Unpacking the Economic Toolbox:
How to Make Sense of Your Economic Expert's Analysis

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ATTORNEYS OFTEN THINK THAT conversing with an antitrust economist is akin to hearing someone speak a foreign language. While the economist is eagerly describing the model specification, the attorney is thinking that it all sounds like Greek to her. But this does not have to be the case. The tools in the economist's toolbox are merely statistical and mathematical embodiments of the antitrust principles that are very familiar to the legal practitioner. More importantly, a communication gap between the antitrust attorney and economist is a serious problem that can reduce the level of service that they provide to the client.

In this article, we explain four frequently used economic tools and how economists apply them to common antitrust issues. We first discuss regression analysis as applied to common antitrust issues. We then explain how critical loss analysis (CLA), the upward pricing pressure (UPP) model, and merger simulation are applied in the review of mergers and acquisitions. For each economic tool, we provide a practical list of the strengths and limitations of these techniques and the key issues that attorneys and economists need to discuss so that they and their clients are fully prepared for how the antitrust agencies or an opposing private litigant might critique the economists' work.

Economics Tools in Antitrust Litigation: Regression Analysis

Regression Analysis in Plain English. Regression analysis provides a powerful tool for examining correlations between input and output variables. Economists use different types of regressions to provide support for antitrust damages analysis as well as other inquiries where data can shed light on rela-

tionships between two or more variables. For example, demand regressions can estimate consumers' propensity to substitute between products in response to price changes (referred to as "cross-price elasticity of demand"), and these elasticities can be used as inputs for determining market definition and market power. In cartel and collusion cases, benchmark and before/after-type regressions are often used to estimate alleged overcharges.

Given the technical nature and variety of regressions used in litigation, some attorneys may lack the background to discuss them in depth with an economist. Below, we provide a framework for guiding the conversation between the attorney and the economist toward the central issues involved in evaluating a regression analysis.

- **Establishing the causal link.** Basic regressions show correlation between variables, but correlation does not imply causation. When working with your economist to establish antitrust damages, it is important for attorneys to determine the degree to which the evidence shows a causal link between the damages being estimated and the conduct at issue.

- **Defending the model.** The government or opposing private litigant frequently argues that regression models are "incomplete" or "misspecified." There is no single best economic model for all cases. Instead, one must employ the right economic model for each situation, and the model must be adapted to take into account relevant market factors. To best prepare for these "battles of the experts," it is often instructive to discuss with your economist why the economist used the model for the market setting at hand, the key assumptions underlying the model, and the evidence and analyses that support the assumptions.

- **Working with data limitations.** In a perfect world, data would be error-free and economists would have all the data they need to estimate the ideal model for each case. In reality, data can be spotty, limited in scope, or prone to errors. Data limitations impose real restrictions on results that can be derived from econometric analysis. It is important that the economist explain to the attorneys and their clients any limitations in the data, the implications of

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such limitations, and how the economist has addressed these limitations.

Establishing the Causal Link. Isolating the economic impact of the alleged harmful act is essential to any antitrust damages analysis. Economic damages reflect how the plaintiff's economic position would have differed, if at all, in the absence of the anticompetitive conduct. As such, economic damages must be causally linked to the defendant's conduct at issue.

As noted above, while regression analysis is often used to *quantify* economic damages, the basic regression framework does not address the issue of *causality*, which is central to economic damages. Basic regressions can only measure correlation between the outcome (e.g., quantity sold) and the input variable (e.g., price). That is, while basic regressions can quantify correlation between designated "input" and "output" variables, correlation—however strong and statistically significant—does not imply causation.

One way that non-causal correlations can arise is in situations where both the "input" and "output" variables are driven by a third factor, leading to what economists call spurious correlation. For example, before/after pricing models of antitrust damages may yield skewed results due to spurious correlation if the models are not properly specified to account for market trends. In before/after models, economic damages are assessed by comparing prices in the impact period to available prices before and/or after the alleged period of antitrust impact (i.e., the "clean" period). However, market factors unrelated to the conduct at issue, such as shifts in consumer tastes, may change at the same time as the alleged anticompetitive conduct.

