A Critique of the “Learning about Demand” Defense in Retrospective Merger Cases

David J. Balan
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Welcome

It is with great pleasure that we welcome you to the Fall 2008 volume of our newsletter. The goal of this endeavor is to provide a forum where Antitrust Section and Economics Committee members can share their views on the many faceted relationship between antitrust law and economics.

This newsletter is intended to provoke discussion. As a result, the opinions expressed in this newsletter are only those of the authors. The opinions found herein do not necessarily reflect those of the economics editor, legal editor, their respective employers, members of the Economics Committee, or the Antitrust Section of the ABA. We also wish to acknowledge the assistance of Katherine Wiebler for excellent proofreading and help with the legal citations.

Enjoy!

Sincerely,

Seth Sacher, Economics Editor
Neil Imus, Legal Editor
Call for Articles

We are always looking for articles for future issues of the newsletter. If you have an article or an idea for an article regarding the current or improved use of economics in analyzing issues of antitrust law, by all means, please share it with us. Contact Seth Sacher at sethsacher@gmail.com or Neil Imus at nimus@velaw.com for more information.
Calendar of Events

Antitrust Economics for Attorneys: The Economics of Innovation and Intellectual Property, Part 2
Tuesday, December 2, 2008 at 9:00 am – 12:30 pm

Co-Sponsored with the Intellectual Property Committee

In July we offered Part 1 of the Economics of Innovation and Intellectual Property. The first session covered the fundamental economics of innovation and intellectual property rights, including a primer on the economics of innovation, the incentives for innovation, and how the appropriability of the fruits of innovations affects those incentives. It also addressed the basic economic issues arising from innovation and intellectual property, with an emphasis on their antitrust implications.

In Part 2, our panel of experts will turn to more advanced aspects of the economics of intellectual property, as applied to two key sectors in the economy: pharmaceuticals and high technology standard setting.

Moderator:
Willard K. Tom, Morgan, Lewis & Bockius LLP, Washington, DC

Speakers:
Sumanth Addanki, NERA Economic Consulting, New York, NY
Anne Layne-Farrar, LECG LLC, Chicago, IL

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1111 Pennsylvania Ave., NW
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RSVP to Nancy Cole, LECG, ncole@lecg.com, 202-973-0297.
(We will need your name for security clearance.)
A Critique of the “Learning about Demand” Defense in Retrospective Merger Cases

David J. Balan and Christopher Garmon
Federal Trade Commission

Introduction

Like most merger challenges by the antitrust enforcement agencies, hospital merger challenges are generally prospective in nature. However, in 2004 the Federal Trade Commission decided to bring a retrospective action against the 2000 acquisition of the independent Highland Park Hospital by the two-hospital system comprising Evanston Hospital and Glenbrook Hospital (henceforth referred to simply as Evanston Hospital), which formed the three-hospital Evanston Northwest Healthcare (ENH) system. A key question in that case was whether the merger had resulted in an anticompetitive price increase (as opposed to whether it would result in a price increase, which is the question in prospective cases). A widely-used economic methodology for answering such questions is to apply a “difference-in-differences” analysis in which the price change at the merging firms is compared to the price change at a set of control firms, which serves as a proxy for the price change that would have occurred at the merged firms if the merger had not taken place. As discussed below, the main virtue of this methodology is that it eliminates most potential sources of spurious findings of anticompetitive harm (or of the absence of harm). That is, it eliminates most ways in which a competitively benign price increase could be mistaken for an anticompetitive one, so that a finding of a price change at the merging firms that is economically and statistically significantly larger than at the control firms can usually be regarded as strong evidence that the merger enabled the exercise of market power.

Each side’s economic expert performed such a difference-in-differences analysis, and while there was disagreement about the magnitude of the effect, both parties agreed that prices at ENH had increased significantly relative to an appropriately selected control group. But Counsel for ENH argued that this relative price increase could not be interpreted as evidence of anticompetitive harm because there was an important confounding factor that was not captured by the difference-in-differences analysis. Specifically, they argued that there had been “learning about demand” (LAD), by which they meant that around the time of the merger, Evanston Hospital learned that it had previously been underestimating the willingness-to-pay for its services, and that learning this allowed them to negotiate substantially higher prices. In other words, Counsel for ENH argued that there was an alternative, competitively benign hypothesis that was also consistent with the relative price increase identified in the difference-in-differences analysis. ENH Counsel went on to argue that it was possible to empirically distinguish between the two hypotheses (market power vs. LAD), and to show that the LAD hypothesis was the correct one.

The purpose of this piece is to critique this alternative LAD hypothesis. With limited exceptions, we will not discuss the facts of the case, as they cannot be adequately addressed in the available space. We will, however, be evaluating the LAD argument as it was advanced in the ENH case specifically.
Problems with ENH Counsel’s Proposed Empirical Test of the LAD Hypothesis

ENH Counsel argued that the two competing hypotheses, both of which predict a relative price increase at ENH, can be empirically distinguished. Specifically, they argued that FTC Complaint Counsel’s market power hypothesis predicts that ENH’s post-merger prices would rise to a level above that of the control hospitals, whereas the LAD hypothesis generates the alternative prediction that ENH’s prices would rise to a level equal to that of the control hospitals, but not above.9 Note that this argument rests on a comparison of relative price levels. As will be discussed below, such comparisons are generally not valid, which is why difference-in-difference analyses, which compare relative price changes, are widely used instead.

In other words ENH Counsel’s test, which was presented as a means of resolving a question that could not be fully resolved through a difference-in-differences analysis, rests on a form of analysis whose invalidity is the very reason why difference-in-differences analyses are commonly used in the first place. To understand why this is so, it is necessary to take a brief detour to discuss the intuition behind difference-in-differences analysis, after which we will be in a position to identify the flaw in ENH Counsel’s argument.

Why is it Standard to Compare Price Changes rather than Price Levels?

A key question in a retrospective merger case is whether or not the post-merger price is higher than it would have been but-for the merger. So the ideal analysis would be to compare the actual post-merger price to this “but-for” price. The problem, of course, is that the but-for price can never be directly observed, so it is necessary to find a proxy for it. One obvious candidate for a proxy would be the merging hospital’s pre-merger price, but of course this would not be appropriate: hospital prices generally increase over time even without a merger, so choosing the pre-merger price as a proxy would generate spurious findings of anticompetitive merger effects. Another possibility would be to use the pre-merger price, but to inflate it using a general measure of hospital inflation. This is a step in the right direction, but it ignores the fact that a general (nation-wide) hospital inflation rate may not accurately reflect the inflation at a particular type of hospital or in a particular geographic area. So this method would also generate a spurious finding of an anticompetitive effect if the merging hospital happened to be of a type or in a location with above-average inflation.

An alternative that avoids this problem would be to identify a group of “control” hospitals that are identical to the merging hospital (except for the fact of the merger itself) and to use the prices of these hospitals as a proxy for the but-for price of the merging hospital. That is, one could compare the post-merger price level of the merging hospital to the levels at the control hospitals. This would be appropriate if it were possible to construct an ideal control group comprising firms that were exactly identical to the merging firm before the merger, and were also identical after the merger except for any changes brought about by the merger itself; in this case, any difference in the post-merger price levels would have to be attributable to the merger.

The problem is that in a differentiated product industry, such as hospitals, perfect control groups do not exist. Any real world control group comprised of hospitals that are not identical to the merging hospital. This introduces an obvious problem: if the control firms are different from the merging firm in ways other than the fact of the
merger, then there is the possibility that what appears to be an anticompetitive effect is really just a consequence of the imperfection of the control group. That is, there will be a spurious finding of a merger effect if the merging firm happens, for some reason unrelated to the merger, to be able to command a relatively high price, and vice-versa.

This problem is mostly confined to instances where the differences between the merged firm and the control firms either cannot be observed by the analyst (they can, often, be observed by market participants), or cannot be quantified. Differences that are observable and quantifiable (such as hospital bed size, for example), can be controlled for using standard multivariate regression techniques, and so are not much of a problem. Choosing control hospitals that are as similar as possible to the merging hospitals in terms of demand, cost, and regulatory conditions is helpful in limiting the problem as well. But hospitals are differentiated along many important dimensions that either cannot be observed by the analyst or cannot be quantified, such as ease of access or perceived quality or even how much market power they have. That is, there is very substantial heterogeneity of prices among hospitals even when all observable/quantifiable characteristics are controlled for. This means that it is not generally possible to construct a control group consisting of hospitals that are identical to, or even very similar to, the merging hospitals, which in turn means that comparisons of relative price levels are not valid.

