Hedonic Regression

By Stephanie A. Rzepka

The 411 on Using Economics 101 to Defeat Price Premium Class Actions

Understanding the economic theory underlying hedonic regression is the key to discrediting the methodology under *Comcast* and *Daubert.*

Product manufacturers and retailers have recently faced a flurry of mislabeling and false advertising class actions advancing a theory known as "price premium." Rather than asserting that they would not have purchased the

product without the challenged labeling or advertising claim, or that they sustained property damage by using the product in line with that claim, price premium plaintiffs contend that they were harmed because the claim's existence inflated the product's purchase price. In other words, these plaintiffs argue that they had to pay a "premium" for a product because of the challenged claim and seek to recover the difference between the purchase price that they paid and the hypothetical purchase price that would have been charged without the claim. Even if this difference amounts to just pennies per unit sold, a manufacturer's or retailer's exposure can easily cross the seven- or eight-figure threshold. This is because, under the price premium theory, a consumer is harmed simply by virtue of purchasing a product when the challenged claim was being used. Therefore,

price premium classes are extraordinarily broad and can embrace any consumer who purchased the product during the years in which the challenged claim was made.

As with other class actions, a plaintiff seeking to certify a price premium class must identify a reliable method of calculating classwide damages. Because price premium plaintiffs allege that they were harmed *solely* by the premium that they purportedly paid for a product, their damages methodology carries the additional burden of establishing legal injury. It is very rare for products to be sold simultaneously with and without the challenged claim; therefore, sales data alone cannot pinpoint the difference between the product's price with and without that claim. Consequently, plaintiffs usually must rely on economists to create models to isolate the value of the challenged claim and esti-

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mate the price at which the product would have sold absent it. Hedonic regression, a form of economic regression analysis, has become one of plaintiffs' experts' models du jour, but the economic theory underlying this methodology illustrates why it is ill-equipped to meet plaintiffs' needs. Weaving these principles of economics into a class certification opposition or motion to exclude an expert can elevate defense counsel's criticisms from a mere battle of the experts to unassailable deficiencies under *Comcast*'s Rule 23(b)(3) predominance standard and *Daubert*'s expert standard.

Defining a Price Premium

The first step to discrediting a price premium model is to illustrate to a court what a price premium is—and what it is not. Federal courts have made clear that a price premium is the difference between the market price of a product with the challenged claim and the hypothetical price at which the product would have sold without the challenged claim. *In re Scotts EZ Seed Litig.*, 304 F.R.D. 397, 412 (S.D.N.Y. 2015); *In re NJOY, Inc. Consumer Class Action Litig.*, No. CV 14-428-JFW (JEMX), 2016 WL 787415, at *5 (C.D. Cal. Feb. 2, 2016). To put this in context, imagine that a gallon of orange juice sells for $6.00 and orange juice bearing an "added calcium" claim is priced at $7.00. A price premium lawsuit alleging that the latter orange juice does not, in fact, contain added calcium would seek damages of $1.00 for each purchase during the class period.

While some plaintiffs have tried to expand "price premiums" to cover what one court termed "subjective disappointment," their efforts have not been successful. In *Irvine v. Kate Spade & Co.*, the plaintiffs attempted to elicit price premium injury from their realization that the luxury goods that they purchased at outlet stores were not in fact perfect substitutes for the goods sold at the brand's boutiques, just priced at 20–70 percent less. No. 16-CV-7300 (JMF), 2017 WL 4326538, at *1 (S.D.N.Y. Sept. 28, 2017). The court soundly rejected the plaintiffs' assertion that they were entitled to price premium damages since they paid more for the goods solely because they believed that they were saving 20–70 percent off the boutique price. Echoing another opinion from the U.S. District for the Southern District of New York, the *Irvine* court found,

Plaintiffs d[id] not, and [could] not, establish a valid "price premium" claim… [because]… a plaintiff's allegation that she paid more than she was subjectively willing to other pay "is not the same as factual allegations that the defendant uses deceptive reference prices to charge consumers a higher price for the same merchandise."