As an illustration, retail prices for DVD players have declined steadily since the early 2000s, driven by shifts in consumer tastes towards Blu-ray and online video streaming technologies.[1] Therefore, if an economist used a before/after model to estimate antitrust price impacts during this period, then the economist must specify the model so that it can separate the effects of the alleged conduct at issue from those of unrelated market factors or combine the results of the model with additional information from documents or testimony to establish causation. Otherwise the estimates from the model would be skewed by spurious correlation, as they would misattribute price changes caused by unrelated shifts in consumer tastes to the alleged conduct at issue.

Comcast v. Behrend provides an illustration of when statistical correlation is not sufficient to demonstrate causation.[2] In *Comcast*, plaintiffs alleged four theories of antitrust impact attributed to defendant's actions, and the plaintiffs' economic expert estimated an econometric damages model by assuming that all four theories were valid. However, the Supreme Court accepted only one of the plaintiffs' theories of antitrust impact, and the plaintiffs' expert's econometric model did not link the estimated damages to any one particular theory of impact.[3] This lack of explicit causal link between the theory of harm and the estimated model proved

to be instrumental, as the Court ruled that "[t]here is no question that the model failed to measure damages resulting from the particular antitrust injury on which [Comcast's] liability in this action is premised" citing "the model's inability to bridge the differences between supra-competitive prices in general and supra-competitive prices attributable to" the particular theory of anticompetitive impact at issue.[4]

The takeaway from the above examples is that regardless of what statistical estimation methods the economist uses, the expert must explain how the results of those estimations are causally linked to the conduct at issue, and are not driven by spurious correlations with unrelated market factors. If the economic expert's explanation of the causal link appears counterintuitive or opaque, attorneys should ask the economist to explain what evidence supports the link. The causal link must be grounded in evidence in the record and consistent with economic theory. Well-specified causal links should be intuitive to a non-technical audience.

There are a variety of methods that can establish causation, including identifying a causal mechanism based on contemporaneous documents, and using *instrumental variables*, which is a method that estimates causal effects when there is a complicated interdependence between the input and output variables of interest. The details of instrumental variables regression analysis are beyond the scope of this article, but it is important to note that for a regression model to withstand scrutiny, the attorneys and economists must ensure that the asserted causal links are grounded in evidence in the record and consistent with economic theory.[5]

Defending the Model. The objective of economic damages analysis is to determine how a plaintiff's economic situations would have differed in the hypothetical but-for world where the defendant did not engage in anticompetitive conduct. When opposing economics experts spar during litigation, the dispute is often centered on whether the econometric model used is appropriate for the problem at hand and whether the model properly accounts for market conditions. Predicted but-for outcomes should isolate the effects on the plaintiff of the alleged conduct from the effects of all other events that are not related to the actions at issue. To best prepare for these "battles of the experts," it is important to discuss with your economist the list of inputs used in the regression and to think about whether this list accounts for all relevant market factors.

The regression input variables that are beyond the key input of interest are referred to as control variables. Regression models need a full set of control variables that account for market factors in order to produce reliable predictions. For example, in *Freeland v. AT&T Corp*, the district court rejected the plaintiffs' expert's regression analysis, which was intended to show the anticompetitive impact of tying and locking of cellphone prices, because the analysis failed to account for the introduction of the smartphone and the industry's shift from analog to digital technology, both major market developments that could have significantly affected prices during the

relevant period.[6] Similarly, in *Blue Dane Simmental Corp. v. American Simmental Association*, the Court of Appeals for the Eighth Circuit rejected an economic expert's analysis because the expert had neglected to consider any input variables other than the alleged cause of injury.[7] As these examples illustrate, failing to account for major market factors results in unreliable estimates, and may also lead to the exclusion of the expert's testimony by the court.

