

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

AGRON, INC a California corporation,)
)
 Plaintiff,)
)
 v.) Case No. CV 03-05872-MMM(KWKx)
)
 CHIEN-LU LIN, an individual, MING-CHIN)
 CHOU, an individual, ALPHAN K. TSOI,)
 an individual, TSOI & ASSOCIATES,)
 California corporation, JUSTIN LUM,)
 an individual, and LAW OFFICES OF A.)
 JUSTIN LUM,)
)
 Defendants)
 _____)

EXPERT REPORT
of
JEFFREY A. DUBIN, Ph.D.

November __, 2004

SECTION I: Introduction

1. I am a co-founding member of Pacific Economics Group, a Limited Liability Company (PEG) headquartered in Pasadena, California. PEG was founded in 1996.
2. I also am a tenured Associate Professor of Economics at the California Institute of Technology ("Caltech") in Pasadena, California, a position I assumed in 1988. For the past twenty years, I have taught both undergraduate and graduate level courses at Caltech. I regularly use econometric and statistical methods in my empirical work.
3. Some of my current research topics include contingent valuation methods, discrete-choice econometrics, the effects of welfare and entitlement programs on unemployment, energy economics, tax compliance, sampling and survey methods, valuing intangible assets, and studying ballot proposition voting. In addition, I have provided testimony before various courts and regulatory Commissions.
4. In much of my research work and in the testimony I have provided before various courts and regulatory Commissions, I have utilized a common and widely used econometric method known as regression analysis. For instance, I have used linear regression analysis to test the hypothesis that troopers in the State of Alaska allocate their resources across the State in a race conscious manner or in a fashion consistent with population density, accessibility access, calls for service, or the types and frequency

of crimes reported. I have used linear regression analysis to determine the incremental impact of NFL football's winning percentage during the season on its home game attendance, and have used regression analysis to determine the demand for various products to determine the likely market price but-for a patent infringement that resulted in price erosion.

5. A true and correct copy of my Vita is attached hereto as Exhibit A, which includes a representative list of my current research assignments and past testimony.
6. I was awarded a Bachelor of Arts degree in Economics from the University of California, Berkeley, in 1978, with highest honors and great distinction, and was awarded a Ph.D. in Economics by the Massachusetts Institute of Technology (MIT) in 1982. Prior to co-founding PEG in 1996, I was the Director of Statistics and Econometric Analysis with Arthur Andersen Economic Consulting (AAEC), an Arthur Andersen and Co. LLP division. Prior to joining AAEC in 1992, I was a senior economist at Putnam, Hayes and Bartlett from 1989 to 1992.
7. I have published four books, entitled respectively, *The California Electricity Crisis What, Why and What's Next* (2004), *Empirical Studies in Applied Economics* (2001), *Studies in Consumer Demand: Econometric Methods Applied to Market Data* (1998), and *Consumer Durable Choice and the Demand for Electricity* (1985). I have also authored many articles and papers. A complete publications list is also included in Exhibit A.

8. The balance of my Report is organized in the following manner. In Section II, I review my understanding of the facts surrounding the litigation. In Section III, I discuss monopolies, specifically how a monopoly is created and maintained. In Section IV, I discuss the relevant product market for 3-D caps. In Section V, I discuss market power measures. In Section VI, I explain and discuss the product cycle model I used in calculating damages. In Section VII, I briefly review my conclusions.

SECTION II: The Factual Background

9. I have read the Second Amended Complaint For Declaratory and Injunctive Relief; Invalidation of Patents; Conspiracies in Restraint of Trade; Attempted Monopolization; and Conspiracy to Monopolize (the Complaint) in the above-captioned case and am familiar with its allegations. Among other things, I have been informed that Agron, Inc., (Agron) is an authorized licensee of adidas America (adidas) and has the right to sell, distribute, and manufacture adidas brand headwear in the United States. Among other products, Agron's license with adidas permits it to make and sell caps, including 3-D caps, which bear the adidas brand name. 3-D caps have raised logos or letters that are embroidered in a manner so they protrude out from the cap cloth giving the letters a three dimensional, rather than a two-dimensional, appearance.
10. I understand that defendants Chien-Lu Lin (Lin) and Ming-Chin Chou (Chou) own and operate an embroidery factory in Shanghai, China. Defendant Alphan K. Tsoi (Tsoi) is an attorney with Defendant Tsoi and Associates. Defendant A. Justin Lum (Lum) is an attorney with Defendant Law Offices of A. Justin Lum.
11. The David & Raymond International Patent Group (David & Raymond Group) is a multi-service organization that provides legal services in the form of obtaining patents, technical advice, and marketing efforts in the

United States. Defendants Lum and Tsoi are members of the David & Raymond Group.

12. The David & Raymond group have applied for and received three patents covering the sewing process that creates the three-dimensional embroidery on 3-D caps. One of the underlying disputes between the parties in this action is whether the patents, if valid, cover the manufacturing process by which Plaintiffs produce their 3-D caps.
13. Plaintiff's assert that Defendants commenced a letter writing campaign where they threatened Agron's customers with patent infringement litigation. The Defendants initiated this campaign by sending cease and desist letters to Agron's customers, demanding a complete accounting and/or demanding that the customer sign a license agreement with Defendants. In the course of a three-month period in 2003, Defendants sent approximately 200 letters to Agron's customers.
14. I have been asked to quantify the damages that Agron has suffered due to lost sales of 3-D caps as a result of the Defendants' action. In performing this calculation, I first need to define a relevant product market and consider whether the actions of defendants were anti-competitive attempts to gain or create market power.

