In the second part of their trilogy, Simon Carne and William Letwin look at the methodology of patent damages claims analysis and show how it can assist the courts in their computations

Patent infringement damages: how are they calculated?

In the first article in this series we looked at the relevance of economics to patent infringement disputes and showed how economics can assist litigants and the courts to resolve the damages issues. In this, the second article of three, we outline the economic analysis of a patent infringement claim.

The analysis of damages in a patent infringement case can conveniently be sub-divided into four tasks:

- To establish the actual sales and profits of the patentee and the infringer during the period of infringement. This is done by ascertaining the prices at which the parties sold their goods, the quantities they sold and the costs they incurred.

- To determine the profit that the plaintiff would have earned "but for" the competition by the infringer. Establishing this figure is, of course, the key to the plaintiff's claim for lost profit and, conversely, to the defendant's counter-arguments as to the appropriate award.

- To determine what proportion of the infringer's sales were "self-generated", by investigating the effects of his marketing efforts. The patentee cannot claim lost profits in respect of sales that the infringer generated by his own efforts, but can claim royalties.

- To consider what royalty rate the defendant should pay in respect of his "self-generated" sales.

Sales and profits

Actual

The data concerning prices, costs and volume of sales derive from the accounts of the parties. Broadly speaking, economists would handle this data in the same way as lawyers, their clients, or their clients' accountants and there is no need for further discussion on this point.

Hypothetical

To determine what the plaintiff's profit would have been in the absence of infringement, three critical questions must be addressed:

- What is the relationship between price charged by the plaintiff and quantity sold, *ie* how much could the plaintiff have sold at various prices? Answering that question enables us to calculate the gross turnover he could have earned at various possible prices.

- What is the relationship between total costs and quantity sold?

- Given the answers to the two prior questions, what profit would the plaintiff have earned — in the absence of the infringer — if he had priced the product at a commercial level?

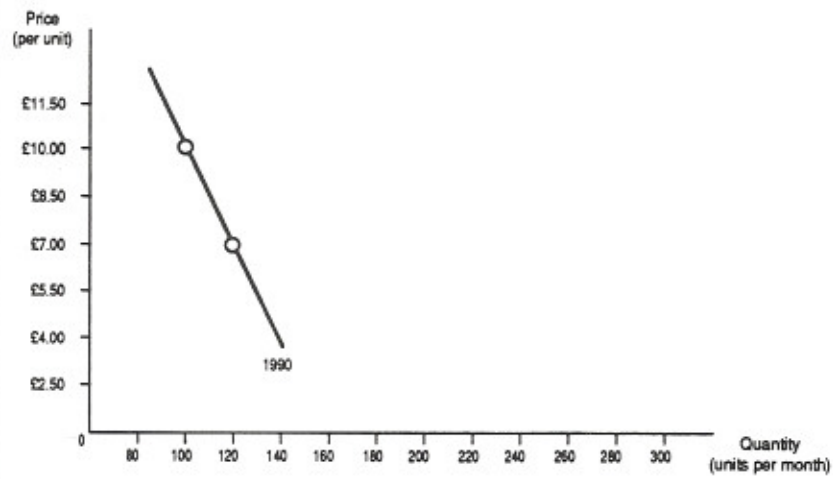
The first question, concerning the relation between price and quantity, is one that economists habitually analyse by reference to what are called "demand curves". One such curve is shown in Diagram 1. It represents something that practically everyone knows from everyday experience: in the absence of special circumstances, the higher the price charged, the smaller the quantity of it that will be sold, as some customers are deterred from buying the product at all and others buy less of it.

The numbers on the graph, which are purely illustrative, show that if the price of the good in question were lowered from £10 per unit to £7 per unit, the quantity sold would rise from 100 to 120 units. If, conversely, the price were raised, the volume of sales would decline.

When the economist sets out to determine what profit the plaintiff would have earned, in the absence of the infringement, his first step is to ascertain the specific shape and position of demand for the plaintiff's product.

In other words, how much would the quantity change for a given change in price, and what is the relationship between quantity and price at any given point on the curve. Also, if the infringement spans a number of years, it will be important to know how the demand curve has changed over time (see Diagram 2).

1: The higher the price, the lower the output



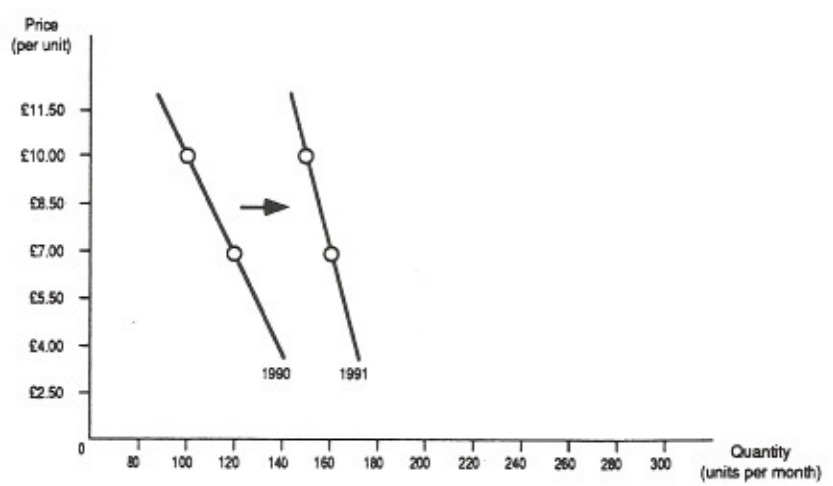
This task can be done relatively easily — though never altogether easily — if the plaintiff had been selling his product for some time before the defendant began infringing. If that is the case, then data is available for determining what has been the shape and position of plaintiff's demand curve at successive moments in that pre-infringement period. Statistical analysis applied to such economic data, analysis known as econometrics, can deliver a projection of demand for the plaintiff's output as it would have been in the absence of the infringer.

