cases the original innovator has been able, as a result of its superior technology and its pricing policy, to dominate the market for many years. Even in these exceptional cases, however, it remains true that if the innovations are priced too high, they are unlikely to achieve their full market potential. In addition, their high prices will facilitate earlier competition from rivals. Thus price is still far from being irrelevant in these cases, even though competitive rivalry appears to be absent in the market.

17 Monopolies Commission, (1973). *Parallel Pricing*. Cmnd 5330, HMSO. Page 7.

18 In *Competition Risk and Profit in the Pharmaceutical Industry*; a review by Runnymede Research, (1975). Association of the British Pharmaceutical Industry. Page 34.

Price competition in pharmaceuticals

Having described the various patterns of pricing which typify 'price and performance' competition in other markets, it is time to turn to the empirical evidence from the prescription medicine market to examine the way in which it fits into these patterns. To understand the behaviour of the prescription medicine market it is necessary to consider separately its various therapeutic sub-markets, because a cough mixture, for example, does not compete with an anti-rheumatic preparation. On this basis, the first obvious conclusion is that there is the same distinction in pharmaceutical markets as occurs elsewhere between those with many new entrants and close rivals and those exceptional cases in which a single product or small group of products have remained dominant over a long period. In the latter group, over the past 20 years, two innovations in the pharmaceutical field have stood out as being commercially quite exceptional. The first were the broad spectrum antibiotics in the 1950s; the second were the benzodiazepine tranquillisers in the 1960s. It was the first which precipitated the Kefauver hearings in America and Enoch Powell's use of Section 46 of the Patents Act in Britain.¹⁹ It was the second which must have very much influenced the Sainsbury Committee's findings in 1967 and which subsequently led to a reference to the British Monopolies Commission in 1971.²⁰ In both cases there have been widespread international repercussions. It was concluded that on both occasions normal competitive forces had broken down. More seriously, it was implicitly assumed that these cases typified pharmaceutical market behaviour and the magnitude of rewards to be earned.

The conclusion that effective market forces were absent was an understandable misinterpretation of the situation which will be discussed more fully later because it is central to the theme of this paper. However, the assumption that the behaviour of the market for broad spectrum antibiotics and for the benzodiazepines was typical is ludicrous. They are obviously outstanding exceptions which correspond to the equally rare cases of outstanding success which have occurred in other markets. Turning to the more typically competitive sub-markets, the general pattern of change in market leadership as a result of the cut and thrust of competition has already been well documented. For example, the usual pattern of market performance within therapeutic sub-groups was illustrated graphically in the Chemicals' Economic Development Committee's report in 1972, 'Focus on Pharmaceuticals'.²¹ Figures 1, 2 and 3 reproduce

the first three of its eleven charts which illustrated the changing market fortunes of different manufacturers. The patterns in these three are typical of the whole. Figure 1 refers to preparations acting on the alimentary system. Here there was an obviously dramatic change in leadership during the five years illustrated. Figure 2 refers to preparations acting on the cardiovascular system and to diuretics. Here the leadership remained constant although there were significant movements among those with a lesser share of the market. However, as the EDC Report points out, maintenance of the *status quo* at the top is only to be expected in some cases over so short a period of time as five years. Figure 3 shows the picture for preparations acting on the lower respiratory system. Once again, like the first, this covered a period in which there was very obviously effective competition at work. Thus the point is readily established that market leadership does change and that competition exists. It is surprising, however, that the relevance of this in pointing to the very exceptional nature of the antibiotic and tranquilliser markets has never been emphasised.

The role of pricing in this competitive situation has already been described in general. It is now time to discuss it in more detail in relation to pharmaceuticals. Ironically, perhaps the best starting point in a discussion on competitive pharmaceutical pricing comes from the two exceptions where effective competition appeared to be absent – the broad spectrum antibiotics and the benzodiazepines. Figure 4 shows Chart 10 from the Kefauver Report. This illustration was crucial to the argument developed in that report. It was intended to highlight the contrast in market behaviour for unpatented streptomycin and penicillin on the one hand and for the patented broad spectrum antibiotics on the other. The price of the unpatented products fell steadily, while over the 10-year period shown in the chart the four broad spectrum antibiotics each remained at the same constant price. From this Kefauver concluded that the manufacturers of the patented products had been able to 'administer' their prices instead of having to respond to competitive pressures. However, Kefauver's Chart 10 deliberately set out to mislead the reader and to encourage him to misinterpret the situation.

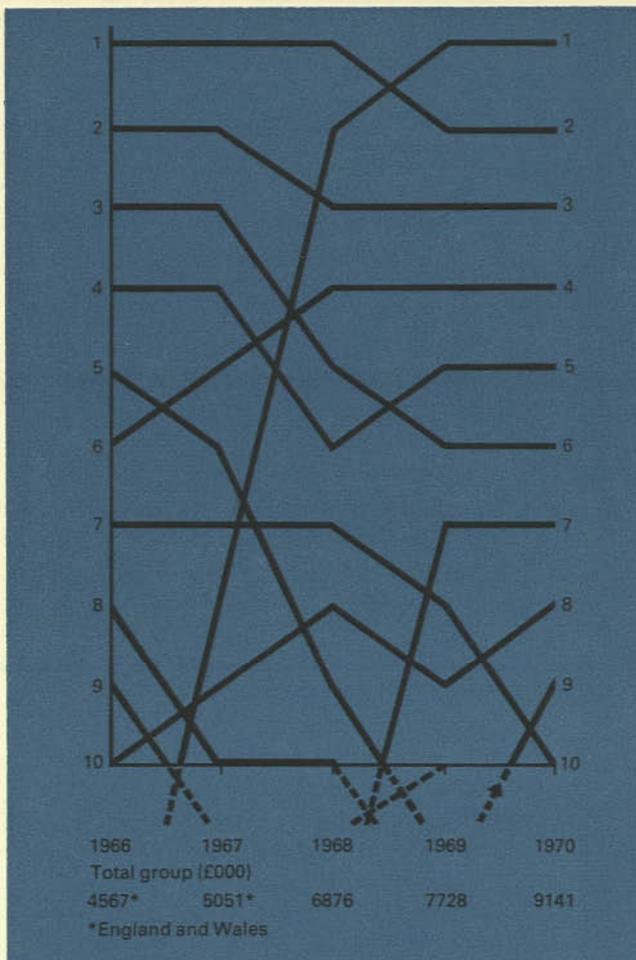
Streptomycin and penicillin, of course, were

19 Section 46 of the 1949 Patents Act gives the government power to obtain patented goods for the public services from alternative unlicensed suppliers.

