

# PITFALLS TO AVOID IN PROVING PRICE FIXING DAMAGES

---

BY: MATTHEW S. WILD

## I. Introduction

Criminal antitrust enforcement has increased dramatically. Indeed, the last fiscal year was the "third highest fine year in the Division's history."<sup>1</sup> As Deputy Assistant Attorney General Scott D. Hammond made clear, "[t]he detection, prosecution, and deterrence of cartel offenses continue to be the highest priority of the Antitrust Division."<sup>2</sup> Further, as a result of recent legislation that provides additional benefits to amnesty recipients, substantially more cartel detection can be expected in the future.

As a consequence of this increased enforcement, private price fixing suits under the Clayton Act have mushroomed. These plaintiffs (whether by class or individually) often seek damages of more than fifty (50) percent of the prices that they paid for cartel members' products as treble damages for the period of time that the cartel was effective — sometimes more

than a decade. Individual defendants' liability has exceeded \$1 billion in certain cases.

The circumstances can be particularly grave because plaintiffs routinely bring these treble damages action after cartel members have pleaded guilty.<sup>3</sup> These defendants are therefore precluded from denying liability and the only question is how much. Thus, their only defense is to minimize the amount of damages. Likewise, plaintiffs have seemingly entered the lottery. With economists prepared to testify credibly to overcharges that exceed twenty (20) percent, plaintiffs need not be greedy to obtain enormous recoveries, particularly after trebling. Many of these actions have become bet-your-company cases, and the early intervention of economists to estimate damages has become indispensable for both sides.

This article reviews various methods to prove price fixing damages and the pitfalls of such approaches. While many articles have been written on how to calculate such damages, few discuss

*(Cont. on p. 12)*

# PITFALLS TO AVOID IN PROVING PRICE FIXING DAMAGES

(cont. from p. 1)

the many court decisions that have rejected these models based upon the application of economic theory to the facts. Courts have rejected the testimony of world renowned economists because -- even though their underlying models may have been reliable -- their implementation was inadequate or the results too speculative.

This article has five parts. Part II is an overview of how cartels raise prices, under what conditions cartels thrive and the measure of price fixing damages. Part II also summarizes the legal principles that justify exclusion of expert testimony. Part III examines econometric approaches to estimate damages and their underlying vulnerabilities. Part IV examines approaches based upon behavioral models and their potential pitfalls. Part V is the conclusion.

## II. Cartel Formation and the Measurement of Damages

### A. Cartel Formation

Cartel members cannot simply agree upon prices and, without more, expect those fixed prices to stick. Rather, as Judge Posner explained "cartelists drive up the market price by (or with the effect of) restricting their output."<sup>4</sup>

Indeed, many cartel agreements are based upon price and market allocations.<sup>6</sup> This article addresses market-wide horizontal cartels, regardless of whether they are limited to price or include output restrictions. For the sake of convenience, all such cartels are referred to as price fixing cartels.

Cartels survive (and thrive) in the same market conditions that support lawful tacit collusion.<sup>7</sup> In addition to industry concentration, the Federal Trade Commission, the United States Department of Justice and United States Supreme Court have identified, among other things, "the availability of key information concerning market conditions, transactions and individual competitors; the extent of firm and product heterogeneity; pricing or market practices; . . . the characteristics of buyers and sellers and . . . of typical transactions," as factors relevant to whether coordinated interaction is likely to occur.<sup>8</sup> Under conditions favorable to coordination, firms can earn supracompetitive profits even without an express agreement.<sup>9</sup>

The only difference between cartels and lawful (tacit) collusion is that cartel members reach express agreements on price or output. These express agreements facilitate supracompetitive pricing over the long term because

interdependent decision making of an oligopoly."<sup>11</sup>

### B. Measure of Price Fixing Damages

Price fixing damages are measured by the overcharge -- the price that the plaintiff paid minus the price that the plaintiff would have paid in the absence of the conspiracy, multiplied by the quantity plaintiff purchased.<sup>12</sup> As an initial matter, the plaintiff must prove causation or the fact of damages by showing that "some damage flow[ed] from the unlawful conspiracy."<sup>13</sup> This standard of proof is stricter than, and prior to the application of, the standard of proof for amount of damages.<sup>14</sup>

Based upon this rule, the plaintiff's damages calculation must disaggregate the conspiratorial from the non-conspiratorial causes of his damages. Accordingly, the plaintiff has to isolate those damages suffered because of the conspiracy. Where plaintiffs have been denied recovery, often they have failed to prove which part of their injury was caused by the conspiracy as opposed to market forces.<sup>15</sup> If plaintiffs meet this burden, then they need only prove the amount of the damages by "just and reasonable inference, although the result be only approximate."<sup>16</sup>

Regardless of whether the plaintiff seeks to prove causation or amount of damages, they cannot rely upon speculation or an inadequate record.<sup>17</sup> While a plaintiff may rely upon expert testimony to fill this void, he must prove sufficient facts to support that testimony.<sup>18</sup> It is therefore essential to create an adequate record.