Id. at *4 (quoting *Belcastro v. Burberry Ltd.*, No. 16-CV-1080 (VEC), 2017 WL 5991782, at *5 (S.D.N.Y. Dec. 1, 2017)). Both opinions' focus on the "factual" nature of price premium damages foreshadows the overarching theme that should shape any brief criticizing a plaintiff's reliance on a hedonic regression: econometric tools designed for academic contexts cannot singlehandedly fit the facts of real-world litigation.

Economics 101

The second step to discrediting a price premium model is to offer a court a primer on the nuts and bolts of calculating a price premium to illustrate why hedonic regression is ill-suited to the job.

The Basics of Supply and Demand

Because a price premium is the difference between the price at which the product sold *with* the challenged claim and the price at which it would have sold *without* the claim, it follows that any price premium damages model must calculate this hypothetical price. It is axiomatic that "[t]he ultimate price of a product is a combination of market demand and market supply." *In re NJOY, Inc. Consumer Class Action Litig.*, 120 F. Supp. 3d 1050, 1119 (C.D. Cal. 2015) (quoting *Apple, Inc. v. Samsung Elecs. Co.*, No. 11-CV-01846-LHK, 2014 WL 976898, at *11 (N.D. Cal. Mar. 6, 2014)).

Distilled to their simplest forms, demand and supply curves are visual depictions of the relationship between a product's price and the quantities that consumers demand (i.e., "the demand curve"), and sellers supply (i.e., "the supply curve"). Within a product's market, a demand curve is the aggregation of consumers' willingness to pay for the product and is derived from how individual consumers value the product's attributes. The more that consumers value certain product attributes, the more that they are willing to pay for products containing them. Similarly, a supply curve

for the same product depicts the quantity at which all the sellers in the market are willing to sell at certain prices. It is derived from each seller's costs, strategy, and responses to competition. In ordinary markets, as prices increase, the quantity demanded decreases and the quantity supplied increases. In other words, when prices increase, buyers demand fewer products and sellers sup-

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ply more. Purchases occur at the prices ("market price") and quantities ("market quantity") where the demand and supply curves intersect. Consequently, a methodology can reliably calculate a price premium only if it accounts for all of the factors that would have shaped the demand and supply curves in the hypothetical market in which the product at issue would have been sold without the challenged claim.

Hedonic Regression: A Tool, Not a "Magic Formula"

Plaintiffs and their experts have tried to meet the challenge of measuring a price premium by repurposing an econometric technique called hedonic regression. Hedonic regression is a specific type of regression analysis that originated during the mid-twentieth century in academic works but is used sparingly in modern applied (i.e., real world) economics. Its limited use in the real world is the natural result of the fact that it provides meaningful results only in very specific instances, and those instances do not often arise in reality. As one court put it, "regression analysis is not a magic formula. It is simply a mathematical tool…[,] which may

or may not yield statistically significant results." *Piggly Wiggly Clarksville, Inc. v. Interstate Brands Corp.*, 100 F.App'x 296, 299 (5th Cir. 2004). Whether a price premium plaintiff's use of hedonic regression will yield statistically significant results depends on whether the plaintiff's empirical application aligns with the theoretical principles underlying the methodology. In most cases, it will not. Therefore, walking a court through these theoretical underpinnings will illustrate the divide between the methodology's purpose and a price premium plaintiff's intended use.

A Brief History of Hedonic Regression

Hedonic regression rose to prominence in 1974 when economist Sherwin Rosen published his paper *Hedonic Prices and Implicit Market: Product Differentiation in Pure Competition*. 82 J. Polit. Econ. 34–55 (1974). His work was based on the theory that a product is made up of numerous attributes that consumers value. He rationalized that in certain situations, if the purchase price of a product can be tied to the presence or absence of an attribute, it is possible to infer how consumers value that product attribute. Rosen supported his work with a version of regression analysis now known as hedonic regression.

Regression analysis is a statistical technique that estimates the relationship between a dependent variable and independent variables. Hedonic regression is a specific application of the technique in which products' purchase prices are the dependent variable and the various attributes comprising those products are the independent variables. By analyzing a large cross section of products, some with the attribute of interest (e.g., the allegedly false advertising claim), and some without, an economist can, if certain conditions are satisfied, determine the effect that the attribute of interest has on the purchase price (i.e., the price premium). Returning to the orange juice example, by evaluating a collection of orange juices with and without different product attributes such as "added calcium" claims, an economist might be able to use a hedonic regression to determine the price premium that consumers pay for the claim—the operative word being "might."