There is no fixed list of universal control variables to account for relevant market factors; the appropriate set of controls depends on the facts in each case. However, a useful framework for thinking about the completeness of the control variables is to consider all of the factors that may affect demand and supply in the market(s) at issue. For example, to predict the prices of shipping services, the regression would need to include supply-side inputs that affect the cost of providing shipping services, including the weight and size of each shipment, distance shipped, shipping speed, and fuel prices. Demand-side inputs for predicting shipping prices may include indicators for seasonal demand (e.g., holiday shopping season), indices of global trade volumes, international exchange rates, and changes in trade regulations (e.g., renegotiations of NAFTA or Brexit).

One way to get a sense of the completeness of the regression model is to ask your economist to list the input factors used in the model and why each is included. If there are factors that could potentially affect the supply or demand in the relevant market, but are not included in the model, ask why they are not included. Another way to assess the completeness of the regression model's list of control variables (and anticipate how the model may be challenged) is to check whether that list is consistent with what is found in the academic literature on the same topic.

For certain input factors, there are often multiple ways to account for or measure that factor. For example, economists can account for seasonal shopping trends by using month-of-year or quarter-of-year variables. Generally, reliable regression predictions should not be sensitive to minor changes in input variables, and should yield similar results with similar variables (such as, for example, whether the economist uses month-of-year or quarter-of-year variables). Testing a regression model prediction's sensitivity to such minor changes in inputs is a good method for assessing the model's reliability.

In addition to the proper accounting of market factors, another common point of contention in "battles of the experts" is whether the economist is using the right type of regression model in the first place. Different econometric models rely on different assumptions and may be suited for different data structures. For example, in assessing antitrust damages, two common regression models are before/after models and benchmark models. As discussed above, in before/after models, the idea is to compare prices in a "clean" period unaffected by the conduct at issue, against prices in a period that are "affected" by the alleged conduct.

Key to the reliability of before/after models is correctly specifying the "clean" and "affected" periods to match the timing of the allegations at issue, and to ensure that the control variables fully account for differences in market conditions between the alleged impact period and the benchmark period that are unrelated to conduct. The correct specification of the "clean" and "affected" periods would also likely be a point of contention between opposing economists in cases using before/after models. A properly specified "clean" and "affected" period is firmly grounded in the facts in the record. As counsel typically has better knowledge of the record than the economics expert, this is an essential topic of conversation with your economist.

Benchmark models compare prices in "clean" benchmark sales to prices "affected" by the conduct at issue. Similar to the before/after model, the reliability of benchmark models depends on correctly specifying the "clean" and "affected" sales to match the allegations at issue and ensuring that the control variables fully account for differences between affected sales and benchmark sales that are unrelated to conduct. Economists often debate the correctness of the chosen benchmark. The choice of a particular benchmark is an assumption that requires support with additional analysis. When economics experts disagree on the choice of benchmarks, which benchmark prevails would depend on how strongly each benchmark is supported by market facts and economic theory.

Working with Data Limitations. Even a perfect recipe will not taste good if the ingredients are spoiled or of poor quality. Similarly, having a perfectly specified regression model will not produce reliable results if the data inputs are bad. Predictions from regression models are only as reliable as their data inputs. When working with economics experts, it is useful to understand any limitations that data availability imposes on their analysis, and also discuss the best approaches for managing those limitations.

Regression analysis is a tool that relies on both the quality and the quantity of the data. If there are fewer data points, then the regression estimates suffer from reduced precision. If there is additional noise in the underlying data, then it is more difficult to isolate the effects of interest from the background noise. The negative effects of data noise can generally be mitigated using larger sample sizes, but this is not always an option. However, the fact that data limitations may preclude analysis using the ideal theoretical economic model does not mean that no economic data analysis should be conducted. To the contrary, econometric models can often be adapted to work with limited data.

Below are some approaches that can be used to adapt models to work within data limitations.