The purpose of difference-in-differences analyses, which compare price changes rather than price levels, is to mitigate this problem. In a difference-in-differences analysis, time-invariant characteristics of the hospitals that may affect their prices are “differenced out,” meaning that an unobserved or unquantifiable characteristic that enabled a merging hospital to command a particularly high price would not confound a difference-in-differences analysis as long as that characteristic was equally present both before and after the merger. Fortunately, the hospital characteristics that are difficult for an analyst to observe and/or quantify also tend to be fundamental characteristics of the hospital, and so tend to be more-or-less invariant over the relatively short time frame of a retrospective merger analysis. For example, a hospital’s perceived quality will be largely the result of long-term investments in human and physical capital, its ease-of-access will be largely the result of its (unchanging) location, and so on. In sum, a comparison of price levels will be invalid whenever there are significant unobservable or unquantifiable differences between the merging hospitals and the control hospitals, whereas a comparison of price changes will be invalid only under the much more unlikely condition that these differences exist and change substantially in magnitude over relatively short periods of time.

Implications for ENH Counsel’s Proposed Test

With the above background in mind, we can now identify the flaw in ENH Counsel’s argument. Their test involves making predictions about what should happen to relative price levels if one or the other hypothesis is true. This test would be valid if it were possible to identify perfect control groups: under Complaint Counsel’s hypothesis, the pre-merger prices should indeed be equal to those at the control hospitals but the post-merger prices should be higher; whereas under the LAD hypothesis the pre-merger prices should be below those at the control hospitals but the post-merger prices should be equal. But as discussed above, nothing even close to such ideal control groups exists: there is simply too much unobserved or
unquantifiable heterogeneity between hospitals.

In the absence of something tolerably close to a perfect control group, the LAD hypothesis does not predict that the merging hospitals’ prices would rise to a level equal to, but not above, those of the control group. It simply predicts that those prices will increase more than the prices in the control group. And Complaint Counsel’s hypothesis predicts the same thing! In other words, once we take into account the (standard) reasons why difference-in-differences analyses of price changes are widely used and analyses of price levels are not, we end up back where we started, which is that both hypotheses predict that prices at the merged hospitals will increase by more than at the control group, and by an amount commensurate with the degree to which there was learning that willingness-to-pay had been underestimated pre-merger (according to the one hypothesis), or with the increase in market power (according to the other). No valid price levels test is possible, as both hypotheses allow for post-merger price levels below, equal to, or above those at the control hospitals.

It is worth pointing out that adopting ENH Counsel’s method of analysis would mean that mergers involving any hospitals that happen to have relatively low prices (due to factors that cannot be observed and/or quantified) could never be challenged as anti-competitive. Such hospitals would always be allowed to merge until they reached the price level of their control group. This would create a ratchet effect whereby all mergers of relatively low-priced hospitals would be allowed until they reached the average level, which would result in a higher average price and even more permissible mergers. It is difficult to imagine that this could be the optimal policy.

Is LAD a Plausible Alternative Hypothesis?

Above we argued that ENH Counsel’s proposed empirical test for distinguishing Complaint Counsel’s market power hypothesis from its own LAD hypothesis was not valid. This does not prove that the LAD hypothesis is incorrect, it merely means that it cannot be validated by a separate analysis of price levels. The next step, then, is to consider the direct arguments offered in favor of the LAD hypothesis, and to critique the claim that they are sufficiently strong as to constitute a plausible alternative to the market power hypothesis.

The main source of the claimed learning that Evanston Hospital had underestimated the willingness-to-pay for its services was the report of a consulting firm that Evanston Hospital hired at about the same time as the merger. The report said that Evanston Hospital’s contracted prices with insurers were far lower than they should have been given the true willingness-to-pay for the hospital. A key element of the consulting firm’s analysis was a comparison of contracted prices at Evanston Hospital to those at HPH (to which Evanston Hospital was now privy as a result of the merger). This comparison, the report claimed, showed that prices at HPH were higher than those at Evanston Hospital, despite the fact that HPH was much smaller, was not an academic institution, and offered fewer high-end services.

This information, if true, certainly could have been of some value to Evanston Hospital in assessing the willingness-to-pay of insurers, and hence the prices that they could command. However, the claim made by ENH Counsel was not merely that Evanston Hospital learned something of value by observing HPH’s prices. Rather, they claimed to have learned something that led them to believe that they had sufficient bargaining
power to command much higher prices. That is, the LAD hypothesis requires that the information learned (primarily) through a comparison of prices at Evanston Hospital to those at HPH was indicative of a severe underestimation of willingness-to-pay.

The first problem with this argument is factual: the FTC Complaint Counsel argued, and the administrative law judge affirmed, that prices at Evanston Hospital were in fact higher than those at HPH, not lower. The second problem is that a finding that prices at HPH were higher than those at Evanston Hospital would only indicate a severe underestimation of willingness-to-pay if Evanston Hospital was (correctly) confident that willingness-to-pay for HPH must actually be much lower than at Evanston Hospital. That is, in order for learning that HPH’s prices were higher than its own to be a sound basis for a belief that it could bargain for much higher prices, Evanston Hospital would have had to be highly confident that the observed difference between its own prices and those at HPH was very far from the “correct” difference. But it is not clear that any such confidence could be justified, because as discussed above, cross-hospital comparisons of price levels generally cannot be validly made.

Conclusion

While comparatively rare, retrospective merger enforcement actions are an important part of the antitrust authorities’ activities. In any such case, the authorities are likely to rely heavily on difference-in-differences analyses of post-merger price changes. When such analyses show a post-merger price increase, it will always remain to consider whether there was some other event, more or less contemporaneous with the merger, which might constitute a benign alternative explanation for a post-merger relative price increase.

Learning about demand is an attractive candidate for parties to offer as an alternative explanation. It is always possible that such learning took place, and it is difficult to prove that it did not. Therefore firms will be tempted to use this explanation as a post-hoc justification for an anticompetitive merger. In this piece, we have argued that the conditions for LAD to be valid are in fact quite narrow, and that the test proposed in the Evanston case to distinguish it from the market power hypothesis is invalid. For these reasons, we believe that claims of LAD should generally be treated with considerable skepticism.

*The authors worked as FTC staff economists during the Evanston Northwestern Healthcare trial. All information cited in this piece is from publicly available sources. The views expressed are those of the authors and do not represent those of the Federal Trade Commission or of any individual Commissioner. We are grateful to Deborah Haas-Wilson, Seth Sacher, and to brown-bag participants at the Antitrust Division of the U.S. Department of Justice and at the Federal Trade Commission for their helpful comments.


2 Naturally, the price issue was not the sole issue in the case, and the difference-in-differences analysis was not the sole element of the price issue (on either side). It was an important element however, and it is the element that is relevant for the purposes of this article.

3 The main economic expert for FTC staff was Professor Deborah Haas-Wilson, and the main economic experts for ENH were Professor Jonathan Baker and Dr. Monica Noether.

4 Following the merger, all three hospitals in the ENH system were united under a single license number. For this reason, it was possible to evaluate the price increase at the ENH system as a whole, but not at the level of the individual hospitals.
Dr. Haas-Wilson estimated that ENH’s inpatient price increased 11.1 to 17.9 percentage points more than the price at various control groups after the merger. See In re Evanston Northwestern Healthcare Corp., Dkt. No. 9315, slip op. at 35 (Aug. 6, 2007) (opinion of the Commission) available at http://www.ftc.gov/os/adjpro/d9315/070806opinion.pdf. Dr. Baker estimated that ENH’s inpatient price increased 9 to 10 percentage points more than at his control group after the merger. Id at 38.

Hospital prices are not posted by the hospital, but rather are set in negotiations between hospitals and insurers.


In recent years economists have developed innovative new ways of quantifying the amount of market power that hospitals have, which means that in future retrospective analyses market power may be among those factors that can be explicitly controlled for. These measures, however, were not used by either side in the ENH matter.

Pretrial Brief of Respondent, supra note 7, at 27; Post-Trial Brief of Respondent, supra note 7, at 42; and Respondents’ Corrected Appeal Brief, supra note 7, at 48.