SECTION III: Creating and Maintaining Monopoly

15. Monopoly or market power means the ability to set price above the competitive level, or marginal cost. A monopolist faces a downward sloping industry demand curve and does not face competition from rival firms. In other words, as the monopolist increases its prices, it sells less product. Consequently, a monopolist is a price setter, not a price taker. Thus, the quantity sold depends on the price charged for the product. Because a monopolist typically faces a downward sloping demand curve, it must decide how much of its product it should sell in order to maximize its profit. Recall that with a downward sloping demand curve, it must lower prices to increase sales. If a monopolist lowers prices in order to sell additional units of a product, it must lower the prices on all units in order to sell one additional unit. Further, increased production means increased costs. While a monopolist earns additional revenue on each additional unit sold, the firm's total revenue may decrease to the extent that the firm has to lower the price on all its units sold in order to sell the one additional unit. This change in revenue from selling one additional unit is known as the marginal revenue a firm receives. If the monopolist faces a downward sloping demand curve, marginal revenue is always less than the price. Conversely, for a firm in a perfectly competitive industry, marginal revenue equals price. If the monopolist faced a completely inelastic demand curve, it would not have to lower price in order to sell one additional unit because

demand is not dependent on price. In such cases, the increment to revenues from selling an additional unit would be equal to the initial price. A monopolist maximizes profits when the extra revenue from selling one additional unit exactly equals the extra production cost. In other words, marginal revenue equals marginal cost.

16. There are several distinct ways in which a firm may become or remain a monopolist. First, a firm may have special knowledge or trade secrets that allow it to produce a new or superior product that others cannot imitate. This differentiated product results in a differentiated demand for that product, and allows the firm to exercise monopoly power with respect to that unique product.
17. Second, a firm may have specialized knowledge about production that allows it to produce a given product at lower costs than its competitors. Therefore, the firm will be more efficient. The cost structure created by these efficiencies may allow the firm to set a price for the product low enough to act as an effective barrier to entry into the market.
18. Third, a firm can obtain a patent to create or maintain its monopoly. A patent is necessary if the product's cost structure or uniqueness can be imitated. A valid patent will prevent other firms from copying the product and also protect the firm from competition for a given period of time.
19. Fourth, a firm can create and maintain monopoly power through government restrictions on entry.

20. Fifth, a firm may, by taking strategic actions, attempt to become or remain a monopoly by preventing other firms from entering a market or forcing other firms to leave a market. These actions might include controlling essential inputs or being sufficiently large in size to dominate a market where there is room for one large firm, but little room for multiple firms. Strategic actions may also include predation through “sham” litigation.
21. Sham litigation is the legal term for predatory litigation and is generally defined as abusing the legal process for anti-competitive gains. The law has recognized that sham litigation is either “baseless” or fraudulent. Economic analysis emphasizes the anti-competitive rationale behind such baseless litigation. In 1982, Judge Posner’s decision for the Seventh Circuit in *Grip-Pak, Inc. v. Illinois Tool Works, Inc.* made clear the viability of litigation as a predatory strategy. Posner argued that an antitrust violation occurs “when his (the predator’s) purpose is not to win a favorable judgment against a competitor but to harass him, and deter others, by the process itself—regardless of outcome—of litigating.”¹ Sham litigation is an example of non-price predation. Predation, without price competition, is often more successful than actually competing because the predator’s costs are lower. Sending out a barrage of threatening letters to a rival’s customers may be very damaging and is fairly inexpensive. Such a competitive rent-seeking strategy, if successful, will shift a competitor’s profits to the party initiating the strategy. Litigation for competitive rents is not itself illegal. Predatory or sham litigation is illegal because it results in

¹ 694 F. 2d 466 (1982).

monopoly or market power when actual or potential competition is eliminated or reduced as a result of that litigation. Strategic actions taken by one firm to limit competition may violate Section 2 of the Sherman Act.²

22. Here, the Defendants' actions have damaged Agron's business with its customers. If the Defendants' actions are ultimately successful, the market for 3-D caps will be less competitive and, with its acquired market power, the Defendants may have gained the ability to raise market prices either directly or through license agreements with manufacturers. Only the Defendants stand to benefit from their actions. Whether or not the Defendants' actions were illegal is beyond the scope of my Report. However, I conclude that the Defendants' action was a strategic action designed to (1) eliminate potential competition; (2) to eliminate a competitor from the market; and (3) to allow the Defendants to gain monopoly power and gain the ability to raise prices by significant amounts for non-transitory time periods.

² Section 2 of the Sherman Antitrust Act, Title 35 of the United States Code, provides that: "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize, any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony..." Section 2 thus encompasses three separate and distinct offenses: actual monopolization; attempted monopolization; and combinations or conspiracies to monopolize.