- **Estimate a simpler model.** "Don't let the perfect be the enemy of the good," as the saying goes. While complex models can provide better insights in theory, complex models also come with more extensive data requirements. The complexity of the economic model scales in propor-

tion to the richness of the available data. For example, in market definition analysis, the complexity of econometrics employed can range from intricate structural models of market supply and demand to simpler regressions that measure cross-price elasticities, to price correlation analysis between product pairs.

■ **Use next-best alternatives for data inputs.** In some cases, when certain input variables are missing, coarser alternatives may be available. For example, household income is often an important variable for estimating prices and demand for products. However, if household income from individual customers is not available in the data, it may be possible to generate a "best estimate" of household income based on the zip code of the customer's address or where the purchase took place (if those variables are available).

■ **Augment the model using reasonable assumptions.** In certain situations, reasonable assumptions may be used to fill in gaps in the data or simplify models. For example, if detailed product cost information is not available, estimating a pricing model assuming constant marginal cost may be a reasonable alternative if documents and testimony in the record firmly support that assumption.

It is important to note that in cases where the economic models are adapted to data limitations, the predictions of those models are necessarily weakened. This is an unavoidable consequence of working with restricted data. When talking to economists about how to manage data limitations, attorneys should ask about the potential weaknesses of data limitations, as well as whether there are ways to address those weaknesses using complementary qualitative analyses. For instance, if data limitations restrict the usefulness of regression analysis for identifying product substitution patterns, qualitative analysis such as consumer surveys can sometimes provide additional economic evidence.

Economics Toolbox in Mergers & Acquisitions
Economists who perform merger analysis also often have to choose between tools that are relatively straightforward to implement and describe and those that are more rigorous. Below we discuss two concepts—critical loss analysis (CLA) and upward pricing pressure (UPP) —that belong to the former category of tools, and another method—merger simulation—that belongs to the latter.[8] CLA is used primarily for market definition and for analysis of unilateral effects. Analogous in nature, UPP is a tool for evaluating the incentive of firms to unilaterally raise prices post-transaction. Merger simulation is similarly applied to predict unilateral competitive effects, and it can potentially speak to the magnitude of the proposed transaction's impact on various economic variables.

Critical Loss Analysis (CLA).
CLA in Plain English. CLA is used extensively to inform the definition of the relevant product or geographic market.[9] The main market definition tool used by the Federal Trade Commission and the Department of Justice, and one that has been increasingly adopted by the courts,[10] is the Hypothetical

Monopolist Test, which takes a narrowly defined set of products and tests whether a hypothetical monopolist would have an incentive to impose "at least a small but significant and non-transitory increase in price (SSNIP) on at least one product in the market."[11] The monopolist would find it unprofitable to impose a SSNIP if there are sufficiently close substitutes outside of the proposed market that consumers would turn to in the event of a price increase. Thus, if the analysis shows that it would not be profitable for the monopolist to impose a SSNIP, the proposed market is expanded to include those substitutes, and the test is repeated.

CLA is used to measure the incentive of the hypothetical monopolist to impose a SSNIP. If the monopolist increases its price, it faces a tradeoff: it would make more money on each retained sale, but it would also lose sales because some consumers would decide to purchase products outside of the market or not purchase at all at the new price. Critical loss is the drop in quantity as a result of the price increase that makes the monopolist indifferent between raising its price and keeping it the same. In the most commonly used version, the critical loss is calculated to equal the value of the SSNIP (often taken to be 5 percent)[12] divided by the sum of the price-cost margin and the value of the SSNIP.[13] The critical loss is then compared to a measure of the "actual loss," which is the quantity that the economist believes will in reality be lost to products outside the proposed market in the event of a SSNIP. If the actual loss is smaller than the critical loss, the monopolist would find it profitable to raise its price and the proposed market is determined to be the relevant product or geographic market.