Using Hedonic Regression to Measure a Price Premium Requires Three Conditions

Rosen, and his successors, have demon-strated that hedonic regression can produce statistically significant results only when certain market conditions and model specifications are present. That means that plaintiffs can substantiate their price premium allegations with a hedonic regression only when their models meet those requirements. Therefore, any hedonic regression purporting to measure a price premium should be examined for the following three conditions. In the (likely) instance that it fails to meet any of them, this deficiency or these deficiencies should be front and center in defense counsel's class certification and expert briefing.

The Seller Is a "Price Taker"

To satisfy the first of the three preconditions under which a hedonic regression can reliably measure a price premium, the product at issue must be sold by a "price taker" (i.e., an entity that does not influence the market's competitive equilibrium price). In these situations, a product's price is equal to the consumer's marginal value and the seller's marginal cost for the product. In layman's terms, and building on the orange juice example, marginal value is a consumer's additional benefit of purchasing one more unit of orange juice. Likewise, marginal cost is a seller's additional cost of offering one more unit of orange juice for sale. When the price of orange juice is equivalent to the marginal value of buying orange juice and the marginal cost of offering orange juice for sale, an individual orange juice seller accepts or "takes" the price set by the equilibrium of the demand and supply curves. Therefore, the price of orange juice is derived solely from sellers' production costs and consumers' valuations, and any price variation could reliably be traced to the presence or absence of product attributes such as "added calcium."

Fortunately for product manufacturers and retailers—and the attorneys defending price premium lawsuits against them—this is not the norm in the real world. Usually, sellers are able to set their prices above their marginal costs because they either have monopoly power or they sell differentiated products that lack perfect substitutes (i.e., products that are unique or that consumers—sometimes as a result of marketing—believe are unique). In these market settings, sellers may use various pricing strategies (e.g., penetration pricing, premium pricing, product line pricing) that break the causal chain between product attributes and price variation. The U.S. District Court for the Central District of California rejected a class action plaintiff's attempt to use a hedonic regression to measure an alleged price premium for this exact reason, stating:

> [U]sing a Bayesian hedonic regression model to estimate how the price of a product would have been different with and without an attribute requires that demand and supply conditions remain unchanged. In other words, it requires a stable market where the price of a product is set by a competitive equilibrium. It is not designed for use in an unstable market, where supply and demand would change significantly from the market in which the prices used as inputs were generated.

In re NJOY, Inc. Consumer Class Action Litig., 2016 WL 787415, at *8. Unless a hedonic regression is supplemented with models that correct for other, less stable market conditions, it is vulnerable to the same criticism. To compel similar results in their cases, defense counsel should look for opportunities to gather evidence outlining the multitude of factors that dictate their clients' costs and prices. This information can most often be gleaned from cost of goods sold data, internal communications regarding marketing strategy, and deposition testimony from corporate witnesses shedding additional light on the data and marketing strategy.

Access to Data that Identifies and Quantifies Every Product Attribute Affecting Price

Second, a hedonic regression can reliably measure a price premium only if the proponent of the model has access to data that identifies and quantifies every product attribute that affects price. A hedonic regression breaks a product down into its component parts and measures the value of each attribute. If an attribute is left out, its effect will be imputed to the other attributes and could impair the accuracy of the results. This again can be illustrated by the orange juice example. Imagine that the orange juice with the "added calcium" claim is simultaneously sold with an easy-pour spout and the comparison orange juice lacks both. A

hedonic regression that does not include an easy-pour spout as a product attribute would incorrectly ascribe the entire $1.00 price differential to the "added calcium" claim. In reality, that $1.00 price increase can likely be attributed in some proportion across the "added calcium" claim and the easy-pour spout. A hedonic regression that fails to do so will grant the plaintiffs a windfall. This is because they would be compensated as if they had purchased orange juice that lacked both the added calcium and the easy-pour spout even though they in fact did receive the benefit of the easy-pour spout.