ENH’s economic experts claimed only that Highland Park’s contract “rates” were higher than those at Evanston Hospital. But these “rates” are not transaction prices. For example, one hospital could have a higher reimbursement rate than another (e.g., 70% vs. 60% of billed charges), but the latter could have higher prices if its list prices are substantially higher. The administrative law judge found that pre-merger prices at Evanston Hospital were higher than at HPH. See In re Evanston Northwestern Healthcare Corp., Dkt. No. 9315, slip op. at 173 (Oct. 20, 2005) (initial decision), available at http://www.ftc.gov/os/adjpro/d9315/051020initialdecision.pdf. Note that the fact that HPH’s prices were not higher than those at Evanston Hospital does not necessarily mean that Evanston Hospital did not acquire valuable information from learning HPH’s prices. It is possible that HPH’s prices were lower, but by less than Evanston Hospital had previously thought. This would be some evidence that Evanston Hospital had underestimated willingness-to-pay, but it makes it even less likely that learning HPH’s prices caused them to believe that the underestimation was severe.
Estimating Overcharges Using Hedonic Price Methods

Allison Holt*
Economists Incorporated

Introduction

One of the key considerations in price-fixing litigation is determining whether or not the alleged collusion affected prices and, if so, determining what the prices for the products in question would have been but for the alleged collusion. Addressing this question is substantially more straightforward with access to reliable price time-series for one or more price-fixed products over a “relevant period” that includes observations from before, during, and after the cartel period. It is often the case, however, that there is no one price-fixed product that spans the full relevant time period. Instead, data may only be available for a set of products with varying feature sets that jointly span the relevant period. Without a reliable price series spanning the relevant period, several of the standard methods – including the econometric approach – to estimate overcharges are problematic to implement. This paper outlines a technique employing hedonic price methods to modify the econometric approach to overcharge estimation to address this challenge. The hedonic methodology entails expressing the price of a product as a function of the product’s features and characteristics. This approach will allow the analyst to incorporate a set of price fixed products – all of which may have price series that do not span the relevant period – into one overall overcharge model.

Overcharge Estimation—Econometric Approach

There are a variety of ways to estimate the damages associated with a price fixing cartel. One of the more widely accepted approaches entails using an econometric model to estimate the relationship between the price of a product and supply and demand factors to thereby isolate the impact of the cartel on price. These models are estimated over a time span that includes both cartel and non-cartel periods. Supply factors typically include variables like the costs of raw materials and energy, the cost of labor, and capacity utilization. Demand factors typically include variables like consumption of complements and macroeconomic variables. The models also include a cartel indicator flagging the collusive period.

Models of this type are typically estimated using standard econometric time series methods, resulting in a set of estimated coefficients. The critical coefficient of interest is the one associated with the cartel indicator. The magnitude of this “overcharge” coefficient measures the impact of the cartel on price.

The overcharge coefficient will only be reliable if at least three conditions are met. First, reasonably complete data are available for the relevant set of cost and demand shifters. Second, reasonably reliable measures for the start and end date of the cartel are used to define the cartel indicator. Third, a price series for the price fixed product that include substantial cartel and non-cartel periods is available. The challenge of addressing this third requirement is the primary motivator for the methodology outlined in this article.

The price series used in overcharge models of this type are typically based on transaction data for one product with one fixed set of features/characteristics. In particular, the weighted (by quantity) average price\(^1\) is calculated in each time interval (typically month or quarter) across the entire relevant time period. However, it is not unusual for...
an analyst to be confronted by a market where there is no single product that will produce a reliable price series over the entire relevant time period. These markets tend to be characterized by products with evolving feature sets that result in one model being updated or replaced with another model in quick succession (e.g., automobiles or personal computers). Hedonic price methods allow the analyst to address this situation with an overcharge analysis that harnesses the price data for several related products (or models) simultaneously.2

Hedonic Price Methods

The key insight of hedonic price methods is that the price of any product can be viewed as a function of that product’s features. In particular, an equation can be specified where each product’s price is a function of a time interval specific constant plus a linear combination of the products’ features.3 Adding a stochastic error term provides an estimating equation.4 Standard regression methods can be applied to a time-series of product price data to generate estimates for the time interval specific constant and the coefficients associated with each feature.

To gain insight into the hedonic approach, consider a simple example. Assume an analyst is interested in better understanding the pricing patterns in the market for personal computers (PCs). One alternative is to look at each PC model in isolation and examine the price series for that product. But this approach is of limited utility because PC models tend to have a relatively short life-span before they are superseded by some newer/faster model. An alternative approach entails looking at all PCs merely as a collection of features in varying degrees. The collection of features would include factors such as: a) processor speed, b) hard drive size, c) memory, and d) power supply. With access to price data for some or all of the models, it is feasible to pool the data and estimate the relationship between the price of a PC and the different features associated with that PC.

Hedonic methods have been used extensively in economic analysis for more than forty years and the approach is now well accepted among economists. Hedonic methods as they apply to economics were initially developed by Waugh5 and Court6 to study vegetable prices and automobiles respectively. The methodology was substantially popularized by Griliches7 when he highlighted how hedonic methods allow for the measurement of quality changes in the context of automobiles. Pakes8 expanded on the approach with an analysis focused on personal computers. Much of this research has informed the utilization of hedonic methods in the Consumer Price Index (CPI).

Nevertheless, at least two considerations can get in the way of applying hedonic methods. First, the relevant product features must be measurable. Second, measurements of the relevant features must be available. Omitting features that are substantially relevant to price from the model can lead to biased results.

Using Hedonic Methods to Develop Overcharge Estimates

Incorporating hedonic methods into an overcharge damages analysis is useful because it allows the analyst to circumvent the lack of availability of one price series that spans the relevant time period. Instead, the analyst can combine the observed price data across several products into one unified overcharge analysis. This model, as with the basic overcharge model, will include controls for pertinent supply and demand factors and a cartel indicator corresponding to the cartel period. In addition, the model will include the set of features for the products included
in the overcharge analysis. A reasonable candidate specification entails defining the log price of a particular product for a particular time interval as a function of: a) a cartel indicator for the time interval, b) a set of supply factors (logged) for the time interval, c) a set of demand factors (logged) for the time interval, d) a set of features (logged) for the product, and, e) a stochastic error term. Standard regression methods can be used to estimate the model using data pooled across products for all available time periods. The coefficient on the cartel indicator is of primary interest. The overcharge coefficient can be interpreted as the percentage increase in price for the price-fixed products attributable to the cartel after controlling for changes in supply and demand factors across time and differences in features across products.

Understanding how the model identifies the impact of the cartel can provide insight into the key features of this approach. First, note that the set of demand and supply shifters vary across time periods, but not across products. In other words, this approach assumes that all the relevant products have a common set of demand and cost shifters. Second, note that the product features vary across products, but not across time for a specific product. In other words this approach embeds the assumption that a product is defined by a specific set of features and when those features change the product ceases to exist and a new product has been introduced. Finally, note that there is a common cartel effect across all products and across all time intervals within the cartel period. It is feasible to relax this assumption with respect to the time interval, allowing for variation in the estimated cartel impact within the cartel period. Given the nature of the posited data, involving a substantial number of products that do not span the relevant period, relaxing the assumption with respect to a common overcharge across products while still identifying the cartel effect can be problematic.

These identifying assumptions point to a few guidelines as to markets where this approach will work best. First, ideally all the products are related to the extent that they share a common set of features, supply factors, and demand factors. Second, ideally the production function of the manufacturers does not change substantially over time such that the importance of the supply factors varies over time. Third, ideally consumer preferences and/or tastes for the relevant product features do not vary substantially over the relevant period, such that various features are valued more or less at different points within the relevant period. To the extent these assumptions are violated, applying this type of damage model is more complicated.

Conclusion

The econometric approach is a common and well accepted route to develop overcharge estimates for price fixed products. One disadvantage of this approach is that the data requirements are substantial, including price series for the relevant products that span both cartel and non-cartel time periods. For markets where products are “updated” frequently this requirement can be problematic, especially if the conspiracy is of long duration. This note has outlined how hedonic methods can be used to incorporate price data for a range of related products into one overall price model in order to estimate the cartel overcharge. This is achieved by expressing the price of each product as a function of the features of the product. While there are a number of caveats associated with this approach, for the right market and set of products the approach allows for rigorous measurement of the cartel overcharge where it might not otherwise have been feasible.
I would like to thank Rick Holt, Henry McFarland, and Mike Baumann for their very helpful comments.