The task is slightly more difficult where the plaintiff had not established a track record before the infringer appeared. In such a case, nevertheless, the elasticity of demand for the plaintiff's product can be inferred from the known or ascertainable elasticity of demand for similar products, guided by the economic expert's experience and knowledge of such matters. As to the hypothetical position of the demand curve, that can be inferred by reasoning from the actual demand for both the plaintiff's and the defendant's products.

Turning now to the second question, what are the costs that the plaintiff would have incurred in the absence of infringement in producing the output demanded. This would be answered by econometric analysis of the plaintiff's actual costs in the past. The result would be a reasoned, defensible judgment about the plaintiff's hypothetical cost, in the absence of infringement.

And the final step is to determine from the projected demand and costs what profit the plaintiff would have earned in the absence of infringement. Now it happens that, for any given structures of demand and of cost, there is some price and a quantity associated with that price, which would produce the highest level of profit that the plaintiff could achieve. This figure is a definite benchmark in estimating the profits that plaintiff lost as a consequence of the infringement.

2: How infringements span the years



The infringer's own efforts

How much of the infringer's sales were due to his own marketing efforts and advantages? This is an issue hotly debated by the parties. As usual, such debate tends to produce more heat than light. Economic analysis may shed somewhat more light.

For instance, suppose that the defendant offers evidence about the relationship between his advertising expenditures and the volume of his sales. Diagram 3 shoes how this might look. On the face of it, this might be taken to show that sales peaked shortly after each vigorous advertising campaign. Also, it shows, or seems to show, that the rising trend in the defendant's sales was closely associated with his cumulative advertising expenditure

over the period. If uncontested, this evidence might stand as part of the defendant's argument that he generated a certain volume of sales by his own efforts.

But it is important not to jump to conclusions. The fact that two variables move together does not mean that one caused the other. The famous example amongst the academic fraternity is the rise in teachers' salaries which is closely correlated with the consumption of alcoholic bevefages.

Rather than suggesting that teachers are spending their additional income on the consumption of alcohol, closer analysis suggests that both factors are related to a third one, *viz* a general increase in incomes in the population — so people buy more alcohol (and other consumer items too) and teachers are paid more to reflect society's view of the amount that should be spent on education.

In the case illustrated in Diagram 3, an expert might be able to show that the trend in sales was more plausibly attributable to increase in overall consumer spending on goods of this sort than to the defendant's advertising expenditure. The matter needs to be looked at very carefully. Although the self-generated sales issue can be very complex, econometric analysis of relevant data may fortify intuitive presumptions or may cast heavy doubt on them.

When the economist sets out to determine what profit the plaintiff would have earned, in the absence of the infringement, his first step is to ascertain the specific demand for the plaintiff's product

The appropriate royalty rate

The royalty that a court will award to the plaintiff in respect of the defendant's self-generated sales is governed by a straight-forward rule of law. The rate is that which would have been agreed by a willing licensor and a willing licensee.

One guide to the appropriate rate, in accordance with that rule, is the "going rate" — the rate previously agreed between this plaintiff and the person or persons whom he has licensed to make and sell the patented good. If such a "going rate" exists, it will be applied in an infringement case — unless one of the parties can persuade the court that in the particular circumstances of the case some other rate is more appropriate than the going rate.