Potential Questions and Weaknesses. While this calculation seems relatively simple, there are important underlying assumptions that the economist must verify to ensure the method is properly applied. For instance, the calculation hinges on a measure of the gross margin, so discuss with your economist what data or documents were used to calculate the margin and whether they were interpreted properly.[14] Economists often assume that the monopolist has constant marginal cost when conducting the Hypothetical Monopolist Test using CLA, but this assumption may not be appropriate in some market settings and may be subject to challenge by enforcers or opposing economists. If an economist employs this assumption, the attorneys should discuss with them if it is appropriate for the given market setting, and how the results might change if the assumption is relaxed.

Perhaps the most important component of CLA is the measurement of the actual loss following a price increase.[15] Data are usually not available to directly measure the loss of sales that would result from a 5 percent price increase. Thus, economists often rely on imperfect measures of substitution, such as win/loss data, customer surveys, or (if the data and timing permit) regression estimates from natural experiments, such as entry or exit of products. Economists should discuss with the attorneys the methods used to estimate the actual loss, the reliability of the data, and whether the estimated

actual loss is consistent with the operation of the client's business and the industry in general. For example, in *United States v. H&R Block*, the opposing experts relied on IRS switching data (plaintiff's expert) and various surveys (defendants' expert) to estimate the actual loss and obtained different results that the court had to reconcile.[16]

Because the actual loss is often difficult to estimate, economic experts and attorneys may attempt to make inferences about the relevant market based only on the critical loss. Doing so could lead to inconsistent conclusions, as described in detail in articles by Michael Katz and Carl Shapiro and Daniel O'Brien and Abraham Wickelgren.[17] These articles explain that observing a small critical loss—which happens when the gross margin is large—should not automatically be interpreted in favor of expanding the relevant market. High gross margins imply that the actual loss is also likely to be small (because firms generally enjoy high margins when they face more inelastic demand), so it could still be the case that the actual loss is smaller than the critical loss.

This issue arose during the preliminary injunction hearing for the proposed acquisition of Wild Oats by Whole Foods in 2007.[18] The merging parties' economic expert presented a critical loss analysis to support expanding the relevant product market put forward by the FTC. However, the merging parties' expert did not estimate the actual loss that would result from a SSNIP, but rather "predicted" that it was large (based primarily on his review of market studies), which implied that a SSNIP would be unprofitable.[19]

The FTC's expert critiqued this analysis based on the arguments described by O'Brien and Wickelgren.[20] Nonetheless, the district court concluded that "premium, natural, and organic supermarkets" (PNOS) was not a distinct product market and denied the motion for a preliminary injunction, citing the merging parties' critical loss analysis along with supporting analyses based on third-party market studies, testimony from other supermarkets, and internal documents from the merging parties.[21] The district court's decision was later overturned by the D.C. Circuit Court of Appeals, citing concerns about potential harm to a "core of committed customers" for PNOS that were not captured in the critical loss analysis performed by the merging parties' expert.[22]

Upward Pricing Pressure (UPP).

UPP in Plain English. UPP was proposed by Joseph Farrell and Carl Shapiro as a way to evaluate the merged firm's incentive to increase prices unilaterally following a merger of competitors selling differentiated products.[23] Rather than focusing on market definition, UPP aims to answer directly the relevant antitrust question: Is the merged firm likely to increase its price after the merger is completed?[24] Given the tight overlap between market definition and anticompetitive effects in unilateral effects cases, the two calculations have a lot in common.

The key insight here is that in a merger of two competitors, sales that would have been lost to the competitor prior to the merger are internalized by the merged firm, which increases the incentive to raise prices post-merger (hence,

upward pricing pressure). Specifically, if a certain volume of sales is internalized (or "recaptured") by the merged firm, the magnitude of the upward pricing pressure is equal to that sales volume multiplied by the merged firm's price-cost margin at the pre-merger price.[25] In simple terms, multiplying the recaptured sales by the margin provides a measure of the profit that the merged firm stands to gain from internalizing the sales that would have been lost but for the merger.