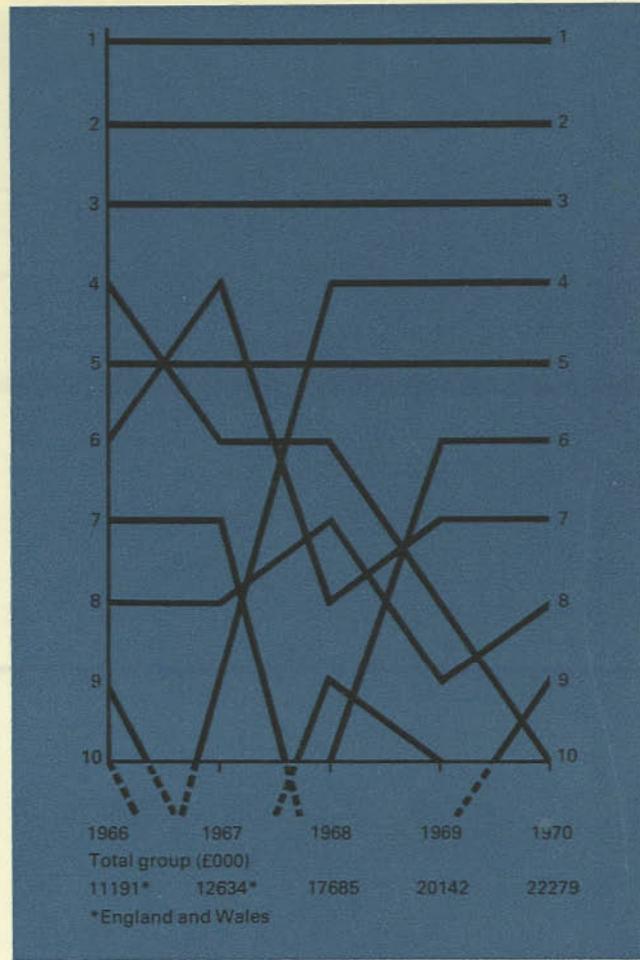
20 This resulted in the publication of the Commission's report on Chlordiazepoxide and Diazepam. (HC 197, HMSO 1973).

21 Published by HMSO.

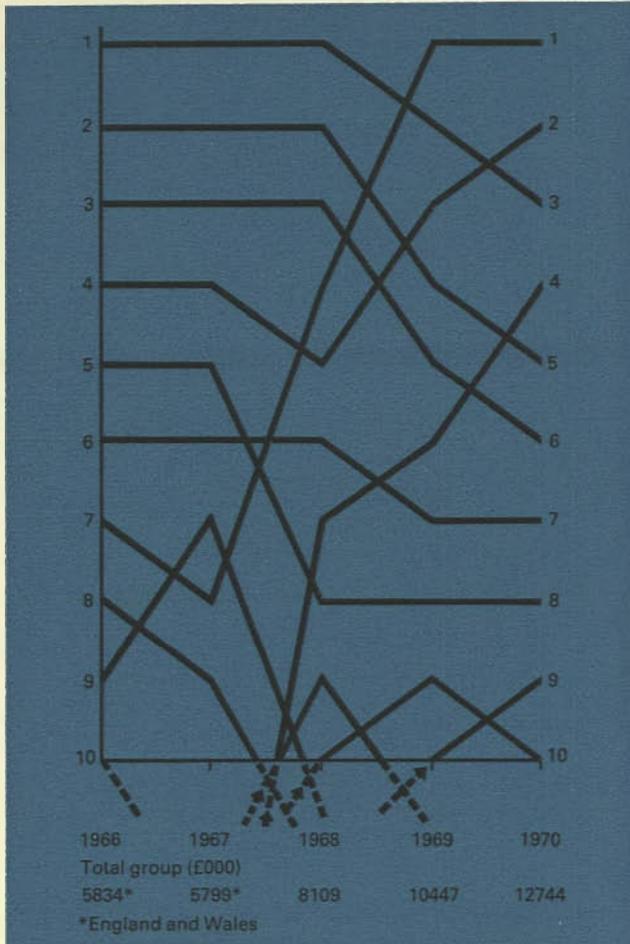
1 Ranking of top ten companies in preparations acting on the alimentary system



2 Ranking of top ten companies in preparations acting on the cardiovascular system and diuretics



3 Ranking of top ten companies in preparations acting on the lower respiratory system



behaving according to the classical economic theory of 'perfect' competition. Without patent or effective brand protection they were selling in typical undifferentiated 'common commodity' markets. Indeed manufacturers had already realised very clearly that they could not support pharmaceutical innovation if the resultant new medicines also lacked patent protection and if their prices were also to plummet rapidly to commodity levels as a result of 'common commodity' price competition. However, the industry had made this point in general terms only. It had failed to focus on what was in fact the fatal flaw in the argument leading to Kefauver's conclusion that effective price competition had been absent for the four broad spectrum antibiotics.

Figure 5 shows a more complete picture. It points to the correct conclusions from the data on the prices of the broad spectrum antibiotics. It shows the 10 years of constant and parallel pricing from Chart 10 in an overall perspective. The market had behaved exactly as current economic theory would have predicted in any situation of 'price and performance' competition where an initial 'skimming' policy is adopted.²²

Chlortetracycline (Aureomycin) was introduced in December 1948 at \$15 for sixteen 250 mg capsules. As production costs fell, the manufacturer saw the need to reduce price to expand the market and to ward off competitive encroachment – actual or anticipated. It was reduced to \$10 in the following February. In March chloramphenicol (Chloromycetin) was put on the market. Again in accordance with theory it was neither cheaper nor more expensive than its predecessor. To have priced it significantly higher would have spoilt its market prospects; but there was no need to price it any lower either. It was entering an expanding market and was thought at the time to have an efficacy and safety comparable to the first entrant into the market. Hence it was 'parallel priced'. In April the same year, oxytetracycline (Terramycin) was introduced. Perhaps its novelty was thought initially to justify a few cents premium in price; more probably the small difference in price was thought to be irrelevant. In May the price of the two initial entrants were cut to \$6 in order further to expand or defend the market. However, the price of Terramycin was maintained, probably because the scale of production had not yet expanded to an extent which made a price reduction realistic. It was eventually reduced to the price of the others in November. Thus, in essence,

²² The Technical Appendix on page 9 described why an initial skimming policy is perfectly justifiable in economic terms.

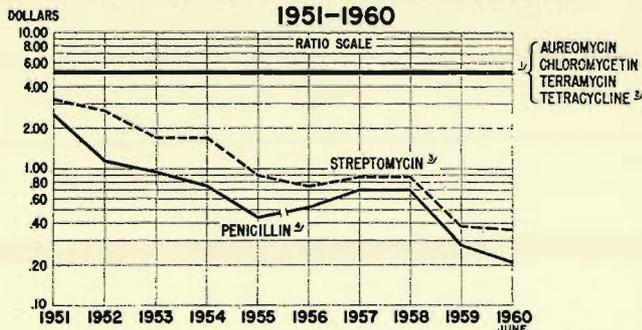
4

ADMINISTERED PRICES—DRUGS

CHART 10

ANTIBIOTIC PRICES BROAD VS NARROW SPECTRUM

1951-1960



all three products of apparently comparable efficacy were parallel priced, as theory would have predicted.

