On the Use of Economic Models in Antitrust:

The Realemon Case

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1. Introduction

This essay deals with the appropriate use of economic models in antitrust analysis. It does not attempt a comprehensive treatment. Rather, after a few general remarks, some aspects of this broad issue are illustrated through consideration of economic issues arising in the Federal Trade Commission's recent proceeding involving Borden's Realemon Foods subdivision.¹

If antitrust is to be concerned, at least in part, with efficient resource use,² any judgement, whether by court or commentator, that some action should be found unlawful or some relief imposed in any particular case must be based, at least in part, on some explicit or implicit model that predicts the economic effects of the action or relief considered. Unless economic efficiency is held to be of no importance, one can no more avoid the use of economic models in this context than one can avoid speaking prose. One can, of course, use an unsound or inappropriate model. I hope to indicate that this is most likely to happen when the model selection problem is either ignored or treated as if it can be solved by the application of simple rules of thumb.

If a model is to be used to make predictions about economic effects, it ought to be internally coherent, in the sense that its predictions can be correctly deduced from its assumptions, and consistent with the general principles of economic analysis. It has often been noted that some economic models regularly used by the courts fail this basic test.³ Further, the model's predictions should not conflict in important ways with the facts at hand. If enough data of the right sort are available, or if controlled
experimentation is possible, one can in principle select the best among a set of competing models entirely on the basis of the accuracy of their predictions. But in the analysis of individual markets that is at the heart of antitrust, this is not always feasible. Under both monopoly and competition, for instance, profits can be high in the short run, cost increases can produce price increases, and, except in the limiting case of pure competition, advertising can occur. If definitive model selection on the basis of prediction accuracy alone is impossible, one has little choice but to look at the assumptions on which competing models rest. A model with assumptions that are in dramatic conflict with the relevant facts ought to be rejected as a basis for decision-making if its predictions cannot be shown to be inferior to those of a competing model with more plausible assumptions.

Over the years, economic theorists have produced a large number of models of market behavior. The principles and methods employed in these studies can be used to produce new models, either designed for general application to some class of situations or tailored to fit the facts of a particular case. The industrial organization literature contains another set of models. These often have their roots in rigorous microeconomic theory, but many depend as much on empirical generalizations of various sorts. The classical models of competition and monopoly are now only two of a large number of more or less respectable economic models that can potentially be used to inform antitrust policy. To limit attention to these two models, or to attempt to go beyond them without explicitly considering the criteria of the preceding paragraph, may be to run the
risk of significant error.

The size of this risk must, of course, vary from case to case, Areeda (1974, p. 5) may be correct when he asserts that "... the economic background needed for understanding antitrust issues seldom requires detailed mastery of economic refinements." Even if this is right, however, it is not clear how one without such "detailed mastery" can recognize the exceptional cases, let alone deal adequately with them.

It would thus be useful to have a set of tests for distinguishing between (a) cases that can probably be adequately analyzed by straightforward application of the tools given in basic price theory and industrial texts and (b) cases in which the model selection problem is likely to be sufficiently difficult as to require explicit comparison of competing theoretical models. Adequate analysis of cases in class (b) may entail heavy reliance on the principles and methods of economic theory and, possibly, the creation and evaluation of new economic models. (It is, after all, somewhat optimistic to suppose that currently-available models will be able to answer all future questions, so that no more work on the theory of markets will ever be necessary.)

I do not know if it is possible to sort cases into these two classes without "detailed mastery of economic refinements" and detailed knowledge of the facts involved. In any event, I have no simple, general tests to propose. But elementary logic does indicate that the more the facts in any particular case depart from the assumptions of textbook microeconomics, the less likely it must become that the textbook models are adequate or that choice among them will be easy. In particular, textbook price theory
assumes that markets are well-defined, that buyers and sellers are perfectly informed, and, generally, that the offerings of competing sellers are viewed by buyers as perfect substitutes. When substitution relations are such that there is no object that corresponds exactly to the classical concept of a market, when buyers or sellers lack important information, or when product differentiation of one form or another is present, there is at least a presumption that market behavior may not be well explained by standard models. This does not imply that no economic model can be employed; as was pointed out above, the necessity to reach conclusions means that some model must be used explicitly or implicitly. It does imply that the task of selecting an appropriate model is likely to be difficult and, if the best model is not of the elementary textbook variety, application of that model is likely to require some knowledge of the "refinements" of economic theory.

In what follows, I attempt to illustrate some of these points through an analysis of the economics of a specific recent antitrust decision: the Initial Decision of Federal Trade Commission Administrative Law Judge Daniel H. Hanscom, which concluded that Borden's Realemon Foods subdivision had monopolized the processed lemon juice market. The next Section outlines the apparent facts of the case. Sections 3 - 5 consider three issues of importance in that case and in others: market definition and its role in the analysis of market power, tests for predatory pricing, and the design of relief. Section 6 provides a few summary remarks.
2. The Realemon Case

In 1935, Irvin Swartzberg began bottling lemon juice in his basement and selling it in Chicago. He began using the "Realemon" trademark in the mid-1940's. The business grew rapidly, and in 1962 Swartzberg's company, Realemon-Puritan, was acquired by Borden, which paid $12.4 million for net assets with a book value of $2.8 million. Borden's books thus showed a $9.6 million "goodwill" asset for this operation.

If one defines nationwide sales of either processed lemon juice (i.e., lemon juice sold except in the form of fresh lemons) or reconstituted lemon juice (described below) as the relevant market, Realemon brand reconstituted lemon juice seems to have maintained about a 90% share through the 1960's. On the other hand, if the market is expanded to include fresh lemons, Realemon's historic share would drop to something below 30% on a gallon basis and below 10% on a dollar basis.

After 1952, Sunkist brand reconstituted lemon juice seems to have achieved a fairly wide distribution. During the period, Realemon charged a lower list price in the eastern U.S. than elsewhere, the stated purpose being "to more closely meet the Sunkist price" there. In 1958, Sunkist cut back its reconstituted lemon juice operation because of the "highly competitive" situation it faced; it now sells only in the Southwest.

Realemon was the only brand of processed lemon juice in national distribution during the 1960's, and it was the only brand to which non-trivial amounts of advertising were devoted. (Realemon's advertising/sales ratio was apparently not unusually high.)

If one ignores the "goodwill" asset mentioned above, the rate of return on assets for Borden's Realemon Foods subdivision (the principal
product of which was Realemon brand reconstituted lemon juice, accounting for 75% of its revenue) averaged about 3.3 times that of the Food and Kindred Products aggregate for 1963 - 1973 and about 4.4 times that benchmark return for 1968 - 1973. If Realemon's assets are augmented by the "goodwill" it carried on its books, these multiples fall to about 1.5 and 1.7, respectively. 12

In 1969, Golden Crown Citrus Corporation was a Chicago-based firm engaged primarily in the home delivery of fruit juices in the Chicago area. It was in some financial distress. New top management, with no experience in retail distribution, decided, without doing any detailed market studies, to begin selling reconstituted lemon juice to supermarkets. 13 It encountered no technical problems; all parties seem to agree with the judge's description of the technology involved: 14

Reconstituted lemon juice is manufactured by adding water, a preservative or preservatives, and lemon oil to pure lemon juice concentrate which is purchased in bulk, often in tank cars, by large producers such as Borden. The ingredients are mixed according to a simple, well-known formula, using uncomplicated, relatively inexpensive equipment of the sort employed by any juice bottling operation.

Golden Grown did find, as had all other regional producers, that in order to induce grocers to stock its product and consumers to buy it, its price had to be well below Realemon's. It priced accordingly, apparently making some sales at prices below any reasonable definition of cost. (In addition,
the trial revealed that Golden Crown had lowered its cost by adulterating its product, though Borden's chemists had previously been unable to prove this.) Golden Crown grew rapidly after 1969. Since most grocers seemed willing to carry at most two brands of reconstituted lemon juice, Realemon and a low-priced brand, Golden Crown's initial gains came at the expense of other small producers.

By 1971, however, Realemon began to consider Golden Crown a force to be reckoned with. This perception was apparently correct. Golden Crown entered the East in 1970, the Northeast in 1971, the Southeast in 1972, and the West and Southwest in 1973. In 1973, Golden Crown also acquired a second production facility, in New Jersey. (Realemon had plants in Chicago, New York, and California.) Golden Crown's (gallon) share of processed lemon juice sales rose from virtually zero in 1969 to about 15% in 1974; most of these sales were made in the northeastern portion of the country. (In early 1973, about 55% of Golden Crown's sales were made in the New York, Philadelphia, Chicago, and Detroit areas, versus about 38% of Realemon's.) Over this same period, Realemon's national share fell from around 90% to about 75%.

After 1969, Realemon's list prices were lower in areas in which it faced the most intense competition from Golden Crown and others. (List prices had been the same in all regions of the U.S. in 1967 and 1968.) Realemon's 1971 - 1974 marketing plans reveal a concern with this "low-priced" competition and an intention to use selective discounts off list price (generally in the form of promotional allowances) to deal with it. The 1973 plan announced the objective of regaining half Realemon's 1971 - 1972 share loss, which amounted to about four percentage points on a gallon basis. This was to be achieved primarily by offering selective
discounts in key areas. In fact, Realemon's share fell by another three points in 1973. The 1974 marketing plan called for an increase in list price, but only in areas not much affected by Golden Crown, along with an increase in advertising and discounting in areas where Golden Crown was a factor. That plan stated as an objective the reduction of Golden Crown's share in four "key Districts" (listed in the preceding paragraph) from 18% to 14%, with Realemon's share to increase from 71% to 75%. Various other documents were introduced into evidence that seemed to indicate an intention to attempt to reduce Golden Crown's market share (and to increase Realemon's) in various areas, and thereby to impair Golden Crown's ability to expand in new areas, chiefly by offering selective discounts of one form or another.

The lowest net prices seem to have been paid by the leading grocery chains in Philadelphia and Buffalo, both of which purchased substantial numbers of 12-quart cases of Realemon for $4.05 in December, 1973. (Other stores in these areas paid $4.20 or more.) On the basis of documents from Realemon's files for this period, complaint counsel charged that these prices were below Realemon's average variable cost. But the judge accepted average variable cost estimates, prepared subsequently, of $3.83 per case for Philadelphia and $3.75 for Buffalo. He thus found that these sales, and all of Realemon's other sales, had been made at prices above average variable cost. He did point out, however, that

The $4.05 per case price is close to Realemon's national average per case cost on a direct shipment basis. This cost appears to have been the only data available to
Borden management at the time the subject sales were made.... Thus, at the time of the sales in question, Borden either failed to consider its cost before agreeing to the low sale prices, or knew that it was selling very close to the cost figures reflected in the data that was [sic] then available to it.

Realemon estimated Golden Crown's average total costs as of the end of 1972 for these markets at $3.74; Golden Crown's estimate as of the end of 1973 was $4.00. After receiving the discounts mentioned in the preceding paragraph, both chains sold Realemon at 39¢ per quart. (By comparison, Realemon retailed at an average of just over 60¢ a quart nationwide in early 1973.) With 12 quarts per case, this gave the Philadelphia chain a 10% markup. In this price range, grocers testified that Golden Crown would have had to be 10¢-15¢ cheaper at retail in order to avoid drastic sales losses. Assuming the same grocer markup, this would require Golden Crown to wholesale at between $2.62 and $3.16 per case, well below Realemon's average variable cost and Golden Crown's average total cost. If, as seems to have been the case, grocers demanded larger margins on Golden Crown, it would have had to sell for even less in order effectively to meet Realemon's price. Central to this, of course, is the "premium brand" status of Realemon; Golden Crown simply could not sell its product unless it offered grocers a substantial discount below the Realemon price, even though the two products were virtually identical.
Golden Crown complained about Realemon's pricing to the Chicago regional office of the Federal Trade Commission. After an investigation, the Commission filed a complaint against Borden (Realemon) in July, 1974. Late in 1974, the assets, name, and business of Golden Crown were acquired by a subsidiary of the Seven-Up Corporation. A successor to Golden Crown, G.C. Citrus, retained some of Golden Crown's liabilities and received a cash payment from Seven-Up. At the time of its purchase, Golden's Crown's liabilities exceeded its assets by about $1 million. Subtracting Seven-Up's cash payment from the Golden Crown liabilities assumed by G.C. Citrus yields a net liability of around $600,000. It thus seems that Seven-Up paid about $400,000 for Golden Crown's "goodwill". By comparison, Golden Crown had lost about $500,000 on its operations in the preceding fiscal year.