UPP also recognizes that the merger can lead to efficiencies that decrease the marginal cost of the merged firm and provide an incentive to reduce price—referred to as downward pricing pressure. The UPP index is equal to the difference between the upward and downward pricing pressure, and if it is determined to be positive, this is a signal that the merger is likely to result in a price increase.[26]

Potential Questions and Weaknesses. As with CLA, the main questions that the attorneys and economists should discuss concern the measurement of the price-cost margin and the volume of sales that is recaptured by the merged firm when it increases its price. The latter is often called the diversion ratio between the two merging parties, and measures the extent to which the parties are close substitutes for each other in the eyes of consumers.

Obtaining a precise measure of diversion is a complex and data-heavy exercise (and might not even be possible, especially in the early stages of a merger investigation), so economists often rely on indirect measures coming from win/loss data, customer surveys, and estimates from natural experiments. In the absence of reliable data of this kind, economists sometimes resort to the use of share-based diversions, which only require information on the market shares of firms. However, the conditions under which share-based diversions provide a reasonable estimate of the closeness of substitution are often not satisfied in practice, so share-based diversions may be limited in their applicability.[27]

Because of these issues, measures of diversion are often a point of contention between opposing economist. *FTC v. Sysco* provides a good example.[28] In its decision to grant a preliminary injunction in *FTC v. Sysco*, the court reviewed diversion ratios calculated by the government's expert, which were based on request-for-proposal and bidding data, as well as ordinary course of business records that tracked sales opportunities. The court acknowledged defendants' criticism of the diversion estimates in that the input data used were incomplete and unreliable and might have reflected lost sales that were unrelated to a price increase. The court ultimately sided with the government, stating that it "hesitates to rely on [the government experts'] precise aggregate diversion percentages," but "when evaluated against the record as a whole, [the government experts'] conclusions are more consistent with the business realities" in the relevant market.[29] The court's decision in *FTC v. Sysco* illustrates the limitations that data issues can impose on diversion ratio analysis, but it also shows how those limitations may be overcome through other supporting analysis.

Merger Simulation.

Merger Simulation in Plain English. Merger simulation refers to any exercise that simulates a market to predict the potential effects of a merger. In contrast to CLA and UPP, which consist of straightforward calculations and involve relatively modest data requirements, merger simulation is a complex modeling and estimation procedure that requires extensive data on the prices and quantities of all products in the relevant market. The tradeoff is that while CLA and UPP can provide answers to basic questions (e.g., is the proposed market a relevant antitrust market; is the merged firm likely to raise its price), merger simulation can potentially predict post-merger prices, quantities, profits, and changes in welfare for all market participants, and can be used to simulate many counterfactual scenarios, including proposed divestitures.[30]

Merger simulations vary by complexity depending on the data and time available to execute them. Typically, the economist begins by assuming a model of firm behavior (e.g., price-setting Bertrand competition or quantity-setting Cournot competition) and a functional form for the cost functions of firms.[31] Consumer preferences are modeled by assuming a functional form of demand.[32] These assumptions lead to a set of parameters that are estimated using pre-merger data on prices and quantities—often referred to as calibrating the model. Then, using these estimated parameters, the economist simulates the merger to predict the equilibrium prices and quantities that the merged firm would realize in the market post-transaction.[33]

Potential Questions and Weaknesses. If the merger simulation is done properly, it can provide measures of the direction and magnitude of the unilateral competitive effects. However, the simulation requires careful modeling and, if done incorrectly, it can lead to wrong answers. A standard critique of a merger simulation is that the assumed competition model does not capture the realities of the industry. Your economist should explain how the underlying model of competition fits the industry facts at hand. Key issues include whether the industry is characterized as one with homogeneous or differentiated products or if the buyer-seller relationship is more accurately represented by an auction model.

You should discuss the values of the estimated parameters in the calibration stage to ensure that they conform to the market realities. For instance, are the estimated pre-merger price-cost margins similar in magnitude to the ones reported by the client? Data on pre-merger market shares are frequently used to calibrate the merger simulation model and shares are often a point of dispute between opposing economists. For example, in *United States v. Oracle*, the government's expert used market shares that the court found to be an inaccurate representation of the parties' positions in the market and therefore the court dismissed the results from the simulation as unreliable.[34]

The results from a merger simulation are sensitive to the functional form of the demand function and the corresponding demand elasticities, so this is an area that might receive scrutiny from enforcers and opposing economists. Your economist should discuss the limitations of her particular choice and how alternative choices might affect the estimated post-merger prices.