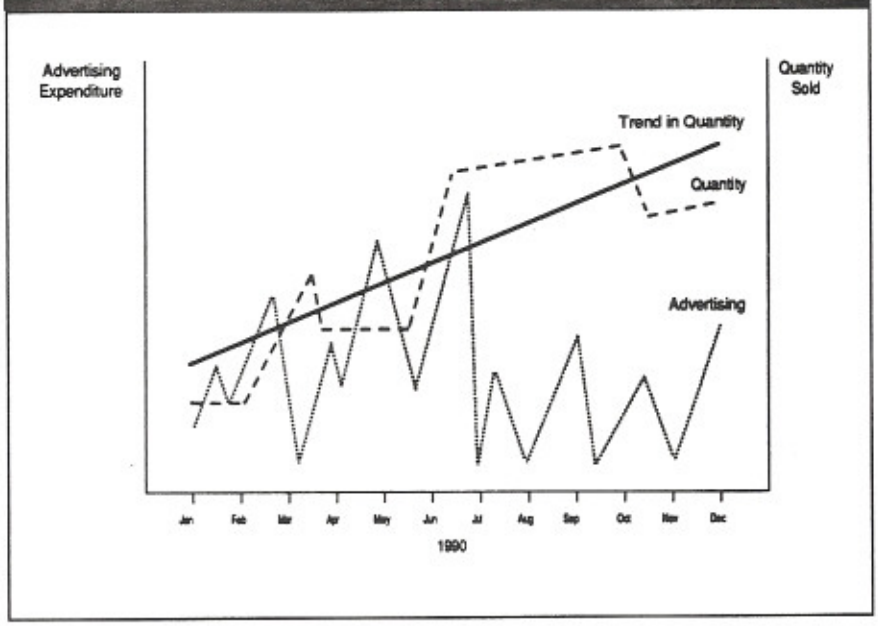
But a greater difficulty arises where there is no going rate, because the plaintiff has never licensed or even offered to licence any competing producer of his patented good. Then the court must decide what rate would have been agreed between the plaintiff and the defendant, had the latter taken a licence rather than infringing.

Now a fundamental premise implicit in the willing buyer/willing seller rule is that the lowest rate that the seller would accept is lower than the highest rate the buyer would accept. This is a common enough phenomenon that many of us experience, for example when haggling with a car dealer. We all know that the list price is negotiable downwards. If a customer is prepared to pay up to £13,000 for a particular car and the dealer's minimum price is £12,000, they can deal — somewhere in the range £12,000-£13,000. But, if the dealer's minimum price is £13,500, they cannot agree because the customer's maximum price is £500 *below* the dealer's minimum.

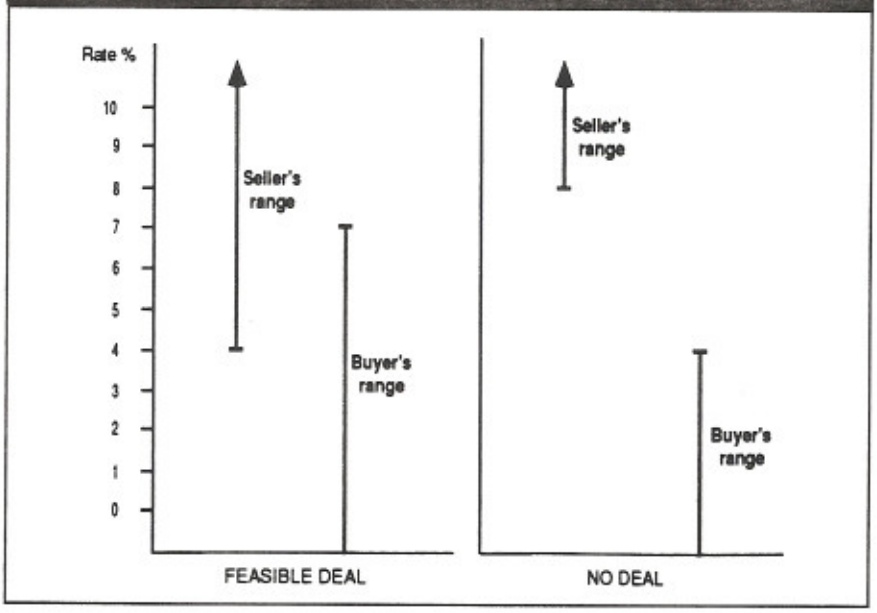
In the case of patents, this condition is illustrated in Diagram 4. In the left panel, the seller would take a royalty of 4% or more, the buyer would take 7% or less — so a feasible bargaining range lies between 4% and 7%, and a meeting of minds can be arrived at. However, it is also possible that the least the seller would take is higher than the most that the buyer would give. If so, there is no feasible bargaining range, and no bargain will rationally be struck.

Now what happens in a patent infringement case if the no-deal

3: Correlating sales with advertisements



4: Sriking a deal — but where?



condition applies? We know what did happen in at least one case, the leading case of *Catnic Components* v *Hill and Smith* (1983). There the plaintiff maintained that a royalty rate of 20% of the defendant's gross sales would be appropriate, because the plaintiff earned a profit margin of almost 25% on its own sales. The defendants contended that the rate should be at most 2.5%, because that was all that they saved in production costs by infringing. Mr Justice Falconer decided that "looking at the matter as a jury sort of question", a fair and reasonable rate pre-tax would be 10%.

It is not for mere economists to question Mr Justice Falconer's decision. But in instances which *appear* to fit the "no-deal" type, economic analysis might help lawyers and their clients. It might be able to show that the rate contended by the plaintiff was unreasonably high in view of economic circumstances in that market. Alternatively it might be able to show that the rate said by the defendant to be his maximum offer was unreasonably low. So even in this "jury sort of question" economists might help the parties — and the court — to a somewhat more precise delimitation of the real gap between the plaintiff's reasonable minimum and the defendant's reasonable maximum. This issue has arisen in the US Courts and is often referred to economists for expert guidance.

 Simon Carne is a principal and William Letwin a senior adviser in Putnam, Hayes & Bartlett, Economic and Mangement Council.