1 Prices are typically expressed in real (i.e., inflation adjusted) terms in models such as these.

2 For certain commodity products, there may exist straightforward price adjustments that allow for the aggregation of the prices series for several independent products into one overall price series. For example, in the *Vitamins* price fixing litigation complete price series were developed by rescaling prices for various vitamin products of differing concentrations by the relevant concentration ratio. See Expert Report of B. Douglas Bernheim, *In re Vitamins Antitrust Litig.*, MDL No. 1285 (D.D.C. May 24, 2002). With more complex products there is typically no direct method to adjust prices across products to create one unified price index.

3 A typical specification of this relationship is as follows.

\[
\ln R_k^t = \beta_0 + \sum_{n=1}^{N} \alpha_n \ln z_{nk} \forall t, \forall k = 1, K^t
\]

In this model the log of the price of product \(k\) in period \(t\) \((R_k^t)\) is defined as a function of the linear combination over the set of the \(n\) features \((z_{nk})\) for the \(k\) products.

4 If a stochastic error term is added the time specific constant \((\beta_0)\) and the feature coefficients \((\alpha_n)\) can be estimated using standard regression methods. The log-log specification of the hedonic equation is typically viewed as optimal because it is most consistent with the micro-economic theory upon which the hedonic approach is derived. In the log-log model the coefficient estimates are interpreted as elasticities.

5 Frederick V. Waugh, *Quality Factors Influencing Vegetable Prices*, 10 J. FARM ECON. 185 (No. 2 1928).

6 Andrew T. Court, *Hedonic Price Indexes with Automotive Examples*, in DYNAMICS OF AUTOMOBILE DEMAND 99 (Gen. Motors Corp. 1939).


9 More formally - the model specification is

\[
\ln R_k^t = \beta_0 + \gamma^t + \sum_{i=1}^{L} \delta_i \ln x_i^t + \sum_{m=1}^{M} \theta_m \ln d_m + \sum_{n=1}^{N} \mu_n \ln z_{nk} + \epsilon^t
\]

\[
\forall t, \forall k = 1, K^t
\]

where the log price of product \(k\) at time \(t\) is a linear combination of a cartel indicator \((\epsilon^t)\), the logs of \(L\) supply shifters \((x_i^t)\), the logs of \(M\) demand shifters \((d_m)\), the logs of \(N\) product features shifters \((z_{nk})\) and a stochastic error term. Standard regression methods can be used to estimate the model coefficients – including the critical overcharge coefficient \((\gamma^t)\).
The Importance of Supply-Side Effects in Antitrust Analyses

D. Lee Heavner and Peter P. Simon*
Analysis Group, Inc.

Introduction

In our work, we have seen practitioners and academics (collectively, “researchers”) draw erroneous conclusions about antitrust-related issues because their analyses ignored the role that supply-side forces play in constraining prices.

Although it is well-accepted that both demand-side and supply-side forces can constrain the prices that producers charge for a product, there is some ambiguity about how to incorporate supply-side substitutes into antitrust analyses. On the one hand, the Merger Guidelines state that a relevant market should be defined based solely on demand-side substitution and that firms that produce supply-side substitutes should be added as participants in the relevant market in a later step of the analysis. On the other hand, several courts have ruled that supply-side substitution should be incorporated into the definition of the relevant market.

Performed correctly, both approaches generally lead to the same conclusion about whether a firm possesses monopoly power as long as they are performed correctly. However, we have been involved in cases where the incorrect application of the Merger Guidelines approach has led researchers to draw erroneous conclusions about the competitiveness of a market. One error that we have seen on multiple occasions is that a researcher follows the Merger Guidelines and defines the market based on demand substitutes, and then implicitly assumes that the market definition step has identified all market participants. That is, the researcher did not follow the Merger Guidelines and evaluate whether entry and/or supply-side substitution would prevent existing producers from charging supra-competitive prices. In this article, we endeavor to remind the reader of the critical role that these supply-side effects can have in antitrust analyses.

How Supply-Side Effects Influence Market Outcomes

Both demand-side and supply-side forces may constrain the price that a firm can profitably sustain. On the demand side, the constraint comes from the degree to which consumers would reduce their purchases of the product or products at issue in response to a price increase. On the supply side, the constraint comes from the degree to which other firms would initiate or increase production or distribution of the product(s) in response to a price increase.

Under the Merger Guidelines approach, supply-side effects are accounted for by defining market participants to include current producers or sellers as well as firms that, in response to a small but significant and non-transitory increase in price (“SSNIP”), would likely begin participating in the relevant market within one year and without incurring significant sunk costs of entry or exit. The Merger Guidelines defines such firms as uncommitted entrants. Uncommitted entrants include firms that would enter the market through production substitution or production extension. The Merger Guidelines further incorporates supply-side responses through entry analysis, which evaluates whether committed entry would be likely, timely, and sufficient to constrain prices to the pre-merger level.

Unfortunately, even though the Merger Guidelines approach clearly requires that a researcher account for supply-side effects,
some researchers omit this analysis and erroneously ignore supply-side effects and assume that market power can be inferred from current market shares or concentration.

**Example of the Failure to Recognize the Importance of Supply Substitution**

Guo Ying Luo’s article on the mutual fund industry provides an example of how the failure to analyze supply-side effects can lead to severely flawed conclusions. In this article, Luo attempts to examine the relationship between market structure and price (fee) mark-ups in the mutual fund industry. In her analysis, Luo assumes that an investor first decides how to allocate his or her investments across the different investment objective categories. Then, within each investment objective category, the investor chooses the funds that possess the preferred combination of product attributes and fees. Luo assumes that demand-side substitution is limited to funds within the same investment objective category. On this basis, she defines each investment objective category as a separate relevant market. Luo’s assumptions regarding demand-side substitution may be incorrect; however, solely for the illustrative purposes of this article, we adopt Luo’s assumption that demand-side substitution is limited to the funds within an investment objective category, and we focus our analysis on evaluating the role that supply-side substitutes can have in constraining fees.

As is generally done in antitrust analyses, Luo uses the Herfindahl-Hirschman Index (“HHI”) to measure concentration. However, Luo appears to ignore the Guidelines’ instructions to treat producers of supply-side substitutes as market participants when evaluating market concentration. For each investment objective category, Luo bases her HHI calculations on the mutual funds’ 1997 shares of mutual fund assets within an investment objective category. According to her calculations, 6 of the 38 investment categories that she examines exceed the Merger Guidelines threshold for classifying a market as highly concentrated.

We were not able to locate data on the Weisenberger categories used by Luo, so we use other data for the purposes of this example. Specifically, we use Morningstar investment objective categories to compute within category HHIs. For 2007, these computations result in 25 of 67 investment categories having an HHI above the Merger Guidelines highly concentrated threshold. One of these “highly concentrated” categories is the Long Term Bond (“LTB”) category, which had a category HHI of 4,065.

However, there is reason to believe that these HHIs do not accurately reflect probable supply responses to a SSNIP. Many mutual fund families offer mutual funds in a variety of investment style categories, and these fund families could in a relatively short period of time establish a new fund or change the investment objective of an existing fund without incurring significant sunk costs. In fact, fund families frequently create new funds and change funds’ investment strategies in an attempt to increase their profits. For example, in 2007, 126 bond mutual funds appeared in an investment objective for the first time. Thus, a proper analysis of concentration in the mutual fund business should account for the likely supply responses that would occur in response to a SSNIP in a given objective category.

The data show that only 16 mutual fund families offered LTB funds in 2007. However, given the low costs of entering the LTB marketplace, we would like to know whether other fund families would likely enter the LTB category in response to a
SSNIP. In 2007, LTB mutual funds had approximately $14.2 billion in assets under management, which was less than 1 percent of the assets under management for all bond mutual funds. Furthermore, there were 69 fund families managing at least $1 billion in bond mutual fund assets and offering bond mutual funds in at least 5 separate Morningstar categories. Thus, it seems reasonable to assume capacity constraints would not prevent supply responses from these fund families from constraining prices.

These facts, combined with the low costs of entering the mutual fund industry, lead us to conclude that if LTB fund fees were to exceed the competitive level, then the other suppliers, including fund families that offer bond mutual funds in other investment categories, would begin offering LTB funds. Thus, fund families that produce funds in the other investment objective categories should be treated as participants in the assumed market for LTB funds.