Trial in this matter began in May, 1975 and concluded in February, 1976. The initial decision of the administrative law judge was handed down in August, 1976. Borden was found to have violated the law:

Respondent Borden, Inc., possesses, and has possessed, a monopoly position and monopoly power in the processed lemon juice market, and has unlawfully engaged in acts and practices with the purpose and intent, and with the effect, of preserving and maintaining that monopoly position and power, and has unlawfully hindered, restrained and prevented competition in the production, marketing and sale of processed lemon juice in violation of Section 5 of the Federal Trade Commission Act.
The acts and practices listed here were maintenance of different list prices and promotional allowances (discounts) in different areas, charging different net prices to different individual customers, and making sales at "unreasonably low prices". Borden was ordered to license the Realemon trademark, at royalty rates designed to cover only the cost of quality control, to all comers for a period of ten years. Borden appealed to the Commission, both briefs were filed by the end of January, 1977, but as this is written, the Commission has yet to hand down its decision.

Of the 204 findings of fact in the Initial Decision, 64 were concerned with the question of whether processed lemon juice was a valid market, the alternative being to include fresh lemons. A similar allocation of effort to this issue is found in the various documents filed by complaint counsel and Borden after the close of trial. The question of market definition is discussed in the next section, along with the basic reason for its perceived importance in this case: the light it presumably shed on Realemon's market power or lack thereof.

A second key issue in this case is whether or not Realemon's pricing was such as to establish monopolization. This topic is considered in light of recent suggestions regarding predatory pricing, and in light of demand conditions in this market, in Section 4.

Finally, the relief ordered in the Initial Decision is somewhat novel and has been the subject of considerable discussion. Some of the economic aspects involved in trademark licensing are considered
in Section 5, where emphasis is placed on the importance of understanding the special features of the situation considered.

3. Market Definition and Market Power

All parties involved in the Realemon litigation seem to have attached considerable importance to the definition of "the relevant market". Nothing in the antitrust statutes compelled this concern; those laws do not mention markets. But the reason for the perceived importance of market definition in this case is clear: if "the relevant market" were held to include fresh lemons along with processed lemon juice, Realemon's market share would be below the minimum levels associated in the case law with the possession of monopoly power. Only if Realemon were held to have monopoly power would the court reach the question of whether that power had been unlawfully exercised or maintained.

In this section, I hope to show that the standard market definition -- market share approach to the measurement of monopoly power is defensible only if attention is restricted to a limited class of economic models, in which all products within "the relevant market" are physically homogenous and there are no important linkages between the market considered and any other individual firms or markets. It is clear that these assumptions do not apply to the situation analyzed in Realemon, nor do they apply in other cases in which the market definition -- market share approach has been employed. Even when this approach is defensible, it provides only an incomplete indication of one aspect of monopoly power: short-run ability to affect price. Better tools for the analysis of
short-run monopoly power exist. Further, the market definition --
market share approach says nothing at all about the long-run dimension
of monopoly power that was the main issue in Realemon: the ability to
affect price in the long run through restriction of new competition.
Application of the market share test for monopoly power in the Realemon
case was, in short, largely wasted effort.

The distinction between short-run and long-run monopoly power is
important but often overlooked.¹⁹ As the Initial Decision in Realemon
notes (p. 151), "Monopoly power has long been defined [by the courts]
as the power to control prices or unreasonably restrict competition."
This usage suggests that monopoly power is a force that, like electricity,
can be employed to perform a variety of unrelated tasks. In fact, a
firm may have the short-run power to control prices without any long-run
ability to restrict competition. Wilkinson Sword was the only seller
of stainless steel razor blades in the U.S. for a (relatively short)
time. During that period, it presumably had some control over the price
of its output, but later effective entry would seem to make clear its
inability to restrict competition. Similarly, a patent that lowers the
cost of making paper will not by itself give its holder any ability to
control the price of paper, but it will provide the power to protect
profits from new competition. "The power to control prices" derives
from the ability to make output changes large enough to have a noticeable
impact on buyers, while the power "unreasonably [to] restrict competition"
in the long run must derive from some advantage over actual or potential
competitors that inherently serves, or can be exploited to serve this
purpose.
In all economic models of which I am aware, the statement that a firm has short-run monopoly power is equivalent to the statement that the firm's optimal price is above its marginal cost. On this test, most firms have some short-run monopoly power, and most groups of competing firms have potential monopoly power, in the sense that their optimal collusive or cartel policy would involve price above marginal cost. But as a practical matter, antitrust cannot be concerned with all deviations from perfection, only with important deviations.

The obvious test for the existence and importance of short-run monopoly power involves comparing prices and marginal costs; if price exceeds marginal cost by an appreciable margin, non-trivial short-run monopoly power is present. But it is notoriously difficult to define and quantify marginal cost with any precision.

A second approach is suggested by standard microeconomic theory. Suppose, for purposes of discussion, that Realemon were the only seller of processed lemon juice in the country. The evidence seems clear that neither fresh lemons nor any other product is a perfect substitute for processed lemon juice, so that it would be sensible to think of Realemon as facing a downward sloping demand curve at any instant. Given all this, an economist would likely invoke the standard formula for monopoly equilibrium in analysis of Realemon's short-run monopoly power:

\[
\frac{P - MC}{P} = \frac{1}{E}
\]

(1)

where \( P \) is price, \( MC \) is marginal cost, and \( E \) is the absolute value of the price elasticity of demand, all other prices in the economy held fixed. (In the present context, this last assumption might be worrisome.)
Might not the demand for fresh lemons be affected noticeably by Realemon's price, with effects that would feed back to Realemon's demand curve? I return to this point below.)

The quantity on the left of the equation (1) is Lerner's (1934) measure of the degree of monopoly. As was mentioned above, it may be difficult to estimate it directly. Equation (1) indicates that this problem can be avoided, under the assumptions mentioned above, by estimating the elasticity of demand for processed lemon juice. Various evidence cited in the Initial Decision indicates that $E$ is finite, since there do not appear to be any perfect substitutes for processed lemon juice in the short term, but it is not clear that one could refine this estimate much. Prices may not have varied enough to permit statistical techniques to yield precise estimates of $E$, and in most situations this elasticity may vary both with the level of price charged and with the length of time over which buyer response to price changes is measured. In the actual situation in Realemon there is a further complication: since other firms selling processed lemon juice might be expected to react to a Realemon price change, the "all other prices constant" elasticity might not be the relevant quantity for Realemon decision-making. The elasticity that Realemon management would rationally employ must take into account any expected competitive reactions, and these expectations cannot be measured with any precision at all by an outside observer.

There is a third quantity that can shed light on the existence and importance of short-run monopoly power: the level of excess profits. If unit costs are constant, so that marginal cost equals average cost
(including a normal return on capital), multiplication and division of the left-hand side of equation (1) by unit sales shows that the ratio of excess profit (or monopoly rent) to sales revenue equals 1/E in monopoly equilibrium. In general, the presence of substantial excess profit may reflect important short-run monopoly power. But profits do not imply power, since purely competitive firms can receive excess profits in short-run disequilibrium. Moreover, it is not always trivial to penetrate the fog of accounting convention and estimate accurately the magnitude of excess profit. Still, information on the level of profit being earned, coupled with an analysis of alternative explanations for excess profits (if detected), can shed considerable light on the importance of short-run monopoly power. While there are serious measurement problems here, they seem generally to be less severe than those encountered in estimating marginal cost or demand elasticities. The key problem with this approach is that if one finds excess profits, further analysis is required before one can conclude that they reflect short-run monopoly power.

Long-run monopoly power that is worth having and that is likely to be an issue in antitrust proceedings must permit a firm or group of firms to protect excess profits from competitive erosion. Thus, one consequence of significant long-run monopoly power is the persistence of short-run monopoly power, which in turn should be reflected in persistent excess profits. The persistence of substantial excess profit generally indicates the presence of some sort of obstacle to effective competition, but not all such obstacles stem from the exercise of the
power to exclude or restrain rivals. The developer of a highly profitable new liquor that requires long aging, for instance, might enjoy a substantial period of high profits before rivals' products were ready to market. Similarly, a firm with extraordinary cost advantages over all actual or potential rivals might continue to earn excess profits over a long period. (The obstacle to effective competition in this case would be whatever prevented other firms from attaining similarly low costs.)

Following Bain (1956), it has become standard to refer to obstacles to effective competition that serve to preserve excess profits as "barriers to entry", though as Caves and Porter (1977) have recently emphasized, such obstacles can affect established sellers as well as (actual or potential) new entrants. Almost as a matter of definition, such obstacles must rest on some sort of long-lived advantage over rivals. Sometimes a firm may obtain such an advantage merely by virtue of having been the first to engage in some activity, as when cost and demand conditions permit only one seller to operate profitably, but this is by no means a universal occurrence. Similarly, some obstacles may serve by themselves to prevent profit erosion, without the necessity for the firm to modify its policies in the interests of restricting competition. But this is not universally the case either: in some instances explicit acts or practices aimed at actual or potential rivals may be necessary to preserve profits. If such acts are taken, it becomes meaningful to speak of the exercise of long-run monopoly power. But if competition is sufficiently restricted (so that excess profits are not threatened) without the need to focus attention on other firms, it is sensible to speak of the possession of long-run
monopoly power, but it is not clear what one might mean by its exercise.

In any case, while persistent excess profits strongly suggest the existence of long-run monopoly power, further analysis is required to determine the source of that power and the manner in which it has been exercised, if at all.25

In the foregoing general remarks, there was no mention of "the market". Indeed, this concept is not strictly necessary for the analysis of monopoly power, actual or potential, short-run or long-run. This is not to say that market definition is never an instructive exercise, however.

The classical economists recognized that a bushel of wheat harvested in Illinois is, strictly speaking, a different commodity than an otherwise identical bushel harvested in Kansas: they are not perfect substitutes for a buyer located in Chicago. But if buyers or sellers can transform one into the other by using readily available means of transport, the price at which one can be sold will be tightly restricted by the price at which the other is sold. If commodities differ only in terms of location, and if their prices are closely linked by transportation possibilities, it makes sense to aggregate them into a market. By using data on transportation costs, shipping patterns, and correlations among prices at different locations, one can produce defensible (though inevitably imperfect) definitions of the extent of the geographic "market" for narrowly defined commodities.26

Let us further follow the classical writers and assume that the market thus defined can be usefully analyzed in isolation. That is, let us suppose that the effects of changes in that market are sufficiently small and
widely dispersed throughout the entire economy that one can neglect the possibility of feedback effects. (The issue is the stability of the demand and cost schedules employed. Suppose the price of steel is raised. Since steel sales are sizeable relative to GNP, this may produce sizeable changes in the prices of a number of other products, and these shifts may in turn affect the costs of steel production or the demand for steel. The classical (partial equilibrium) analysis assumes such feedback effects away.) One can then take the demand for the product considered as determined primarily by its own price; there exists a well-defined demand curve of the usual blackboard variety that is relevant to decision-making. Under all these assumptions, market share may serve as a partial indicator of the extent of short-run monopoly power.

