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PREDATORY PRICING AND THE RECONSTITUTED
LEMON JUICE INDUSTRY

by
David I. Rosenbaum *

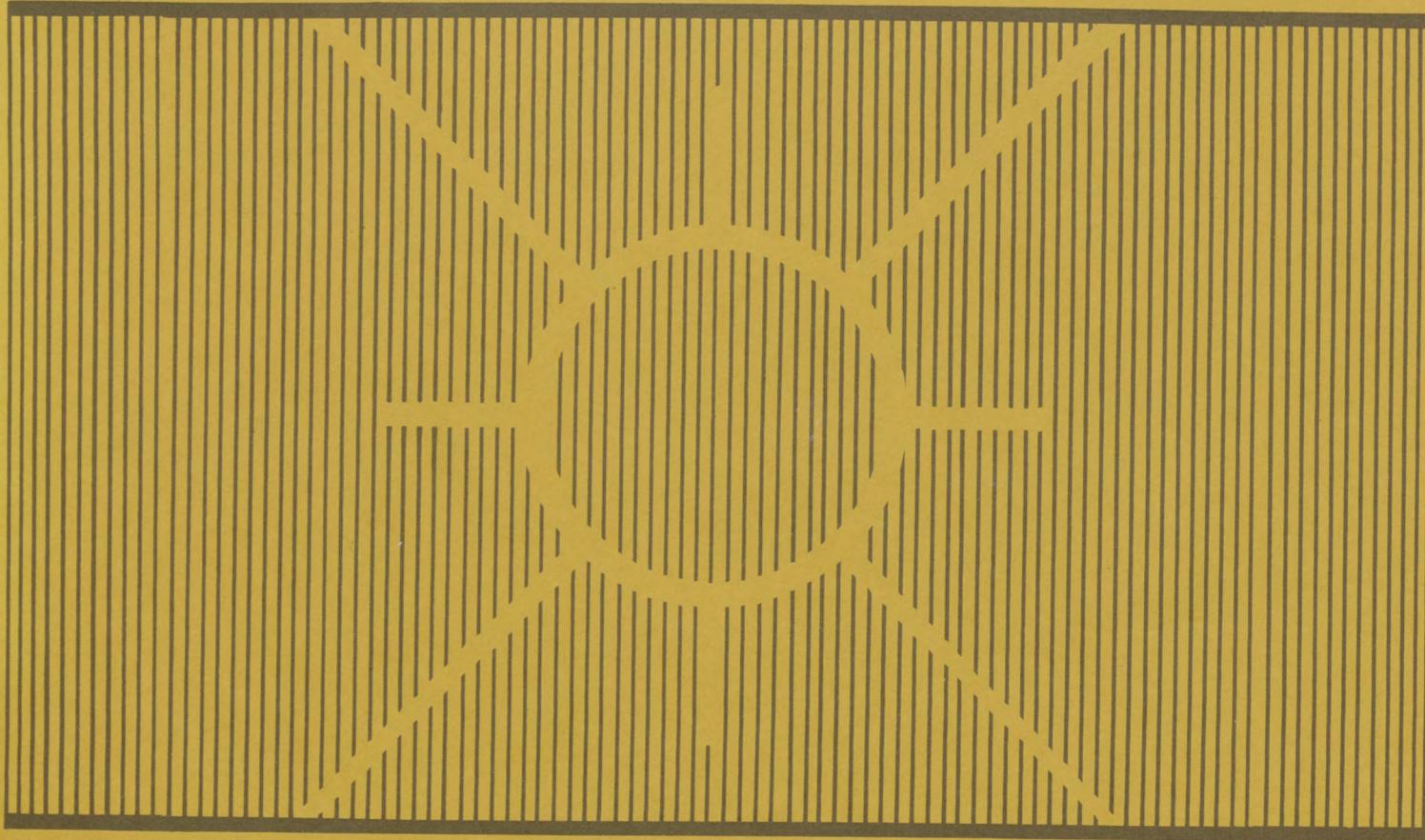
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David I. Rosenbaum *

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Current antitrust doctrine seemingly accepts average variable cost as one possible boundary between competitive and predatory pricing. Certain authors contend however, that equally efficient rivals can sometimes be excluded from a market even when a dominant firm prices above its own average variable cost. A model is developed to test for predatory conduct in one such case. This model is applied to the reconstituted lemon juice industry. It shows that under certain conditions, even prices above average variable cost can be exclusionary.

Part 1 of this paper contains a discussion of predation standards. It examines the arguments for an average variable cost rule and also the arguments for finding predatory conduct at prices above average variable cost. Part 2 contains a description of the reconstituted lemon juice industry. The dominant firm's position and the importance of advertising and promotional pricing in maintaining that position are discussed.

Part 3 presents the predation model. This model determines if the dominant firm's pricing strategy could force an equally efficient competitor to exit the reconstituted lemon juice market. The data used in this study are shown in part 4. Part 5 presents the results of this model. Given reasonable parameter assumptions, pricing above average variable cost can be interpreted as predatory conduct in certain situations.

1. PREDATION STANDARDS

A review of the literature indicates that predation is generally viewed as a decrease in a dominant firm's short term profits, due to a temporary price reduction, in anticipation of eventual monopoly control of a market and associated long-run monopoly profits. The Federal Trade Commission, in a recent opinion, suggested that an ideal predatory pricing rule must meet the following criteria:¹

First, it must distinguish predatory intent from competitive intent; that is, it must distinguish pricing behavior that is very likely intended to injure competition from pricing behavior that could very well be directed toward perfectly legitimate competitive objectives ... [and] secondly [it must] distinguish pricing behavior that is likely to injure competition in the generality of cases from pricing behavior that is not.

There must be predatory intent and there must be predatory conduct.

In trying to more clearly define the boundary between prices that are predatory and prices that are not predatory, a majority of the Commissioners went on to say that:²

Sales at prices below average variable cost for a significant period of time should be rebuttably presumed to be anticompetitive.

In explaining why pricing below average variable cost establishes predatory intent, the Commissioners wrote:³

Sales at prices below average variable cost -- as properly defined -- for a significant period of time ... are more likely intended to injure competition than to achieve legitimate competitive objectives because they do not cover any fixed costs of operation. The firm that sells at such prices consequently loses more money by continuing to operate than by shutting down altogether. Sustained sales at such prices can therefore be presumed to be intended to injure competition.