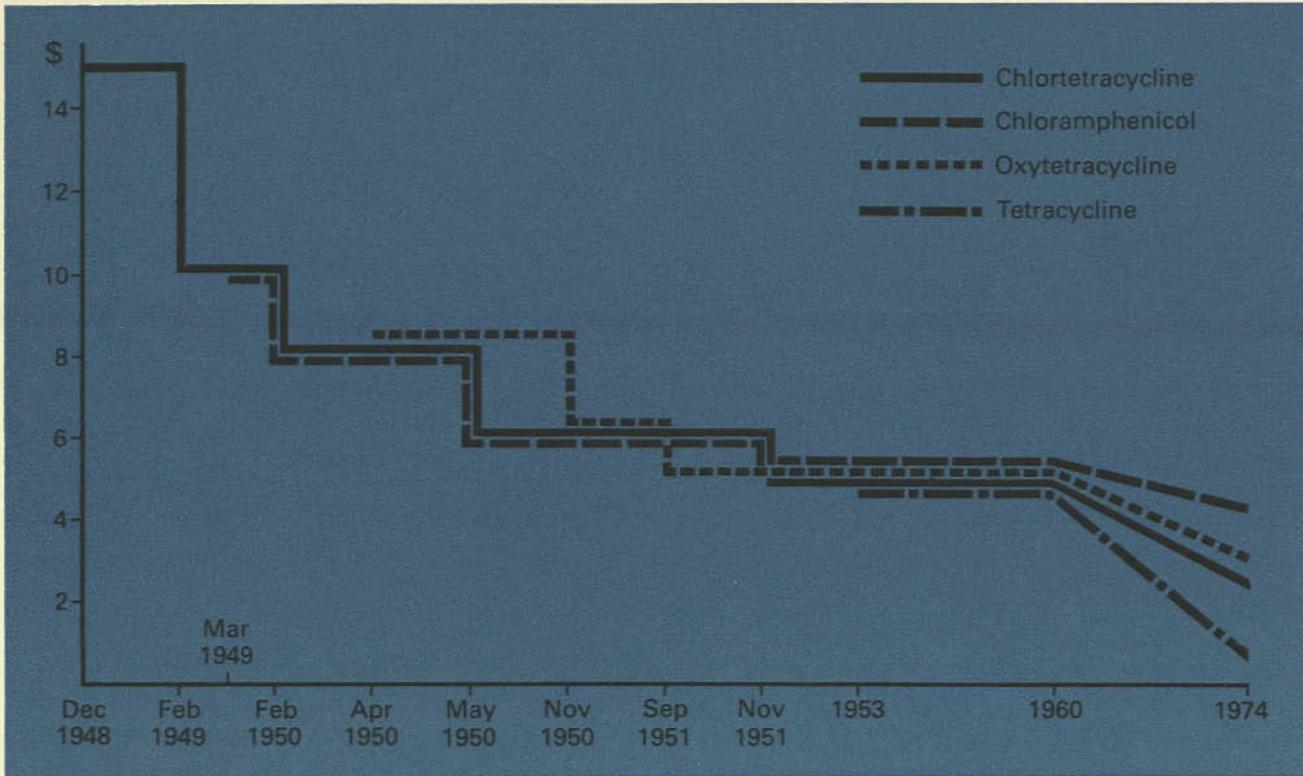
Finally, in two movements in September and November 1951 all three were brought down to the price base of \$5.10. Again as theory would have predicted, when the fourth entrant, tetracycline, was introduced in 1953 it too followed the pattern of parallel pricing. Because no further economic advantage was thought to be gained by further reductions, this common price was held into the 1960s. The four competitors judged that at \$5.10 physicians now perceived these antibiotics to be sufficiently cheap for general use. They had also come down to a level where it was a long time before any other innovator could introduce a product which could either undercut their price or else be seen as a major step forward in therapy. This next stage in the development of the market came with the introduction of the Beecham semi-synthetic penicillins in 1961. In the event, the broad spectrum antibiotic patents expired shortly after, before the penicillins had become effective rivals under the rules of 'price and performance' competition.

The significance of this inability of subsequent innovators to undercut the originators' price will be illustrated again later. For the moment, however, the questions must be these. If the prices really were administered and if prescribers and patients could be held to ransom as Kefauver implied, why did Cyanamid ever reduce the price of Aureomycin in the first place? Why did the price level drop from \$15 to \$5.10? The answer must be that 'price and performance' competition was operating exactly in the way that has already been described. So far from competition being absent, it had functioned effectively and had dramatically reduced the initial prices – a fact which Kefauver used Chart 10 to conceal. The only absentee was classical 'perfect' or 'common commodity' price competition, which any economist following the precepts of Chamberlin, Schumpeter and others should have seen to be irrelevant.

The highly exceptional experience in the broad spectrum antibiotic market also throws light on a previously unexplained enigma in respect of sales promotion. In his PHD thesis, Duncan Reekie²³ plotted sales promotion expenditure for each therapeutic sub-market in 1966 against the number of innovations over the period 1962-65. Figure 6 shows the result. There is an obvious and highly

23 Reekie W D, (1969). The Economics of Innovation with Special Reference to the Pharmaceutical Industry. University of Strathclyde.