SECTION IV: The Relevant Product Market

23. The extent to which a firm has market power for a particular product in a specified market area is determined by demand substitutability, supply substitutability, and firm entry. Demand substitutability refers to buyers' ability to substitute away from the marketed good in the relevant market and replace it with another product. Supply substitutability and entry both generally refer to a firm's ability to supply a product in a relevant market even if it currently does not supply that market. Supply substitutability refers to actions taken by existing firms not currently selling in a relevant market. Firm entry is a form of supply substitutability that refers to a firm entering the relevant market. This requires significant investment and distribution.
24. A market is defined as a "product or group of products, and a geographic area in which it is produced or sold such that a hypothetical, profit-maximizing firm, not subject to price regulation, that was the only present and future producer or seller of those products in that area likely would impose at least a small, but significant and non-transitory increase in price, assuming the terms of sale of all other products are held constant."³ The relevant market for antitrust purposes may be only one of several overlapping and intersecting markets. Thus, the relevant market is defined as "the smallest group of products and geographic area that constitutes a

³ The 1992 Dept. of Justice/Federal Trade Commission Horizontal Merger Guidelines, issued April 2, 1992, revised April 8, 1997 ("Horizontal Merger Guidelines").

market.”⁴ The main condition for ascertaining what constitutes a market is that a hypothetical monopolist could successfully raise price by a “small but significant and non-transitory” amount above current and likely future price levels.⁵

25. In evaluating the extent to which a price increase would be possible for a monopolist, it is necessary to consider both demand and supply substitution possibilities. Several fairly general factors may be relevant in delineating a product market including: (1) Evidence reflecting buyers’ perceptions that certain products are or are not substitutes for one another. This evidence is particularly relevant if those buyers have shifted purchases between the products in response to changes in relative price or other competitive variables; (2) Similarities or differences in the products’ price movement over time; (3) Similarities or differences in the products’ customary usage, design, or other physical and technical characteristics; and (4) Evidence of sellers’ perceptions that the products are or are not substitutes, particularly a change in a company’s business plan that has been based on those perceptions.
26. To define the relevant market for Agron’s headwear products, I relied on the four elements stated above. I conducted interviews with CEO and CFO of Agron, Inc., and with the CEO of Hat World, Mr. Glenn Campbell. Hat World is a retailer of headwear with approximately 25% market share of the market for 3-D caps. My interviews reveal that consumers do not

⁴ Horizontal Merger Guidelines

⁵ *Ibid.*

regard non 3-D caps as substitutes for 3-D caps. Non 3-D caps, which include 2-D or flat embroidery designs, are considered to be in a different market segment by consumers. Non 3-D caps frequently sell through lower price-point chain retailers, such as Walmart. 3-D cap suppliers, such as Agron, do not provide 3-D caps to lower price-point chain retailers, such as Walmart. Additionally, there has been a significant shift in demand from 2-D to 3-D caps.

27. The price-points for 2-D and 3-D caps are significantly different. 2-D caps sell for \$5–\$10, while 3-D caps sell for \$20–\$25 in some cases. The price differential has remained quite stable over time and price changes in 3-D caps have not caused significant movement by consumers away from the 3-D market segment into the 2-D market segment.
28. The products are physically different, with the 3-D cap being much more attractive to consumers than 2-D caps. Additionally, sellers do not regard the products as substitutes. When asked whether a sole-producer could raise prices for 3-D caps without significant risk of losing share to non 3-D caps, Mr. Campbell stated unequivocally that such a price increase would be feasible.
29. I conclude that 3-D caps, sold in the United States, form a relevant product market.

SECTION V: Market Power Measures

Herfindahl-Hirschman Index (HHI)

30. The HHI is a widely accepted method used to measure market concentration. It involves first determining the relevant geographic and product markets, market participants, and each participant's market share. The HHI is first calculated by squaring the market share possessed by each participant firm selling a particular good in a specific, well-defined geographic market and then summing the squares across all firms in the market. The HHI's interpretation and significance is apparent when its potential mathematical range is considered.
31. At one extreme is an industry with a single firm selling all the output. The HHI for a pure monopoly is calculated by taking the market share of 100 percent and squaring it. Thus, a pure monopoly yields an HHI of 10,000. At the other extreme is a pure competitive industry where each participant firm's market share is about zero. Squaring zero and summing the squares over all firms in the industry yields an HHI approaching zero.⁶ Accordingly, the possible HHI results range from 0 to 10,000.
32. A great deal can be learned by calculating a specific firm's market share. When the market share is close to zero, the firm would not be able to manipulate price to increase profits because the firm would be too small.

⁶ A market with N participants of equal size has an HHI of $\sum_{i=1}^N (1/N)^2 = N/N^2 = 1/N$. For instance, a market of 10 competitors, each with a market share of 0.10 would have an HHI of 1000. As N gets large (pure competition), the HHI approaches zero since $\lim_{N \rightarrow \infty} (1/N) = 0$.

Thus, the firm would be a price taker. The market, not the firm, sets the price. This is, of course, the classic definition of a competitive market.

33. When market share is close to 100%, the firm would generally be able to set, or at a minimum, greatly influence prices in the market. This is generally accomplished by the firm using its market concentration to control output. A dominant supplier might also be able to reduce output to drive up prices and maximize its profit. A pure monopoly is classically defined when a firm can accomplish this without fear of encouraging competitive entry or response.
34. This interest in overall competitiveness (or lack thereof) is also related to concern over the prospect for collusion. In general, an industry with many small suppliers would not likely have the ability to collude by controlling supply or entry in order to drive up price. However, collusion can be relatively easy in an industry with a small number of firms, each with a significant market share which would approach 100%, if they acted together. And, even a small firm (*i.e.*, a firm with relatively little market share) might collude with a dominant, quantity-controlling, price-setting segment of the industry. Therefore, a small firm with no apparent market power may find it profitable to engage in anti-competitive behavior by following a dominant player's lead. Accordingly, the market's overall concentration is an important factor used to determine the potential for pricing above marginal cost, which is the competitive market standard.