In discussing why pricing below average variable cost establishes predatory conduct, the Commissioners wrote:⁴

[the] antitrust laws focus upon preserving or enhancing consumer welfare by preserving or enhancing competition. One effect of healthy competition is to redirect production and sales

from less efficient firms to more efficient rivals. Therefore, one logically ought to determine the pricing level that is likely to force equally efficient firms to shut down, with the effect of injuring competition. A price that forces an equally efficient firm to sell at a price below its own average variable costs for a significant period of time satisfies this criterion. Because sales at such prices do not even cover the variable costs of operation, an equally efficient firm will ordinarily shut down completely rather than continue to operate. Since its shutdown is induced not by competitive conditions but rather by anticompetitive conduct on the part of the predatory firm, it injures competition and therefore worsens consumer welfare.

Following the Commission's arguments, predatory intent is presumptively established (except under certain particular circumstances) because there is no profit-maximizing or loss-minimizing reason for a monopolist to deliberately price below its own average variable cost. Predatory conduct is presumptively established because when a loss-minimizing competitor is forced to sell at a price under its average variable cost, its best strategy is to halt production.

In adopting the average variable cost rule, the Commission accepted the so called Areeda-Turner rule. Phillip Areeda and Donald F. Turner, in their seminal 1975 article,⁵ argued that "pricing behavior should be deemed non-predatory so long as the prices equal or exceed average total costs"⁶ and, ignoring certain exemptions, that only "a monopolist pricing below [short-run] marginal cost [which for practical purposes should be measured as average variable cost]⁷ should be presumed to have engaged in a predatory or exclusionary practice."⁸ Areeda and Turner defend this rule in writing "marginal-cost pricing leads to a proper resource allocation and is consistent with competition on the merits,"⁹ and that:¹⁰

[i]f a monopolist produces to a point where price equals marginal cost, only less efficient firms will suffer larger losses per unit of output; more efficient firms will be losing less or even operating profitably.

Thus Areeda and Turner feel their rule will lead to an equitable allocation of resources across firms and markets, and will protect equally efficient competitors.

Other well respected economists and attorneys have examined the predatory pricing problem as well. They agree that the Areeda-Turner rule is certainly sufficient to establish predation in some cases. However, they argue that predation can occur when a dominant firm prices above short-run marginal cost (or average variable cost), and that predation may even occur at prices above average total cost.

Richard Posner, an eminent antitrust scholar, argues to broaden the Areeda-Turner rule.¹¹ Posner writes:¹²

I believe the most useful definition of predatory pricing is the following: pricing at a level calculated to exclude from the market an equally or more efficient competitor.

Like Areeda and Turner, Posner is concerned with allowing equally efficient firms to remain in a market. However, he feels that equally efficient competitors may be excluded even at prices above short-run marginal cost.

Posner points out that due to "interest costs, rent, depreciation, and other overhead items, ... a firm's short-run marginal cost is normally lower than its long-run marginal cost."¹³ He then points out that if a particular firm has to cover its long-run marginal costs to remain in a market, then even if its own long-run marginal costs are lower than those of a competitor, a price above short-run marginal cost but below long-run marginal cost will effectively exclude that firm. Thus, "a price equal to seller A's short-run marginal cost might enable A to drive from the market his competitor, B, who was more efficient than A because his long-run marginal cost was lower than A's, but was

unwilling to remain in the market if forced to meet a price lower than his long-run marginal cost."¹⁴

Following this reasoning, Posner suggests that another standard, in addition to the Areeda-Turner standard, be used to define predation. He writes that "[t]he second practice that is predatory under my definition is selling below long-run marginal cost with the intent to exclude a competitor."¹⁵

Paul Joskow and Alvin Klevorik combine the thoughts of several authors in proposing a two tier approach for analyzing whether certain pricing practices are predatory.¹⁶ Their first tier would analyze industry structure to see if it could provide the potential long-run supra-normal profits associated with predatory pricing. If so, the second tier would then determine if pricing was predatory or competitive.

Joskow and Klevorik concur with Areeda and Turner when they write "the adoption of a strategy of pricing below average variable cost by a dominant firm confronted with entry is sufficient to demonstrate predation."¹⁷ However, they go on to say "we do not believe it [pricing below average variable cost] should be a necessary condition."¹⁸ Joskow and Klevorik write that because firms will need to earn a normal return on investment, and this will be included in the firms' average total costs, "[a] price below average total cost could drive equally efficient and perhaps even more efficient rivals from the market or deter such firms from entering."¹⁹ Hence, they "would recommend that if [an industry passes their first tier analysis]... a price response that does not cover average total cost should be presumed predatory [with one restrictive condition]."²⁰

Other authors have also shown that pricing above average variable cost or short-run marginal cost can be exclusionary. Oliver Williamson discusses the case where there are diseconomies to entering at small scale.²¹ Frederick M. Scherer considers the case where an entrant has to enter at large scale.²²

Scherer also looks at the case where two firms are different, not because they have different unit-production costs, but because one has an image advantage that permits it to maintain a premium between its price and the price of its rival. Scherer concludes that an image advantage:²³

enhances the dominant firm's incentive to cut prices temporarily to exclude less-favored rivals [and that what] society obtains following successful image-induced exclusionary pricing is not the freeing of resources that can be employed more effectively elsewhere, but rather, higher prices and profits accompanied by increased consumption of the "premium" product.

Following Scherer's reasoning, it may be that while two firms can produce equally efficiently, one firm, due to a lack of consumer recognition, is forced to sell its product at a lower price. Then, while the firm with the more recognized brand can sell its product at a price greater than short-run marginal cost, the firm with the lesser known brand may be forced to sell its product below marginal cost. In effect, the firm with the lesser known brand may be forced to leave the market. Thus, predatory conduct can possibly occur even if the firm with the more recognized brand prices above its own short-run marginal cost.

The following is an examination of exclusionary pricing under such advertising-induced conditions. An economic model is developed to determine when pricing by a firm with a more recognized brand will exclude an equally efficient, though lesser known, rival. This model is applied to the reconstituted lemon juice industry. It will be shown

that even if the dominant firm in that industry prices above its own average variable cost, in some cases, this will exclude an equally efficient, though lesser known, rival.