### C. Standard for Exclusion of Expert Testimony

Rule 702 codifies the admissibility standard handed down by *Daubert v. Merrell Dow*. Under *Daubert* and its progeny,<sup>19</sup> the Supreme Court has "established several factors trial courts are to consider in evaluating expert testimony."<sup>20</sup> These factors include: "1) whether the theory or technique

*Courts have rejected the testimony of world renowned economists because -- even though their underlying models may have been reliable -- their implementation was inadequate or the results too speculative.*

The end result is that "a perfectly functioning cartel maximizes its profits by reducing output to the same level and charging the same prices that a single-firm monopolist would charge."<sup>5</sup>

they reduce uncertainty among competitors.<sup>10</sup> As Professor Areeda explained, "an express agreement can create more perfect coordination than would result from the individual but

can be tested; 2) whether the technique or theory has been subject to peer review and publication; 3) the known or potential rate of error and standards controlling the technique's operations; and 4) whether the theory or technique has been generally accepted by the scientific community.”<sup>21</sup> In addition to the reliability requirement, the expert testimony must “fit” the facts. While the underlying theory might be reliable, the Supreme Court has made clear that “nothing in either Daubert or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the ipse dixit of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.”<sup>22</sup>

The Daubert inquiry is “a flexible one,” and not all of these factors must be met to admit expert testimony.<sup>23</sup> Thus, the Supreme Court has emphasized that expert evidence should ordinarily be attacked by the “traditional and appropriate means,” including “[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof,” not by exclusion.<sup>24</sup>

As shown *infra*, economic estimates of price fixing damages usually satisfy the reliability prong. Such expert testimony typically satisfies three of the tests under Daubert – peer review, standards controlling the technique's operation and general acceptance in the academic community. The inability of such testimony to be “tested” has presented no impediment to its admission. In contrast, economic testimony has been excluded primarily based upon its failure to meet the relevancy requirement. In implementing their models, the economists' subjective choices, such as selection of data or assumptions, have led to exclusion.

### III. Econometrics

*The goal of the econometrician is to identify a relationship between the price of the product and its determinants that is as precise as possible and true in the absence of any conspiracy.*

Econometrics involves the application of statistical techniques to economic data. Generally, this involves the estimation of economic models developed from economic theory.<sup>25</sup> In particular, econometricians employ multiple regressions to examine the relationship between independent explanatory variables and the dependent variable.<sup>26</sup> The multiple regression equation seeks to account quantitatively for the impact of these independent variables upon the dependent variable. Through the use of multiple regressions, econometricians can try to predict, for example, what the price of Vitamin C would have been in the absence of an antitrust conspiracy among Vitamin C producers.

One court has characterized the calculation of damages based upon a predicted but-for price as “the products of simple arithmetic and algebra and of multiple regression analysis.”<sup>27</sup> In any given case, however, the calculation of damages might be more complicated, particularly where it is difficult to determine the quantity sold or purchased.

When applied properly, econometrics is a well accepted, reliable tool that should survive any challenge to its admissibility.<sup>28</sup> Expert testimony based upon this technique has been admitted in a wide range of industries including vitamins, monosodium glutamate,

polypropylene, industrial silicon, fat and bone rendering, repackaged chlorine, and milk.

To estimate damages, an econometric approach will measure the relationship (when no illegal conduct occurred) between the price of the commodity at issue and market conditions (i.e., demand and supply) that might affect that price. The goal of the econometrician is to identify a relationship between the price of the product and its determinants that is as precise as possible and true in the absence of any conspiracy. Ideally, the econometrician would like to identify a relationship so precise that if given a list of price determinants, he or she can, by applying the model, guess the price of the commodity at issue. Because one cannot observe demand and supply for a product, an econometrician will use theoretically relevant variables – i.e., explanatory variables – to measure these values.<sup>29</sup> Variables that can explain demand include, among other things, prices of substitutes, complements or other factors such as differences in population, taste or income during the benchmark period. Supply can be measured using primarily variable production costs such as inputs, energy and labor. Based upon these relationships, the multiple regression will predict the but-for price.

Once the econometrician has identified the relationship between the price of the product at issue and its determinants in the absence of the conspiracy, it is possible to observe determinants during the conspiracy period and therefore calculate what the price *should have been* in the absence of the conspiracy. A comparison of that price with the price actually observed during the conspiracy will provide a first glimpse into potential damages.

To illustrate how a multiple regression works, assume that the parties seek to estimate the but-for prices as consequence of a local milk cartel. Using a residuals model, the multiple regression equation might be specified

as follows:  $p = aSCH + bINC + cCOW + dCONT + e$ . The dependent variable  $p$  = the but-for price. The independent explanatory variables are SCH= the local school enrollment; INC= the local income; COW= the price of cows; and CONT= the price of one gallon milk containers. The random error is  $e$ . To estimate the influence of the coefficients ( $a$ ,  $b$ ,  $c$ , and  $d$ ) and therefore the value of  $p$ , the econometrician must use data (unaffected by the cartel) for each of these variables. With these data, an estimator, such as ordinary least squares, determines the values of the coefficients based upon the data for each independent variable.<sup>30</sup>

Although conceptually straightforward, implementation of these econometric models is often complex. The subjective nature of the expert's selection of independent variables and the data used to measure those variables invite challenges. While rare, expert testimony has been excluded because of flaws in the data or the omission of relevant explanatory variables.

With respect to data issues, the expert must avoid using data that would have been affected by the price fixing conspiracy. Econometricians refer to such data as "endogenous" to the model. If such data are employed, the multiple regression will not accurately predict the impact of the conspiracy on price as opposed to the impact of market forces.<sup>31</sup> For example, the econometrician should be careful when using post-conspiracy data to ensure that they are not influenced by the conspiracy. Courts have excluded models based upon such endogenous or biased data.<sup>32</sup> Even if admitted, the use of such data is a fertile ground for cross-examination.<sup>33</sup>

While this concern for clean data may seem obvious, it can nonetheless present serious practical problems. For example, a conspiracy to fix the prices of sorbates had a seventeen (17) year duration.<sup>34</sup> In such a case, pre-conspiracy data might be difficult to

find. If the conspiracy was not in operation throughout the country (or the world), data drawn from areas unaffected by the conspiracy (i.e., areas in which competition was observed during the same time period) may be a useful proxy. However, many cartels are directed at entire geographic markets for particular products and, for those cartels, this alternative data source would therefore be unsuitable.