For present purposes, we assume that the capacity that a fund family would likely devote to LTB funds is proportional to the total bond mutual fund assets it manages. This assumption means that each fund family’s ability to offer LTB funds is correlated with its total bond mutual fund assets under management, and computing HHIs on fund families’ shares of bond mutual fund assets gives the HHI for market participants in the LTB market. Under this calculation, the HHI for LTB funds would be 558.

This HHI is well within the range that the Merger Guidelines defines as unconcentrated. Recall that when supply-side substitutes were excluded from the analysis, the HHI was 4,065. Thus, the example shows the substantial impact that supply-side substitutes can have on antitrust analyses.

Other examples

For confidentiality reasons, we have limited discussion here to a published article; however, we see similarly flawed approaches being used to assess monopoly power in the context of litigation. For example, we have been involved in multiple cases in which plaintiffs’ experts have tried to evaluate concentration in the mutual fund industry without accounting for likely supply-side substitution. We have also been involved in a case in which antitrust claims were dropped after the defendant showed that the supply-side forces would prevent the existing providers of a given investment management service from charging excessive fees.

Conclusion

A proper antitrust analysis evaluates the role of both demand-side and supply-side forces in possibly constraining firms from exercising monopoly power. Unfortunately, some researchers fail to evaluate the effects that probable supply-side responses have on the ability of current producers to exercise monopoly power. This fundamental error can dramatically alter the results of antitrust analyses.

* We are grateful to Michael Beauregard, Neil Imus, Stanley Ornstein, and Seth Sacher for helpful comments on earlier drafts. We also thank Sheryl Aguilera, Jennifer Cooke, and David Lin for valuable research assistance.

2 See ABA Section of Antitrust Law, 2007 ANNUAL REVIEW OF ANTITRUST LAW DEVELOPMENTS 576-78 (6th ed. 2007) for several examples, including Rebel Oil Co. v. Atlantic Richfield Co., 51 F.3d 1421 (9th Cir. 1995), in which the Ninth Circuit ruled that full-service gasoline should be included in the market with self-serve gasoline because service stations could
convert their full-serve pumps to self-serve pumps with relative ease and at little cost. Jonathan Baker writes that the Merger Guidelines approach is preferable because incorporating both supply-side and demand-side substitutes into the market definition step can be difficult and confusing. Baker recognizes that some courts have ruled that supply-side substitution should be incorporated into the market definition step, and he suggests that in the context of Sherman Act litigation, courts may favor incorporating supply-side and demand-side substitutes into the market definition step because doing so may allow courts to apply a “quick look analysis” to dismiss cases in which supply-side substitution would obviously prevent the alleged harm to competition. See Jonathan B. Baker, Market Definition: An Analytical Overview, 74 ANTITRUST L. J. 129 (2007).

In what follows, our comments apply to market definition, whether in the context of Section 1 or Section 2 cases.

4 Merger Guidelines, supra note 1, § 1.3.
5 Production substitution occurs when a firm shifts from using assets used to produce (or to distribute) one good (or service) to using the assets to produce another good. Production extension occurs when a firm extends the use of its assets to produce a second good along with the good currently being produced. See Merger Guidelines, supra note 1, § 1.321.

Although this article discusses supply-side effects only in the context of product markets, supply-side effects also arise in the context of geographic markets. In the geographic market context, supply-side substitution involves producers in one geographic area initiating or expanding production in another geographic area.

6 See Merger Guidelines, supra note 1, § 3. The Merger Guidelines defines committed entry as “entry that requires expenditures of significant sunk costs of entry or exit.”
7 Guo Ying Luo, Mutual Fund Fee-setting, Market Structure and Mark-ups, 69 ECONOMICA 245 (2002).
8 In the mutual fund industry, the “prices” at issue are the fees investors pay mutual fund providers for operating mutual funds.
9 The fund attributes which Luo assumes investors choose over are historical performance and fund age.
10 Weisenberger appears to have been a research firm focused on mutual funds. We have seen reference to their data through the early 2000s, but we have not found any evidence of their continued existence. The names of the investment objective categories that Luo used are similar to the category names currently used by mutual fund research firms, such as Morningstar.
11 Our calculations are based on data from the Strategic Insight SimFund database, a database of detailed information on mutual funds.
12 These calculations exclude money market funds because the Morningstar investment objective was missing for most money market funds.
13 Luo calculated her HHI’s based on the share of investment objective category assets held in each mutual fund; whereas, we calculate HHI’s based on a fund family’s share of assets. The HHIs are different when a fund family (for example, Vanguard) offers more than one mutual fund within a single investment objective category. This correction increases HHIs, and is not the focus of this article.
15 The relatively high HHI is driven primarily by Vanguard, which had an approximately 61 percent share of all LTB mutual fund assets. However, this share is not indicative of Vanguard’s presence among all bond mutual funds. Vanguard’s 2007 share of all mutual fund bond assets was approximately 15 percent.
16 In 2007, bond mutual funds assets under management were approximately $1.5 trillion. This total excludes funds of funds, money market mutual funds and bond exchange traded funds.
17 This result does not change if one limits the analysis only to non-LTB bond assets and categories.
18 It is possible that limiting our analysis to asset shares of bond mutual fund excludes many market participants. Other potential market participants include firms that offer equity or money market mutual funds but do not currently offer bond mutual funds. Expanding the analysis to include all mutual fund advisors as market participants does not change the nature of our results.
Some Issues with Recent Cost-based Tests in Bundling Cases

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Introduction

Bundling is selling two or more types of products together often at a discount. Many firms bundle for procompetitive reasons, such as realizing cost savings or lowering prices to undercut rivals and increase sales. Consumers may also benefit from bundling beyond the discount they receive on a bundle. For example, consumers’ cost of search for complementary products or cost of transactions may be reduced. However, despite its abundant procompetitive uses, bundling can also be employed with a predatory intent to suppress competition, erect entry barriers, increase market power, or even to monopolize a market.

Because bundling is so prevalent and may benefit both firms and consumers, courts have been cautious in their approach and rulings regarding bundling. Unlike the case of tying, in which consumers are forced to buy a tied product whenever they purchase a tying product, bundling has not been treated as per se illegal by U.S. courts. The antitrust treatment of bundling is evolving and there is an increasing interest in designing tests which have a high degree of success in detecting anticompetitive bundling, and at the same time, a low likelihood of falsely condemning a firm engaged in procompetitive bundling that lowers prices and enhances consumer welfare.

Recent antitrust treatment of bundling

Recent antitrust cases offer different views about when bundling constitutes an anticompetitive act. In LePage's Inc. v. 3M, the Third Circuit concluded that “[t]he principal anticompetitive effect of bundled rebates . . . is that when offered by a monopolist they may foreclose portions of the market to a potential competitor who does not manufacture an equally diverse group of products and who therefore cannot make a comparable offer.” Under the Third Circuit standard, the question of whether bundling was anticompetitive is primarily focused on the issue of product-line breadth, rather than whether the bundled discounts constituted competition on the merits. Consequently, by separating the legality of bundling discounts from the usual price-cost based tests of predatory pricing, the Third Circuit's decision opened the door for alternative definitions of exclusionary practice in bundling cases. It also clearly put at risk multi-product firms that engage in procompetitive bundling that leads to lower prices and higher consumer benefit with no apparent predatory intent. Under some circumstances, it may not be appropriate to place firms with market power under antitrust scrutiny solely because they provide a broader line of products than their rivals and choose to sell some or all of them as a bundle at a discount.

In the more recent case of Cascade Health Solutions v. PeaceHealth, the court of appeals for the Ninth Circuit adopted a different approach.

The court stated that “[G]iven the endemic nature of bundled discounts in many spheres of normal economic activity, we decline to endorse the Third Circuit’s definition of when bundled discounts constitute the exclusionary conduct proscribed by § 2 of the Sherman Act...we hold that the exclusionary conduct element of a claim arising under § 2 of the Sherman Act cannot be satisfied by reference to bundled discounts unless the discounts result in prices that are below an appropriate measure of the defendant’s
Economics Committee Newsletter

To define the test adopted by the court, consider a multi-product firm which sells several products. The firm is a monopoly or has a sufficiently high market share in one or more of the product markets, called, for simplicity, monopoly markets, and faces competition in the remaining product markets, labeled competitive markets. The firm can bundle the products in its monopoly markets with its products in the competitive markets, and offer a discount on the bundle. The main question the court addressed is what constitutes predatory behavior with respect to the rivals only in the competitive markets.