2. THE RECONSTITUTED LEMON JUICE INDUSTRY

This section describes the reconstituted lemon juice industry of the late 1960s and early 1970s. It describes Borden's position in the industry and the impact of competition on that position. This section also describes the importance of advertising and promotional pricing in Borden's marketing strategy. Finally it discusses Borden's strategy for dealing with its competitors and how that strategy led to an antitrust complaint.

In 1962, Borden, Inc. purchased the ReaLemon-Puritan Company.²⁴ Borden formed that company into ReaLemon Foods, a separate unit of its Borden Foods Division.²⁵ The principle product of ReaLemon Foods has been ReaLemon brand reconstituted lemon juice.²⁶

In the early 1970s ReaLemon was the only nationally distributed reconstituted lemon juice.²⁷ ReaLemon's estimated national market share in January 1970 was approximately 90%.²⁸ ReaLemon's 1970 sales were over \$20,500,000.²⁹ Its 1970 profits were estimated to be \$3,740,000, over 18% of sales.³⁰

ReaLemon faced competition from a handful of local and regional competitors. None of these competitors distributed its brand of reconstituted lemon juice nationally.³¹ However, some were significant in certain regional markets. For example, while ReaLemon's national market share was 88.2% in August 1970, its market share in Pittsburgh at the same time was only 62.5%.³²

It is clear from documents describing the industry that if a supermarket had only room for one brand of reconstituted lemon juice, that brand would be ReaLemon.³³ It is also clear that when a supermarket had room, it would take on only one alternative brand of reconstituted lemon juice and that brand would be the cheapest of the "second" brands available.³⁴ This meant there was competition among the regional producers to become the second brand in a market. As a consequence, while ReaLemon faced competition from several producers across all its markets, within any one market or region, it typically faced competition from only one firm.

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.³⁵ 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. The production process for making reconstituted lemon juice exhibits few sunk costs, low fixed costs, and no appreciable economies of scale. Production among firms is so similar, that ReaLemon Foods officials stated "reconstituted lemon juice is virtually indistinguishable one brand from another."³⁶

During the early 1970s, ReaLemon was the only significant national advertiser of reconstituted lemon juice.³⁷ ReaLemon's advertising expenditures in 1970 were over \$1,120,000, about 5.5% of sales.³⁸ ReaLemon Foods spent more than \$5,000,000 on advertising between 1969 and 1974.³⁹ ReaLemon Foods management felt its brand was so well known that "ReaLemon [was] thought of as the commercial lemon juice".⁴⁰ Management described ReaLemon as "the total market" for reconstituted

lemon juice and believed that ReaLemon had become the "protective umbrella" over all lemon juice activity.⁴¹

Certainly part of Borden's motivation for undertaking advertising was to promote its reconstituted lemon juice as an alternative to real lemons in cooking and other uses. However, part of its advertising was also promotional and acted to differentiate ReaLemon from all other reconstituted lemon juices. In fact, ReaLemon officials believed that "heavy emphasis on the ReaLemon Brand name through its media effort should create such memorability for that brand, that an almost imaginary superiority would exist [for ReaLemon] in the mind of the consumer."⁴² So even though ReaLemon and other reconstituted lemon juices may have been chemically similar or identical, in most consumers' minds they were distinctly different products. This was accomplished through Borden's product differentiation efforts.

ReaLemon's pricing strategy had two components. The country was divided into three zones.⁴³ Each zone had its own list price.⁴⁴ ReaLemon also offered three or four trade promotions per year.⁴⁵ These promotions usually covered the periods around Memorial Day, midsummer, Thanksgiving-Christmas, and were sometimes offered during Lent.⁴⁶ The trade promotions were intended to induce a retailer to promote ReaLemon and/or to offer it for sale at a reduced price.⁴⁷ Some promotions required certain actions or "performance" on the part of retailers.

Other promotions did not.⁴⁸ For those promotions which did require performance, one of the performance options was generally a reduced retail price.⁴⁹ In 1972, ReaLemon sold approximately 71 percent of its largest selling size during promotional periods, in 1973, about 84 percent, in 1974, an estimated 77 percent.⁵⁰

Regional reconstituted lemon juice producers competed with ReaLemon on retailer margin and retail price. These competitors recognized that "only the presence of a price differential [between their brand of reconstituted lemon juice and ReaLemon] sufficient to induce the supermarket to stock their brand, and motivating the consumer to buy it, enabled them to survive".⁵¹ In the early 1970s, regional competitors' reconstituted lemon juices were priced as much as 25 to 30 cents below the average 65 cent retail price for 32 ounce bottles of ReaLemon.⁵²

The president of one regional reconstituted lemon juice company testified that his firm operated⁵³

on the basis of price and offered the housewife a second choice of [reconstituted] lemon juice at a lower price. This price also influence[d] the [retail] buyers to take our merchandise on. ... We watch[ed] prices of our competitors very closely because that [was] our reason for being on the shelf.

The president of another regional reconstituted lemon juice company testified that⁵⁴

[w]e look[ed] at the cost, we look[ed] at the price of ReaLemon, and then we decide[d] how aggressive we [were] going to be in selling bottled [reconstituted] lemon juice ... [A]ssuming we [could have sold] it sufficiently under ReaLemon to give the buyer a reason to carry a second brand, and assuming that that [was] enough over our cost to get us a gross profit that [was] adequate to cover our cost and produce a net profit, then we [would have competed] in the field more aggressively.

The implication is that regional bottlers were very aware of ReaLemon's effective price. Regional producers had to sell their products at a price which gave consumers an absolute cost saving vis-a-vis ReaLemon. When ReaLemon lowered its price, the regional competitors had to lower their prices as well.

In 1970 ReaLemon Foods decided its market share in certain regions was falling too low and that one regional competitor in particular was

gaining too much market share in too many regions.⁵⁵ ReaLemon management realized "competition began to make serious inroads into ReaLemon's market share as a direct result of attacking in the most vulnerable area, price."⁵⁶

To counter the advances of these producers, ReaLemon management stated that⁵⁷

[i]n those markets where competition has been making inroads, tentative plans are to increase the size of the [promotional] allowances to as much as \$1.20 per case, or 10¢ a bottle. Based on past history, it is hoped that the trade will reflect reduced retails of as much as 15¢ per unit. We will again be specifically attacking the problem of the retail price spread between ReaLemon and competition. In general terms, competitive activity exists in the Eastern half of the United States. [I]n the Western half, promotional allowances will be limited to a range of 60 to 75 cents per case.