Another question to discuss with the economist is the treatment of efficiencies, the likelihood and magnitude of which are often disputed by the two sides in a merger investigation. For example, are the merging firms assumed to have lower costs post-merger and, if so, how much? Where are the efficiencies coming from? Most merger simulations assume that the merger only affects pricing and output decisions and possibly production costs. However, in some settings, the transaction might affect entry or exit, changes in product offerings, or changes in other strategic variables such as advertising. Discuss with your economist whether the enforcers or opposing economists are likely to raise these issues and, if so, what would be the best way to incorporate them in the merger simulation.

Conclusion

While antitrust attorneys and economists often use different terminology, providing the highest level of service to clients requires that attorneys and economists work together to address the same questions about competition in markets. Combining insights from attorneys' and economists' different skill sets and backgrounds is the best way to answer these questions. Build your conversations with economists on this common ground and you may find that the language barrier is not so high after all. ■

1 *See, e.g.*, Ryan Faughnder, *Home Video Sales Shrank Again in 2016 as Americans Switched to Streaming*, L.A. Times, Jan. 6, 2007, http://www.latimes.com/business/hollywood/la-fi-ct-home-video-decline-20170106-story.html.

2 Comcast Corp. v. Behrend, 133 S. Ct. 1426 (2013).

3 *Id.* at 1430–31.

4 *Id.* at 1434–35.

5 For more details on instrumental variables, see Joshua D. Angrist & Jörn-Steffen Pischke, Mostly Harmless Econometrics: An Empiricist's Companion ch. 4, at 113 (2009).

6 Freeland v. AT&T Corp., 238 F.R.D. 130 (S.D.N.Y. 2006).

7 Blue Dane Simmental v. American Simmental Ass'n, 178 F.3d 1035, 1039–41 (8th Cir. 1999).

8 Properly implementing CLA or UPP analysis is by no means an easy exercise. As we discuss below, the use of diversion ratios in UPP analysis is particularly tricky and should be done with care.

9 For cases in which CLA featured prominently, see, e.g., FTC v. Tenet Healthcare Corp., 186 F.3d 1045 (8th Cir. 1999); United States v. Sungard Data Sys., 172 F. Supp. 2d 172 (D.D.C. 2001); United States v. H&R Block, Inc., 833 F. Supp. 2d 36 (D.D.C. 2011).

10 For cases where the Hypothetical Monopolist Test was accepted by the court as an appropriate tool for market definition, see, e.g., United States v. Aetna Inc., No. 16-cv-1494, 2017 WL 325189 (D.D.C. Jan. 23, 2017); FTC v. Staples Inc., 190 F. Supp. 3d 100 (D.D.C. 2016); FTC v. Sysco Corp., 113 F. Supp. 3d 1 (D.D.C. 2015).

11 U.S. Dep't of Justice & Fed. Trade Comm'n, Horizontal Merger Guidelines 4.1.1. (2010).

[12] "The Agencies most often use a SSNIP of five percent of the price paid by customers for the products or services to which the merging firms contribute value." *Id.* § 4.1.2.

[13] Critical loss was first introduced by Barry Harris and Joseph Simons. *See* Barry C. Harris & Joseph J. Simons, *Focusing Market Definition: How Much Substitution Is Necessary?*, 12 RESEARCH IN L. & ECON. 207 (providing a formal overview of the method and the arithmetic).

[14] The proper measurement of margins was a topic of disagreement between the economic experts in the recent preliminary injunction hearings in, e.g., FTC v. Advocate Health Care Network, 1:15-cv-11473, 2017 U.S. Dist. LEXIS 37707 (N.D. Ill. Mar. 16, 2017), and *Sysco*, 113 F. Supp. 3d 1.