The analysis goes as follows. Since all sellers' outputs are effectively perfect substitutes (after transportation, if necessary), any seller that reduced price a penny below the going market price (which is here well-defined) would receive the entire market demand, and any seller that priced a penny above the market would sell nothing. This would suggest that no firm could have any short-run monopoly power, even if there were only two or three sellers. A more sensible approach in such situations is to consider output, not price, to be the decision variable. Then, if rivalry is as intense as one can imagine, so that each firm makes the output decision that maximizes its own profits given its rivals' decisions, it is easy to show that the equilibrium condition for the $i^{th}$ (typical) firm in the market is the following: 27
where $MC_i$ is the $i$th firm's marginal cost and $s_i$ is its share of the market. Again, the quantity on the left is a direct measure of the firm's short-run monopoly power. If this is difficult to estimate directly, one can instead employ the quantity on the right, the ratio of the firm's market share to the elasticity of demand for the market as a whole. Even in this hyper-classical case, market share is not the whole story: a firm with a large share of a market with highly elastic demand will set a price indistinguishable from marginal cost. Further, it should be obvious that knowing a firm's market share in this model, or even the ratio of its share to the market demand elasticity, reveals nothing about its long-run monopoly power. Finally, there is no critical or threshold value of market share in this sort of model, above which the firm has monopoly power and below which it has none.

While the market definition by aggregation over space has firm foundations in classical economics, aggregation over non-identical products (the sort of aggregation that was a key issue in the Realemon litigation) seems to have as its intellectual basis the procedures followed in some empirical work in industrial organization. In order to use statistical techniques to test hypotheses about the determinants and results of inter-firm rivalry, many investigators have mass-produced data on sizeable numbers of "markets". The usual rule is that the latter should include all products among which buyers and sellers can easily switch, so that each "market" used in the analysis corresponds to a set of
sellers that are in more or less direct competition. Rarely is there any claim that this can be done with great precision. If the sample of "markets" is large enough, it is reasonable to hope that minor and non-systematic errors in the allocation of sellers to "markets" will not have much effect on the results obtained. Many studies of this sort take profitability as an indicator of monopoly power and seek to explain variations in profitability across "markets" as functions of observable quantities.\textsuperscript{29}

With all this as background, let us consider the market definition exercise in the Initial Decision in \textit{Realemon}, along with its legal and economic implications for market power. The judge concluded that fresh lemons and processed lemon juice were not closely linked on the supply side, since they employ different production and distribution processes. This appears sensible as a short-run finding, but to assert it for the long run is to assert that entry into the processed lemon juice industry is difficult, and a finding of distinct technology \textit{cannot justify} such an assertion. He then considered a great deal of evidence on the demand side. Respondents produced usage data that indicated that fresh lemons and processed lemon juice are often used by households for the same things. (Both are used in tea and lemonade, for instance.) Econometric work was introduced that seemed to show a significant (negative) relation between the relative price of the two commodities and their relative sales, and it was pointed out that Realemon advertising had historically stressed its advantages vis-à-vis fresh lemons. Complaint counsel stressed the different attributes (taste, shelf life, etc.) of the two
products, substantial and variable per-ounce price differences, and the apparent lack of attention paid to the price of fresh lemons by producers and (wholesale) buyers of processed lemon juice. Judge Hanscom weighed and sorted all this evidence and concluded that the two products were not sufficiently close substitutes in demand to require placing them in the same market for antitrust purposes. He then drew an inference about monopoly power:

Having determined that processed lemon juice constitutes, at the least, a valid submarket for the purposes of this proceeding, there is no question that respondent Borden's Realemon brand over the years has had, and now has, a monopoly share of that market.

Later discussion (p. 151) notes the apparently well-established legal principle that "The existence of monopoly power may be inferred from a predominant share of the market."

Can this procedure and the economic inference drawn from it be rationalized in terms of the foregoing discussion of the nature and measurement of short-run and long-run monopoly power? Not readily. No evidence was offered or considered comparing Realemon's prices to its marginal costs. Thus an indirect measure of Realemon's short-run monopoly power was necessary. The market definition -- market share analysis undertaken to construct such a measure can be viewed, charitably, I think, as an attempt to use something like the homogenous product model that underlies equation (2) above to construct such a measure.
But that model is obviously inappropriate here. The evidence seems clear that competing brands of processed lemon juice were not viewed by buyers as perfect substitutes, though the impact of the pricing of one brand on the demand for another was often substantial. It also seems obvious that processed lemon juice and fresh lemons are substitutes -- but imperfect substitutes. The decision is written as if this latter clear fact must be overlooked, either by ignoring the demand linkage between these two products (and defining "the relevant market" narrowly) or by assuming that they are perfect substitutes (and using a broad market definition). Either approach must involve the use of an inappropriate economic model, and there are no simple rules for deciding which of the two is likely to be the less misleading.

In the first place, there is no single "best" measure of the degree of substitutability between two products in consumption. Thus any attempt to quantify the relation between imperfect substitutes is open to valid attack. Moreover, even if a single "best" measure did exist, it would certainly have to take on a wide range of values in principle, with no natural thresholds or break-points.

About the most that one can conclude from the finding that fresh lemons and processed lemon juice are imperfect substitutes is that the demand curve for the latter, whether or not feedback effects involving the price of fresh lemon are considered, has a finite elasticity. This is not enough, even if one takes all brands of processed lemon juice as perfect substitutes, to permit one to conclude that Realemon's large share of processed lemon juice sales translates into non-trivial short-run
monopoly power. To draw this inference, one would have to know, at least, the magnitude of the price elasticity of demand for processed lemon juice. Even then, it is not obvious that the classical "all other prices constant" elasticity would be appropriate, since Realemon might well take into account its impact on the price of fresh lemons and the feedback effect from that price to the demand curve for processed lemon juice. (This effect might be negligible, of course; the question is an empirical one.)

Had the judge's consideration of the mountain of conflicting evidence on substitution in consumption led him to the other model under consideration, which treats processed lemon juice and fresh lemons as perfect substitutes, the analytical error involved in the inference that Realemon's share of that "market" implied no monopoly power would be even more obvious. Very little meaning can be attached to "market share" when the "market" includes commodities that are plainly imperfect substitutes. One cannot conclude that Mercedes has no short-run monopoly power from its share of the U.S. automobile "market", much less from its share of the U.S. motor vehicle "market".

In short, the market definition -- market share analysis in Realemon proves nothing at all about respondent's short-run monopoly power. Even if a demand-side analysis had been done correctly, using precise estimates of the many relevant elasticities and expectations, it would say nothing about the firm's long-run monopoly power, its ability to restrict competition.

The problems with the market definition -- market share approach in Realemon are certainly not limited to that case. Market definition
exercises rest on the implicit assumption that in any situation there must exist a grouping of products and sellers such that (a) all products within the group ("the relevant market") are very nearly perfect substitutes, and (b) no products outside the group are good substitutes for any products within it. I would hope that is it clear by now that such a grouping may not exist in the case under consideration. The narrow definition proposed by complaint counsel and accepted by the judge (processed lemon juice) could be correctly attacked for violating (b) above. On the other hand, the broad definition proposed by respondent (processed lemon juice plus fresh lemons) could be correctly attacked for violating (a) above. The judge was left with the problem of deciding which violation was more serious, a very ill-posed and intractable problem. In many other situations, where aggregation over physically distinct products or products perceived by buyers as different is attempted, similar logically correct attacks on any proposed market definition will likely be possible. If the facts in any case indicate that no satisfactory market definition is possible, then, since theory tells use that even with such a definition and the corresponding market share information only limited inferences can be drawn, why attempt the impossible task of market definition?

The Initial Decision (pp. 67-8) does cite Realemon's apparently extraordinary profitability as confirming the monopoly power implied by its dominant share of "the relevant market". Excluding the "goodwill" asset on Realemon's books, which obviously was present because the price paid for the business in 1962 reflected the high future profits it was expected to produce, and assuming no unusually severe accounting problems,
Realemon's return on invested capital (see Section 2, above) indicates persistent excess profits. This establishes at least a presumption of persistent short-run monopoly power, and it shows, more importantly, that Borden would have something to lose if rivalry intensified. That is, the evidence on profitability indicates that Realemon would have an interest in restraining competition, and the persistence of high returns indicates the presence of some sort of obstacle to effective competition. But this is only a starting point from which analysis of that obstacle and of Realemon's possible long-run monopoly power can proceed.

4. Tests for Predatory Pricing

As Section 2, above, indicates, it seems clear that Realemon's pricing policy was influenced by the actions of other producers of processed lemon juice, Golden Crown in particular. Realemon reacted to Golden Crown's rapid expansion and the erosion of its own market share (which it generally computed in terms of processed lemon juice) by lowering prices in geographic areas where Golden Crown's share was largest. Given that Realemon was found to possess monopoly power, the legal question is whether or not its pricing policy constituted unlawful maintenance of that power. Or, adopting Bork's (1978, p. 144) provisional definition of predation as "a firm's deliberate aggression against one or more rivals through the employment of business practices that would not be considered profit-maximizing except for the expectation either that (1) rivals will be driven from the market . . . or (2) rivals will be chastened sufficiently to abandon competitive behavior the predator
finds inconvenient or threatening", was Realemon's pricing predatory?

Since Borden was apparently not a notably badly-run firm, if predatory pricing could be shown to be irrational in general or in this case, it might be possible to establish a presumption that its pricing was not predatory. (Such a showing would not prove the point beyond doubt, though; even well-run firms sometimes make mistakes. And, as Posner (1976, p. 187-8) notes in this context, if certain kinds of mistakes have significant adverse consequences, it may be good policy to prescribe penalties for those who make them.) But, as Yamey (1972) and Posner (1976, pp. 184-6) have argued convincingly, economic theory cannot (yet, at least) prove that predatory pricing is never in the predator's interest. The predator sacrifices some current profit in the expectation of future gain. Rationality can be directly evaluated only by comparing the sacrifice with the expected gain, and the latter is hard to assess in principle and impossible to observe in practice. If the predator has sufficient advantages over the prey, (e.g., much easier access to liquid capital), and if an episode of predation has desirable long-lived effects on the employment of relevant assets or on the expectations of actual or potential rivals, predatory pricing may be profitable after the fact and thus may appear profitable before the fact. Actions that appear mad in the short run may be quite sane in the long run, as a reputation for irrationality may instill a valuable (to the predator) timidity in actual or potential rivals.32 Similarly, current models cannot yield firm judgements as to the rationality or irrationality of predatory pricing under any particular set of observable conditions.
Most economists would, I think, agree with Areeda and Turner (1975, p. 669) that "proven cases of predatory pricing have been extremely rare". Both they and Bork (1978, pp. 144-55) draw the reasonable inference that, since predatory pricing is often charged, it in fact occurs very rarely - whether it is rational or not. Areeda and Turner (1975, p. 669) note that this implies that one must be careful in formulating rules for dealing with alleged predatory pricing, "lest the threat of litigation, particularly by private parties, materially deter legitimate, competitive pricing." Bork (1978, pp. 154-5) goes further and argues that it is unwise "to construct rules about a phenomenon that probably does not exist or which, should it exist in very rare cases, the courts would have grave difficulty distinguishing from competitive price behavior." He would thus drop predatory pricing from the list of possible antitrust violations. Most economists would, I think, agree with Areeda and Turner. Bork's proposal is less likely to win wide acceptance.

I shall return to this proposal below. First, however, it is instructive to consider, in the context of the facts in Realemon, some recent attempts to use economic theory to devise more or less clear standards for predatory pricing. Specifically, do these analyses permit a clear-cut judgement to be passed on Realemon's pricing behavior?