In essence ReaLemon management felt it could maintain its market share by manipulating the spread between retail prices for ReaLemon and its competitors' brands. Also management decided that the best way to manipulate the retail price spread was through selective changes in promotional allowances where these promotions typically required reduced retail prices. In those regions where ReaLemon faced competition, promotions were increased. In those regions where ReaLemon did not face competition, promotions were not increased.

In July 1974, the Federal Trade Commission filed a complaint against Borden, charging it with violation of Section 5 of the Federal Trade Commission Act.⁵⁸ The Commission charged that Borden had⁵⁹

used its dominant position, size and economic power to frustrate the growth of smaller reconstituted lemon juice processors and distributors; to reduce their opportunities for business survival; and to prevent, hinder, or lessen competition in the processing, distribution and sale of reconstituted lemon juice. Thus, Borden [had] been, ... engaging in various monopolistic or other unfair acts, practices or methods of competition in maintaining a monopo-

ly in the processing, distribution or sale of reconstituted lemon juice.

Among the monopolistic acts Borden was accused of committing were, the⁶⁰

granting of selective price reductions; ... selling reconstituted lemon juice below its cost or at unreasonably low prices under circumstances where the effect was, and has been, to injure, suppress or destroy competition in the processing, distribution or sale of reconstituted lemon juice; and [e]recting barriers to entry into the reconstituted lemon juice market through extensive trademark promotion and advertising which has artificially differentiated Borden's reconstituted lemon juice from comparable products of its competitors.

Within this paper, a model is developed to determine whether a price above Borden's average variable cost would have been exclusionary. Through its product differentiation, Borden was able to put other equally efficient producers at a marketing disadvantage. This disadvantage forced other firms to maintain a price differential between their brands of reconstituted lemon juice and ReaLemon. Given this differential, Borden's pricing strategy may have forced its competitors to sell their products at unprofitable prices. It seems reasonable to broaden the theoretical concept of predation to consider behavior of this type.

3. THE MODELLING OF A PREDATION STANDARD

In this section, the predation model is developed. The model calculates the highest wholesale price that a regional competitor can charge a food retailer for its brand of reconstituted lemon juice while still remaining competitive with ReaLemon. This maximum price is then compared to the regional competitor's average variable cost. If the maximum price is above the regional competitor's average variable cost,

the competitor can profitably remain in the market. If this price is below the regional competitor's average variable cost, the regional competitor will be forced from the market and predatory conduct can be inferred.

In this model, there are two brands of reconstituted lemon juice: Borden's ReaLemon and a regional competitor's reconstituted lemon juice. ReaLemon is an established brand. It is advertised nationally and has a strong consumer franchise. In contrast, the regional competitor's brand is relatively new to the market. Its position is more tenuous. The regional competitor is concerned with gaining retailer and consumer acceptance of its product. To accomplish this, the regional competitor has to maintain a sufficient spread between its price and Borden's -- both at wholesale and retail.

For the regional competitor to sell its product, it has to satisfy two agents in the food distribution system. The regional competitor has to (1) convince a retailer to carry its product and (2) convince consumers to purchase its product.

Consider first the problem of getting a retailer to carry its product. Hamm makes the point that retailers will accept a new item if that item will increase the retailer's gross profit dollars.⁶¹ A new product has to bring in more money than the product it replaces. Switching products has to provide a positive marginal gain in gross profits.

The marginal gain, or the change in gross profit dollars from stocking one brand as opposed to another, is measured per unit of shelf space over a specific period of time. For a retailer, the marginal profit from carrying a regional competitor's reconstituted lemon juice

as opposed to ReaLemon is the gross profit derived from selling the regional competitor's product minus the gross profit forgone by not stocking that shelf space with ReaLemon.

The gross profit a retailer can derive by selling either brand of reconstituted lemon juice is influenced by three factors. The first factor is retail price. Let $P_B^R(t)$ represent Borden's retail price in period t and let $P_C^R(t)$ represent the regional competitor's retail price in period t .

Within this model, the superscript R denotes a retail observation. The superscript W denotes a wholesale observation. The subscript B denotes Borden and the subscript C denotes the regional competitor.

The second factor determining the gross profit available from either brand is its gross margin. Gross margin is the difference between the retail price and the wholesale price of a product, calculated as a percentage of retail price. Denote the gross margin a retailer can earn on any product it sells as M . If $P_B^W(t)$ denotes Borden's wholesale price in period t and $P_C^W(t)$ denotes the regional competitor's wholesale price in period t , then the gross margin a retailer can earn on Borden's ReaLemon can be described as

$$(1) \quad M_B(t) = \frac{P_B^R(t) - P_B^W(t)}{P_B^R(t)} .$$

Similarly, the gross margin a retailer can earn on the regional competitor's brand of reconstituted lemon juice can be described as

$$(2) \quad M_C(t) = \frac{P_C^R(t) - P_C^W(t)}{P_C^R(t)} .$$

Borden's trade promotions frequently affected the retailer's gross margin on ReaLemon. In order to qualify for Borden's promotional discount, certain actions were often required of retailers. One of the performance options available to retailers was generally a reduced retail price. To the extent that retailers chose this performance option, when Borden set its wholesale price for promotions, it also set the retail price. This would establish the retailer's gross margin on ReaLemon as a function of Borden's own pricing strategy.

The final factor determining a product's gross profit is the number of units sold. Define $N_B(t)$ as the marginal sales of ReaLemon a retailer loses by stocking one less unit of shelf space with ReaLemon. For example, if the shelf space devoted to ReaLemon is reduced from 10 to 9 facings, and 10 fewer cases are sold, $N_B(t)$ is equal to 10. Define $N_C(t)$ as the marginal number of units of the regional competitor's reconstituted lemon juice a retailer can sell if the retailer stocks one more unit of shelf space with that brand.

For a retailer to have an incentive to carry a regional competitor's brand -- and consequently not fill that shelf space with ReaLemon -- the marginal gross profit from switching to that brand must be positive. It must be that for at least one unit of shelf space:

$$(3) \quad P_C^R(t) \cdot M_C(t) \cdot N_C(t) - P_B^R(t) \cdot M_B(t) \cdot N_B(t) > \emptyset.$$

That is, the gross profit from stocking one unit of shelf space with the regional competitor's brand must be greater than the gross profit forgone from not stocking that shelf space with ReaLemon.