This error is called omitted variable bias, and it robs a hedonic regression of all reliability.

By not including any additional variables in the regression, the possibility of omitted variable bias is high. In other words, there are omitted factors that may influence market share growth. These omitted factors could confound the results of the statistical analysis by biasing the damage estimates.… *Because the possibility of omitted variable bias is high, we cannot, therefore, infer anything from these results.* In re Live Concert Antitrust Litig., 863 F.Supp. 2d 966, 974 (D.C. Cal. 2012) (emphasis added). Collecting this data presents price premium plaintiffs with a difficult, expensive, and sometimes impossible task. They must identify the closest substitutes for the product at issue and collect a cross section of sales and attribute data for those products over the relevant time period. Third-party vendors compile some of this data but generally make it available to plaintiffs only at considerable cost. And some product attributes cannot be quantified; therefore, they cannot be reliably included in a hedonic regression. Consequently, plaintiffs are forced to choose between accepting the risk of omitted variable bias and supplementing their hedonic regressions with additional econometric tools at added time and expense. Choosing to exercise the latter option provides defense counsel with excellent fodder for discrediting their methodology. Defense counsel can further bolster their omitted variable bias arguments by, during discovery, taking note of any consumer surveys, tests, and panels used by their client during product research and development that reveal the slew of factors that influence

how consumers view and value the product at issue.

No Product Attribute Affecting Price Is Collinear with the Challenged Claim

Third and finally, if the challenged claim and another attribute are collinear (i.e., highly correlated) and affect price, a hedonic regression model cannot disentangle the two attributes' individual effects on price. For example, if it turns out that orange juice with the "added calcium" claim is always sold with an easy-pour spout, and orange juice with the spout is never sold without the claim, a hedonic regression cannot unpack the $1.00 price differential to apportion it across the two product attributes. This error is known as "multicollinearity." Multicollinearity robs a hedonic regression of probative value because it means that even if a price premium may be calculated, it cannot reliably be attributed to the challenged claim.

Given that modern products are highly customized and marketed as unique entities offering a host of benefits over their closest competitors, the risk of multicollinearity is high. As one court put it, "When two or more variables are highly, but not perfectly, correlated—that is, when there is multicollinearity—the regression can be estimated, but some concerns remain. The greater the multicollinearity between two variables, the less precise are the estimates of individual regression parameters." *Freeland v. AT & T Corp.*, 238 F.R.D. 130, 147 (S.D.N.Y. 2006) (quoting Federal Judicial Center, *Reference Manual of Scientific Evidence* 197 (2d ed. 2000)). A "severe multicollinearity problem" even contributed to one court's decision that a price premium plaintiff's hedonic regression was wholly "inadmissible under Rule 702." *Reed Const. Data Inc. v. McGraw-Hill Cos., Inc.*, 49 F. Supp. 3d 385, 404 (S.D.N.Y. 2014), *aff'd*, No. 14-4022-CV, 2016 WL 80577 (2d Cir. Jan. 7, 2016). Evidence indicating that a product offers many unique or bundled features can be instrumental in making a case for multicollinearity, so defense counsel should look for opportunities in their discovery and motion practice to highlight this from day one.

Conclusion and Best Practice Tips

A hedonic regression that fails to satisfy any one of these three conditions is incapa-

ble of properly calculating a price premium allegedly charged for a challenged claim. Since real-world markets rarely mirror the academic contexts for which hedonic regression was designed, price premium hedonic regressions generally fail to satisfy most—and frequently all—of these necessary conditions. To elevate their criticisms of a class action plaintiff's hedonic

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regression methodology from a battle of the experts to bases for exclusion under *Comcast*'s Rule 23(b)(3) predominance standard and *Daubert*'s expert standard, defense counsel's briefing should make strategic use of the principles of economics underlying hedonic regression and case-specific evidence showing that these principles cannot be met. As courts and litigants gain greater exposure to the limitations of hedonic regression, plaintiffs will depend more heavily on other econometric, statistical, and survey tools, such as conjoint analyses and discrete choice models, to supplement or replace their hedonic regressions. However, these methodologies are by no means silver bullets because they can be subject to different but equally fatal flaws.　FD