5 USA broad spectrum antibiotic market, 1948–74 A more complete picture



Source: derived from Cooper table 71, updated by PMA

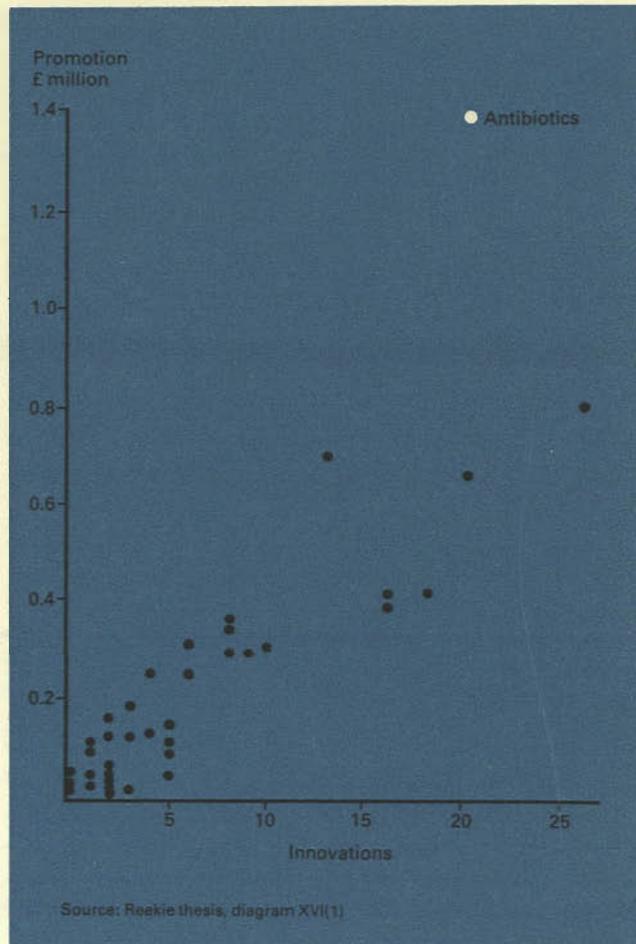
Note: Time scale non-linear

significant straight-line correlation between the level of innovation and the level of promotion expenditure. A regression analysis of the data confirmed that the rate of innovation was the principal determinant of the level of promotion expenditure, exactly as the industry had previously claimed. However, antibiotics were clearly out of line, having a very much higher expenditure than Reekie's trend line would have predicted. This anomalous result appeared somewhat embarrassing at the time. Now, however, seen against the obviously exceptional nature of the antibiotic market, it is exactly what might have been expected. The size and security of the antibiotic manufacturers' market had allowed them the opportunity to spend on promotion at levels which would have been uncompetitive in smaller and more typical sub-markets. They also had the economic motive to spend heavily because of the huge economies of scale which can be achieved in the production of these particular products. Thus, as a corollary, it may be deduced that, in the typical sub-market situation, 'price and performance' competition in pharmaceuticals provides a normal commercial restraint on what a company can afford to spend on promotion, exactly as manufacturers had always believed. The conspicuously lavish promotional expenditure on the broad spectrum antibiotics in the 1950s – like their apparently non-competitive prices – probably unfairly cast doubt on the effectiveness of competition in ensuring economy in the prescription medicine market as a whole.

Turning to the second exceptional case, the benzodiazepine tranquillisers, the principles are basically the same as with the antibiotics, but the price history is radically different. This may perhaps partly have been due to a different company philosophy. Roche believed in setting a 'reasonable' or sharply competitive price from the outset, just as the colour television manufacturers could have chosen to do in order to penetrate the market as rapidly as possible. This was made possible for the benzodiazepines by their relatively simple chemical production process. By contrast the fermentation process for the production of the antibiotics was more complex. The economies of scale in the production of the antibiotics would have tended to come more slowly, so in their case an initial high price was probably necessary regardless of company philosophy.

Thus while the broad spectrum antibiotics had to come down from \$15 to \$5.10 in order to gain general acceptability and to discourage further market entrants, Roche claim that no corresponding

6 Therapeutics classes, promotion 1966, innovations 1962–65



price movement was necessary for the more modestly priced benzodiazepines. Librium and Valium had been first introduced at prices which were already seen by doctors to represent good value in terms of patient benefits. They had started life, as it were, at Volkswagen rather than Rolls Royce prices. In line with the theory of 'price and performance' competition, they were also cheap enough to make it difficult (and in the event so far impossible) for the other innovators to introduce alternative compounds at competitive prices. Thus the monumental success of the benzodiazepines both in terms of acceptance by prescribers and in terms of their continuing unique position in therapy does not result from a breakdown in the effectiveness of price competition. Their success has been explained by Roche as being due to its own initial pricing decision, consciously taken in the context of the competitive behaviour of the market as it has been described.

In support of this claim, Roche have quoted in evidence before the British House of Lords another example of their pricing policy.²⁴ In this case a product was being marketed jointly in Britain with another firm. The latter argued that the product had limited scope and should, therefore, be priced high. Roche retorted that a high price would indeed result in a limited market, but a competitive price would result in the product being widely prescribed. At the lower price which Roche successfully argued for, the product has been an overwhelming success. The other company has confirmed that events took place as Roche described them and it now realises that an uncompetitive price would have greatly handicapped the product.

One can support the argument as it has been developed in respect of these two exceptional cases, by reference to the more usual pattern of market behaviour as typified by Figures 1, 2 and 3. From examples in these markets there is substantial evidence to support the thesis that companies and the market do behave in the competitive way described. The fact that price will be seen in the subsequent discussion to be far from irrelevant in affecting market performance in other therapeutic sub-groups strongly supports the assertion that competitive pricing is a general phenomenon which would, therefore, have been applied even in the exceptional cases. It will be shown that manufacturers who fail to price competitively are likely to suffer rather than to benefit, and there is no reason why the two exceptions so far described should not also have obeyed this rule. Before discussing examples from the other sub-

markets, however, it is appropriate here to look at the evidence which shows that at least in Britain prescribers are in general broadly aware of the cost of the medicines which they prescribe. This was a matter to which the Sainsbury Committee addressed itself. A panel of general practitioners were asked what prescription they would write in a variety of circumstances. They were then asked to give an estimate, within five shilling price brackets, of the cost of filling these prescriptions. The next two Figures are derived from the results of this survey. Figure 7 is based on all the prescriptions which would in fact have cost less than five shillings. For each diagnosis, the first column shows that a very respectable percentage of doctors correctly assessed the cost as being in this price bracket. The second column shows the percentage of doctors who made estimates either below five shillings or between five shillings and ten shillings. For each diagnosis, about nine out of ten doctors were 'correct' on this basis. These latter percentages would have included cases, for example, where a doctor thought a prescription would cost six or seven shillings when in fact it would cost just under five. Hence the overall impression is that doctors are remarkably accurate in their estimates of the cost of inexpensive prescriptions. Figure 8 shows the situation for all prescriptions actually costing between ten shillings and fifteen shillings. Here the numbers in the precisely correct bracket are less impressive. However, when estimates in the adjacent price brackets on either side are included, a substantial majority of doctors can be seen once again to have made estimates which are at least approximately correct. These two examples are representative of the complete data included in Table 14.1 of the Sainsbury Report. Hence there does seem to be a fairly accurate awareness of prescription costs among doctors.

²⁴ Quoted by Richard Yorke QC at the House of Lords hearing before the Special Orders Committee on the Regulation of Prices (Tranquillising Drugs) Order, 1973.