To convince a retailer to carry its product, the regional competitor must make its reconstituted lemon juice attractive to consumers as well. The regional competitor can do this by making its brand of

reconstituted lemon juice relatively less expensive than ReaLemon.

Define $d(t)$ as the difference between the retail price of Borden's ReaLemon and the retail price of the regional competitor's reconstituted lemon juice, or as:

$$(4) \quad d(t) = P_B^R(t) - P_C^R(t).$$

This model assumes that as $d(t)$ rises, given any absolute price level, the regional competitor's reconstituted lemon juice becomes more attractive to consumers. So as $d(t)$ rises, the regional competitor can expect to gain market share. Similarly, as $d(t)$ rises, Borden can expect to lose market share.

To counteract these losses, Borden can attempt to reduce $d(t)$. Theoretically, when $d(t)$ reaches zero, the competitor can not offer consumers a better deal on its brand of reconstituted lemon juice than Borden, will realize no sales, and will be forced from the market. Given consumer preference for ReaLemon, I assume that retailers require some minimum price difference between the two products in order to carry the regional competitor's reconstituted lemon juice. Call this difference

$$(5) \quad \min d(t) = \text{minimum required difference between retail prices for ReaLemon and a regional competitor's reconstituted lemon juice.}$$

Combining equations (1), (2) and (5), and rearranging, provides the equation;

$$(6) \quad P_C^W(t) < \frac{P_B^W(t)}{(1-M_B(t))} \left(1 - \frac{N_B(t)}{N_C(t)} M_B(t)\right) - \min d(t).$$

This equation describes the highest wholesale price the regional competitor can charge for its brand of reconstituted lemon juice in any period. This price is a function of Borden's wholesale price, the gross margin on ReaLemon and the minimum retail price margin. Given Borden's

pricing strategy, this price will allow a competitor to (1) offer retailers sufficient marginal revenues to carry the competitor's brand, and (2) maintain at least a minimum retail price spread between its brand of reconstituted lemon juice and ReaLemon. If Borden sets its wholesale price or retailers earn a gross margin so that the maximum price in equation (6) is above the regional competitor's average variable cost, an equally efficient regional competitor can remain in the market. If Borden sets its wholesale price or retailers earn a gross margin so that the maximum price shown in equation (6) falls below the regional competitor's average variable cost, then under the standard proposed in this model, predatory conduct can be inferred.

4. DATA

This section describes the data used in estimating the model developed previously. All data were derived from documents in the Federal Trade Commission's case against Borden.

M_B and $P_B^W(t)$:

According to the Administrative Law Judge's Findings of Fact, in April and May of 1973, on average, retailers earned a gross margin of 9.3% on ReaLemon.⁶² This was a non-promotional period. During promotional periods, Borden typically changed its wholesale price and allowed reduced retail prices as performance options. So it is not unreasonable to expect the gross margin in promotional periods to be different from the average gross margin in certain non-promotional periods.

According to the record in the case, during December 1973, Borden charged Acme Markets \$3.25 per case of ReaLemon to induce Acme to sell

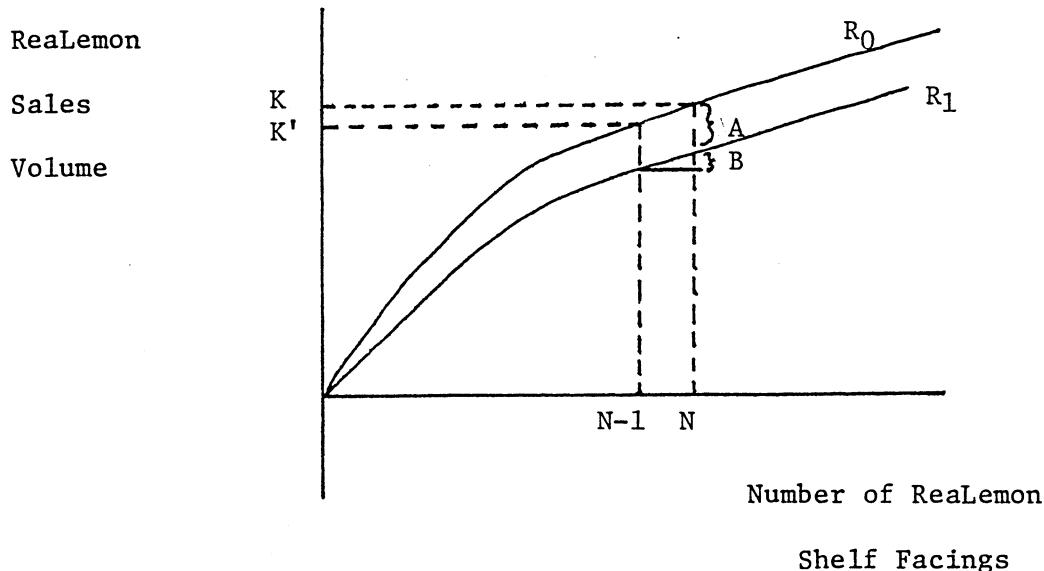
ReaLemon for 39¢ per quart.⁶³ In his Initial Decision, the Administrative Law Judge (Judge Hanscom) found that due to accrued promotional reimbursements credited at the time of purchase, the actual wholesale price could reasonably be inferred as \$4.05 per case.⁶⁴ At an effective wholesale price of \$4.05, and a suggested retail price of 39¢ per quart or \$4.68 per case of 12 quarts, Acme's gross margin on ReaLemon in December 1973 would have been 13.5%. This figure will be used for the retailer's gross margin on ReaLemon in equation (6). Borden's wholesale price of \$4.05 will be used in the model as well.

$N_B(t)/N_C(t)$: A retailer only would have restocked a unit of shelf space with the regional competitor's brand if it expected more gross profit from that brand than from ReaLemon. The sales ratio, $N_B(t)/N_C(t)$, compares the volume of ReaLemon sales lost by removing it from one unit of shelf space to the volume gained by the regional competitor's brand when it was substituted for ReaLemon on that unit of shelf space.