Indeed, data limitations can drive the choice of independent variables for demand and supply. In the sorbates conspiracy, for instance, data on the prices of competing food preservatives and variable production costs might be unavailable before 1979. Data from the period after the conspiracy ended might also be endogenous or insufficient in number or kind.

Even if historical data were available, the connection of these data to demand or supply might be attenuated. While historical data for certain substitutes, complements or inputs might be available, those data might be far from ideal.<sup>35</sup> Under these circumstances, economists might choose explanatory variables for which lengthy historical data are available. Courts are often sympathetic and accept justifications for the selection of proxies on that basis.<sup>36</sup>

Occasions do exist, however, where the number or kind of data are too few or limited. Where data are too few or widely dispersed, the regression's predictive power might be weak. To demonstrate the weakness of the model, a competing econometrician can calculate the confidence interval around the predicted price. The confidence interval shows the highest and the lowest predicted price that one might expect to find if random samples of data were drawn repeatedly. The confidence interval is expressed with a certain degree of confidence (e.g., ninety-five (95) percent).<sup>37</sup> To illustrate, assume that the mean predicted price is \$10 and upper and lower bounds of the predicted price are \$18 and \$2 with a ninety-five (95)

percent degree of confidence. This means that while \$10 is the expected value of the mean price, values between \$2 and \$18 for the mean price occur ninety-five (95) percent of the time. In other words, if one was to repeat the calculation based on other samples of data, ninety-five (95) percent of the time the mean price would be between \$2 and \$18. With such a wide range of prices, the regression may not be meaningful.

An econometrician can also formally measure the predictive power of a regression based (in part) upon the fit – called the adjusted  $R^2$ . For example, an adjusted  $R^2$  of .30 would mean that the regression explains thirty (30) percent of the variance in the dependent variable. This formal statistic refers to the predictive power of the entire model, unlike the confidence interval around one coefficient or one mean which expresses the variability of a single determining factor. The antitrust cases, however, do not speak in terms of fit or  $R^2$ .

In contrast to attacks based upon whether the data are biased or tainted, a *Daubert* challenge based upon the sufficiency of the data will likely be unsuccessful.<sup>38</sup> Cross-examination that highlights the weakness of the model based upon too limited a sample (or too low a statistical significance) has succeeded.<sup>39</sup>

Even if the data are exogenous and sufficient in number and kind, the choice of explanatory variables is often attacked. Litigants may argue that the multiple regression omitted key explanatory variables or included explanatory variables that are not relevant. To warrant exclusion, the regression must be "so incomplete as to be inadmissible as irrelevant."<sup>40</sup> Although the proponent of model has the burden to establish its admissibility, in practice the party challenging the model needs to show that it "fail[s] to consider significant external forces that served to raise the price of [the price-fixed product]."<sup>41</sup>



Accordingly, the challenger cannot prevail on a *Daubert* motion by “[m]erely pointing to economic conditions that may affect the dependent variable,”<sup>42</sup> but “must introduce evidence to support its contention that failure to include those variables would change the outcome of the analysis.”<sup>43</sup> Omitted variable bias alone can but generally does not result in exclusion.<sup>44</sup> Nevertheless, courts have rejected econometric models because they failed to account for non-conspiratorial causes of price changes and thus overstated plaintiff’s damages. These courts did not appear to require an elaborate showing.<sup>45</sup>

For the party challenging the model, one persuasive method to meet this burden is to have a competing econometrician identify a critical demand or supply factor that the model did not consider. After identifying that factor and justifying from an economic perspective why that factor should matter, the economist should re-run the model taking the new variable into consideration. If the newly predicted but-for price is substantially lower or higher, then a powerful argument can be made that the model fails to account for an important market factor. Ideally, the difference between the newly predicted but-for price should be so different from the originally predicted but-for price as to be outside the ninety-five (95) percent confidence interval. Such a result eliminates chance as the basis for the different predictions.

To illustrate, assume that there was a price fixing conspiracy among local milk producers, and plaintiffs’ econometrician estimates the but-for price as \$3.00 with the upper and lower bounds of the ninety-five (95) percent confidence interval as \$3.15 and \$2.85. Assume also that the model did not include an explanatory variable to account for school enrollment, an important determinant of demand for milk. If the predicted but-for price based upon the new proxy for school enrollment is above \$3.15, a strong argument exists that the model omits a market factor that “would change the outcome of the analysis.”<sup>46</sup> Under this circumstance, exclusion of the model would be warranted.<sup>47</sup> As shown below, if the proposed explanatory variable is not material, the but-for price should not significantly change.

“Omitted variable bias” can also be expressed with a formal statistical measure. Where a claim is made that an important explanatory variable has been omitted (if true), the inclusion of that variable in the identical model should raise the adjusted  $R^2$ .<sup>48</sup> No case, however, appears to have been decided on the basis of  $R^2$ . Further, reliance upon the value of the adjusted  $R^2$  to support an argument of omitted variable bias or inclusion of irrelevant variables is often misplaced. As many academics have emphasized, an econometrician should base his selection of explanatory variables upon economic theory. A contrary approach “capitalizes on chance.”<sup>49</sup> Thus, a regression with a lower adjusted  $R^2$

might nevertheless be a superior prediction of the but-for price than one with a higher adjusted  $R^2$ . Furthermore,  $R^2$  cannot be compared across regression analyses that use different dependent variables.