7 Percentage of practitioners aware that their prescription of choice costs less than 5s

Disease	Percentage in correct 5s price bracket	Percentage in correct or adjacent 5s price bracket ¹
Painful osteoarthritis	73	93
Childhood eczema	47	93
Acute diarrhoea in an adult	76	92
Acute bronchitis in an adult	62	86
Peptic ulcer	68	92

Sainsbury Report table 14.1

8 Percentage of practitioners aware that their prescription of choice cost between 10s and 15s

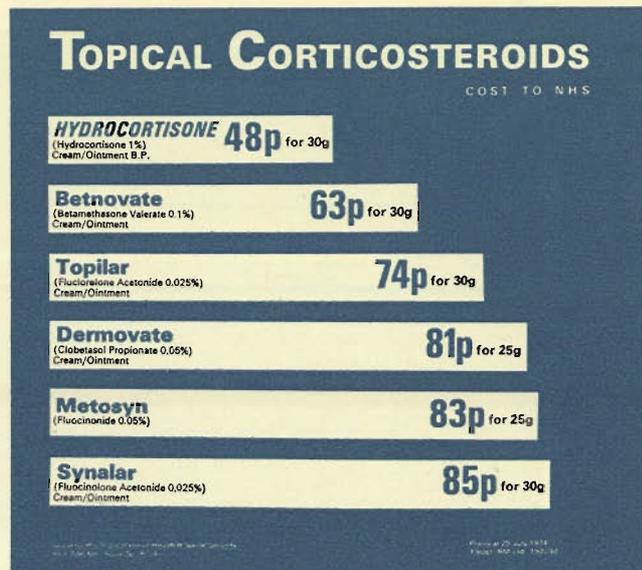
Disease	Percentage in correct 5s price bracket	Percentage in correct or adjacent 5s price bracket
Painful osteoarthritis	26	58
Childhood eczema	52	88
Acute diarrhoea in an adult	38	84
Acute bronchitis in an adult	32	73
Peptic ulcer	N/A	N/A

Sainsbury Report table 14.1

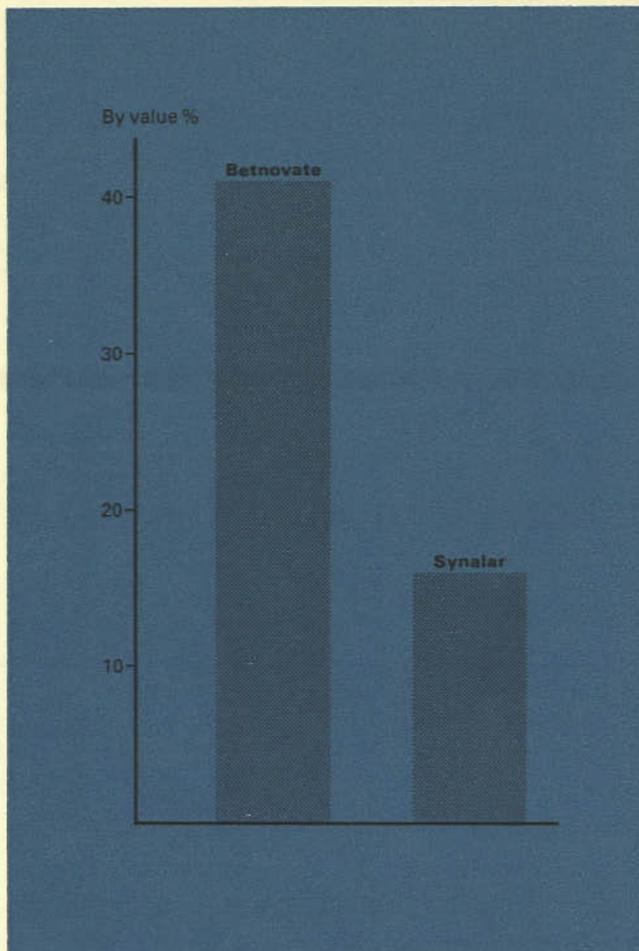
Against this background, one can now postulate certain types of market behaviour assuming different balances of price/effectiveness between successive new entrants into a particular therapeutic sub-group.

First, there is the outstanding innovation which will achieve rapid market success despite being priced relatively higher than existing less effective competitors. Figure 2 illustrated just such an example. Here a Merck Sharp and Dohme innovation in the treatment of hypertension quickly established a substantial market share despite its high price. It was able to maintain its resulting market leadership over a number of years. Second, there are the examples of high-priced innovations with little or no therapeutic advantage over existing therapy. These in consequence achieve negligible sales. Anyone familiar with the pharmaceutical industry can quote an embarrassing number of such market failures, but it would be invidious to name examples from specific manufacturers in this paper. However, the way in which these failures can occur will be discussed in some detail later.

The third type of market behaviour is crucial to the general argument. This is especially so since the very existence of such cases is sometimes denied. These are the examples where an essentially 'me-too' innovation, with no distinctive advantage over competitors already established on the market, nevertheless outsells the original simply because it is more modestly priced. A classic example comes from the topical corticosteroid market. In the early 1960s ICI Pharmaceuticals marketed Synalar, a steroid sold under licence from Syntex. It was a significant advance over hydrocortisone. Hence it quickly established a substantial share of the market despite its much higher price. Shortly afterwards Glaxo introduced Betnovate. It could not be claimed to represent a distinctive advance over Synalar, and the two compounds were generally regarded as therapeutic alternatives of broadly equivalent value. However, Betnovate was introduced significantly below the price of Synalar. Figure 9 shows one of the British government's Bar Charts which are distributed to all general practitioners to show comparative costs of different treatments. This illustrates the significant price difference between hydrocortisone and the more expensive later innovations. It also shows the price differential between the first entrant of the new generation of steroids, Synalar, and its subsequent competitor, Betnovate. Figure 10 shows their eventual market shares. This illustrates two points. The new generation of steroids as represented by



10 Share of topical cortico steroid market, UK Jan–Sept 1974



Synalar and Betnovate had captured almost 60 per cent of the market despite being much more expensive than hydrocortisone. Thus a high price had not prevented a better product from being prescribed. But between the two closely competing alternatives, the less expensive one held almost three times as large a market share as its more expensive competitor. It is almost impossible to escape the conclusion that price has had a decisive influence on market performance exactly as would have been predicted in such a situation under the theory of 'price and performance' competition. Ideally, to maximise their return ICI should have followed the principles of parallel pricing in the way that was discussed earlier. However, in this case the competitive position was complicated by one firm being an original innovator and the other a licensee.

This case introduces another important factor. This is the role of sales promotion in stimulating price consciousness among doctors and in fostering effective price competition. The intuitive sales approach of the Glaxo medical representatives must have been to emphasise the similarity in therapeutic activity between the two products, and at the same time their difference in price. Thus, it can be argued that any limitation of sales promotion activity will tend to reduce the effectiveness of price competition, whether resulting from price differences or from price reductions. Once again this would be in accordance with the principles of 'price and performance' competition.