Hamm shows that the way a product is displayed influences how well it sells.⁶⁵ He makes the point that when the amount of shelf space allocated to a product increases, sales of that product increase as well. An extension of Hamm's idea says that the absolute increase in sales volume will be a function of the initial amount of shelf space allocated to a product as well as the amount of space gained. From his results, it can be inferred that sales volume is a concave function of shelf space: sales volume increases at a decreasing rate with increases in shelf space.

Curve R_0 in figure 1 shows a hypothetical example of the functional relationship between ReaLemon shelf facings and ReaLemon sales volume.

Figure 1.
The Relationship Between Shelf Facings and Sales Volume



When ReaLemon has N facings, its sales volume is K units. When ReaLemon has $N-1$ facings, its sales volume falls to K' units.

If a competitor were to enter the market, the functional relationship between ReaLemon shelf facings and sales volume may shift from R_0 to R_1 . At every number of shelf facings, ReaLemon sales volume would fall. This shift would be due to substitution between brands. Some consumers would be willing to switch from ReaLemon to a lower priced alternative brand. The magnitude of this shift will depend on the relative price difference between the two brands and the number of shelf facings given to the competing brand.

The effect of entry on ReaLemon shelf facings is important in determining ReaLemon's total losses in sales volume. Suppose entry occurs and ReaLemon does not lose facings. (This implies that when entry occurs, shelf space is taken from a product unrelated to

reconstituted lemon juice and given to the regional competitor.)

Substitution between brands would imply that ReaLemon would lose and the regional competitor would gain sales volume equal to A in figure 1.

A more reasonable assumption, however, may be that retailers keep the total amount of shelf space allocated to reconstituted lemon juice as a category fixed when entry occurs. Then, every facing given to the regional competitor's product would be one facing taken from ReaLemon.

Suppose entry occurs under these conditions. If the regional competitor were given one facing, ReaLemon would then have $N-1$ facings. Not only would ReaLemon lose A sales due to substitution between brands, but according to figure 1, ReaLemon would lose B sales due to the concave nature of the sales function. A reduction in shelf facings would reduce sales absent any substitution.

In this example, when entry occurs, ReaLemon sales losses (referred to as N_B in this model) would equal $A+B$ and the regional competitor's sales gains (N_C) would equal A. Then the sales ratio, N_B/N_C , would equal $(A+B)/A$.

However, there is another component to consider when calculating the sales ratio. When the regional competitor enters the market, it does so with a retail price that is lower than ReaLemon's retail price. Therefore, the regional competitor's brand may draw new customers into the market. These customers would buy this brand because its price was low enough--in absolute terms--to get these consumers to try reconstituted lemon juice. These customers would not be substituting between brands. They would be entering because the retail price for the regional competitor's brand was below their reservation price for

reconstituted lemon juice in general. Call this increase in sales C. Then the sales ratio would equal $(A+B)/(A+C)$.

Unfortunately, documents from the case do not provide the information necessary to calculate $N_B(t)/N_C(t)$. Therefore, the maximum wholesale price a regional competitor could charge for its reconstituted lemon juice will be calculated using several estimates. This should provide some insight into how the minimum price would change if different ratios are assumed.

Sales ratios either greater than or less than 1.0 are reasonable. When the sales ratio exceeds 1.0, ReaLemon sales losses due to reduced shelf space outweigh the gains in sales from new customers. When the sales ratio is less than 1.0, the opposite is true.

The extreme value the sales ratio may take is 0.00. This would occur if Borden lost no sales when one unit of its space was given to the regional brand. However, this seems unreasonable. It is clear that Borden was losing market share. For Borden to lose market share without losing sales, the regional competitor would have had to obtain its sales exclusively from new customers to the reconstituted lemon juice market. It seems much more plausible that the regional competitor was taking at least some customers from Borden. For this reason, it seems most reasonable to expect the sales ratio to be above zero but probably below 2.0.

$\min_{d(t)}$: Only a difference in retail prices allowed the regional competitor to sell its reconstituted lemon juice. A retailer would have required some minimum retail price difference to carry the regional competitor's brand because the price difference would have allowed that brand to gain at least a minimum market share. In all probability, the price difference would not be independent of other demand influences

such as the number of facings given to the regional brand.

In his initial decision, Judge Hanscom described a retail price difference of 5¢ as "probably far less than the differential needed to cause purchasers to abandon the premium ReaLemon brand for a relatively unknown new entrant."⁶⁶ While this does not indicate the exact price difference needed to gain the minimum market share, it does suggest a probable lower bound. Results will be calculated using several values for \min_d .

5. RESULTS

This section presents results of the maximum wholesale price model in equation (6). Again, given certain market parameters and Borden's pricing strategy it is possible to calculate the maximum wholesale price a regional competitor could have charged and still remained competitive. Remaining competitive means (1) that the competitor offered retailers greater gross profits by carrying its brand than by filling equivalent shelf space with ReaLemon and (2) that the competitor's brand was sold to consumers at an absolute cost saving in comparison to ReaLemon. If this maximum wholesale price was above the regional competitor's average variable cost, the regional competitor could have remained in the market. If this maximum wholesale price was below the regional competitor's average variable cost, it would have been excluded from the market.

Results of the maximum wholesale price model are shown in Table 1. These results were calculated using several values for $N_B(t)/N_C(t)$ and \min_d , and using Borden's wholesale price charged to Acme Markets of \$4.05 per case and a gross margin of 13.5%.

Table 1

The Regional Competitor's Maximum Wholesale Price
as a Function of the Sales Ratio
and the Minimum Retail Price Spread