35. The HHI is a screening statistic. By itself, it does not determine whether or not anti-competitive behavior is actually taking place by a particular firm or a group of firms in a particular market. Instead, the test is used to establish ranges, which in some cases suggest the need for additional analysis. Generally, a market with an HHI of 0 to 1,000 or less is considered to be competitive.⁷ A market with HHI of also 1,000 to 1,800 is usually thought to represent a competitive market. However, constraints and/or additional analyses may be necessary to ensure that there are no anti-competitive practices in these markets. Regulators and anti-trust enforcers often presume that a market with HHI over 1,800 indicates the potential for a firm to exercise market power.
36. Generally, the HHI works well in distinguishing between different markets with the same number of firms and different underlying shares. For example, the HHI for a two-firm market in which both firms have equal market share is 5000. This is calculated by first squaring each firm's market share ($50^2 = 2500$) and then summing the squares ($2500 + 2500 = 5000$). By comparison, a more concentrated market in which one firm has an 80% share and the other firm has a 20% share yields an HHI of 6800. Again, the HHI is calculated by summing the firms' respective market

⁷ "The Department of Justice and Federal Trade Commission divide the spectrum of market concentration as measured by the HHI into three regions that can be broadly characterized as unconcentrated (HHI below 1000), moderately concentrated (HHI between 1,000 and 1,800), and highly concentrated (HHI above 1,800)." Horizontal Merger Guidelines. It is generally acknowledged that the 1,800 threshold recommended in the Merger Guidelines is used as a level of concentration that triggers intensive scrutiny.

share squares. Thus, 80^2 (6400) is added to 20^2 (400) to yield an HHI of 6800.

37. The logic for considering both firm and market concentrations now begins to emerge. The firm with 20% market share has less market power than one with 50% market share. However, the market with two equal sized firms is less concentrated (HHI of 5000) than the market with one 80% share firm and one 20% share firm (HHI of 6800). Both measures are usually considered important by economic regulators and the courts, and are, therefore, analyzed.
38. I collected data on year-end market shares from SportScanINFO, a market research firm that collects point-of-sale data from more than 13,000 stores. I was able to obtain market share data for a four-year period from 2001 through 2004. In Table 1, I show the market shares for the top 15 firms, by year, in the headwear/caps market segment. I also calculate the HHI statistic by year for the roughly 80 manufacturers tracked by SportScanINFO. In Figure 1, I display the market share of Agron in the Headwear/Cap market over time. First, I observe that the main manufacturers in this market have remained relatively stable in their rankings, although Agron appears to be losing some market share to its competitors beginning in 2004. This is consistent with their sales history which I discuss below. Second, I observe that the HHI statistics for this market are between 2400 and 3200 over the four-year period between 2001 and 2004. Thus, I conclude that the headwear/cap market is fairly

concentrated. The loss of one or more competitors in this market would likely result in higher market prices because it would increase the market concentration. The market's concentration makes it valuable to control, and raises the benefits to Defendants if their letter campaign is successful.

Table 1. Headwear/Cap Market Segment

	2001	2002	2003	2004
Nike	35.17%	46.07%	50.64%	48.40%
Agron	17.09%	21.97%	23.93%	22.15%
Outerstuff	29.05%	5.18%	4.76%	5.77%
Titleist/Footjoy	2.24%	4.73%	5.47%	3.01%
Paramount Headwear	3.99%	6.22%	0.96%	0.32%
Callaway	2.05%	3.73%	3.13%	3.4%
Jr286	0.01%	0.00%	0.75%	5.08%
Life is Good	0.71%	0.61%	0.99%	3.07%
Taylor Made	1.38%	1.88%	1.40%	0.16%
Columbia	0.64%	0.56%	0.91%	0.76%
Reebok	0.15%	0.84%	0.76%	0.48%
DORFPA	0.07%	0.41%	0.80%	0.22%
TWINSE	0.17%	0.17%	0.78%	0.28%
HAAS	0.02%	0.85%	0.12%	0.00%
DYNO	0.34%	0.46%	0.55%	0.27%
OTHERS	5.44%	5.78%	3.72%	5.65%
HHI	2402	2714	3207	2924