The fourth main pattern of market behaviour is the parallel pricing which has already been fully described. It is, however, worth quoting one current example. This introduces the relationship between manufacturing cost and lowest practicable selling price – that is the 'base price' which has already been described in respect of a market operating under the rules of 'price and performance' competition. This in turn relates back to the experience of companies who have failed with trivial innovations introduced at high prices. There is a very large market for anti-inflammatory agents in the treatment of joint disease, and a number of companies working on parallel lines of research introduced compounds in this field during 1973 and 1974 which were much less toxic than those previously available. Figure 11 shows the comparative cost of weekly treatment for the four leading products in Britain based on the dosage regimen used at St Bartholomew's hospital in London. The compounds are coded as the market performance data which are also shown in the

Figure are more or less current and hence confidential. Product A was introduced first, and Products B and C were more or less parallel priced. The latest entry, Product D, however, stands out as being more expensive. As far as relative therapeutic efficacy goes, a clinical trial undertaken at St Bartholomew's has suggested that there is considerable individual patient variation in response to the different compounds so there is a useful place in therapy for all of them. However, on an overall view there are only small differences in their relative efficacies.²⁵

In this situation according to the Kefauver model of 'administered prices', under which price competition is considered to be absent, Product D should be achieving the largest sales. This is partly because its return per unit prescribed is greatest. More importantly it would be because according to the critics' theory the high price of Product D should have provided an extra margin to be spent on sales promotion and this should have 'bought' an extra market share. In fact, the respective market performances of the four products are the reverse of this prediction.

It is obvious that Product D is not performing according to the Kefauver model. It has less than a quarter of the market share of its nearest rival, and less than one-tenth of the market share achieved by the first two entrants. This is not merely because its market share has not yet developed. Products B and C had both reached their peak market share within the length of time that Product D had been on the market when the Figure was prepared. Once again the theory of price competition seems to be fully supported. Clinically, there is nothing wrong with Product D. However, its high price appears to have killed any prospects of success, exactly as would have been predicted.

The most interesting feature of this particular market, however, is not the fact that it so strongly supports the theory that, other things being equal, a high price is an obstacle to market success. It illustrates beautifully (as will be shown in the next two paragraphs) the establishment of a 'price base' under the 'price and performance' rules of competition, below which no innovator can afford to sell.

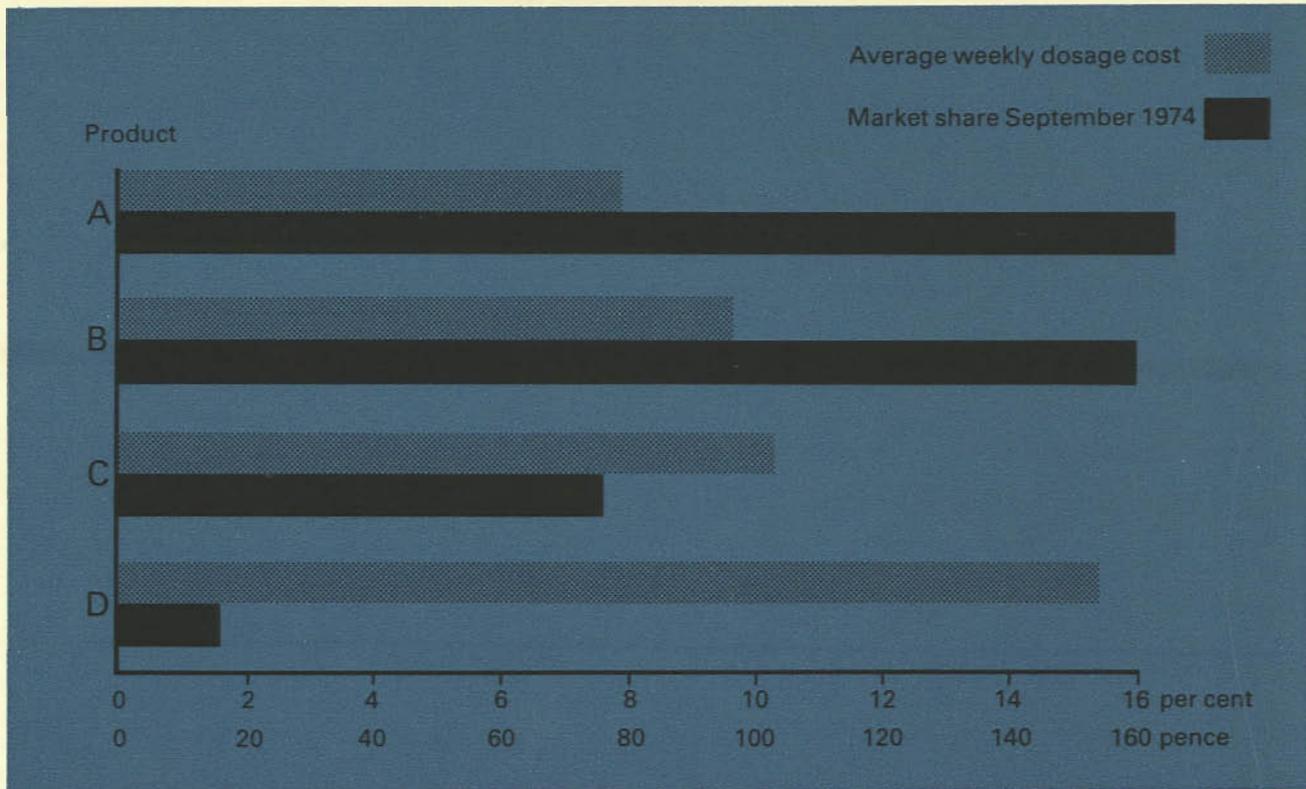
In the early stages in the development of this new generation of anti-inflammatories, an expanding market predicated a policy of parallel pricing. However, as dosage must be individually titrated in response to patient reaction, precise price comparisons in relation to normal dosage would be less easy than in the case, for example, of the identically sized tubes of topical corticosteroids.

Hence in this case a 20 per cent difference would not initially have been perceived by the prescriber as significant. It is also possible that the company which introduced Product A may have been less active than it should have been in using their small but significant price advantage as a promotional argument. In an industry which has been indoctrinated by its critics into believing that price competition is more or less absent this would have been understandable. Thus preparations whose weekly cost was in the range of 80–100 pence were probably perceived by prescribers as being parallel priced, while Product D, at about twice the price of Product A, seems to have been regarded as too expensive.

The market is now well-established and any additional new entrant faces an even harder challenge. They would probably find it difficult to carve out a worthwhile market share even if they were to price parallel to the market leaders. To achieve success they would need either a significant therapeutic advantage or a substantial price advantage. Faced with this situation, one company which has completed clinical trials is confronted with an apparently insuperable problem. They have a product with no distinctive advantage, but which consists of a complex chemical compound, which has to be given in fairly high dosage. Hence on the basis of initial pilot scale production costs it cannot economically be sold below the 80–100 pence price range. Indeed, based on actual costs the company would like to market it at a price even higher than that of Product D. If they do so they will almost certainly do no more than add to the list of expensive failures referred to earlier, which already looks like including Product D. On the other hand it would be a reckless gamble for the company to come in below existing prices effectively selling at a loss, in the hope that its price advantage would eventually lead to a scale of production with which its low-priced sales would become profitable. Even if the company were to adopt this policy, it is possible that the established manufacturers could at least temporarily undermine the new entrant's price advantage by cutting prices themselves – given the economies of scale which they already enjoy. This would be in accordance with the pattern of price competition already described. In effect, the new entrant would have tried to enter the market with a product which would have been priced below the 'price base' which had been established under 'price and performance' competition. The putative new entrant at this

25 Huskisson E C, (1975). Private communication.

11 Anti inflammatory agents



uneconomic price would have risked bankrupting itself and at the same time would have undermined the financial basis for future successful innovation by its competitors.