		$N_B(t)/N_C(t)$						
		<u>1.9</u>	<u>1.6</u>	<u>1.3</u>	<u>1.0</u>	<u>0.6</u>	<u>0.3</u>	<u>0.0</u>
	0.00:	\$3.48	\$3.67	\$3.86	\$4.05	\$4.30	\$4.49	\$4.68
	0.36:	3.12	3.31	3.50	3.69	3.94	4.13	4.32
$\frac{\text{min}_d}{\text{per case}} \text{ (in dollars of 12 bottles)}$	0.60:	2.88	3.07	3.26	3.45	3.70	3.89	4.08
	0.84:	2.64	2.83	3.02	3.21	3.46	3.65	3.84
	1.08:	2.40	2.59	2.78	2.97	3.22	3.41	3.60
	1.80:	1.68	1.87	2.06	2.25	2.50	2.69	2.88
	2.40:	1.08	1.27	1.46	1.65	1.90	2.09	2.28

$$M_B(t) = 0.135 \text{ or } 13.5\%$$

$$P_B^W(t) = \$4.05$$

The maximum wholesale price varies as the sales ratio (N_B/N_C) varies and as the minimum retail price spread ($\frac{\text{min}_d}{\text{per case}}$) varies. For example, if the sales ratio equaled 1.0 and the minimum retail price spread equaled 5 cents a quart or 60 cents a case, the regional competitor's maximum wholesale price would have been \$3.45. When Borden sold ReaLemon to food retailers at a promotional wholesale price of \$4.05 and retailers took a 13.5% gross margin, the most a regional competitor could have charged retailers for its brand of reconstituted lemon juice would have been \$3.45. At that price, the regional competitor would have given retailers an incentive to carry its brand and would have given consumers an incentive to switch away from ReaLemon. Whether \$3.45 was above or below the regional competitor's

average variable cost would have determined whether the competitor remained in the market.

Holding the minimum retail price spread to 60 cents, if the sales ratio was 0.60 instead of 1.0, the regional competitor's maximum wholesale price would rise to \$3.70. A sales ratio of 0.30 raises the maximum wholesale price to \$3.89. The sales ratio represents the ratio of sales lost by ReaLemon to sales gained by the regional competitor. As the sales ratio falls, the regional competitor adds increasingly more to the sales of reconstituted lemon juice relative to the loss in ReaLemon sales. The more sales are increased by the regional brand, the lower the necessary per-unit profit margin to food retailers. With a low sales ratio, the regional competitor could have maintained the requisite retail price spread, charged a higher wholesale price, and still allowed retailers higher gross profit dollars by carrying its brand.

For any fixed value of the sales ratio, as the minimum retail price spread ($\frac{\text{min}}{\text{d}}$) increases, the regional competitor's maximum wholesale price falls. Suppose, for example, the sales ratio equaled 1.0. If the minimum retail price spread equaled 84 cents per case, the maximum wholesale price a regional competitor could have charged to remain competitive would have been \$3.21. A minimum spread of \$1.08 per case would have forced the maximum wholesale price to \$2.97.

In his initial decision, Judge Hanscom estimated Borden's average variable cost on its sale to Acme Markets as \$3.99 per case.⁶⁷ By establishing a wholesale price of \$4.05, Borden would have been selling above its own average variable cost. However, a wholesale price of \$4.05 may still have excluded an equally efficient rival. To show this,

the calculated maximum wholesale price a regional competitor could have charged must be compared to the regional competitor's average variable cost.

In a planning document, a Borden official estimated the manufacturing costs for its regional competitor.⁶⁸ Estimated cost parameters for the regional competitor are reproduced in Table 2. Variable costs would have included the cost of goods, distribution costs and part of selling costs. Following Judge Hanscom's argument, selling expenses that go toward such things as salaries of salesmen or their office space would have been considered fixed costs.⁶⁹ He found that approximately 14% of Borden's average selling expenses were fixed costs. Applying this same percentage to the regional competitor's selling expenses, average variable costs are estimated as \$3.51 per quart of reconstituted lemon juice.

Table 2
Estimated Manufacturing Costs for a Regional Competitor

	<u>Regional Competitor's</u> <u>Estimated Cost</u>
Glass	\$1.048
Caps	.061
Labels	.079
Product	1.574
Direct Labor/Fringe	<u>.067</u>
Cost of Goods	2.83
Distribution	.50
Selling	.21
Advertising/Promotion	.10
Overhead	<u>.20</u>
Average Total Cost	3.84
Average Variable Cost	\$3.51

Comparing this figure to results in Table 1, it is clear that under certain conditions Borden's pricing strategy could have acted to exclude the regional competitor. Given the assertion that Borden set its own wholesale price at \$4.05 and retailers earned 13.5% gross margin on ReaLemon, there are several combinations of minimum retail price spreads and sales ratios that would have forced a regional competitor to sell its output for less than its variable production costs. For example, if the sales ratio equaled 0.6 and the minimum retail price spread was 84 cents per case (or 7 cents per quart), the maximum wholesale price a regional competitor could charge would have been below the its own variable cost of \$3.51 per case. Under those conditions the regional competitor would have effectively been excluded from the market.

One could argue that the sales ratio and the minimum retail price spread in fact take on values not shown in Table 1. Clearly both will be bounded below by zero. However, their maximum values may be above those shown in Table 1. While this is true, it is not necessarily germane to the problem. Equation (6) shows that both \min^d and $N_B(t)/N_C(t)$ have a negative influence on the regional competitor's maximum wholesale price.⁷⁰ Therefore, as one increases, the other would have to decrease to keep the maximum wholesale price at some fixed level.

When the sales ratio is zero, the regional competitor's maximum wholesale price falls below its average variable cost when the retail price spread surpasses \$1.08 per case, or 9 cents per quart. Therefore, if one were to argue that the minimum retail price spread indeed was above 9 cents per quart, the value of the sales ratio would be irrelevant. Since the sales ratio can never be negative, a price spread greater than 9 cents would always exclude the regional competitor.

Similarly, if one were to argue that the sales ratio was indeed greater than 1.9, the value of d^{\min} would become irrelevant. If the sales ratio was greater than 1.9, there would be no positive values that the retail price spread could take so that the regional competitor's maximum wholesale price was above its variable production cost of \$3.51. Once again, the regional competitor would always be excluded.

This effectively places a boundary on values that need to be considered. Given Borden charged a wholesale price of \$4.05 and retailers took a gross margin of 13.5 percent, the relevant values of the sales ratio would fall between 0 and 1.9. The relevant values of the retail price spread would fall between 0 and \$1.08 per case. Within these bounds, the model may give an ambiguous result. If either parameter took a value outside these bounds, the result is clear--the regional competitor would be excluded.

The dashed line in table 1 indicates the probable boundary marking reasonable from unreasonable values for the minimum price difference and the sales ratio. It seems unlikely that the sales ratio would have been below 0.3 or that the minimum price difference would have been less than 60 cents per case or 5 cents per quart. Once again, given Borden charged a wholesale price of \$4.05 and retailers took a gross margin of 13.5%, there are very few combinations of the sales ratio and the minimum price difference within the area below and to the left of the dashed line that would not have excluded an equally efficient, though lesser known rival. One can conclude from this that it's likely Borden's promotional wholesale price of \$4.05 and gross margin of 13.5% would have acted to exclude an equally efficient rival.