Unlike the omission of relevant variables, the inclusion of irrelevant variables should not significantly impact the predicted but-for price.<sup>50</sup> Their inclusion will, however, increase the variance and thus widen the confidence interval and lower the adjusted  $R^2$ .<sup>51</sup> As a result, the inclusion of irrelevant variables may prove helpful for cross-examination particularly of plaintiffs’ experts by increasing the range of potential predicted but-for prices. While a basis for cross-examination, the exclusion of a model on that basis is unlikely.<sup>52</sup>

In addition to bias, use of endogenous data, and omission of key explanatory variables, a regression might not properly account for structural change, particularly with a conspiracy of long duration. Models are often based upon the assumption that “the value of a coefficient . . . remained constant between the benchmark period and the [conspiracy] period.”<sup>53</sup> Where, for example, the benchmark period is before and after the conspiracy, a regression can become vulnerable if the relationship between demand or supply variables has changed and data are pooled from both periods. The sorbates industry’s seventeen (17) year conspiracy brings this issue into focus. The basic econometric question is whether, during any time of the benchmark or conspiracy periods, there were substantial market changes caused, for example, by new technology or new entry.<sup>54</sup> Indeed, many cartels fall apart not from government detection, but because the supracompetitive profits spur new entry.<sup>55</sup> Thus, it is unsafe to assume a constant relationship between the dependent and independent variables.

Formal statistical tests can be used to determine whether that relationship has remained constant.<sup>56</sup> To support a

*To support a Daubert motion, the competing economist should demonstrate that the model fails one or more of these tests rather than simply asserting that one should have been performed.*

*Daubert* motion, the competing economist should demonstrate that the model fails one or more of these tests rather than simply asserting that one should have been performed.<sup>57</sup> Failure of one of these tests has been held sufficient to discredit a statistical analysis.<sup>58</sup>

#### IV. Industrial Organization Economic Theories

Many well accepted methods exist to estimate damages other than econometrics. These methods are based upon principles of industrial organization. To estimate damages under such an approach, economists measure, among other things, differences in market power or costs between the benchmark and conspiracy periods. Based upon these changes, industrial organization economists can estimate an overcharge.

As an initial matter, industrial organization models have the same vulnerabilities to biased or insufficient data as econometric models. Without proper data, the results of any model will be unreliable. Moreover, unlike econometric models, there is no formal way to measure the adequacy of the data used for industrial organization models.<sup>59</sup>

As noted above, an industry composed of, among other things, few firms, homogenous goods and barriers to entry can result in the presence of supracompetitive profits. This theory holds even in the absence of any conspiracy, and also applies to a cartel for any length of time. Thus, any theory to estimate damages must take into account the industry structure as that structure would have prevailed in the but-for world.

Use of the Lerner Index is a method that takes the market structure into account. The Lerner Index attempts to measure market power based upon economic profits, and is obtained by subtracting a firm's marginal cost from its price, and then dividing the result by the firm's price.<sup>60</sup> The ratio ranges

from zero to one, with a firm that lacks market power close to zero. As the ratio increases and approaches one, it indicates that a firm possesses significant market power.

The estimation of the overcharge is based upon changes in the Lerner Index during the conspiracy period as compared to the benchmark period.<sup>61</sup> Under this approach, the economist calculates the average Lerner Index for a period of time before the conspiracy. The operative assumption is that the pre-conspiracy market structure would have prevailed in the absence of the conspiracy. This assumption is based upon the theory that inflated prices during the conspiracy may have caused new entry and the breakdown in the industry structure. If prices rise during the conspiracy at a rate greater than marginal costs, the Lerner Index increases and the overcharge increases.

The underlying reliability of the Lerner Index should survive a *Daubert* challenge. Although no court has addressed the reliability of the Lerner Index to estimate damages, courts have recognized its basis in economics.<sup>62</sup> It is a mainstay of industrial organization economics.<sup>63</sup>

Nevertheless, this approach has its own vulnerabilities. Most critically, this approach ignores changes in demand as a non-conspiratorial basis for a change in the Lerner Index. In addition, the calculation of marginal cost is "rarely available" in the real world.<sup>64</sup> Rather, a proxy must be used – usually, the average variable cost – and that proxy can lead to "serious bias."<sup>65</sup> To illustrate, assume that a firm has two factories – one factory with greater average cost and greater capacity utilization than the other factory. Under this example, average variable cost is a poor proxy because it will not account for why the factory with the greater average variable cost has greater capacity utilization than the factory with lower average variable cost. However, as long as the Lerner Index is calculated consistently based upon the same firm or firms,

measurement problems should be of less significance. The overcharge is based upon the change in the Lerner Index, rather than its absolute value.<sup>66</sup> Such an approach therefore tends to minimize these problems.

The Lerner Index based approach assumes that cartel members would have the same non-conspiratorial market power (and economic profits) during the conspiracy as they did before the conspiracy. More sophisticated behavioral models take additional market factors into account to correct for potential changes in market power independent of the conspiracy. Using game theoretical models of behavior in which one firm may determine its price and output based on the expected reaction of other firms to its decision, an economist can attempt to predict firm production decisions in light of changes in costs and output of its competitors. While this approach offers a wide array of possibilities, the components of the Cournot model highlight the variables important to game theory. As Professor Areeda explains, under the Cournot model, "each firm maximizes its profits by assuming the observed output as a given, and then equating its own marginal cost and marginal revenue on that assumption."<sup>67</sup>

Only two reported cases have considered *Daubert* motions directed to Cournot models. Both courts excluded the experts based not upon the reliability of model but rather upon their relevancy. These courts excluded these models because their underlying assumptions were inconsistent with the facts.<sup>68</sup>

These two cases provide guidance about potential pitfalls. First, the many assumptions upon which these models are based need to conform to the facts. One model was excluded because it assumed that the producers' market shares would have been equal during the conspiracy.<sup>69</sup> Another model was excluded because it assumed that the producers had the same profit margins.