The Discount Reallocation Test

The Ninth Circuit proposed the “attribution” or “discount reallocation” test as part of a set of requirements for the bundling to be deemed anticompetitive. Specifically, the plaintiff must show that if the defendant's total discounts on all bundled products were allocated to the competitive product or products, the resulting price of the competitive product or products would be below the defendant's average variable cost for the competitive products.

The proposed test essentially labels a bundled discount anticompetitive only if the familiar notion of predatory pricing in a single product market is applicable to the case of multiple markets. While the test is appealing in its simplicity in drawing a parallel to the single-market case, more attention should be paid to some of its potential shortcomings. By confining what is essentially a multi-market interaction to the standards set for a single market, the test does not account for some complexities of multi-market interaction and their consequences. For example, if there are two plaintiffs challenging a bundling firm and each plaintiff participates in a different set of competitive markets, the same aggregate discount would have to be applied separately to the competitive markets each plaintiff sells in. The aggregate discount may indicate below-cost-pricing in one plaintiff’s markets, but not in the other’s. As this example suggests, there are several aspects of the test still open to discussion. In this article, we focus only on some issues surrounding the measurement of a bundling firm’s costs for the purposes of applying the test.

Some issues with measuring the costs of a bundling firm

The discount reallocation test proposes the use of the average variable cost of the bundling firm for the competitive products for the purposes of comparison with the price of the bundle. There are several potential issues related to the measurement of this cost.

Measuring costs when many products are involved

Aside from the general criticisms pertaining to the use of average variable cost as a yardstick for predatory pricing, bundling cases with multiple competitive markets at issue adds the complexity of measuring the average variable cost of a firm across two or more markets. When there are many competitive markets and products in the bundle, the measurement of average variable cost may require careful analysis. It is not always straightforward to offer a general definition and measurement of average variable cost for jointly produced or distributed products. In certain cases, some of the variable costs in the competitive markets may be shared with monopoly markets. It may not be obvious to trace such costs to the competitive products, raising the question of whether cost estimates accurately reflect the actual cost of the bundling firm only in the competitive markets. One alternative offered by some amici of the court in Cascade Health Solutions v. Peacehealth was the “discount
aggregation rule.” This rule proposed the comparison of the discounted price of the entire bundle with the average variable cost of the entire bundle, not just the average variable cost pertaining to the competitive markets. But the court did not agree with this alternative definition, arguing that “[U]nder a discount aggregation rule, anti-competitive bundled discounting schemes that harm competition may too easily escape liability.”

Cost-reducing bundling and the timing of cost measurement

An important and frequent motivation for bundling is to generate or enhance scale, scope, distribution, or network economies that may have favorable effects on firm’s costs across products. Such cost reductions have pro-competitive effects. Lower costs for all or some products involved in the bundle can put downward pressure on all prices in the relevant markets. Cost-reducing effects of bundling have generally been recognized in the academic literature as well as by courts. More importantly, in some cases the anticipated cost savings from bundling can even be the reason why a firm is able to offer bundled discounts in the first place. Cost savings can sometimes be almost immediate or may take much longer to be realized.

If, and when, bundling allows for cost reductions across the products in the bundle, a bundling firm’s ex-post cost, that is, its cost after the cost-reducing effects of bundling are fully realized, is lower than its ex-ante cost, that is, its cost before such effects materialize. In such situations, the ex-post measure correctly reflects the efficiency gains from bundling. Thus, in those situations, an equally efficient rival that is not bundling needs to have sufficiently low costs in the competitive markets, considering the absence of any cost benefits of bundling. If the cost reductions are significant, the bundling discounts, when subtracted from the price of a competitive product or products, may well result in a price below average variable cost when ex-ante cost is used, but a price above average variable cost when ex-post cost is used. The timing of cost measurement thus can become an important issue.

If the costs are measured ex-ante before the cost savings due to bundling fully take place, such as before or shortly after the challenged bundling discounts go into effect, or in the interim before cost reductions have not yet been fully realized, then the measured costs may not adequately capture the ex-post cost of the bundling firm. The burden of proof in the test is placed on plaintiffs and plaintiffs likely would favor using cost measures closer to ex-ante cost. Thus, depending on the specifics of a case, what cost components to be included and how costs should be measured need careful consideration.

Accuracy of cost measures and evidence of cost savings

If ex-post efficiency gains are deemed to be important, ex-post costs should be used for analysis. Such efficiency gains from bundling must be demonstrated. Similarly, a defendant may contemplate whether to engage in bundling and may want to assess whether its bundling scheme can pass the test. These tasks may require good estimates of ex-post costs. While the argument about cost savings can be persuasive for a given case, evidence of such savings and their quantification is still necessary. Producing estimates of ex-post cost may involve several issues. First, accurate estimates of ex-post cost savings from bundling may not be available ex-ante. A profit-maximizing firm is nonetheless expected to have reliable estimates of these savings, as such estimates would need
to be used by the firm in the first place to decide whether to bundle or not. Second, even though estimates of efficiency gains may be available, defendants may be asked to provide evidence that such cost savings are likely to be realized *ex-post*.

Concrete arguments for, and demonstration of, efficiency and cost savings from bundling have been successfully used in recent services procurement cases as a defense against allegations of violations of competitive contracting. For instance, in 2004 the U.S. General Accountability Office decided against Teximara, Inc., a small contractor, which argued that the proposal by the Department of Air Force for the bundling of thirteen other base operations support functions with grounds maintenance at Kessler Air Force Base in Mississippi excluded Teximara, Inc. and violated both the Competition in Contracting Act and the Small Business Act.\(^1\) Detailed research and evidence provided by the Air Force demonstrated that bundling certain integrally linked functions maximized cross-utilization, increased efficiency, and reduced costs.\(^2\) In 2005, a similar decision was reached for a similar protest filed by B.H. Aircraft Company against Defense Logistics Agency regarding the Agency’s bundling of consumable parts for the F-404 engine into a single supply chain management contract.\(^3\) In both cases, the evidence presented *ex-ante* by the defending parties in support of *ex-post* efficiency gains was found to be persuasive.

**Conclusion**

Overall, the discount reallocation test is simple, clear, and analogous to the familiar single-market cost-based tests of anticompetitive pricing. However, the test faces challenges when some aspects of multi-market competition among firms are considered. This article focused only on some of the issues pertaining to the measurement of costs, especially in cases when average variable cost has to be measured across several different products, when there are cost synergies across products, and when there are important cost savings due to bundling that can only be realized over time. Consequently, application of the test, if appropriate, may require a good understanding of the cost synergies across markets in the bundle and the nature and timing of cost reductions due to bundling, which depend on the specifics of a case.

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1. Firms may also bundle, among many other reasons, to generate customer loyalty, introduce a new product, or create or enhance network effects.
2. 324 F.3d 131 (3d Cir., 2003) (en banc).
3. 515 F.3d 883 (9th Cir., 2008).
4. 515 F.3d at 903.
5. *Id.* at 906.
6. As the court emphasized, a specific intent to monopolize and a high probability of success in achieving that goal must also be present for the defendant to be liable under a Sherman Act § 2 attempt to monopolize claim. *Id.* at 903 n.13.
8. It is well known that pricing below average cost can be justified in a dynamic context without any element of predatory intent. Examples include learning by doing and penetration pricing in order to be able to attract consumers from established rivals when the degree of customer loyalty is high.
9. 515 F.3d at 904.


Introduction

FTC Commissioner and veteran antitrust litigator Tom Rosch recently remarked that antitrust trial advocacy is no different than trial advocacy in any other field. It is all about telling a story. Complex statistical tools, standing alone, are poor storytellers. As Rosch noted, “the use of mathematical formulae are of little persuasive value in the courtroom setting.”

Explaining during an opening statement that the evidence will show that \[ P_i = \alpha + \beta w + \gamma \delta + \lambda D_i + \varepsilon_i \] is not likely to grab the jury’s attention as would a description of clandestine price exchange meetings. Yet statistical tools, such as multiple regression analyses, are now commonplace in antitrust litigation and their results can be powerful when explained by a skilled economic testifying expert. Even then, as Rosch went on to note, “most economists, no matter how well prepared, will not have the industry experience to serve as primary storytellers.”

For a regression analysis to be truly effective, it must mesh with the stories of the lay witnesses to form a coherent picture. It is critical for the economic expert to spend time looking beyond the data and consider the broader factual landscape from the perspective of the businesspeople who were involved. The expert must make this investment up front or risk omitting key variables necessary for a complete analysis.