Areeda and Turner (1975), in an influential and widely-cited essay, propose definite tests for predation, to be applied (p. 732) to "a monopolist" in a "market in which he has monopoly power". As the preceding Section sought to show through the example of Realemon, there are no clear rules for deciding, on the basis of the traditional market...
definition -- market share exercise whether or not any particular seller can be so described. This difficulty is not unique to the Areeda-Turner analysis, however, so I will return to it below. Areeda and Turner argue that because marginal cost pricing has well-known efficiency properties, and because only prices equal to or above marginal cost can maximize short-run profits under any plausible assumptions, only prices below short-run marginal cost should be considered predatory. Recognizing that reliable estimates of marginal cost are difficult to obtain, they propose (p. 733) the use of "reasonably anticipated average variable cost" as the standard; prices above this quantity are to be lawful, prices below it predatory and unlawful. This shift is not without its substantive consequences, as Scherer (1976a) has pointed out, but the technical issues he raises seem secondary in the present context. Indeed, the Initial Decision in Realemon (pp. 117-30) considers the average variable cost test, citing Areeda-Turner. As Section 2, above, noted, Realemon's prices were apparently above accurate estimates of its average variable cost prepared after the fact. If it could have "reasonably anticipated" those figures, the Areeda-Turner test would declare its pricing lawful. On the other hand, it is not clear what the firm thought its costs were at the time the prices in question were set. Some of its prices were close to or (depending on how the figures are treated) below the unit cost figures that were available to decision-makers. In any case, the price-cost gaps were not huge under any of the definitions discussed in the Initial Decision. Do any set of cost estimates deserve to be treated as exact values of "reasonably anticipated average variable
cost", so that prices below such estimates by tiny amounts would serve to establish a violation?37 If the reality of likely cost estimation error is considered, how can it be incorporated into the rule? While I don't think the Areeda-Turner test gives a crystal clear result in Realemon, it does seem to point toward the legality of respondent's pricing.

Posner (1976, p. 188) defines predatory pricing as "pricing at a level calculated to exclude from the market an equally or more efficient competitor." After analyzing the implications of this definition, he concludes that "Proof of sales below average balance sheet costs with intent to exclude might be enough to establish a prima facie case of predatory pricing." Average balance sheet costs would be obtained by dividing total accounting cost by output; if the accounting system has no major biases, this quantity is approximately average total economic cost, minus the per-unit cost of equity capital.38 A prima facie case could be rebutted by a defendant's showing that its pricing could be justified in terms of the relevant marginal cost.

In trying to apply this analysis to Realemon, a number of problems arise. First, in terms of the underlying definition, was Golden Crown "an equally or more efficient competitor"? Golden Crown's production costs per ounce of lemon juice seem to have been comparable to Realemon's. But, all else equal, buyers were willing to pay more for an ounce of Realemon than for an ounce of Golden Crown. Thus, in terms of the dollar value of outputs per dollar of inputs employed, Realemon was distinctly more efficient.
I think a case can be made that the premium price commanded by Realemon was in part at least a reflection of consumers' greater experience with it than with rival brands. (Some arguments for this view are sketched in Section 5, below.) That is, there was learning on the demand side. It is at least plausible, since the two products were apparently physically indistinguishable, that if buyers had had the same experience with Golden Crown that they had with Realemon, the two products would have been able to sell for the same price. Then, if one adopts a static notion of efficiency, buyers' preferences for Realemon would seem to imply that it was more efficient than Golden Crown. But if one takes a more dynamic view of efficiency, there is no obvious reason to suppose that Golden Crown was not "an equally or more efficient competitor". Exactly the same problem arises under classical "learning-by-doing" in production, which implies that a firm's unit cost is a decreasing function of its total cumulative output to date. Under this assumption, a new entrant may have higher costs today than an established firm, even though with the same production experience it would have the same costs.

It seems likely, though by no means certain, on the basis of the data in the Initial Decision (pp. 117-30), that Realemon made at least some sales below its "average balance sheet cost". Applying Posner's suggested test, this is a key issue: if the firm never sold below "average balance sheet cost", charges should be dismissed, while if it did, further inquiry would be necessary. But if we step back from Posner's test to the definition of predation from which it is derived, things seem less clear. As Section 2, above, indicated, Realemon was in a
position confidently to expect that in order effectively to meet its prices, Golden Crown would have to sell below its own "average balance sheet costs". If a static view of efficiency is adopted, Golden Crown was a less efficient competitor, and only Realemon's costs matter. But if one accepts that in a dynamic sense Golden Crown was arguably as efficient as Realemon, it could be argued that prices above Realemon's "average balance sheet costs" could serve to exclude an equally efficient competitor if they forced losses upon Golden Crown. Acceptance of an argument of this sort could, of course, place Realemon in the awkward position of having to justify its prices in terms of its reasonably-derived estimates of a rival's costs.

In order to establish a prima facie case against Realemon, Posner would also require some evidence of exclusionary intent, though he clearly recognizes (pp. 189-90) the difficulty of establishing intent in litigation. In Realemon, complaint counsel were able to find a number of documents that at the very least strongly suggest that Realemon's top management intended to regain sales lost to Golden Crown and to reduce the latter's share or at least hinder its expansion. Some documents, though apparently none written by top management, suggest an intent to exclude Golden Crown from some areas. If one follows Posner (1976, p. 190) and gives little weight to the latter because of "the inveterate tendency of sales executives to brag to their superiors about their competitive prowess, often using metaphors of coercion that are compelling evidence of predatory intent to the naive," one is left with little that points to exclusionary intent. It would appear then,
that Posner's requirements for a prima facie case against Realemon cannot be met. If, however, Posner, like Bork (1978, p. 144) had considered the chastening of rivals to be a possible goal of predation and had phrased his rule to allow intent to chasten to satisfy it, it would seem that a prima facie could be made.

Accepting such a broadened rule, could Realemon have rebutted this case? Probably, since it could argue that in an intensely competitive situation, in which rivals are selling below average total cost, the quantity relevant for pricing decisions is short-run marginal cost. It could then invoke Areeda-Turner, use average variable cost as a proxy for short-run marginal cost, and point to the evidence that it never sold below its average variable cost. Thus, though a slightly broadened version of Posner's rule would likely, though not certainly, suggest that Realemon engaged in predatory pricing, the latter would likely, though again not certainly, be able to rebut the presumption thus established by, in effect, invoking the Areeda-Turner test. Since the rebuttal argument just outlined must be useable in many cases, it might be simpler just to begin with the average variable cost test.

Scherer (1976a, 1976b) and Williamson (1977) effectively criticize the economic models underlying these cost-based rules. Both argue that, by its very nature, predatory pricing is transient and, generally, localized in space. Thus, the relation between, say, price and marginal cost during an episode of such pricing in some locality is likely to be of negligible welfare importance relative to pricing policies at other times and in other places. Had Realemon made sales to the Philadelphia
and Buffalo chains mentioned in Section 2 at prices below marginal cost in December, 1973, it is true that an efficiency loss, relative to sales at marginal cost, would have been produced. But to focus closely on this loss and to ignore the substantial general excess of price over marginal cost suggested by Realemon's overall profitability is to use one small, atypical tree to evaluate a large forest. Both Scherer and Williamson argue that a proper application of economic principles in this context involves consideration of the overall, long-run effects of predation or of any standards adopted by the courts to define it. At this point, they part company; Scherer suggests the necessity for a detailed "rule of reason" examination of the relevant facts, while Williamson proposes a set of apparently precise "per se" rules.

The bulk of Williamson's (1977) analysis is devoted to a dominant firm's response to the appearance of a new entrant. The rules for this case are different from those he would apply to established firms. Without going through the sort of market definition -- market share exercise discussed in Section 3, above, however, it is not clear how one would establish that a firm was either dominant in this sense or, what seems to come to the same thing, a monopolist in the sense of Areeda and Turner (1975). I have tried to argue that such exercises are an unreliable approach to the measurement of short-run monopoly power, and that is presumably the issue here. In the present case, and in others, one can get at the economically relevant considerations without defining markets or using structural definitions of "monopoly" or "dominance".

It seems indisputably clear that Realemon and Golden Crown were affected.
by one another's pricing. It is also clear that Realemon's profits were plausibly viewed by its management as threatened by Golden Crown; at the very least, Realemon would have been better off if Golden Crown had either vanished or become much less aggressive. This suggests that Realemon had a motive for chastening or excluding Golden Crown. The much larger initial sales, wider geographic distribution, and greater financial resources of Realemon, coupled with its "premium brand" status, suggest that it might have had or plausibly thought itself to have had the ability to chasten or exclude Golden Crown. Surely no showing of of dominance or monopoly can do more than indicate motive and ability, and such indications are more appropriately sought in a direct comparison of the alleged predator and prey than through attempts to define "the relevant market" and to compute their shares thereof.

In attempting to apply the Williamson rules to Realemon, the first question that must be faced is whether Golden Crown should be considered a new entrant or an established firm. It seems to have sold processed lemon juice, apparently quite aggressively, for over a year before its name appears in available Realemon documents; this suggests the latter classification. On the other hand, Golden Crown had not entered all of Realemon's regional markets, and it would appear that Realemon was worried that it would later do so effectively. This, along with Golden Crown's small scale of operations relative to that of Realemon at the time the latter first took actions complained of, suggests that Golden Crown should be treated as a new entrant. Had the judge been forced to make a choice here, I do not think he would have found it an easy one. But, on
Williamson's rules, it would have been an important decision.

Suppose first that Golden Crown is considered to have been "established". Williamson (1977, pp. 336-7) would then instruct the judge to ignore "episodic price wars". Was Realemon's pricing more than this? How would one decide? Must one wait until price is increased before filing a complaint? Let us go further and suppose that it is held that Realemon's price cuts were sufficiently long-lived as to be potentially illegal. Williamson would then apply an average total cost test, which is seems likely that Realemon would have failed.

Suppose, on the other hand, that Golden Crown is considered to have been a new entrant. Williamson's analysis of this situation is based on a standard model, deriving from Bain (1956), of a homogenous product market with substantial economies of scale and a single established seller. He assumes that entry will be deterred if the expected post-entry price is below the entrant's average total cost. He then shows that a rule prohibiting the established seller from increasing its output after entry induces that firm to charge a lower pre-entry price in order to deter entry than would a number of cost-based rules, including that of Areeda and Turner (1975). His proposed rule for new entry (p. 334) would thus make it illegal for a dominant firm to increase its output, adjusted for changes in the level of demand, for 12-18 months after the appearance of new entry. After that period, an average total cost test would apply. Though there would likely have been considerable debate on this point, let us suppose for the sake of argument that all of Realemon's discounting is held to be subject to this output test. Did it then engage in predation?
First, one must face the problem of defining a base period, against which increases in unit sales are to be measured. Let us, again purely for the sake of argument, supuse that 1972 is selected. (Respondent would, of course, argue for an earlier benchmark, probably 1968, the year before Golden Crown began to challenge it.) Then the evidence seems clear that Realemon intended to violate Williamson's rule; it intended to increase its share of processed lemon juice sales in some regions at the expense of Golden Crown through price cuts. Had it succeeded, it surely would have increased its demand-adjusted output, since an increase in share plus a lower average price must imply higher unit sales.

But Golden Crown was not passive; it may have reacted by making some sales below its average total cost, a possibility not recognized in the analysis underlying Williamson's rule. In any case, it does not seem that Realemon achieved its share objectives; its nationwide share in 1973 was below that in 1972. It may or may not have managed to increase demand-adjusted unit sales in its target areas; it certainly could not have checked this until after the fact. Suppose, as seems likely, that demand-adjusted output did not rise. Should one then find Realemon guilty of attempted predation or dismiss the charges because it failed in a serious attempt to break the law? Suppose all the facts were the same, but no evidence at all on intent were available? It would seem that Realemon's pricing below average total cost would then have to be found unlawful unless it extended beyond 18 months after Golden Crown became visible, in which case Realemon would be found to have
predated. Had the Williamson rule been law during the relevant period, of course, Golden Crown could have ensured itself treble damages by either failing to react to Realemon's discounting or by failing to make deliveries in key areas.