Based upon this assumption (and contrary to fact), the firms would have had the same marginal costs.<sup>70</sup> Similarly, one of these models attributed the entire increase in the defendant's market share during the period of the alleged antitrust violation to the alleged unlawful conduct. The failure to consider non-conspiratorial influences on market share was another reason for exclusion.<sup>71</sup>

## V. Conclusion

With tremendous damage awards at stake, defendants need to rely upon economists to minimize their exposure and even give a knock-out punch to plaintiffs' economists. Similarly, plaintiffs seek to use economists to maximize damages and, at the same time, maintain credibility. Regardless of whether plaintiffs or defendants develop them, economic approaches to the estimation of price fixing damages are generally reliable. To avoid exclusion or devastating cross-examination, economists must be careful in their selection of data and assumptions. Similarly, the models as implemented must account for non-conspiratorial factors that may have caused plaintiffs' damages. Accordingly, models based upon clean data and assumptions consistent with the facts, and which explain causation should survive challenge.

<sup>1</sup>Scott D. Hammond, Deputy Assistant Attorney General, Antitrust Division, United States Department of Justice, An Update of the Antitrust Division's Criminal Enforcement Policy (Nov. 16, 2005), at 1. <http://www.usdoj.gov/atr/public/speeches/213247.pdf>.

<sup>2</sup>Id.

<sup>3</sup>See, e.g., Wright, Miller & Kane, *Federal Practice and Procedure*: Civil 2d § 1781 ("Private antitrust actions frequently are instituted after a criminal action has been successfully brought by the government against the same defendants").

<sup>4</sup>*Blue Cross & Blue Shield United v. Marshfield Clinic*, 152 F.3d 588, 594 (7th Cir. 1998); cf. *Brook Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 233 (1993)

("Supracompetitive pricing entails a restriction in output").

<sup>5</sup>2A Phillip E. Areeda & Herbert Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, at 96 (2d ed. 2002).

<sup>6</sup>See, e.g., Press Release, United States Department of Justice, "Top Japanese Executives Indicted In Price-Fixing Conspiracy; Daicel Chemical Industries Ltd. Agrees to Pay \$53 Million Criminal Fine," at 1 (July 25, 2000) ("the grand jury charged ... current executive officers of Daicel, with conspiring with other corporate and individual co-conspirators to suppress competition by fixing the prices and allocating the volumes of sorbates to be sold in the United States and elsewhere from 1979 to 1996") (hereinafter the "sorbates conspiracy"); "Three International Companies To Plead Guilty In Food Flavoring Cartel," at 1 (Aug. 27, 2001) ("Ajinomoto, Daesang, and Cheil ... [agreed to] allocate customers [of] nucleotides") (hereinafter the "food flavoring conspiracy"); "International Chemical Corp. Agrees To Plead Guilty, Pay Fines For Participating In Multiple Criminal Antitrust Conspiracies," at 2 (Mar. 14, 2002) ("Elf Atochem and Stainton ... agree[d] ... to allocate among major MCAA producers the market shares of MCAA to be sold in the United States") (hereinafter the "MCAA conspiracy"); "Former Top ADM Executives, Japanese Executive, Indicted In Lysine Price Fixing Conspiracy," at 1 (Dec. 3, 1996) ("A Chicago federal grand jury indicted three former top Archer Daniels Midland Co. executives and one Japanese executive today for conspiring to fix prices and allocate sales in the lysine market worldwide") (hereinafter lysine conspiracy); "Two German Firms And Two U.S. Corporations Agree To Plead Guilty To Participating In International Vitamin Cartels," at 2 (May 5, 2000) ("Merck has agreed to pay a \$14 million criminal fine for participating in the vitamin C conspiracy from early 1991 until the Fall of 1995 ... Merck joined and participated with other unnamed co-conspirators in the vitamin C conspiracy to suppress and eliminate competition in the U.S. and elsewhere by ... agreeing ... to allocate among the corporate conspirators the approximate volume of vitamin C to be sold by them in the U.S. and elsewhere") (hereinafter the "Vitamin C conspiracy").

(All press releases are available at <http://www.usdoj.gov/atr/>.)

<sup>7</sup>United States Department of Justice and Federal Trade Commission, "Horizontal Merger Guidelines" § 2.1 (Apr. 1992) ("It is likely that market conditions are conducive to coordinated interaction when the firms in the market have previously engaged in express collusion"), at [http://www.usdoj.gov/atr/public/guidelines/horiz\\_book/21.html](http://www.usdoj.gov/atr/public/guidelines/horiz_book/21.html).

<sup>8</sup>Id.; see also *Brooke Group*, 509 U.S. at 227; Federal Trade Commission Decision and Order In the Matter of B.F. Goodrich Co., Docket No. 9159, issued September 24, 1985.

<sup>9</sup>*Brooke Group*, 509 U.S. at 227 ("Tacit collusion, sometimes called oligopolistic price coordination or conscious parallelism, describes the process, not in itself unlawful, by which firms in a concentrated market might in effect share monopoly power, setting their prices at a profit-maximizing supracompetitive level by recognizing their interdependence with respect to price and output decisions"); *Clamp-All Corp. v. Cast Iron Soil Pipe Inst.*, 851 F.2d 478, 484 (1st Cir. 1988) (Breyer, J.) ("A firm in a concentrated industry typically has reason to decide (individually) to copy an industry leader . . . . One does not need an agreement to bring about this kind of follow-the-leader effect in a concentrated industry").