AGRON

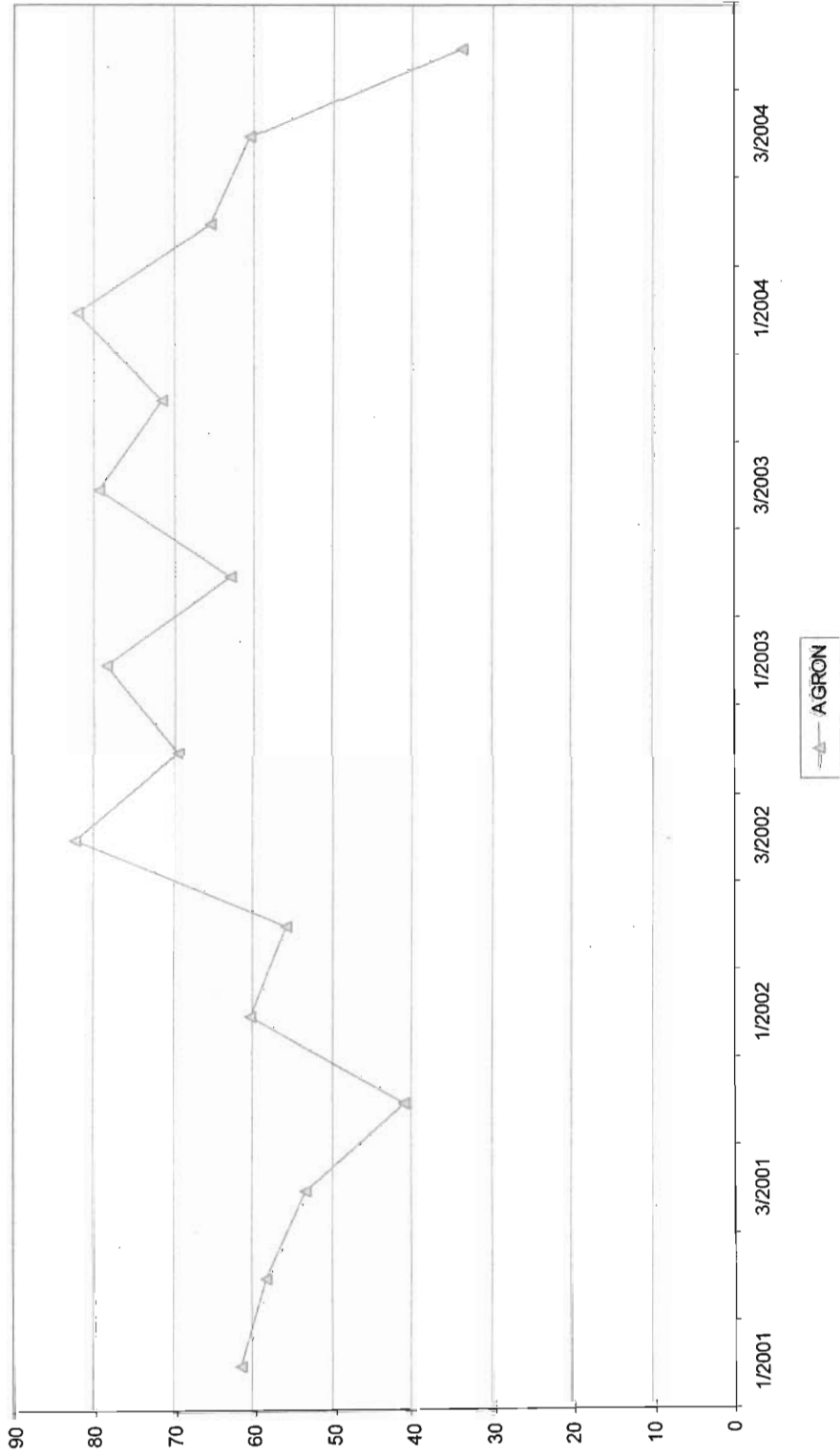


Figure 1: Agron's Market Share for Headwear/Caps

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SECTION VI: The Product Life-Cycle Model and Damages

39. In 1969, Frank Bass developed the product life-cycle model (Bass, Frank, "A New Product Growth Model for Consumer Durables," *Management Science*, Vol. 15, January 1969, pp. 215–227). The product life-cycle model attempts to explain why many products have sales that grow to a peak, and then level out at some volume lower than the peak. The model postulates both (1) an increasing demand for a product as consumers make purchases fueled by the pressure to imitate purchases made by others and (2) a simultaneously shrinking supply of potential buyers. The product life-cycle model has been applied literally hundreds of times to explain the purchase of everything from color televisions, automatic coffee makers, and power lawnmowers (in the original Bass paper) to semiconductor memory, instant cameras, and telecommunications products (in more recent applications).
40. The Bass model postulates two types of individuals. The first types are *innovators* who adopt an innovation or new product independent of others. These individuals are the first to try a new technology or a new product. They may be first to buy a fad item such as the Pet Rock. Innovators are, for example, the first to buy flat-panel plasma television sets. Often they do so at very high prices. Innovators were also the first purchasers of Bennie-Babies. Innovators spread the word and show off their acquisitions to other buyers.

41. The second types of individuals are *adopters*. Adopters are influenced by the fad or bandwagon effect (*i.e.*, they follow the purchases made by the innovators). The social pressure of previous buyers influences the timing of the adoption. (In this sense, the product life-cycle model is similar to models of infectious disease in epidemiology.)
42. The innovators' interaction with potential buyers helps promote further adoption of the product. The social pressure (for a fad item) grows as more and more individuals join the bandwagon. The rate of purchase also increases due to the social pressure. However, sales eventually peak and then decline as the number of potential customers declines. (In this model, Bass was considering purchases of durable goods so that the likelihood of repeat purchases was small.)
43. The basic assumption of the Bass model is that the probability of an initial purchase occurs at time period T given that no purchase has yet been made. This is a linear increasing function of the number of previous buyers. In mathematical terms:

$$\begin{aligned} P(T) &= \text{probability of initial purchase at} \\ &\quad \text{time } T \text{ given no previous purchase} \\ &= p + (q/m)Y(T) \end{aligned}$$

where:

$Y(T)$ = number of previous purchase
 m = number of purchases over the relevant life - cycle period
 p = constant coefficient of innovation
 q = constant coefficient of adoption