Some of the ambiguities and difficult choices that arise when one attempts to apply the Williamson standards to Realemon would likely arise in other cases as well. But the deeper problem revealed by the foregoing discussion is that the model underlying Williamson's output test is inappropriate: it fails in apparently important respects to fit the facts of the case. Williamson's potential entrants are deterred if they expect a post-entry price below their average total cost, while Golden Crown was apparently willing to expand its sales at such prices for some time. In Williamson's model, output is a decision variable, so that it can sensibly be used to evaluate behavior, while in the processed lemon juice market, demand for any one brand seems to have depended critically on the prices of all others. Price, not output, was the decision variable. In Williamson's model there is a single market price, while rival brands of processed lemon juice sold at different prices. The barrier to entry that drives Williamson's model is the high cost of producing at small scale, but scale economies do not seem to be important in the production of reconstituted lemon juice. Finally, the main obstacle to effective competition discussed in the Initial Decision is the "premium brand" status of Realemon, which enabled it to command a higher price than other brands. This sort of obstacle is not easily built into the Williamson model, especially if it is
plausibly assumed to be capable of erosion over time.

If the economic model from which Williamson's test is derived is not suitable for use in the analysis of Realemon, it is hard to believe that acceptance of its implications in all other cases would be appropriate. But this means that Williamson's rule must be inapplicable to at least some cases. I have argued above that the Scherer (1976a) -- Williamson (1977) critique of the economic analysis underlying the (apparently) simple cost-based rules of Areeda and Turner (1975) and Posner (1976, pp. 190-1) establishes that these rules cannot be defensibly applied to all (or even most) cases. If Williamson's rules are not universally applicable either, it would appear that we do not possess any simple yet sound tests for predatory pricing. Given the ability of those who have sought to devise such tests, I think one must at least entertain the possibility that no such standards exist.

If the conclusions of the preceding paragraph are accepted, there would seem to remain only two supportable general policies towards predatory pricing. One could follow Bork (1978, pp. 154-5) and simply drop such conduct from the list of practices with which antitrust is concerned. If predatory pricing is in fact very rare, and if courts always have considerable difficulty distinguishing it from vigorous but innocent competition, this may be the safest route. The economic case for this policy is strengthened if one fears that courts, confronted difficult decisions, are likely to err in the direction of protecting competitors, not competition. 41
But there are problems with this prescription. It is hard to believe that the apparent infrequency with which predatory pricing is attempted is totally unrelated to the courts' hostility to it and the propensity of small firms to allege it. Further, not all cases of alleged predatory pricing are identical; error must be more likely in some than in others. It is at least plausible that removal of predatory pricing from the list of proscribed practices would result in the occurrence of some cases that any reasonable being would be able to distinguish from innocent competition.

If, for these or other reasons, it is decided that predatory pricing cannot simply be declared lawful, there would appear to remain only one economically defensible general policy choice: Scherer's (1976a) proposal that courts follow a "rule of reason" approach and perform "a thorough examination of the factual circumstances accompanying the monopolist's alleged predatory behavior, how the monopolist's officials perceived the probable effects of its behavior (i.e., intent), and the structural consequences actually flowing from that behavior." Scherer's suggestion that the only defensible policy here must involve, in effect, long-run cost/benefit analysis has been attacked by a number of writers as unwieldy and unworkable. But I think that Scherer's answer to such criticism is compelling:

...just about any important Sherman Act, Section 2 or Federal Trade Commission Act, Section 5 monopolization case entails discovery and trial costs running into the millions of dollars. If, despite such vast outlays, the existing adjudicative system cannot cope with complex ... questions,
the solution, I contend, is not to adopt oversimplified rules of thumb that it can handle. Rather, a new and better system should be devised.

In any event, Judge Hanscom in Realemon did perform a "rule of reason" analysis. As was noted above, he determined that Realemon had monopoly power, largely on the basis of its share of "the relevant market". He deduced from documentary evidence that it had exhibited intent to maintain and preserve its monopoly. He found that it had used discriminatory price differentials among different areas and "unreasonably low prices" to this end. Since its share of the processed lemon juice "market" was still a healthy 75% in 1974, he concluded that Realemon had in fact maintained its monopoly position as it had intended to do. Intent, actions, and effects were then added to establish a violation of the law.

I do not think that the issues involved here are simple, but I am convinced that the analytical approach (implicit model) employed in the Initial Decision is not the best way to resolve them. It seems clear that Realemon was a lucrative operation and that its management felt that its long-run profitability could be enhanced by price moves directed at Golden Crown; one need not define markets or compute market shares to reach this conclusion. Given Realemon's superior status in the minds of consumers, it might plausibly have felt that its price reductions, to or below its average total cost, would cause serious injury to Golden Crown. It is hard to know whether Realemon management did expect or might plausibly have expected that Golden Crown would either substantially
retrench its operations or drop out of the industry. In any event, it did neither; its share continued to grow and the terms of its sale to Seven-Up in late 1974 would seem to indicate that at least one firm estimated that it had accumulated positive "goodwill" in the process. The growth of Golden Crown, in spite of Realemon's actions, when considered in light of the circumstances surrounding its sale, suggests that whatever Realemon's intent or expectations, it did not manage to reduce the effective rivalry it faced.

The Initial Decision (p. 134-6) focuses on Realemon's substantial market share in 1974 as evidence of its continuing dominance. This seems to me to reflect capture by models in which market share is given excessive weight as a measure of monopoly power. I would place much more stress on Realemon's rapid loss of share in the 1970 - 1974 period. In any case, if Realemon's initial expectations of success were influenced by its likely better access to liquid capital than Golden Crown, the sale of the latter to Seven-Up would surely have altered those expectations.

There is no question but that Golden Crown would have been better off if Realemon had not engaged in the price and discount policies complained of. In deciding that Realemon's prices were "unreasonably low", the judge relied on Golden Crown's costs as a benchmark. This comes close to the application of what Williamson (1977, p. 328) terms "a naked theory of umbrella pricing - in order to ensure the viability of a new entrant, the dominant firm is expected to maintain price." I agree with him that such a standard is generally unacceptable; it is biased against innocent, competitive price reductions that would benefit buyers. But I do not think
that the judge's concerns here are only appropriate under "a naked theory of umbrella pricing"; the dynamic efficiency issues raised above may also underlie it.

This review of intent and effect does not establish beyond doubt whether or not Realemon's pricing was predatory or constituted monopolization. In cases like this, where the economic analysis permits no definite conclusion (and these must be the majority of cases), it would seem appropriate to heed the warnings of Areeda and Turner (1975, p. 699), Bork (1978, pp. 154-5), and others about the dangers of inhibiting competition and find for respondent. Some of the strong language in Realemon. documents introduced by complaint counsel to establish intent might make this difficult to do, but in the absence of intent to do much more than recoup losses and check a rival's expansion, and with no evidence that these goals were achieved, dismissal of charges seems warranted. One can, I think, sensibly couple Scherer's rule of reason with Bork's strong presumption of innocence.

5. The Design of Relief: Trademark Licensing

In fact, Judge Hanscom did not dismiss the charges against Realemon. Having found that it had monopolized, he turned to the question of relief. He began with the observation, "In a 'monopolization' case, adequate relief must put an end to the monopoly position, and break up or render impotent the monopoly power found to have been preserved and maintained in violation of law." Immediately after stating that a cease and desist order would hardly accomplish this end, he declared as follows:
The heart of the monopoly power preserved and maintained by respondent Borden lies in the Realemon trademark and its dominant market position. For competition to enter the processed lemon juice industry, the barrier to entry which inheres in the Realemon trademark must be eliminated. As a consequence, in the judgement of the undersigned, the only effective relief under the facts shown by the record in this case requires the licensing of the Realemon brand name to others wishing to enter the production, marketing and sale of processed lemon juice.

As Section 2, above, noted, the order attached to the Initial Decision called for compulsory licensing of the Realemon mark for a period of ten years, at rates intended only to cover Borden's costs of ensuring adequate quality control.

However one might feel about the proper role of economic analysis in the determination of the legal status of particular acts or practices, it seems clear that some economic theory must be relied upon when relief of this sort is imposed. If the objective of such structural relief is to improve economic performance, rather than to punish offenders, the design of relief must be based on an economic model that predicts that more efficient resource use will flow from the announced order. In this section, I hope first to show that no satisfactory model of this sort was employed to analyze the relief ordered in Realemon, I then sketch an
economic analysis of the role of the Realemon trademark and indicate some of its consequences. Though the analysis may be of some general interest, I intend it mainly to be illustrative of the importance of integrating the central facts in any individual case into a coherent model before prescribing structural change.

It seems apparent that in markets in which they both competed, Realemon's trademark provided its main advantage (probably its only significant advantage) over Golden Crown. The Initial Decision describes at length the widespread acceptance of the Realemon name, terming it (p. 59) "virtually the generic name for bottled lemon juice". The price differentials that Realemon could charge, apparently entirely because of the strength of its "consumer franchise", are noted. This premium brand status is simply described (p. 60) as having been "created by a number of factors including advertising and promotion over the years". This, I would argue, is hardly an adequate model of the source of the Realemon mark's status or value. 48 Similarly, the conclusion (p. 77) that Realemon's trademark was an important source of its power to exclude competition is apparently based on its historic price premium and on expert testimony characterizing it (p. 72) as "a successfully differentiated product".

But the latter term comes to little more than a statement that consumers perceived Realemon to be different from other brands (thus "differentiated") and in fact superior to them (thus "successfully differentiated"), Surely the basic character of the differentiation involved is not the same in all situations in which consumers perceive
differences. Ready-to-eat breakfast cereals clearly form a class of "differentiated products", for instance. But different brands of cereal do seem to differ in ways perceptible by and important to consumers, while competing brands of lemon juice are apparently identical. Substantial perceived differences in the face of actual product homogeneity would seem to imply the importance of the sort of consumer information problems discussed by Holton (1970); it is not obvious that such problems are central to the functioning of the breakfast cereal market. Different brands of breakfast cereals appeal to different segments of the population, while there is no segmentation here. There are many brands of cereal produced by the leading firms, but only a very few brands of processed lemon juice in any region. Advertising and product development are apparently much more important in the breakfast cereal industry than in the processed lemon juice industry. To lump these product categories along with other that differ from both in major ways under the single heading of "differentiated products" is to mistake a call for analysis for the results thereof. As the comparison of these two industries indicates, "product differentiation" takes many forms; there is no reason at all to suppose that they can all be adequately comprehended by any single model. 49

Any model that predicts that Realemon's trademark provides it with substantial long-run monopoly power must show how possession of that mark gives the firm a relatively long-lived advantage over its actual and potential rivals, one that they would find it more expensive to overcome than Realemon found it to acquire. 50 A showing that Realemon
commanded a premium price over some period does not suffice to do this. Suppose, for instance, that the premium were due simply to the fact that only Realemon had done non-trivial amounts of advertising, and suppose further that it could be erased totally and permanently by an advertising outlay of, say, $1 million spread over two years. It would be hard, under these assumptions, to argue that Realemon had much of a long-run advantage. Similarly, a showing that Realemon's production costs were lower than those of Golden Crown because the former had a much more efficient bottling line would not establish a serious obstacle to effective competition; one would have to go further and show that it would somehow have been unusually difficult for Golden Crown to have acquired an equally efficient line.