Another recent example in which chemical manufacturing cost seemed likely to prove a bar to entry at a commercially viable price was with a urinary tract antiseptic. This once again involved a high dosage of a complex chemical. At one stage the company which had developed it took the view that its selling price would have to be so far above that of the current market leader that its therapeutic advantages would not be great enough to motivate doctors to change their pattern of prescribing. It was only when an improvement in the chemical synthesis resulted in a lower manufacturing cost that the company decided to go ahead after all with the marketing of what became a valuable new medicine.

Returning to the example of the anti-inflammatories, in many ways it appears to provide a realistic and practical explanation as to why the two exceptions, the broad spectrum antibiotics and the benzodiazepines, had established such an invincible market position. Like the first three anti-inflammatories, they were selling – as they claimed – at a truly ‘competitive’ price. There was complete freedom for anyone else to enter their market, but the original innovators’ lead over their competitors and the market share they had been able to build up because of their price meant that further competition could only come from another major innovation rather than a mere ‘me-too’ development. This major innovation could come, of course, either in the form of a therapeutic advance or as a new product produced by a radically less costly manufacturing process. Incidentally, the opportunity to compete in this way through manufacturing costs negates another criticism of the industry. Contrary to past allegations companies do indeed have a very real economic incentive to manufacture at the lowest possible cost.

This interpretation of the situation in respect of the antibiotics and tranquillisers provides an interesting echo of the discussion of excessive profits by the Sainsbury Committee. Paragraph 135 of their report stated that:

‘It is much more difficult to ensure the special incentive that may be required to push effort in particular directions which may be especially important, but lengthy and with a higher risk of failure, without at the same time creating at least the appearance if not the reality of ‘unreasonable’ profits.’

The lesson of the anti-inflammatories indicates that one has to be into the market quickly to earn the

large rewards. The latecomers often get nothing. Thus the level of profit earned under the typical ‘price and performance’ competition of the prescription medicine market should be seen as an economic reward for bringing therapeutic benefits to patients more rapidly and for pricing them reasonably. The apparently unreasonable profits which Kefauver and the Sainsbury Committee observed from the antibiotics and tranquillisers respectively were precisely the sort of rewards which the Sainsbury Committee had itself concluded to be necessary in order to stimulate valuable but difficult research.

The theory of ‘price and performance competition’ in the prescription medicine market and its practical consequences in relation to a product’s market success can be summarised very simply (Figure 12). A major innovation may be priced high with a good prospect of success; however, a minor innovation at a high price will probably be a failure. A minor innovation must be priced low to be successful. But if a major innovation in a large potential market is also priced low, and here Valium and Librium are the supreme examples, it is likely to lead at least to the appearance of unreasonable profits, exactly as the Sainsbury Committee anticipated. The longer the lead which a company has ahead of its competitors in making such a major breakthrough, and the more reasonably the products are priced, the greater is the chance of a company achieving that sort of exceptional success. If the possibility of these exceptional and apparently unreasonable rewards is eliminated by price controls, the incentives to discover quickly and to sell cheaply will also be eliminated. This is the nub of the argument for allowing unregulated price competition between innovators in order to stimulate successful and economical therapeutic progress.

12 Outcome of pricing strategy

Major innovation	▶	High price	▶	Success
Minor innovation	▶	High price	▶	Failure
Minor innovation	▶	Low price	▶	Success
Major innovation	▶	Low price	▶	'Unreasonable profit'

Pricing in relation to patent expiry

So far this paper has been concerned mainly with the way in which the prices of prescription medicines are determined by the competitive process both at their time of introduction and during the relatively early stages of their life. Before enlarging on the implications of this argument as it relates to government price regulatory agencies, it is useful to look briefly at the way that the market behaves when pharmaceutical preparations reach the end of their spell of patent-protection and when they may be translated from being specialty products into being commodities. For the great majority of products, sales at this stage in a product's life will be relatively modest, either because they were never an outstanding success or more often because they have been superseded by subsequent innovations. In addition, the profitability of medicines at this stage will usually have become fairly low, because cost-inflation in conjunction with constant or declining prices will have eroded the original profit margins. For such products the end of patent protection is in practice a non-event. It is not worthwhile for any other company to try to take a share of the limited market either with a new competing brand or with a generic version. It is economically impossible for a new competitor to sell at a significantly lower price and hence there is no incentive for prescribers to switch away from the original manufacturer's product, in which over the years they have established confidence. However, there is a much-publicised minority of medicines which still have very substantial and very profitable sales when their patent expires. This situation may provide considerable scope for new brands and for generic versions to gain a share of their market. The expiry of the oxytetracycline patents or those for imiprimine provide obvious examples. As a company approaches this situation with one of its products, it can adopt one of two alternative pricing strategies. It can hold its price at the level effectively set by 'price and performance' competition up to the last possible point in time. If it does this, it can expect much cheaper competitors to make dramatic inroads into its market share from the moment the patents expire, as happened with the Terramycin brand of oxytetracycline in many countries. For a company which is largely dependent on a single product or a small group of products this can be an extremely traumatic and potentially catastrophic experience. Hence many companies feel it more prudent to adopt the alternative pricing strategy. This involves gradually lowering the product's price from the effective level under 'price and performance'

competition to the level which the company judges to represent a competitive price under the rules of 'common commodity' competition. By doing this, the manufacturer will have created a situation similar to that with any run-of-the-mill minor product when its patent expires. No competitor will be able to undercut or even to match the originator's price, because his economies of scale in production will give him a decisive advantage. He cannot, however, unreasonably exploit this happy situation because the rules of 'common commodity' competition will always remain in operation as a safeguard.

There is a place for economic studies, which are outside the scope of this paper, to consider the relative benefits for the firm and for society from these two alternative pricing strategies during the transition from 'price and performance' to 'common commodity' competition.²⁶ They have been mentioned here mainly for the sake of completing the picture of the way in which competition in the prescription medicine market determines prices. It will, however, be clear that if a company adopts the first pricing strategy, the price reductions when the patents expire may be dramatic. But this in no way invalidates the earlier argument that effective and appropriate price competition was in operation during the period of patent protection, when innovations need to be sheltered from unbridled competition and when their manufacturers can be expected to compete only in a league with other innovators.

Nor, incidentally, is the Canberra Hypothesis in any way invalidated by evidence recently advanced in the United States.²⁷ This suggested that the originator's brands, which were still selling at high prices compared to the 'common commodity' competitors after patent expiry, could in practice continue to hold a large market share. This merely means that in the United States the prescribers' brand loyalty which was built up with the support of patent protection has persisted, even after the patent has expired. It tells one nothing about prescribers' attitudes to price when the medicine was first introduced, which is the theme of this paper.