Overview of Regression Analyses

Most readers of this newsletter understand that multiple regression analysis is a statistical device for describing the relationship between certain explanatory variables (independent variables) and a variable to be explained (or dependent variable). A regression can isolate the effect of a specific variable of interest on the dependent variable by mathematically extracting the effects of the other variables. In other words, the technique helps separate the signal from the noise. A multiple regression analysis generates an expression of probabilities that certain variables are correlated, but cannot show that one event caused the second. However, the results can be used to infer a causal relationship on the basis of an underlying causal theory that explains the relationship between the two variables. The technique has found use in various antitrust contexts including estimating the competitive impact of a conspiracy, predicting the effects of a merger, and in class certification battles.

Regression analysis is not new; it has been around since the nineteenth century. It has only become popular in litigation, however, in recent decades as courts have become more willing to review economic effects rather than relying on presumptions of anti-competitive consequences flowing from particular industrial structures. The increased popularity of regression analyses is also due to improvements in computing power that have allowed for efficient crunching of data, and improvements in electronic data gathering and storage technology that has allowed companies to capture, maintain and exploit massive quantities of transactional data (for example from check-out scanners or loyalty card usage).

Omitted Variables—A Model Specification Error

The availability of rich, relatively clean electronic datasets is seductive to many
economists. Yet caution is warranted. One of the most serious potential problems with a regression analysis is misspecification of the model. Model specification refers to the determination of which explanatory variables should be included or excluded in the regression equation. A danger arises in model specification that one will “work backwards,” beginning by “designing a regression model that includes only variables that can be measured in the available sample, and finish by ‘molding’ a theory that includes precisely those variables.” For example, with access to defendants’ retail sales data and evidence of an agreement among those defendants an economist may be tempted to use a regression analysis to correlate the agreement with changes in prices and opine that the agreement caused those changes in prices. That would be too facile.

In order for a regression analysis to be of use, the explanatory variables necessary to allow for a full evaluation of plausible alternative hypotheses should be included. If the model excludes an independent variable that is theoretically relevant, it may lead to omitted variable bias. That error arises when two variables are closely related but bear no causal relationship because they are both caused by a third, unexamined variable leading to a spurious correlation between the examined variables. As a simple, and oft-cited, example, one could look solely at wages and level of education and see that they are positively correlated. But there are no doubt other variables that help explain wage levels, including intelligence, natural ability, motivation, parental upbringing, connections, gender (sadly), etc.

Of course, a regression analysis can never account for every variable—all models are simplifications. Moreover, if the omitted variables are uncorrelated with the included independent variables the regression results will not be biased. But every effort should be made to include variables that reasonably could explain the observations.

From an evidentiary standpoint, the Supreme Court has held that failure to include variables will normally affect only the probativeness of the analysis, not its admissibility. The Court has also held, however, that if the omissions are egregious the regressions may be held inadmissible. At the very least, accounting for all major variables will smooth the path for the expert’s deposition and trial testimony.

What’s The Story?

The frame of reference for determining what variables to include is the theory of what happened and why. In scientific parlance, a well defined null hypothesis (a scenario presumed to be true unless statistically refuted) is specified which is evaluated against alternative hypotheses. In specifying the model to test the alternative hypotheses, it is important that the expert look for evidence of causal relationships. He or she should spend time understanding the industry and the story from the perspective of the primary actors. This means reviewing available documents and literature, reviewing deposition testimony, speaking with other industry experts and, if possible, interviewing key players. As one commentator noted, “[a] quantitative analysis conducted without reference to this rich vein of evidence is often a missed opportunity for deep understanding.” More than that, it can be a missed opportunity to account for a bias when a variable must be omitted for lack of data, either with statistical techniques or qualitatively.

The need to review evidence applies equally to those attacking a regression analysis. In the Staples/Office Depot merger case, the FTC used regression analyses to correlate
Staples’ prices with the presence or absence of a nearby Office Depot. The FTC economists found that prices were higher in the absence of superstore competition. The merging parties argued that the FTC analysis was flawed because it did not take into account certain higher costs in those areas, for example due to local zoning provisions or congestion. The higher costs, they argued, simultaneously led Staples to raise prices and discouraged Office Depot from entering. The defense argument did not win the day, however, because the merging parties’ documents did not support it.

A Case Study

A recent dispute at the intersection of antitrust and labor law illustrates the points mentioned above. The facts, simplified slightly for the sake of brevity, were as follows: Several competing retail chains were bargaining together as a multiemployer group against several labor unions. The unions struck, and in a divide-and-conquer strategy focused their pickets on two of the retailers while allowing customers to shop at the others unfettered. In a show of solidarity the retailers had agreed before the strike that if the unions pursued such a strategy, those who were not picketed would share some of their revenues based on a predetermined formula in order to even out the pain of the strike. The agreement was challenged as a Section 1 violation. The question was whether the agreement harmed competition.

The plaintiff’s economic expert, taking advantage of vast quantities of the retailers’ sales data, conducted a regression analysis in which he sought to correlate the presence of the agreement with the defendants’ prices. The regression was based on the plaintiff’s expert’s theory that the reduced demand due to the picketers should have caused the retailers to dramatically reduce their prices. Because prices did not drop as much as the drop in demand suggested, the expert concluded that the agreement had propped up prices.

The defendants’ expert pointed to several problems with the analysis that a review of the testimony and documents highlighted. First, the discovery record showed that none of the pricing managers was aware of the terms of the challenged agreement and thus that it could not have had an effect on prices. Moreover, the analysis ignored witness testimony that during a labor strike the presence of pickets alters demand elasticities and disrupts the supply chain. Executives testified that efforts to lure customers across the picket lines with drastic cuts in prices simply were not successful. Eventually, they eased up on the deep discounts. The discovery record also showed that the retailers were having a difficult time keeping a full complement of product on the shelves which affected the mix of products sold, and thus affected the observed prices. The testimony also demonstrated that the defendants faced other operational challenges, such as trying to run stores with inexperienced temporary replacement workers. This affected prices because the temporary employees were not skilled at changing the shelf price tags and therefore some normal price discounting was curtailed to simplify the running of the store under trying circumstances. All of these facts helped explain why prices would not respond solely to a drop in demand.

Because the regression analysis did not include variables reflecting these facts (for example variables measuring the number of picketers, the willingness of customers to cross picket lines, workforce shortages, number of replacement workers, skill level of replacement workers, product limitations, incentive to retain customer loyalty, etc.), it could not say anything useful about the effect of the agreement on prices. It was a classic omitted variables/spurious correla-
tion problem. The analysis was not able to disentangle the effects of the agreement from the effects of the strike.

Time records revealed that the plaintiff’s expert spent very little time reviewing deposition testimony and documents. The defense expert, on the other hand, thoroughly reviewed the discovery record and interviewed various businesspeople. This allowed him to come up with a more complete and reasonable explanation of the defendants’ conduct, and importantly, one that fit a storyline.

Conclusion

A regression analysis must not focus myopically on the data. To be convincing, the analysis, and the testimony explaining it must fit comfortably into an overall narrative supported by the other witnesses and documents. Plugging in to these witnesses and documents early will allow the expert to determine if a regression analysis is even the right way to go. In some cases the data necessary for a complete regression analysis simply will not exist. If that is the case a regression analysis should be left on the shelf.


3 Rosch, supra note 1, at 10.
5 Id. at 386-87.
7 Michael Patrick Allen, UNDERSTANDING REGRESSION ANALYSIS, 166-67 (Springer 1997).
8 William T. Berry, UNDERSTANDING REGRESSION Assumptions, 30 (1993).
9 Bazemore v. Friday, 478 U.S. 385, 400 (1986).
10 Id. at 400 n. 10.
11 Baker & Rubinfeld, supra note 4, at 430 (“Data analysis does not exist in a vacuum; it interacts with the analysis of nonstatistical information.”).
12 Id. at 430-31.
13 REFERENCE MANUAL ON SCIENTIFIC EVIDENCE, supra note 6, at 189.
Brazilian Antitrust Authorities and Economic Efficiencies in Merger Analysis

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“[T]he basic objective of competition policy is to protect competition as the most appropriate means of ensuring the efficient allocation of resources—and thus efficient market outcomes—in free market economies.”

The importance of encouraging competition resides primarily in the promotion of efficiency and in the enhancement of consumer surplus. Economically, real competitive pressure on companies obliges them to put products on the market with the best combination of prices and quality, encouraging the creation of more efficient companies.