I do not disagree with the proposition that the Realemon mark gave its holder a short-run advantage over Golden Crown and others. My point is that this does not establish the presence of an important long-run advantage that would serve significantly to inhibit effective competition. One needs a model that indicates how Realemon's advantage was obtained and that says something about the difficulties, if any, that rivals would face in attempting to overcome that advantage.

One might, for instance, assert that "Realemon" simply happened to be a name endowed with certain magical properties in this area, that it was for some reason impossible for consumers to resist buying lemon-based products to which that name was affixed. But Borden's apparent lack of success with products other than reconstituted lemon juice that bore the Realemon name would seem to dispose of this possibility.
Similarly, one might follow Chamberlin (1962; pp. 57-62, 270-4) and argue that trademarks are analytically indistinguishable from patents; both provide monopoly power, but trademarks can last much longer. Chamberlin would permit much of what is now condemned as trademark infringement on the grounds that it erodes monopoly. He would favor more extensive use of legislated quality standards to perform the consumer protection function of trademarks in certain industries. At the most, he would give trademark protection a limited duration, around five years (p. 274). If one accepts this point of view, it would seem to follow directly that any device, even a Federal Trade Commission Act, Section 5 monopolization proceeding, that enabled one to end important trademark protection of the sort enjoyed by Realemon should be seized upon. While there is clearly something to the analogy between patents and trademarks, I doubt that most contemporary economists share Chamberlin's extreme hostility toward the latter. The information provision role of trademarks cannot be dismissed lightly. But if all trademarks are not be be attacked, one still needs a model that either singles out "Realemon" for special treatment or shows that it should not be so singled out.

It seems apparent that the "action" here is on the demand side; in order to understand the determinants of the value of the "Realemon" mark, one must have an appropriate model of consumer behavior. Some hints as to the nature of such a model are given by documents and testimony cited in the Initial Decision. A survey of consumer attitudes (p. 62) concluded that consumers "see Realemon as the brand that is proven and reliable and has captured their brand loyalty," A former Realemon regional sales
manager stated (p. 62), "Realemon was first in the business and over a long period of years they had established a very dominant consumer and trade-wise acceptance." The Grocery Buyer for the leading chain in Buffalo noted (p. 64) that Realemon "is the product that customers have used for years, and they are familiar with it." Finally, the Grocery Buyer for a Wisconsin-based chain generalized (p. 65) that, "The first in, that constantly promotes their own name themselves, seems to almost create a brand identity in the consumer's mind that she just can't get out of it." A common thread running through these and similar statements is that consumers' long experience with Realemon had a good deal to do with that brand's premium status.

There are a number of mechanisms that one might invoke to link experience to preferences. Studies by Allison and Uh1 (1964), White (1966, pp. 102-3), and others have found that product labeling can affect experienced product performance. It is somewhat difficult to reconcile this effect with either broad or narrow definitions of buyer rationality (Simon 1978), but in any case it is not obvious that consumers' perceptions of the qualities of competing brands of processed lemon juice were distorted in major ways. The study of consumer attitudes cited above noted that "no differences were mentioned between Realemon and the other products."52

A more appealing mechanism, perfectly consistent with consumer rationality, is suggested by Bauer's (1960) interesting discussion of the risk-taking involved in consumer behavior. Bauer notes that any purchase act has an enormous number of possible consequences, the relative likelihoods of which cannot be calculated by boundedly rational humans. (Can a "bad"
bottle of lemon juice kill you? Can it cause cancer? Can it give bad
breath? How might one value or attach subjective probabilities to these
sorts of events?) Bauer points out that "brand loyalty", in the generalized
sense of forming a strong attachment to a brand with which one has had
satisfactory experience, perhaps by being willing to pay a premium price
for it, can be a sensible way of reducing perceived risk. He provides
illustrative anecdotal evidence of stronger loyalty to particular brands
of sugar among frequent bakers, for whom the consequences of using an
unsatisfactory sugar might be severe, than among housewives who do not
bake often. Subsequently, Cunningham (1967) found a strong positive
association between the risk that individuals associated with particular
product classes and the strength of their expressed preference for their
favorite brand in each class. Roselius (1971) found that consumers
generally ranked brand loyalty (i.e., buying a favorite brand) well above
a number of other methods of risk-reduction (e.g., buying the most expen-
sive brand). Sheth and Venkatesan (1968) found that as experience with a
product class grew (in an experimental setting), brand loyalty became the
dominant risk-reduction device employed.

Not only has the Bauer hypothesis, that perceived risk leads to
the formation of loyalty toward a brand with which one has had favorable
experience, stood up to direct testing, it is consistent with a good deal
of apparently unrelated theory and evidence. It is, in particular,
consistent with hyper-rational consumer behavior of the sort usually
assumed by economists. The Appendix sketches a very simple model, in which
buyers know the laws of probability and properly compute the relevant
expectations, that predicts brand loyalty as a consequence of uncertain product performance. Rational consumers who have had experience with the first brand of a particular type may decide not even to try a second brand introduced at the same (or even a somewhat lower) price and of equal \textit{ex ante} attractiveness. Once the first brand has been used, continuing to buy it involves less risk than trying a new brand, and trial will occur only if the expected gains are sufficiently large. In the model in the Appendix, the first brand on the market obtains a lasting advantage, which is more substantial the more averse consumers are to the risks involved.

On the empirical side, one can point to the recent study by Bond and Lean (1977) of two drug markets, which concluded (p. 76) that:

... strong preferences are revealed for brands that are the first of their kind to appear on the market. These preferences wane only slowly over time... [P]hysicians can be persuaded to prescribe late entering brands if these brands offer some therapeutic gain useful to a subset of patients.

The authors note that these first-brand preferences cannot be explained by differences in advertising or promotional spending. Given physicians' insensitivity to drug prices and the riskiness that must be associated, subjectively at least, with prescribing a new drug, this form of brand loyalty is easily explained as risk-reducing behavior. Buzzell and Farris (1976) find somewhat weaker evidence of early-brand advantages (and late-brand disadvantages) in marketing costs across a wide range of consumer goods.
Peckham (1966) expresses the conventional wisdom, consistent with the quotation above, that it is much more difficult to market an imitative ("me-too") brand than one differing from others already being sold. In experiments with neutrally-labeled (e.g., "Brand H") but physically identical "brands" of bread and beer, Tucker (1974) and McConnell (1968), respectively, found that subjects were willing to pay a premium to continue consuming "brands" with which they had acquired experience. The parallel with the processed lemon juice market seems apparent, as does the broad consistency of such behavior with a risk-avoidance model.

All of this at least suggests that it is plausible to think of the main cause of the observed premium that consumers were willing to pay for the Realemon name as being their greater experience with that brand than with other brands. Those other brands were then rationally (at least in the broad sense in which this term is use outside of economics) viewed as riskier alternatives. This is almost certainly an incomplete model of consumer behavior in this market. But all models of reality, by definition, are incomplete. The real issue is whether the assumptions or predictions of the risk-avoidance model are inconsistent with the facts of the case. That issue clearly cannot be definitively settled here. Had the trial in Realemon explicitly considered alternative models of the source of the value of the "Realemon" trademark, we might have more relevant information, but it did not.

In any case, let me assume the correctness of this framework and consider some of its implications. As I argued above, what matters is not the price premium that buyers are willing to pay for Realemon at any
instant, but rather the difficulty that an entrant would have in eroding it. The risk-avoidance model suggests the relative longevity of the first brand's advantage vis-à-vis later "me-too" entrants, but it does not establish the magnitude of that advantage.

One might conjecture, for instance, that processed lemon juice purchases are not viewed as particularly risky by consumers, so the advantage should be small. But this is not obvious; lemon juice is often used as an ingredient in various dishes, so that a bad bottle of lemon juice could ruin an expensive meal prepared for important guests. Robertson (1973) reports that in at least one small sample, food purchases were rated only slightly (and insignificantly) less risky than purchases of clothing or appliances.

Even if one takes the view that the (average) perceived risk at any instant is measured by the Realemon price premium, historically substantial relative to the cost of a bottle of lemon juice, there still remains the question of how easily that premium could be eroded. Demsetz' (1962) study of frozen orange juice, for instance, seemed to indicate that buyer experience rather rapidly eroded loyalty to premium-priced national brands of that product. One might infer similar ease of erosion here, but the long period of Realemon's dominance makes that inference suspect. The rapid rise in Golden Crown's share, coupled with its purchase by Seven-Up, would seem to point to the same direction, however, since it would appear that with a reasonably modest investment, Golden Crown managed to make substantial inroads. But this doesn't really settle the matter either. One would like to know how the premium that Realemon commanded
varied with consumer experience with Golden Crown. If it were totally erased by one purchase of Golden Crown, and if Golden Crown could obtain trial relatively cheaply, then Realemon's long-run advantage would be minimal. On the other hand, if Realemon's premium were not materially lessened in areas in which Golden Crown attained a large share, or if detailed studies showed that years of using Golden Crown were required to erase preference for Realemon at identical prices, Realemon's advantage would seem to be substantial. In any case, empirical work relating the strength of loyalty to Realemon to the penetration of Golden Crown could have calibrated the risk-avoidance model by indicating the real, long-run importance of Realemon's advantage, but apparently no such work was done.

We are thus left with only the main qualitative implication of the risk-avoidance model: consumers' experience with Realemon gives it some long-lived advantage. This supports the conclusion in the Initial Decision that the "Realemon" trademark is at the heart of the firm's long-run monopoly power, but it avoids the near-tautology involved in such a statement by indicating the source of that power and the trademark's value. Further, since the risk apparently attached by buyers to Golden Crown and other "low-priced" brands reflects ignorance of the apparent homogeneity of all brands of bottled reconstituted lemon juice, there is a clear market failure of the sort economists are used to dealing with. 56 (If the source of Realemon's premium brand status lay in consumer perceptions that it tasted better than other brands, it could be argued that the problem was irrationality, not ignorance. If consumers are irrational in any deep sense, the welfare-economic case for competition breaks down.)
The usual remedy for ignorance is information provision. Golden Crown, by seeking to persuade customers to try its product, was attempting to provide information. If one accepts the decision that Realemon "monopolized", it follows that Realemon was hindering the provision of information in an unacceptable fashion. If there is no way to prevent Realemon from continuing to do this, a logical remedy is force information provision. In principle, this could be done via government-financed or Borden-financed advertising to the effect that all brands of reconstituted lemon juice are chemically identical. But unless some sort of quality standards are imposed on all producers of reconstituted lemon juice, by the FTC or some other entity, this "information" might in fact be misleading. (Golden Crown, after all, did adulterate its product, though the adulterations were apparently indetectable.) Moreover, as Holton (1970) and others have stressed, consumers do not have infinite capacity for information processing. Information is more likely to affect decisions the more easily it can be understood and employed.

A trademark provides a good deal of information quickly to one who has experience with it. It can thus be argued that the trademark licensing relief ordered in the Initial Decision, with the associated quality control provisions, is an efficient way to transmit information to consumers, the lack of which is at the root of the apparent market failure here. Thus, if relief is needed in this case, the relief actually ordered seems appropriate. I do not think, however, that one can defensibly reach this conclusion simply by asserting, "The heart of the monopoly power preserved and maintained by respondent Borden lies in the Realemon
trademark and its dominant market position." A careful selection and examination of an economic model appropriate to the situation involved is required.

6. Summary and Conclusions

Through an examination of the major issues in a recent case, this essay has attempted to shed some light on the appropriate use of economic analysis in antitrust. The logical impossibility of avoiding the selection of an appropriate economic model or models in this context is, I hope, clear. If model selection is not done explicitly, the model employed in any particular decision or analysis emerges as that model or class of models that supports the conclusions reached. In situations in which the appropriate economic model is not obvious, and these can hardly be uncommon, failure to face the selection problem explicitly serves to make error more likely.