The quantity $Y(T)/m$ is the fraction of the population that has purchased the product by time period T . The Bass postulate is that the rate of sales, $S(T)/m$, divided by the fraction of the population that has not yet purchased (the ratio is a measure of the conditional probability that a sale occurs at time period T) is linear in the number of previous purchases:

$$\frac{S(T)/m}{[1 - Y(T)/m]} = p + \left(\frac{q}{m}\right)Y(T)$$

$$\frac{S(T)}{m - Y(T)} = p + \left(\frac{q}{m}\right)Y(T)$$

$$S(T) = \left[p + \left(\frac{q}{m}\right)Y(T) \right] [m - Y(T)]$$

$$S(T) = pm + (q - p)Y(T) - \left(\frac{q}{m}\right)(Y(T))^2$$

44. The conclusion of the Bass model is that sales made at time period T will be related in a quadratic manner to historical sales (*i.e.*, sales depend on $Y(T)$ and the square of the historical sales $(Y(T))^2$).

In discrete-time, the sales equation is given by:

$$S_T = a + bY_{T-1} + c(Y_{T-1})^2$$

where:

S_T = sales made at time period T

$Y_{T-1} = \sum_{t=1}^{T-1} S_t$ are cumulative sales made through time period $T-1$

This equation may be estimated by the linear regression analysis (ordinary least squares) using current sales as the dependent variable and lagged

cumulative sales (and the square at lagged cumulative sales) as independent explanatory factors. Ordinary least squares determine the coefficients: a , b , and c , which then identify the model parameters: p , q , and m .

45. Multivariate regression analysis seeks to uncover the factors that explain how a particular variable, known as the dependent variable, responds to different explanatory variables. For example, a multivariate regression analysis could be used to determine how house prices vary based on various characteristics of the house and/or the characteristics of the neighborhood in which the house resides. We might obtain factors that might affect value for several house listings, including the size of the house (in square feet), the number of bedrooms, the age and condition of the house, the average income in the neighborhood, and other factors. Once this information has been compiled for various houses, it would be useful to see whether and how these measures relate to the price for which a house is sold. For example, one might learn that the number of bedrooms is a better predictor of the price for which a house sells in a particular neighborhood than how "pretty" the house is (a subjective rating). One might also learn that additional bedrooms are not always of equal value because an increase in bedrooms without an increase in house size implies smaller rooms. A regression analysis determines the marginal or incremental contribution of each characteristic to the total house price. Regression analysis can also be used to test the hypothesis

that some factor such as access to better police or school services has an affect on price that is statistically significantly different from zero (*i.e.*, that the factor helps account for the variation in the dependent variable beyond what could be expected by random chance alone). Regression analysis can also detect "outliers," that is, houses that should really sell for more than they actually sold for, given their location and characteristics.

46. In a linear regression model, the dependent variable is assumed to be a linear function of one or more independent variables, plus an error introduced to account for all other factors. In the case of one dependent variable and one explanatory variable, the linear regression model attempts to put the best fitting line through the data graphed, with the dependent variable on the vertical axis and the explanatory variable on the horizontal axis. Extending the regression analysis to multiple explanatory factors attempts to find the best fitting linear relationship between the factors and the dependent variable by minimizing the sum of squared prediction errors (the prediction error is the difference between the actual house price and the house price predicted by the linear regression model).
47. Regression analysis has been applied in almost every social science context. In economics, the dependent variable might be a family's consumption expenditure and the independent variables might be the family's income, number of children in the family, and other factors that would affect the family's consumption patterns. In political science, the dependent variable might be a state's level of welfare spending and the

independent variables might be measures of public opinion and institutional variables that would cause the state to have higher or lower levels of welfare spending. In sociology, the dependent variable might be a measure of the social status of various occupations and the independent variables might be characteristics of the occupations (pay, qualifications, etc.). In psychology, the dependent variable might be individual's racial tolerance as measured on a standard scale with indicators of social background as independent variables. In education, the dependent variable might be a student's score on an achievement test and the independent variables characteristics might be the student's family, teachers, or school.

48. Two important statistics in regression models are the t-statistics and the R-squared. The R-squared determines the percent of the variation in the dependent variable that the multivariate regression model explains relative to the total variation in the dependent variable. For example, if a particular model could explain all the variation in a sample of home prices, then the R-squared would be 100%, or one. In this case, the set of explanatory factors could be used to make a perfect prediction of each home's selling price. On the other hand, a low R-squared of zero (R-squared is always a value between zero and one), implies that collectively, the explanatory variables have done no better than assuming that every house sells for the sample average value. In other words, the explanatory variables have provided no additional information to help in predicting the sales price.

The second statistic, the t-statistic, measures the statistical significance of a particular coefficient or weight attached to a specific explanatory factor. The t-statistic is used to test whether the coefficient or weight attached to a factor is statistically different from zero. The t-statistic is related to the idea of a confidence interval around an estimated effect. For instance, we might determine from a regression analysis that the value of one additional square foot in a house in a particular area is \$323. The precision of the estimate is determined by how well the regression model fits the actual data. A confidence interval might be determined so that a statistician can say that there is 90% likelihood that the true, but unobserved, incremental value of a square foot is between \$299 and \$347 based on the regression analysis. If the regression analysis is very imprecise, the results might not allow the statistician to conclude that this confidence interval excludes zero as a possible value for an additional square foot. When this happens, the statistician would report that the coefficient, or weight attached to square footage in the regression, is not statistically different from zero. (This could happen in a particular sample of homes taken from a planned development where almost every home is exactly the same size so that house size does not determine price.) The t-statistic is the ratio of the estimated coefficient to the standard error, which is a measure of dispersion used to form the confidence interval. The t-statistic is a quick way to measure the statistical significance of a particular effect at a certain level of assumed statistical significance.