<sup>10</sup>*Brooke Group*, 509 U.S. at 238 ("[u]ncertainty is an oligopoly's greatest enemy").

<sup>11</sup>Areeda & Hovenkamp, *supra* note 6, at 96.

<sup>12</sup>*Chattanooga Foundry & Pipe Works v. City of Atlanta*, 203 U.S. 390, 396 (1906).

<sup>13</sup>*Zenith Radio Corp. v. Hazeltine Research Inc.*, 395 U.S. 100, 114 n.9 (1969).

<sup>14</sup>See, e.g., *U.S. Football League v. Nat'l Football League*, 842 F.2d 1335, 1378 (2d Cir. 1988) (citing *Bigelow v. RKO Radio Pictures, Inc.*, 327 U.S. 251, 264 (1946) for the proposition that a plaintiff may prove its amount of damages approximately through the more relaxed "just and reasonable inference" standard only after proving causation).

<sup>15</sup>See, e.g., *Concord Boat*, 207 F.3d at 1060 ("the boat builders have failed to establish . . . a sufficient causal connection between the alleged violations and their injuries"); *Blue Cross*, 152 F.3d at 592 (holding that plaintiff failed to prove fact of damage because plaintiff failed to account "for any nonconspiratorial factors that might have

caused the prices that are being compared to be different from each other”).

<sup>16</sup> *Story Parchment Co. v. Paterson Parchment Paper Co.*, 282 U.S. 555, 563 (1931).

<sup>17</sup> See, e.g., *U.S. Football*, 842 F.2d at 1378-79 (even “plaintiffs’ proof of amount of damages thus must provide the jury with a reasonable basis upon which to estimate the amount of its losses caused by other factors, such as management problems, a general recession or lawful factors”).

<sup>18</sup> *Brooke Group*, 509 U.S. at 242 (“Expert testimony is useful as a guide to interpreting market facts but it is not a substitute for them”); *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 594 n.19 (1986) (“expert opinion evidence . . . has little probative value in comparison with the economic factors”); *In re Citric Acid Litig.*, 191 F.3d 1090, 1102 (9th Cir. 1999) (“The law is clear, however, that an expert report cannot be used to prove the existence of the facts set forth therein”).

<sup>19</sup> *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993); *Gen. Elec. Co. v. Joiner*, 522 U.S. 136 (1997); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

<sup>20</sup> *S.M. v. J.K.*, 262 F.3d 914, 921 n.6 (9th Cir. 2001).

<sup>21</sup> *Ohio ex rel. Montgomery v. Louis Trauth Dairy, Inc.*, 925 F. Supp. 1247, 1251 (S.D. Oh. 1996).

<sup>22</sup> *Gen. Elec.*, 522 U.S. at 146.

<sup>23</sup> *Kumho Tire*, 526 U.S. at 138.

<sup>24</sup> *Daubert*, 509 U.S. at 596.

<sup>25</sup> *In re Polypropylene Carpet Antitrust Litig.*, 93 F. Supp. 2d 1348, 1359 (N.D. Ga. 2000) (“econometrics involves the [use of] statistical analysis [to solve] an economic problem”) (internal quotations omitted); *Louis Trauth Dairy, Inc.*, 925 F. Supp. at 1250 n.2 (“Econometrics ‘is the application of statistical and mathematical techniques to solving problems as well as in testing and demonstrating theories’”).

<sup>26</sup> *In re Indus. Silicon Antitrust Litig.*, Nos. 95-2104, 95-1131, 96-2003, 96-2111, 96-2338, 1998 WL 1031507, at \*2 (W.D. Pa. Oct. 13, 1998) (“Multiple regression analysis is a statistical technique designed to determine the effect that two or more explanatory independent variables have on a single dependent variable. This method allows the expert to test the causal relationship, if any, between the explanatory independent variables and the dependent variable”); *In re Linerboard Antitrust Litig.*, 203 F.R.D. 197, 218 (E.D. Pa. 2001) (“Multiple regressions analysis is a statistical tool for understanding the relationship between

two or more variables”) (internal quotations omitted).

<sup>27</sup> *City of Tuscaloosa v. Harcros Chems., Inc.*, 158 F.3d 548, 566 (11th Cir. 1998).

<sup>28</sup> *City of Tuscaloosa*, 158 F.3d at 566 n.25; *Petrugzi’s IGA Supermks., Inc. v. Darling Delaware Co.*, 998 F.2d 1224, 1238 (3d Cir. 1993); *Blue Cross*, 152 F.3d at 593; *Polypropylene*, 93 F. Supp. 2d at 1359; *Allapattab Servs., Inc. v. Exxon Corp.*, 61 F. Supp. 2d 1335, 1339 n.7 (S.D. Fla. 1999); *In re Indus. Silicon*, 1998 WL 1031507 at 2; *Louis Trauth Dairy*, 925 F. Supp. at 1252; *In re Linerboard*, 203 F.R.D. at 218.

<sup>29</sup> Peter Kennedy, *A Guide to Econometrics*, at 148 (4th ed. 1998) (“Often an explanatory variable is unobservable, but a proxy for it can be constructed”); *Polypropylene*, 93 F. Supp.2d at 1360 (“Econometricians use economic theory . . . to identify the correct set of explanatory variables for a particular model”).