Mergers are a structural phenomenon that result in a potential concentration of power and may produce both procompetitive (economies of scale and scope or marketing efficiencies) and anticompetitive effects (price increases, quality reductions, diminished variety or reduced innovations).

The treatment of efficiencies in mergers in the EU, United States, and Brazil

Various antitrust enforcement laws recognize the benefits associated with mergers. One prominent example can be found in the introduction to European Counsel Merger Regulation, which states: “Such reorganizations are to be welcomed to the extent that they are in line with the requirements of dynamic competition and are capable of increasing the competitiveness of European industry, improving the conditions of growth and raising the standard of living in the Community.”

Mergers can indeed improve economic efficiency, leading to the optimization of investments and thus promoting a better allocation of resources. These efficiency-enhancing effects must, in some cases, outweigh the possible anticompetitive effects on the market. They will be “of such particular importance in a market in which the cost of production of a product is high in comparison to the size, or the anticipated size, of the market or where there is a minimum efficient scale of production.”

Currently, in the United States, the antitrust authorities are open to defense arguments based on the efficiencies and cost savings of a merger. The greater the potential likely post-merger anticompetitive effects, the stronger the evidence of the alleged efficiencies must be. The U.S. Merger Guidelines indicate that the efficiencies are more likely to be accepted when: (1) they are merger-specific (i.e., they could not be achieved in the absence of the merger); (2) the efficiencies are verifiable and do not arise from anticompetitive reductions in output; and finally, (3) the efficiencies likely would be sufficient to reverse the merger’s potential harm to consumers in the relevant market, such as preventing price increases in that market.

In Brazil, the principle of free competition is contained in Article 170, subparagraph IV, of the Federal Constitution and is based upon the premises that the State shall balance both principles of free enterprise and the protection of free competition, with the purpose of preventing possible abusive conduct of private agents of a great economic power. The general provisions are supplemented by Law No. 8884, enacted in 1994, known as Brazil’s Antitrust Act, which provides that a merger may be approved if it
meets the following conditions: (1) it is intended to “increase productivity; improve product or service quality; or cause an increased efficiency,” or “foster technological or economical development,” (2) it generates benefits that are equitably allocated between the merging or economical development,” (3) it does not eliminate “a substantial portion of the relevant market for a product or service,” and, (4) its “provisions are no more restrictive than necessary to obtain the beneficial effects.”

Following the logic applied in the European Union Mergers Regulation and in the U.S. Merger Guidelines, the Administrative Council for Economic Defense (CADE), the Brazilian antitrust authority, has recently confirmed the importance of analyzing post-merger economic efficiencies in possibly approving transactions that could lead to a better allocation of resources. Even though mergers result in increased concentration, Brazil now recognizes that in some cases these transactions may lead to efficiencies resulting in an increase in economic welfare that may not otherwise be realized within a reasonable amount of time any other way. It does not mean, however, a merger decreasing consumers’ welfare could be approved under the Law No. 8884/1994, since it explicitly refers to absence of consumer losses as a condition to a merger approval.

A case study of the treatment of economic efficiencies in mergers matters in Brazil

In 2004, CADE conducted an in-depth analysis of the economic efficiencies alleged by the parties in the proposed merger of Nestlé and Garoto, two chocolate manufacturers. Even though CADE ultimately blocked the transaction, for the first time it relied on sophisticated economic analyses to assess the competitive implications of the proposed transaction. CADE used econometric studies (which indicated a high cross elasticity of demand among the various chocolate products sold by the parties) and used economic simulation methods to more precisely define the merger’s effects on prices and quantities.

The parties based their defense on post-merger economic efficiencies, such as: 1) the elimination of redundant manufacturing overhead through the closing of warehouses; 2) shifting packing to lower cost facilities, 3) reductions in costs resulting from alterations in formulas and ingredients of the products through the exchange of know how between the parties; 4) rationalization of productive capacity across the companies’ plants through the absorption of Nestlé’s chocolate Easter egg production by Garoto and the transferring of the production of chocolate powder and confits from Garoto to Nestlé; and, 5) purchasing economies gained through the renegotiation of prices of packaging items and derivatives of cocoa.

Generally speaking, CADE adopted the rationale set forth by the Organization for Economic Co-operation and Development (“OECD”) in its “Competition Policy and Efficiency Claims in Horizontal Agreements,” and stated that efficiencies derived from economies of scale and scope and rationalization of industrial plants should be accepted, but that economies derived from reductions in management costs should not be considered in the merger analysis since they are not merger-specific (i.e., they could be achieved by different means and even in the absence of the merger).

The Agency accepted economic efficiencies related to reductions in cost associated with closing of warehouses; reduction in costs associated with packing and gain from increased purchasing power with respect to freight. CADE argued these were reasonably demonstrated merger-specific efficiencies that would also lead to reductions in the
price of the products and thus increase in consumers’ welfare. CADE estimated these efficiencies would reduce variable costs by around 2.16%.

CADE justified the rejection of the other alleged efficiencies with five different arguments that illustrated the situations in which the Brazilian Antitrust Agency does not recognize an alleged economic efficiency:

**Two of the alleged efficiencies could be obtained otherwise than through the merger.** The economic benefits of using Garoto’s formula in Nestlé’s chocolate toppings and the gain from optimizing Garoto’s distribution chain were not accepted by CADE since these were not considered merger specific efficiencies that could not be reached otherwise than through the merger.

**Two of the alleged efficiencies were merely pecuniary.** They consisted of only an interchange of resources between the parties. The economic benefits from Garoto absorbing Nestlé’s chocolate Easter egg production and the supposed gain from optimizing Garoto’s distribution chain were denied by CADE, which emphasized that these economies would come from the transfer of profits from a third company supplier to the post-merger company, without generation of surplus.

**Two of the alleged efficiencies were rejected because the benefits generated by the merger would not be equally distributed between the consumers and companies involved in the operation.** The efficiencies resulting from the alignment of input prices and the alleged gain from renegotiation of packing item prices were not accepted because they were seen as a mere transfer of resources in the same production chain, which would not share benefits with the final consumers. Although these alleged efficiencies could, in theory, reduce and expand output, the CADE stated this increase in consumers’ welfare was not a necessary consequence of the alleged economic efficiencies.

One of the alleged efficiencies was not reasonably demonstrated by the parties. The reduction in costs resulting from alterations in formulas and ingredients was not accepted by the Agency, which understood that the impact on the market could not be consistently measured and thus could not be characterized as an economic efficiency. This argument is commonly known as “verifiability standard compliance.” Although it is not expressly stated in the Brazilian Antitrust Act, it is provided for in the U.S. Merger guidelines and adopted by the Brazilian experts in Competition Law.

**Two of the alleged efficiencies were not strictly related to the given relevant market.** The gains associated with the reduction in warehouse locations were not accepted by the CADE as a merger specific economic efficiency since the companies had affirmed that products other than chocolates were being stocked in the same warehouse locations. Thus, the generated economies would not be strictly related to the given relevant market. For the same reason, claimed efficiencies associated with the transference of chocolate powder and confits production from Garoto to Nestlé was rejected based on the premise that chocolate powder did not belong to the relevant chocolate market.

Finally, CADE concluded that the reduction in variable costs created by the operation were not enough to outweigh the distortions in competition generated by the higher concentration of economic power and stated that Nestlé should sell Garoto to a competitor having less than 20% of the relevant market share. This decision was suspended by the
Brazilian Judiciary, which has not decided the case yet.

**Conclusion**

The cases discussed above demonstrate that CADE uses the same basic rationale and approach to efficiency claims as set out in the European Union Mergers Regulation and in the U.S. *Merger Guidelines*. It primarily recognizes efficiencies of a productive and allocative nature and rejects efficiencies related to reductions in managerial and administrative costs for the reason that it considers they could be achieved in the absence of the merger and thus they do not justify any harm to competition. Further, the CADE recognizes economic efficiencies, reasonably proved by the parties, that generate benefits directly and necessarily increasing consumers’ welfare.

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4. At one time, the U.S. Courts viewed efficiencies as a possible reason to condemn mergers because the merging companies might gain a competitive advantage. *See Brown Shoe Co. v. United States*, 370 U.S. 294 (1962).
6. *See* Concentration Act No. 08012.001697/02-89 Garoto/Nestlé Case.
7. *Idem.*
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