²⁶ The statistical base from which such studies could begin were given in the Technical Appendix on page 9.

²⁷ Brooke P, (1975). Study on Antibiotic Markets. Council on Economic Priorities, New York.

Implications for price regulation schemes

What, then, are the policy implications from this new interpretation of the way in which corporate strategies and competitive pricing policies effectively shape the market for prescription medicines?

In Britain the Voluntary Price Regulation Scheme is based on the assumption that normal competitive forces which would effectively determine prices and hence ensure industrial efficiency are weak or absent in the prescription medicine market. It also by implication assumes the principle that a government-funded health service has a responsibility to override market forces and to determine 'reasonable' prices according to a set of formulae related, *inter alia*, to profitability and sales promotion expenditure. It is perhaps appropriate to deal with this latter principle first because it sets the background against which the appropriateness of a price regulation scheme may be judged.

It is sometimes supposed that in centrally directed economies, normally termed command economies, or in central government controlled sectors of otherwise decentralised economies (such as the National Health Service) there is no place for the concept of price competition or the market model. Yet as long ago as 1938, the Marxist economist Oskar Lange challenged this proposition in his paper *On the Economic Theory of Socialism*.²⁸ He argued that price systems (reflecting the precepts of the classical micro-economic distributive model of the market) can play just as relevant an economic role in centrally directed command economies as they can in free markets or decentralised systems. More recently in 1949, von Hayek²⁹, argued too that the price mechanism was essentially non-political in concept and in its effect upon the allocation of resources.

In 1973, the economist Samuel Brittan supported this proposition in his book on *Capitalism and the Permissive Society*.³⁰ He went further and argued that normal market forces could be more effective than centrally directed and politically motivated bureaucracies in achieving an optimum use of scarce resources. In a somewhat barbed comment he pointed out that the market 'reduces the number and range of decisions which have to be taken by coercive organs after a struggle for votes, power and influence'. It seems, therefore, that there is a wide spectrum of political economic opinion which would agree that if price and profit signals are working effectively either in a centrally directed or a free enterprise economic system there is no need for political or bureaucratic interference such as that implied in any government regulatory scheme. The creation of a 'perfect market',

reflecting theoretical and abstractly based ideas of optimal resource allocation, through bureaucratic control is a chimera.

Returning, then, to the first issue, the question remains whether or not market forces effectively determine competitive prices in respect of medicines supplied through the National Health Service. This paper has produced evidence to suggest that they do, and it has been recorded that a more rigorous economic study is being undertaken to seek formal proof of this hypothesis. In the meantime, therefore, there appears to be a case for great caution in bureaucratic interference in the pricing and in other economic controls in the pharmaceutical market. The Kefauver conclusion that pharmaceutical companies have been free to 'administer' prices must, to say the least, now be seen as 'not proven'.

Furthermore, the Sainsbury Committee, unlike Kefauver, examined a situation in which medicines were normally paid for by the State. Hence the Committee may have been influenced in making its criticisms not only by Kefauver's philosophy of administered prices but also by a residual suspicion that the existence of the National Health Service itself might have reduced the effectiveness of competition. In fact, they should in this respect have looked back to the experience under the earliest vprs. This clearly implied that pressures on prescribers under a publicly financed health scheme had already sharpened price awareness and hence stimulated price competition rather than the reverse. The British Department of Health Bar Charts, such as the one illustrated in Figure 9, are only one of several forms of persuasion being applied to British doctors to encourage them to be economical in their prescribing. Hence if the market can establish competitive prices in the private sector, it is likely to do so even more effectively in relation to a publicly funded health scheme. The evidence quoted in this paper suggests that this is indeed the case. This conclusion is also strongly supported by the study of international pharmaceutical prices undertaken by the Coopers for the Pharmaceuticals Working Party of the Chemicals Economic Development Committee.³¹ This showed that in 1970 Britain was clearly one of the lowest priced among the nine countries in

28 Lange O. *On the Economic Theory of Socialism* in Lippincott B E, *On the Economic Theory of Socialism*. University of Minnesota Press, 1938. Pages 57-90.

29 von Hayek F A. *The Use of Knowledge in Society*, In *Individualism and Economic Order*. Routledge & Kegan Paul, 1949. Pages 77-91.

30 Published by MacMillan.

31 Cooper M H and A J, (1972). *International Price Comparison*. National Economic Development Office.

which the prices of prescription medicines were compared.

Nevertheless, it would be wrong to go on to argue that the British government should be expected to relinquish all interest in pharmaceutical pricing. First, it is obviously necessary to await the results of the more stringent economic analysis of the market behaviour which is being undertaken by Reekie, in order to see whether this provides a further indication that competition alone is sufficient to safeguard the public interest in respect of pharmaceutical prices. Second, the political reality is that even provided with a firm proof of the existence of effective price competition many people will probably continue to view the multinational pharmaceutical industry with suspicion. Thus a degree of frankness between the suppliers of prescription medicines and the Government Department meeting their cost is likely to remain a political necessity. Third, there is another important consideration which provides justification for public surveillance of pharmaceutical prices.

It has been pointed out that a lower price may significantly increase a new product's market share if the potential savings in prescribing costs are advertised to doctors. There are also cases where a significant price reduction for an existing product can, if it is well publicised, considerably increase sales. Indeed, it has been argued that restrictions on sales promotion would be likely to reduce the effectiveness of price competition in such situations.

However, in the case of price increases the manufacturer has no corresponding motive to advertise to prescribers. Admittedly, his competitors do have such a motive; but even the publicity which competitors may give to such price increases, either directly or indirectly, may have little influence on the prescribing habits which doctors have already established. Thus the government has a social responsibility in relation to proposed increases in pharmaceutical prices.

They must ensure both that the increase appears justifiable in terms of the economics of the company and, if appropriate, they must also ensure that prescribers are made aware that their prescribing costs may have been affected.

Beyond this, in line with the economic philosophy of Lange, von Hayek and Brittan, the Government needs to exercise caution in interfering with the normal market operation in the determination of competitive prices for prescription medicines. As the Sainsbury Committee pointed out, apparently unreasonable profits can be a necessary incentive to innovation. The Government should be more cautious in future in reacting to ill-informed public

opinion which may have been influenced by the sort of misinterpretation of the situation in which the Kefauver hearings specialised. Nor need it be influenced by the doubtful doctrine that free markets and price mechanisms are inimical to a sound economic relationship between the pharmaceutical industry and the National Health Service.

There is at the moment real concern that the operation of the latest Voluntary Price Regulation Scheme, which now appears to have been based on a fundamental misconception of the market situation, may have brought British pharmaceutical prices down to a dangerously low level. The Government should consider seriously whether the re-introduction of more natural market influences may not in the long-term be to the greater public good.