<sup>30</sup> Economists can use many different approaches to specify the equation and estimate the results. See American Bar Association, Antitrust Practice Guide, *Proving Antitrust Damages: Legal and Economic Issues*, at 145-68 (1996). A fundamentally different approach would employ the use of a dummy variable. The dummy variable becomes another explanatory variable and, when the conspiracy is in effect, its coefficient represents the overcharge. See *id.* at 174-75. For the sake of convenience, the econometrics discussion in this article focuses primarily upon the residuals model. The dummy variable approach has the same vulnerabilities as the residuals model and the discussion in this article is equally applicable to either approach.

<sup>31</sup> *Blue Cross*, 152 F.3d at 592; *Polypropylene*, 93 F. Supp.2d at 1361.

<sup>32</sup> *City of Tuscaloosa*, 158 F.3d at 566 (“we find that . . . a small portion of [the expert’s] data . . . is fundamentally flawed, and the evidence based thereon is consequently unreliable and must be excluded”); *Polypropylene*, 93 F. Supp. 2d at 1355 (“Opinions based upon erroneous data, of course, must be excluded”); *U.S. Info. Sys., Inc. v. Int’l Bhd. of Elec. Workers Local Union No. 3*, 313 F. Supp. 2d 213, 235 (S.D.N.Y. 2004) (“Dr. Dunbar’s data sample therefore cannot provide the basis for his testimony”); but see *Louis Trauth Dairy*, 925 F. Supp. at 1253 (“Problems in [the] selection of a sample bear on the weight of the testimony, not its admissibility”).

<sup>33</sup> *Allapattab*, 61 F. Supp. 2d at 1350 (“much of [the] attack [about the selection of data] goes more to weight rather than reliability”); *Louis Trauth Dairy*, 925 F. Supp. at 1253.

<sup>34</sup> Press Release, United States Department of Justice, “Top Japanese Executives Indicted In Price-Fixing Conspiracy; Daicel Chemical Industries Ltd. Agrees to Pay \$53 Million Criminal Fine,” at 1 (July 25, 2000) (“the grand jury charged . . . current executive officers of Daicel, with conspiring with other corporate and individual co-conspirators to suppress competition by fixing the prices and allocating the volumes of sorbates to be sold in the United States and elsewhere from 1979 to 1996”).

<sup>35</sup> The federal government maintains historical population and income data, producer price indices and import and export data. Private subscription databases also maintain historical price data of certain goods which could be inputs, substitutes or complements.

<sup>36</sup> Compare *In re Aluminum Phosphide Antitrust Litig.*, 893 F. Supp. 1497, 1503 (D. Kan. 1995) (“to the extent that Dr. Hoyt has selected the normative period by reference to the availability of data (as opposed to its relevance or reliability), he offers no scientific or theoretical basis for his calculations and opinions”) with *Polypropylene*, 93 F. Supp.2d at 1361 (upholding decision to exclude explanatory variable because of “limited data . . . in the benchmark period”); *Coates v. Johnson & Johnson*, 756 F.2d 524, 541 (7th Cir. 1985) (“Pooling data is sometimes not only appropriate but necessary, since statistical significance becomes harder to attain as the sample size shrinks.”).

<sup>37</sup> A ninety-five (95) percent degree of confidence is “typically accepted.” *FTC v. Swedish Match*, 131 F. Supp. 2d 151, 161 n.10 (D.D.C. 2000).

<sup>38</sup> *U.S. Info. Sys.*, 313 F. Supp.2d at 232 (“sample size will not skew the results . . . . Accordingly, small sample size goes to the weight rather than to the reliability (and admissibility) of a study”); *United States v. City of Yonkers*, 609 F. Supp. 1281, 1288 (S.D.N.Y. 1984) (small sample size does not make results “unreliable”).

<sup>39</sup> *Int’l Bhd. of Teamsters v. United States*, 431 U.S. 324, 340 n.20 (1977) (“small sample size may, of course, detract from the value of such evidence”); *Mayor of Philadelphia v. Educ. Equal. League*, 415 U.S. 605, 621 (1974) (“the District Court’s concern for



the smallness of the sample ... was also well founded"); *FTC v. H.J. Heinz Co.*, 246 F.3d 708, 723 (D.C. Cir. 2001) ("the number of data points ... were few .... Assessing such data's statistical significance in establishing the proposition ... is thus highly speculative"); *Swedish Match*, 131 F. Supp. 2d at 161 n.10 ("While it may be true that there is no bright line between an eighty-five (85) percent statistical significance level and more typically accepted level of confidence such as ninety-five (95) percent, defendants have simply not convinced the Court ... to accept conclusions at this lesser level of confidence"); *FTC v. Staples, Inc.*, 970 F. Supp. 1066, 1076 (D.D.C. 1997) ("The number of SKUs in the sample was not provided to the Court .... Therefore, the Court would not give much weight to this evidence standing alone").

<sup>40</sup> *Bazemore v. Friday*, 478 U.S. 385, 400 n.10 (1986).

<sup>41</sup> *Bloomkest Fertilizer, Inc. v. Potash Corp.*, 203 F.3d 1028, 1038 (8th Cir. 2000) (*en banc*); see also *Blue Cross*, 152 F.3d at 594.

<sup>42</sup> *Polypropylene*, 93 F. Supp. 2d at 1365. *In re Indus. Silicon*, 1998 WL 1031507 at \*3 ("a party cannot successfully challenge the admissibility of a regression analysis by simply pointing to a laundry list of possible independent variables that were not included").

<sup>43</sup> *Id.*; cf. *In re Monosodium Glutamate Antitrust Litig.*, No. Civ. 00-MDL-1328 (PAM), 2003 WL 244729, at \*2 (D. Minn. Jan. 29, 2003) ("Dr. Beyer should be allowed to explain why he used a negative demand variable").