In Section 3, I attempted to show that the importance attached to the market definition -- market share exercise in Realemon reflected the implicit selection of a restrictive class of models. The debate surrounding the definition of "the relevant market" serves to point up the difficulty of bending those models to fit the facts in this case. I argued that at best, such exercises can give some information on short-run monopoly power, but that better information may be obtained through analysis of profitability. Moreover, market definition -- market share exercises can shed no light at all on long-run monopoly power, the power to prevent the erosion of profits through more intense rivalry, unless
one adopts a particularly limited form of the difficult-to-defend "size is power" model.59

Section 4 considered appropriate tests for predatory pricing, both in general and in Realemon. It was shown there that the apparently simple rules proposed in recent years by several authors are not in fact simple to apply to Realemon. Moreover, they are either derived from welfare-economic arguments with internal problems or from economic models that cannot claim universal applicability. Since selection of a per se test for predatory pricing amounts to a judgement that the economic model from which it was derived is applicable to the case at hand, and since no models that yield simple tests are likely to be universally applicable, this discussion indicated that the choice of a general policy in this area must be between a "hands off" approach and a "rule of reason" analysis. It was also noted, in the discussion of Realemon, that these could be sensibly joined by establishing a strong presumption that observed pricing practices are innocent until proven to be otherwise by an examination of the facts involved.

Section 5 considered the relief ordered in the Initial Decision in Realemon. That relief sought to change the industry's performance by altering an important element of industry structure. Such relief must logically derive from an economic model of the situation considered, since a prediction of improved performance clearly cannot be based on facts alone. An illustrative analysis of the role of the "Realemon" trademark was offered, which tended to provide support for the trademark licensing relief ordered. But it is important to note that no such
analysis seems to have underlain the Initial Decision: a decision to attack respondent's trademark was based on little more than observation of its widespread acceptance and apparent short-run competitive importance.

The point of focusing on Realemon was not to show that the Initial Decision was wrong or incompetent by prevailing standards. On the contrary, the Administrative Law Judge seems to have dealt with the issues before him in relatively standard ways. This, along with the inherent interest of the main issues in the case, permitted the sort of critical analysis attempted here. My goal has not been to attack or defend the Initial Decision, but rather to focus attention on the ways in which antitrust cases have traditionally been decided. The Realemon case may involve more complex economic issues than many other cases, but it seems unlikely that it is truly exceptional in this regard. If reliance on the implications of a set of economic models that were never explicitly evaluated in light of the facts at hand led to problems in Realemon, as I have argued it did, it would seem hard to doubt that this standard approach produces inadequate analysis in other cases as well. If antitrust is to become a more consistent force for economic efficiency, it would thus appear that the selection and analysis of appropriate economic models must be more frequently incorporated into antitrust proceedings. This would require more use of the tools of economic theory, which in turn would alter the tasks and roles of both lawyers and economists.
Appendix: Rational Brand Loyalty

Suppose that a new product, R, apparently different from anything on the market, is developed and introduced at price P. Buyers are uncertain how much a unit of R will be worth to them until they have tried it. For simplicity, it is assumed that R is what Nelson (1970) calls an experience good; no quality information can be ascertained prior to purchase, but complete information is provided by a single trial. Let us assume that R’s "value" can be measured in dollar terms. Before trying the product, each individual's subjective distribution of its value to him is assumed for simplicity to be uniform between zero and X. It is also assumed that this is the correct distribution on average. That is, the objective distribution of actual values of R across members of the population is also uniform between zero and X. Another way of looking at this is to suppose that each individual knows the distribution of values for the population as a whole but is completely ignorant as to where his own experience will place him in that distribution. I might know, for instance, that R is worth at least $10 to 10% of the population but have no idea before trying it whether I will fall in that 10%. (A very large population is assumed throughout, so that distributions can be treated as continuous.) Let x be the actual value of R experienced by a typical buyer.

Let us initially assume risk-neutrality. Then as long as the random variable (x - P) has a non-negative expectation, all consumers will try R once. If we define α by P/X = 1-α, then trial by all will occur as long as α ≥ 1/2, and a fraction α of the population will continue purchasing R after having tried it.
Now let a second product, G, be introduced. It is clear to all that G and R are members of the same product class, such as bottled reconstituted lemon juice or freeze-dried instant coffee. There is no (visible) claim that G has attributes lacked by R or that it lacks any of R's characteristics. In marketing terminology, G is a "me-too" product. Buyers thus view their choices as G, R, or neither; there is no point to buying both G and R. Suppose the price of G is also set at \( P \) and that, unknown to consumers in advance, G and R are in fact identical.

In one extreme case, consumers might simply assume that, in the absence of any apparent differences, G and R are identical. They would thus assume that their experience with R applies perfectly to G. Since the products, by assumption, sell for the same price, each can expect to capture half of total sales. But this is surely a very extreme case; one must doubt that consumers always assume in the absence of any information to the contrary that all products in the same narrow product class are identical. Some generalization of this sort probably occurs, of course. That is, consumers who have tried R are likely to act as if they knew more about G than if they had never seen any product in the relevant class before. But as long as such generalization is not complete, as long as some residual uncertainty attaches to the worth of G even after R has been tried, some light on behavior may be shed by considering the polar case of no generalization.

Let us examine that case, still assuming risk-neutrality. Assume that each consumer takes the worth of G to him, call it \( \tilde{y} \), as a random
variable uniformly distributed between zero and X, regardless of his experience with R. Thus G is felt to be exactly as risky, *ex ante*, as R was. (This is an extreme case, of course; one might expect high experienced x to imply high expected y, since individuals' tastes are the stochastic element here.) On these assumptions, the fraction \((1-\alpha)\) of consumers who tried R and then decided not to buy it will also try G and, since the products are identical, reject it. The remaining \(100\alpha\%\) of the population is already buying R. These individuals face a choice between continuing to purchase R, and receiving a net benefit of \((x-P)\) each time for sure, or trying G. *Ex ante*, each consumer assigns some probability to the event that G is better for him than R; trial of G essentially buys him the option of switching to the better product if this event occurs.

We can ignore the cost stream associated with the individual's purchase sequence, since it will be identical whether or not G is tried or selected. Let \((1+r)^{-1}\) be the discount factor applied to benefits generated by successive purchases. Let \(f(y)\) and \(F(y)\) be, respectively, the density and distribution functions of the random variable \(\tilde{y}\), the value of G to the consumer considered. Then a consumer purchasing R and receiving "value" \(x\) will elect not to try G if and only if the following inequality is satisfied:

\[
x[1+(r/1)] \geq \int_{0}^{X} f(y)dy + F(x)x(1/r) + (1/r)[1-F(x)]\int_{x}^{X} \frac{f(y)}{1-F(x)}dy.
\]  

\[(A1)\]

The term on the left is the capitalized value of benefits from remaining with R. The first term on the right is the expected gain from the initial
trial of G. The second term is the probability that $\tilde{y}$ is revealed to be no greater than $x$, times the capitalized benefit from returning to R after trying G once. The third term is the probability that $\tilde{y}$ exceeds $x$, times the capitalized expected value of $\tilde{y}$, conditional on its exceeding $x$.

Under the assumption of a uniform distribution, $f(y) = 1/X$, and $F(y) = y/X$, for $0 \leq y \leq X$. Substituting into (A1), integrating, and collecting and simplifying terms, the condition for not trying G at all becomes

$$\left(\frac{x}{X}\right)^2 - 2r\left(\frac{x}{X}\right) + (1+r) \leq 0. \quad (A2)$$

It is easy to show that as long as $r$ is positive, this inequality will be satisfied for $x$ sufficiently close to $X$. Customers who are very satisfied with R, in the sense that they attach sufficiently low probability to the existence of a better brand, rationally decide not to try G, even though they attach no disutility to the risk such trial involves. Solving (A2), and focusing on the relevant root, one obtains the fraction, $\gamma$, of the population that does not try G as

$$\gamma = \frac{\sqrt{r(1+r)} - r}{r} \quad (A3)$$

or $r = .01$, about 9% of the total population does not try G, while for $r = .10$, $\gamma = .23$. If the two products are identical, and if consumers who have tried both divide their purchases evenly, R sells to a fraction $(\alpha + \gamma)/2$ of the population, while G sells to $(\alpha - \gamma)/2$.

In this model, G and R are identical and are recognized as such by all who try both. They sell at the same price and before trial they
are viewed as equally risky. Yet the first brand in obtains a lasting advantage. In this setup, G could induce more trial by lowering its price. If the price decrease were perceived as temporary, however, it might have to be quite large in order to have a significant impact, since it would, in effect, only increase the first term on the left of (A1), the term giving the expected value of the initial trial. On the other hand, since G and R are by assumption identical, one might expect R's advantage to erode over time, if only through word-of-mouth communication between those who initially tried G and those who decided not to.

It is of some interest to see what happens if the two products are not identical. Again, a simple polar case is of some illustrative value. Suppose now that for the population as a whole, the true values of x and y are independently, identically, and uniformly distributed over the range [0,X]. That is, it is now possible for an individual to value R highly and not care at all for G, or vice versa. This means that consumers' expectation that the distribution of \( \tilde{y} \) is independent of their experienced x is now correct. Then it is relatively straightforward to show that the first brand's advantage is still present, though it is smaller.

Of the fraction \((1-\alpha)\) of the population that tried R and decided not to buy it, a fraction \(\alpha\) will decide to buy G when they try it, since that is the probability that the \(y\) experienced exceeds \(P\). A fraction \(\gamma\) will remain with R and not try G, as before. If a consumer is buying R and receiving value \(x\), the probability that trying G will induce a shift to that brand because \(y > x\) is easily seen to be \((1 - x/X)\). Then
the fraction of the population that switches to G is given by

\[ \int_{\frac{1}{X}}^{(1-\gamma)X} (1 - x/X)(1/X)dx = \frac{(a^2 - \gamma^2)/2}{P}. \]  

(A4)

(The fraction of the population that could switch is \((\alpha-\gamma)\), so that G captures a fraction \((\alpha+\gamma)/2\) of them.) Adding things up, the fractions of the population to which each brand sells are as follows:

\[ R: \alpha = \frac{(\alpha^2 + \gamma^2)}{2}, \quad G: \alpha = \frac{(\alpha^2 - \gamma^2)}{2}, \]

The fraction of the population buying R exceeds that buying G by \(\gamma^2\); the difference is easily seen to be \(\gamma\) in the case where the brands are identical. Note that when expectations are correct, G's entry causes the total fraction buying to rise from \(\alpha\) to \(\alpha(2-\alpha)\). In spite of this, G's sales can be less than half R's pre-entry sales if \(\gamma^2\) exceeds \(\alpha(1-\alpha)\).

Thus, in this example of "true" differentiation, the first brand in again has an advantage over the second. The advantage is smaller, but there is now less reason to expect its erosion. Though G and R are of equal value on average, consumers initially electing not to try G will receive conflicting reports of its relative quality from those who have tried both.

A second interesting extension of the basic model is to allow consumers to be averse to risk. I want to show that risk-aversion increases the strength of the effect found above; a risk-averter purchasing R will be less likely than a risk-neutral individual to try G, all else equal. To capture the effects of risk-aversion, let us suppose that the dollar value of the net gain from consuming R or G at price P is given by
U(z), where z = x if R is purchased and z = y if G is bought instead, with U a strictly concave, increasing function.