[15] Note that the actual loss is a completely separate entity from the critical loss and has to be evaluated through other means.

[16] *H&R Block*, 833 F. Supp. 2d at 62–63.

[17] Michael Katz & Carl Shapiro, *Critical Loss: Let's Tell the Whole Story*, ANTITRUST, Spring 2003, at 49; Daniel P. O'Brien & Abraham L. Wickelgren, *A Critical Analysis of Critical Loss Analysis*, 71 ANTITRUST L.J. 161 (2003).

[18] FTC v. Whole Foods Mkt., Inc., 502 F. Supp. 2d 1 (D.D.C. 2007).

[19] *Id.* at 14; *see also* FTC v. Whole Foods Mkt., Inc., 548 F.3d 1028 (D.C. Cir. 2008).

[20] *See* Rebuttal Expert Report of Kevin Murphy, *supra* note 18, ¶ 25 ("O'Brien and Wickelgren, in their critique of CL analysis, use this very methodology to calculate whether it would be profitable for a hypothetical monopolist to increase price by a given amount.").

[21] *Whole Foods*, 502 F. Supp. 2d at 34–36.

[22] *Whole Foods*, 548 F.3d at 1041.

[23] Joseph Farrell & Carl Shapiro, *Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition*, B.E. J. THEORETICAL ECON., Vol. 10, Iss. 1 (Policies & Perspectives), Art. (2010), http://faculty.haas.berkeley.edu/shapiro/alternative.pdf.

[24] In its original version, UPP analysis speaks only to the likelihood of a price increase, but not to the magnitude of it. *See id.* (detailed discussion).

[25] This general description of the analysis effectively assumes that the merging firms have the same costs and the same price prior to the merger. To relax this assumption, it may be possible to expand the analysis by calculating two upward pricing pressure indices—one for each of the merging firms.

[26] Another term often used in the context of UPP analysis is GUPPI, or "Gross Upward Pricing Pressure Index." *See* Steven Salop & Serge Moresi, *Updating the Merger Guidelines: Comments* (Georgetown Law Faculty Publications and Other Works 1662, Nov. 9, 2009, http://scholarship.law.georgetown.edu/facpub/1662. UPP is viewed as a net index since it subtracts the impact of efficiencies from the upward pricing pressure. GUPPI ignores efficiencies and looks strictly at the upward pricing pressure. *See id.*

[27] In particular, in calculations for share-based diversion ratios, the underlying assumptions are that all sales lost by the firm/product in question are recaptured by other firms/products in the market and that all firms/products are equally close substitutes in the eyes of consumers.

[28] *Sysco*, 113 F. Supp. 3d 1.

[29] *Id.* at 37.

[30] For instance, the economist can answer such question as how big the merger efficiencies have to be to defeat the incentive for a price increase or if the entry of a new competitor would be sufficient to discipline prices post-merger.

[31] Of particular interest here is the marginal cost function. Most often, economists assume that marginal costs do not vary with output.

[32] In cases where the data are insufficient to perform demand estimation, economists might use other available information to estimate the values of demand elasticities, which are then used in the merger simulation.

[33] For an in-depth description of merger simulation methods, see e.g., Farrell & Shapiro, *supra* note 23; Gregory J. Werden & Luke M. Froeb, *Correlation, Causality, and All That Jazz: The Inherent Shortcomings of Price Tests for*

Antitrust Market Delineation, 8 REV. INDUS. ORG. 329 (1993). A brief non-technical example is provided by Roy Epstein, *Merger Simulation and Unilateral Effects: A Primer for Antitrust Lawyers*, ECON. COMM. NEWSL. (ABA Section of Antitrust Law), Vol. 2, No. 2 (2002). *See also* Joseph Farrell & Carl Shapiro, *Horizontal Mergers: An Equilibrium Analysis*, 80 AM. ECON. REV. 107 (1990).

[34] United States v. Oracle Corp., 331 F. Supp. 2d 1098 (N.D. Cal. 2004).