<sup>44</sup> *Bazemore*, 478 U.S. at 400 ("Normally, failure to include variables will affect the analysis' probativeness, not its admissibility").

<sup>45</sup> See, e.g., *Bloomkest Fertilizer*, 203 F.3d at 1038; *Blue Cross*, 152 F.3d at 594 (the expert "failed to correct for the effect of market share on the Clinic's prices. ... [N]o reasonable jury could estimate the plaintiffs' damages from the reports of the plaintiffs' experts").

<sup>46</sup> *Id.*

<sup>47</sup> While the cases do not speak in terms of "omitted variable bias," courts have rejected econometric models because they failed to account for significant non-conspiratorial market factors that would have prevailed in the but-for world. See, e.g., *Bloomkest Fertilizer*, 203 F.3d at 1038; *Blue Cross*, 152 F.3d at 594.

<sup>48</sup> Kennedy, *supra* note 33, at 82 ("This procedure is valid in the sense that the

'correct set' of independent variables will produce, on average in repeated samples, a higher adjusted R<sup>2</sup> than will any 'incorrect' set of independent variables").

<sup>49</sup> Kennedy, *supra* note 33, at 86 (the adjusted R<sup>2</sup> "does a poor job of picking out the correct specification, mainly because it capitalizes on chance, choosing a specification because it is able to explain better the peculiarities of the particular data set") (collecting academic articles).

<sup>50</sup> Kennedy, *supra* note 33, at 95.

<sup>51</sup> *Id.* ("This creates ... the 'kitchen sink' dilemma — omitted variables, and the bias they cause, will be avoided, but the irrelevant variables that will inevitably be present will cause high variances").

<sup>52</sup> *Id.*; *Polypropylene*, 93 F. Supp.2d at 1365-66 (denying *Daubert* motion because defendant "does not proffer evidence that the alleged reduction in demand for the modeled styles during the benchmark period correlates with the dependant [sic] and is likely to affect the result of [the expert's] analysis").

<sup>53</sup> *Polypropylene*, 93 F. Supp.2d at 1361.

<sup>54</sup> See, e.g., Chaim Freshman & Ariel Pakes, "A Dynamic Oligopoly With Collusion and Price Wars," National Bureau of Economic Research, at 5 (Feb. 1999).

<sup>55</sup> *Id.* ("[T]he possibility of collusion and the type of the collusive equilibrium affect the firms' investments as well as their exit and entry decision"). The sorbates, vitamin C, food flavoring, and MCAA conspiracies all seem to have collapsed well before government detection. See *supra* note 8.

<sup>56</sup> *Coates*, 756 F.2d 524 at 542 ("Both the log linear and Chow tests are statistical tests for whether two or more sets of data may be grouped as a single sample in a statistical model").

<sup>57</sup> *Dukes v. Wal-Mart Stores, Inc.*, 222 F.R.D. 137, 157 (N.D. Cal. 2004) (no "authority that would require use of a Chow test in this case").

<sup>58</sup> *Coates*, 756 F.2d at 542 ("[t]he district court therefore could have accepted . . . that the Chow test was the proper test and could discount the probative value of the pooled analyses").

<sup>59</sup> As noted above, formal measurement statistics will reveal the variance in a regression, but offer no insight about whether the data are biased or otherwise unreliable.

<sup>60</sup> Herbert Hovenkamp, FEDERAL ANTITRUST POLICY § 3.1a (1994). See also *Polypropylene*, 93 F. Supp.2d at 1362-3

(The marginal cost is defined as "the cost of producing one more unit").

<sup>61</sup> See *Polypropylene*, 93 F. Supp.2d at 1357 ("industrial organization economists frequently use margins" for their analysis) (internal quotations omitted).

<sup>62</sup> *Polypropylene*, 93 F. Supp. 2d at 1362-3; *FTC v. Swedish Match*, 131 F. Supp. 2d at 161.

<sup>63</sup> Dennis W. Carlton & Jeffrey M. Perloff, *Modern Industrial Organization*, at 246 (3d ed. 2000) ("many economists use a different measure of performance, the Lerner Index").

<sup>64</sup> *Id.*

<sup>65</sup> *Id.*

<sup>66</sup> For this reason, Chief Judge Hogan's criticism of the Lerner Index to calculate the elasticity of demand (*i.e.*, its absolute value) is inapplicable. *FTC v. Swedish Match*, 131 F. Supp.2d at 161 ("use of the Lerner Index in this case is at least questionable").

<sup>67</sup> Areeda & Hovenkamp, *supra* note 7, at 93.

<sup>68</sup> See *Concord Boat*, 207 F.3d at 1056; *Heary Bros. Lightning Prot. Co. v. Lightning Prot. Inst.*, 287 F. Supp.2d 1038 (D. Ariz. 2003). The court in *Heary Bros.*, 287 F. Supp. 2d at 1067, also excluded the Cournot model because the firms competed on price -- which was contrary to the assumption upon which the Cournot model was based. While the Cournot model does not apply in these circumstances, other game theory models focus on price competition rather than output, such as the Bertrand and Stackleberg models. These models rely upon the pricing behavior of competitors. See *supra* note 72, at 166-75.

<sup>69</sup> *Concord Boat*, 207 F.3d at 1056.

<sup>70</sup> *Heary Bros.*, 287 F. Supp. 2d at 1067.

<sup>71</sup> *Concord Boat*, 207 F.3d at 1056.

"Antitrust 101: What is Copperweld?" by Miriam Gold. Published in *The Antitrust Counselor*. Volume 2. No.4. November 2005. © 2005 by the American Bar Association. Reprinted with Permission.