If an individual finds R to be worth x when purchasing R, a slight generalization of (Al) indicates that this individual will try G if and only if the following inequality holds:

\[
T_U(x) = r \int_0^x U(y)f(y)dy + [1-F(x)] \int_x^X U(y)f_x(y)dy - [1+r-F(x)]U(x) \geq 0, \tag{A5}
\]

where \( f_x(y) = f(y)/[1-F(x)], \ x < y < X. \)

If the consumer were risk-neutral, the test inequality would be simply

\[
T(x) = \bar{y} - r \bar{y} + [1-F(x)]\bar{y}_x - [1+r-F(x)]x \geq 0, \tag{A6}
\]

where \( \bar{y} = \int_0^x yf(y)dy, \) and \( \bar{y}_x = \int_x^X yf_x(y)dy. \)

Recalling that x is some particular constant for each consumer, we can re-scale U without loss of generality for any particular consumer so that \( U(x) = x. \) Exploiting the concavity of U, we have

\[
T_U(x) < rU(\bar{y}) + [1-F(x)]U(\bar{y}_x) - [1+r-F(x)]x
< r[x + U'(x)(\bar{y} - x)] + [1-F(x)][x + U'(x)(\bar{y}_x - x)] - [1+r-F(x)]x
= U'(x)T(x).
\]

Thus, if T(x) is negative, so that a risk-neutral individual experiencing value x from brand R would not try G, a risk-averse individual with the same experience and the same expectations about G's value will not try it either. Moreover, if T(x) is positive but sufficiently small, \( T_U(x) \) will be negative; risk-aversion will cause some individuals who would have tried
G rationally to decide not to do so. It should be clear from this latter proof, which did not require any assumptions about the shape of f(y), that the earlier use of uniform and identical distributions merely served to simplify exposition; the qualitative results did not depend on the shapes of the distributions involved.
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1. Docket No. 8978. Realemon Foods is operated as part of Borden's Borden Foods Division. As of this writing, the Commission has yet to announce its decision on Borden's appeal of the initial decision of the FTC's administrative law judge.

2. For the sake of making my prejudices explicit, I should note that I find persuasive the arguments of Posner (1976) and Bork (1978) that economic efficiency should be the only objective of antitrust.

3. A leading example is the "foreclosure" model that guides current policy toward vertical mergers; see, for instance, Peltzman (1969) and Bork (1976, ch. 11).

4. For an example of the latter, see Schmalensee (1978).

5. This document, filed August 19, 1976 under Docket No. 8978, will hereinafter generally be referred to simply as the Initial Decision.

6. Except where noted, these are based on the Initial Decision. Submissions of complaint counsel or respondent are used only for elaborations of points either not at issue or resolved by the Initial Decision.


8. In 1973, total sales of reconstituted lemon juice were about $25 million, while sales of fresh lemons were about $200 million.
these were combined, Realemon's 90% dollar share would fall to around 8%. On a per-ounce basis, Realemon sold for around one quarter the price of juice from fresh lemons in the early 1970's. (There was considerable variation around this multiple.) This implies, along with the foregoing, that a 90% share of reconstituted lemon juice sales in ounces would translate to about a 27% share of the larger market. Since the relative share of lemons in the larger market was apparently falling during the 1960's these figures based on early 1970's data are probably upper bounds.

10. Initial Decision, p. 99; quotation from a Sunkist employee.
15. Initial Decision, p. 130.
16. Answering Brief of Complaint Counsel in Response to Appeal Brief of Borden, Inc., and in Support of the Initial Decision of the Administrative Law Judge, filed January 14, 1977, pp. 25-26. This leaves out contingent payments of up to $1,75 million that Seven-Up was to make to G.C. Citrus if returns on Golden Crown exceeded certain thresholds. As of September,
1978, Seven-Up was still marketing Golden Crown reconstituted lemon juice in the Boston area, at least.

17. Initial Decision, p. 162.

18. The standard citation, given in this context on page 151 of the Initial Decision, is Learned Hand's dictum in Alcoa: United States v. Aluminum Co. of America, 148, F.2d 416, 424 (2nd Cir. 1945).

19. It is at the core of Mason's (1937) famous distinction between the legal and economic meanings of monopoly. The former, stressing the power to exclude rivals, corresponds to what is termed long-run monopoly power in the text, while the latter, stressing market structure at any instant, corresponds to short-run power over price.

20. For a discussion of demand elasticity estimation as an alternative to market definition, see Posner (1976, p. 125).

21. Similarly, short-run monopoly power need not imply excess profits since one can have an iron-clad monopoly over something that nobody will buy unless price is below production cost. Such situations will be missed by a profits test, but this is no great problem: to reduce the short-run monopoly power of a firm earning no excess profit is to drive it from the market, and this can result in a net efficiency loss by depriving buyers of a product not available elsewhere: see Schmalensee (1978, pp. 319-21) and the references there cited.

22. On these problems, see Weiss (1974), who notes that a massive amount of empirical work simply takes accounting profitability as a measure of exercised monopoly power.
23. It is possible for an unprofitable firm to have the power to exclude new competition. But this power will never become visible, since low profits by themselves would serve to discourage potential entrants.

24. See, for instance, Bain (1956, pp. 21-5).

25. For an example of this sort of analysis, see Schmalensee (1978).

26. Alfred Marshall (1922, Bk. V, Ch. 1) provides a lucid and still useful discussion of the principles involved. It is worth noting that there seems to be no mention in Marshall (1922) of the aggregation of physically distinct goods into a single market. Modern microeconomic theory texts generally do not consider this possibility either.

27. Dropping subscripts for the moment, let \( q \) be the output of some firm, and let \( \bar{q} \) be the aggregate output of its rivals. If \( Q = q + \bar{q} \), the assumption of homogeneous outputs means that market price, \( P \), must be a (decreasing) function of \( Q \). In order to maximize its profit for any given \( \bar{q} \), the firm considered must choose \( q \) so that marginal cost, \( MC \), equals the partial derivative of the firm's total revenue, \( qP(q + \bar{q}) \), with respect to \( q \). The latter quantity can be written as \( P[1 - (q/QE)] \), where \( E \), the market demand elasticity, is given by \( -P/(QP') \). Equation (2), with \( s_1 = q/Q \) then follows directly.


30. Initial Decision, page 50. This is the first sentence of the first Finding of Fact under the general heading "Monopoly Power".
31. On the difficulty of defining a good measure of substitutability or complimentarity at the household level, see Samuelson (1974). On the difficulty of inferring market relations from market elasticity data, see Bishop (1952). At various places in the Realemon transcript, "the" cross-price elasticity of demand between fresh lemons and processed lemon juice is referred to. But there are at least eight ways of defining such an elasticity: one can look at the change in either the price or quantity demanded of fresh lemons, holding the other constant, produced by a change in either the price or the quantity of processed lemon juice, holding the other constant; the other four definitions are obtained by considering the impact of changes relating to fresh lemons on processed lemon juice. In general, no two of these elasticities are equal, and any one of them (or some other elasticity) could be the most informative in some situation.

32. As Section 2 noted, Golden Crown entered the processed lemon juice industry without engaging in much market analysis. It thus may not have known of the difficulties encountered by Sunkist in the 1950's. Or, if it knew of them, it might have thought that Borden would not be as tough on it as Realemon-Puritan had apparently been on Sunkist. As elsewhere in economics, the impossibility of observing expectations directly is a source of serious problems.

33. Though the Realemon case was brought by the Federal Trade Commission, it is worth noting that Golden Crown's successor, G.C. Citrus Corporation, filed a related treble damage suit against Borden. (Proposed Findings of Fact and Conclusions of Law of Respondent, Borden, Inc., dated April 9, 1976, p. 11.)
34. This argument can be given a cost/benefit gloss as follows. Suppose that in the sample of cases that can be brought under some predatory pricing rule, predation is actually present with probability $p$. Let there be zero loss if any case is decided correctly. (This neglects litigation costs.) Suppose that average loss from undetected predation is $N$; so that if all allegations of predatory pricing were simply dismissed, the expected total loss would be $Mp$. Suppose that the probability of an incorrect decision is $e$, and let the loss if relief is imposed when no predation is actually present be $C$ - this stems from inhibition of competitive conduct. Then it is easy to show that the expected loss if all cases are litigated exceeds that if all cases are dismissed if and only if $e$ exceeds \[ \frac{1}{1 + \left[\frac{1-p}{p}\right]\left[C/M\right]} \]. If $p$ is low, say 0.01, and $(C/M)$ is non-trivial, say 0.5, then the critical value of $e$ can be quite low, 0.02 in this sample. If error is more likely, it is better simply to bring no cases.

35. See also Areeda and Turner (1976).

36. On these issues, see also Areeda and Turner (1976), Scherer (1976b), and Posner (1976, pp. 191-3).

37. Bork (1978, p. 154) stresses the complexities and allocation problems involved in preparing cost estimates that will stand up in litigation and argues that "the costs the law uses are only coincidentally related to real economic cost".

38. Though one can quibble with this cost concept, it does correspond to the non-economist's notion of average total cost, and I do not think that there is much to be served by going into detailed analytics here.
39. For an interesting analysis of entry deterrence in the presence of "learning-by-doing" in production, see Smiley and Ravid (1978).

40. Data available to me do not permit a definite conclusion on this point, but it may be worth noting that Golden Crown's shares of processed lemon juice sales in Buffalo and Philadelphia in 1974, after the Realemon sales at very low prices discussed in Section 2, above, were both around 29%. (Brief of Respondent Borden, Inc., in Support of its Appeal from the Initial Decision of the Administrative Law Judge, filed November 15, 1976, p. 35.)

41. One might acquire such a fear by reading Posner (1976, pp. 193-6).

42. Scherer (1976a, p. 890).


44. Scherer (1976b, p. 903), emphasis in original.

45. Initial Decision, pp. 313-4.

46. Initial Decision, pp. 162-3.

47. Initial Decision, p. 164.

48. It suggests, if anything, that Realemon's apparently high profits may have reflected mainly inappropriate accounting treatment of its advertising. If the "goodwill" for which Borden paid in 1962 was, in fact, equal to the properly depreciated cost of past advertising, Realemon's apparent excess profits would largely vanish. Moreover, unless there were some obstacle preventing Golden Crown and others from advertising with equal effectiveness, it would be hard to sustain a finding of substantial barriers to entry; see Schmalensee (1974) on this point.
49. For a discussion of the ready-to-eat breakfast cereal industry, see Schmalensee (1978). It should be clear that the spatial competition approach used there to model product differentiation would make no sense in the processed lemon juice industry.

50. For details of this sort of argument in a related context, see Schmalensee (1974).


52. Initial Decision, p. 62

53. On the many definitions of "brand loyalty" in various contexts, see Engle, Kollat, and Blackwell (1973, ch.23) and the references they cite. In the text, this term is employed in a fashion consistent with the facts in Realemon: a loyal consumer is willing to pay a premium price for the favored brand.

54. Taylor (1974) provides an overview of the marketing literature concerned with the risk-taking dimension of consumer behavior.

55. It ignores the likelihood that habitual purchase of Realemon will be questioned only if the consumer receives a sufficiently convincing indication that another brand might be better. That is, it is probably unrealistic to model consumers, as the foregoing discussion has implicitly done, as constantly comparing available alternatives on the margin. Habit serves to economize on decision-making time and effort and, once established, may persist in the absence of strong stimuli. The risk reduction model also ignores the role that Realemon's advertising might have played and the possibility that Realemon's
premium price served as an indicator of quality, reinforcing its premium status. (On this last point, see Engle, Kollat, and Blackwell (1973, pp. 251-2) and the references they cite.)

56. In Holton's (1970) terms, the problem is the apparent low quality of consumer demand. It is perhaps worth noting that bottled lemon juice would seem to possess the characteristics that he argues work against problems of this sort.

57. Initial Decision, p. 164

58. While trademarks are also important in the ready-to-eat breakfast cereal industry, a comparison of the analysis here with that in Schmalensee (1978) should serve to indicate that they play very different roles in the two industries and that defensible economic arguments for trademark licensing in the two cases must therefore differ in basic ways.

59. It is not clear why market share would be an appropriate measure of size even under models of this sort; surely total assets or total liquid assets would be more relevant when predation is an issue.