49. The basic Bass model has been extended in the economics and marketing literature by recognizing that the coefficients of innovation and adoption (p and q) and the initial population size (m) may depend on advertising, competing products, price, or other factors. Using the Bass model, in this case, assumes that 3-D cap sales depend on cumulative historical sales and, potentially, the level of retail clothing sales in the U.S. economy, and the "letter campaign" initiated by Defendants. I employ the sales information on 3-D caps for Agron's sales from February 1997 through September 2004.
50. The explanatory factor for retail clothing sales attempts to capture large scale trends in the nine-year period I examine, including changes in purchasing power, trends in the purchase of retail clothing, and seasonal variation in retail purchases. The explanatory factor for the "letter campaign" permits me to quantify the effect the threatening letters sent to retail sellers by the Defendants had on Agron's 3-D cap sales. But for the negative effects of the letters sent by Defendants, Agron would have enjoyed larger 3-D cap sales as the fad in 3-D caps continued in accordance with the rate of product growth revealed by the Bass model and the level of retail clothing sales more generally present in the economy.
51. I have specified an econometric model in which 3-D cap sales in a particular month depend on cumulative 3-D cap sales (and their square, according to the Bass model), seasonal factors (determined by the month

indicators JAN–NOV), retail sales of clothes in the U.S. economy, and the lagged effect of the letters sent by the Defendants. The econometric model for 3-D cap sales is:

$$Q_t = \alpha + JAN_t\beta_1 + FEB_t\beta_2 + \dots \\ NOV_t\beta_{11} + RS_{t-1}\gamma_1 + RS_{t-1}^2\gamma_2 + CLOTHES_t\delta + PER_{t-4}\psi + \varepsilon_t$$

where:

Q_t = cap sales at time period t

JAN, \dots, NOV = monthly dummy variables where, for example,

$JAN_t = 1$ whenever observation t is a January and zero otherwise

RS_{t-1} = the running sum (cumulative sum) of sales made up to and including period $t - 1$

$CLOTHES_t$ = retail sales of clothes at time period t . This factor is the retail sales for clothing and clothing accessory stores (NAICS 448), seasonally adjusted

PER_{t-4} = the four month lag for the "letter campaign" of February 2003 through May 2003

52. In specifying this model, I tried several alternative measures for retail sales and achieved nearly identical results. I determined the lag period of four months for the "letter campaign" by examining alternative regression models. I estimated lag effects of zero-lag through six-month lags, and found that a four-month lag revealed the closest correlation. This lag cycle is empirically validated by the replenishment cycle that Agron experiences wherein sales orders are taken today for caps to be delivered roughly four months into the future.
53. The estimated econometric model is given in Table 2. The regression model is estimated over the 89-month period from February 1997 through September 2004. As evidenced in Table 2, there are some seasonal

effects present, with larger sales made in June through October in each year. Both the cumulative sales and its square are significant effects in determining 3-D cap sales with signs consistent with the Bass product life-cycle model. I conclude that retail clothing sales are statistically significant determinants of 3-D cap sales. Finally, the lagged effect of letters sent by defendants reduced the cap sales with a four-month lag. In other words, current orders fell and the threatening letters sent to Agron's customers by the Defendants led to diminished future (four months later) 3-D cap sales. This effect is significant at the 90% confidence level based on a one-sided hypothesis test.

Table 2. Estimated Econometric Model

Independent Variables	Dependent Variable
	3-d Cap Sales
Constant	-5877.69 (-4.43785)
January	839.086 (3.28185)
February	917.97 (3.58861)
March	1009.76 (3.94439)
April	835.507 (3.26529)
May	978.461 (3.95064)
June	1162.4 (4.64043)
July	1279.21 (5.10619)
August	915.786 (3.65646)
September	1238.1 (4.97382)
October	1177.4 (4.60652)
November	646.312 (2.52798)
rs[-1]	0.0483295 (6.52289)
rs[-1]^2	-0.00000055441 (-8.04844)
Clothes	0.40948 (3.94133)
per[-4]	-477.804 (-1.5696)
Number of Observations	89.00
R-squared	0.72
Durbin-Watson Statistic	0.92
Mean of Dependent Variable	1112.22

*t-statistics in parenthesis

54. Actual 3-D cap sales and the prediction of 3-D cap sales from the regression model are shown in Figure 2. The R-squared in this model is

over 72%. This implies that 72% of the total variation in 3-D cap sales is explained by the regression model. It is apparent from reviewing Figure 2 that Agron's 3-D cap sales were already declining somewhat prior to the time that the Defendants sent threatening letters to Agron's customers. This decline is consistent with the Bass model and product life-cycle for a maturing product. My regression analysis quantifies the incremental negative effect of the Defendants' letter campaign while holding constant these other background trends.