Conclusion

This study has shown that under certain plausible conditions it would have been possible for Borden to price above its own average variable cost and still exclude an equally efficient rival from the reconstituted lemon juice market. If a strictly cost based rule is established that sets the predatory boundary at average variable cost, then Borden's pricing strategy would have been legal. However, if a broader approach is taken, the opposite conclusion is not only possible but probable. This may be an important distinction, especially if market structure includes high entry barriers that make future entry difficult or requires equally efficient firms to enter only through the use of price discounting.

These results depend on the values of two unknown parameters -- the sales ratio (N_B/N_C) and the minimum retail price spread (d^{\min}). However, the boundaries for each have been estimated. The lack of information on these parameters in the Borden record suggests that the Courts may want to expand their information search in predation cases. The Courts may want to look at the marketing disadvantage an equally efficient though lesser known product has in relation to a nationally advertised brand. If the disadvantage is significant enough, predatory conduct could effectively occur even if the nationally advertised brand were priced above its own average variable production cost.

Footnotes

¹"FTC's Opinions in RE International Telephone and Telegraph Corp." contained in Antitrust and Trade Regulation Report, 8-9-84, p. 286.

²Ibid.

³FTC supra note 1, p. 286, emphasis added.

⁴Ibid.

⁵Phillip Areeda and Donald F. Turner, 1975, "Predatory Pricing and Related Practices Under Section 2 of the Sherman Act," 88 Harvard Law Review 697.

⁶Areeda and Turner, supra note 5, p. 705.

⁷Areeda and Turner, supra note 5, p. 712, note 37.

⁸Areeda and Turner, supra note 5, p. 712.

⁹Areeda and Turner, supra note 5, p. 712.

¹⁰Areeda and Turner, supra note 5, p. 711.

¹¹Richard A. Posner, 1976, Antitrust Law: An Economic Perspective, The University of Chicago Press.

¹²Posner, supra note 11, p. 188.

¹³Posner, supra note 11, p. 191.

¹⁴Posner, supra note 11, p. 192.

¹⁵Posner, supra note 11, p. 189. Posner adds the intent clause because he feels: "selling below long-run marginal cost is only suggestive, and not conclusive, evidence of socially inefficient pricing... . That is why pricing below long-run as distinct from short-run marginal cost cannot be presumed to be anticompetitive unless there is intent to exclude" (p. 189).

¹⁶Joskow, Paul L. and Alvin K. Klevorick, 1979, "A Framework for Analyzing Predatory Pricing Policy," 89 The Yale Law Review 213.

¹⁷Joskow and Klevorick, supra note 16, p. 252.

¹⁸Ibid.

¹⁹Joskow and Klevorick, supra note 16, p. 253.

²⁰Ibid.

²¹Williamson, Oliver E., 1977, "Predatory Pricing: A Strategic and Welfare Analysis," 87 Yale Law Review 284.

²² Scherer, F.M., 1976, "Predatory Pricing and the Sherman Act: A Comment," 89 Harvard Law Review 868.

²³ Scherer, supra note 22, p. 889.

²⁴ 92 FTC 669, p. 674.

²⁵ Ibid.

²⁶ Ibid.

²⁷ 92 FTC 669, pp. 708-709.

²⁸ ReaLemon Foods, 1971 Marketing Plan, p. 3.

²⁹ ReaLemon Foods, 1972 Marketing Plan, p. 6.

³⁰ ReaLemon Foods, 1971 Marketing Plan, p. 8.

³¹ 92 FTC 669, p. 709.

³² ReaLemon Foods, 1971 Marketing Plan, p. 3-4.

³³ See discussion in 92 FTC 669, p. 712.

³⁴ See discussion in 92 FTC 669, p. 720.

³⁵ For a discussion of manufacturing processes in the reconstituted lemon juice industry, see 92 FTC 669, p. 676-677.

³⁶ ReaLemon Foods, 1971 Marketing Plan, p. 11.

³⁷ 92 FTC 669, p. 712.

³⁸ ReaLemon Foods, 1971 Marketing Plan, p. 15.

³⁹ 92 FTC 669, p. 714.

⁴⁰ ReaLemon Foods, 1973 Marketing Plan, p. 21.

⁴¹ ReaLemon Foods, 1971 Marketing Plan, p. 10.

⁴² ReaLemon Foods, 1971 Marketing Plan, p. 11.

⁴³ 92 FTC 669, p. 732.

⁴⁴ Ibid.

⁴⁵ 92 FTC 669, p. 733.

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸Ibid.

⁴⁹92 FTC 669, p. 721.

⁵⁰92 FTC 669, p. 733.

⁵¹92 FTC 669, p. 717.

⁵²92 FTC 669, p. 704.

⁵³92 FTC 669, p. 717.

⁵⁴Ibid.

⁵⁵See 92 FTC 669, p. 721.

⁵⁶ReaLemon Foods, 1971 Marketing Plan, p. 7.

⁵⁷Ibid, pp. 16-17.

⁵⁸For the complaint see 92 FTC 669, pp. 669-672.

⁵⁹92 FTC 669, p. 671.

⁶⁰Ibid.

⁶¹Larry G. Hamm, Retailer-Manufacturer Relationships in the Food Sector -- Some Observations from the U.S.A., NC-117 Working Paper, Department of Agricultural Economics, University of Wisconsin, April 1982.

⁶²92 FTC 669, p. 727.

⁶³92 FTC 669, p. 739-740.

⁶⁴92 FTC 669, pp. 751-53.

⁶⁵See Hamm, supra note 61, p. 29.

⁶⁶92 FTC 669, p. 756.

⁶⁷92 FTC 669, p. 753.

⁶⁸92 FTC 669, p. 744.

⁶⁹ReaLemon Foods, 1973 Marketing Plan, p. 26.

⁷⁰

$$\frac{\partial P_C^W(t)}{\partial (\overset{\text{min}}{d})} = -1 < 0$$

$$\frac{\partial P_C^W(t)}{\partial (N_B(t)/N_C(t))} = - \frac{P_B^W(t)}{(1-M_B(t))} < 0; M_B(t) \ll 1$$