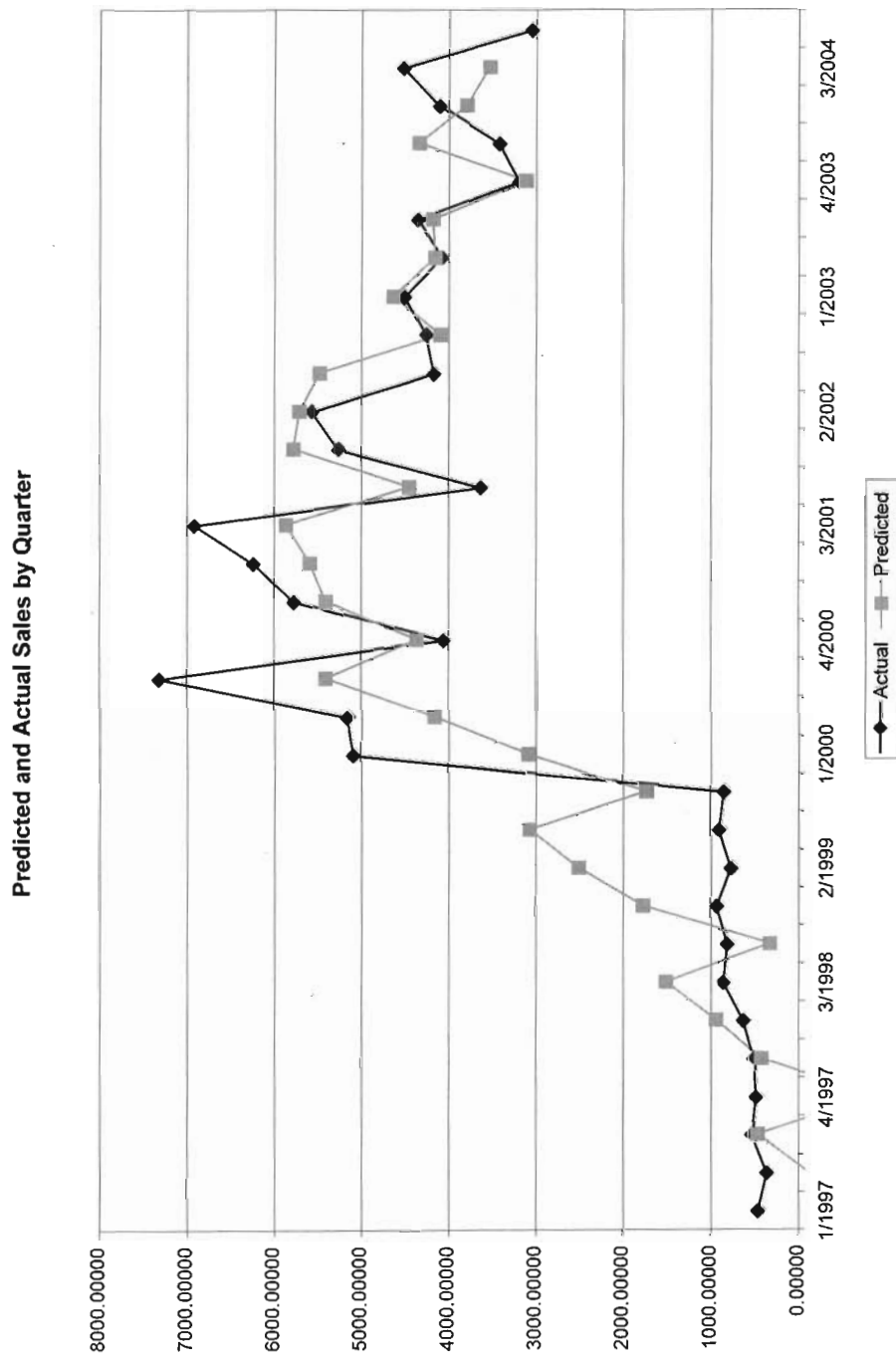


Figure 2

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55. To calculate sales lost due to the Defendant's "letter campaign," I simulate the regression model using actual values for the explanatory factors and then again setting the "letter campaign" factor to zero (*i.e.*, assuming in the but-for world that the threatening letters had not been sent by the Defendants).
56. The predicted total sales amount for the period is \$22,973,000, and the predicted total for the period absent the "letter campaign" was \$23,656,000. The difference is \$683,000 in gross revenue. I am informed that the Plaintiff enjoyed a 28% profit rate on its sales. Thus, I estimate that the lost profit on the \$683,000 in gross revenue is \$191,240, based on a 28% profit margin.

SECTION VII: Conclusion

57. I conclude that 3-D caps are a distinct market from other caps and hats. Thus, I conclude that the relevant product market for my analysis is the market for 3-D caps.
58. I conclude that the Defendants engaged in predatory or sham litigation in an attempt to monopolize the market for 3-D caps. I conclude that these actions were anti-competitive. The Defendants' actions in sending cease and desist letters to Agron's customers threatening to initiate patent litigation had a negative effect on Agron's sales. I utilized the Bass model to calculate the lost gross sales revenue that resulted from Defendants' actions.
59. I conclude that the Defendants' actions resulted in lost gross revenues to Agron of \$673,000 and lost profit of \$191,240.

VERIFICATION

I, Jeffrey A. Dubin, verify under penalty of perjury under the laws of the United States that the foregoing is true and correct. Further, I certify that I am qualified and authorized to file this Verified Statement and that my hourly fee is \$375 per hour.

Executed on November ____, 2004

Jeffrey A. Dubin, Ph. D.