



ECONOMICS COMMITTEE NEWSLETTER

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Welcome

It is with great pleasure that we welcome you to the sixth 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 editor, associate editor, or other members of the Economics Committee.

Enjoy!

Sincerely,

Stephan Levy, Editor
Seth Sacher, Associate 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 Stephan Levy at slevy@lecg.com or Seth Sacher at seth.sacher@bateswhite.com for more information.

Calendar of Events

ABA Section of Antitrust Law's Spring Meeting
Washington, DC
March 29-31, 2006

Economics Fundamentals

Wednesday, March 29, 2:00 PM

Richard Rapp of NERA and Prof. Dan Rubinfeld of UC Berkeley Law School and LECG will teach a course on the economics of market definition, and market power. This is a new version of two highly successful Economics Committee brown bags on this topic given in Washington, DC in 2004.

"Economic Experts Speak"

Wednesday, March 29, 3:45 PM

Four leading economic experts led by two experienced lawyers will discuss how best to choose and use economic experts. A number of useful and specific pointers and insights will be provided.

The Economics of the FTC Hawaii Terminal Case (FTC v. Aloha)

Friday, March 31, 8:15 AM

The FTC and its expert and the parties and their expert will discuss the economic issues. A great session that besides the specific issues in Aloha will provide insight on the use of economics and economic experts in litigation.

More information is available online at:
<http://www.abanet.org/antitrust/programs/spring-06.html>.

Assessing Conflict, Impact, and Common Methods of Proof in Intermediate Indirect-Purchaser Class Action Litigation

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Analysis Group
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Introduction

To certify a class in cases involving indirect-purchasers, specific legal standards, which in practice vary a fair amount across states, must be satisfied. State courts have determined generally that a class can be certified if it meets five key requirements of state analogues to Federal Rules 23(a) and 23(b)(3), which stipulate the following provisions:

- *Numerosity*: the class is so numerous that joinder of all members is impractical
- *Commonality*: questions of law or fact are common to the class
- *Typicality*: the claims or defenses of the representative parties are typical of the claims or defenses of the class
- *Adequacy*: the representative parties will fairly and adequately protect the interests of the class
- *Predominance/Superiority*: questions of law or fact common across members of the class predominate over any questions affecting only individual members; and a class

action is superior to other available methods for fair and efficient adjudication of the controversy.

Economists do not often opine on the legal concept of numerosity. However, the economic issues associated with typicality, commonality, adequacy, and predominance are frequently pivotal to class certification in both direct- and indirect-purchaser litigations. Typicality, adequacy, and predominance must be analyzed to determine whether a common method exists to assess impact to all class members, and potential conflicts among class members (commonality is largely subsumed under predominance). In cases in which the putative class excludes end-consumers but consists of other indirect-purchasers at different levels of the distribution chain, these issues present multiple challenges.

We begin our discussion by positioning these economic arguments within the broader context of varying state laws. Neither the standing of indirect-purchasers as plaintiffs, nor the permissibility, scale, or scope of pass-through arguments (claims of overcharge being passed through different points of the distribution chain) is treated uniformly across jurisdictions.

Legal Background

In 1977, the Supreme Court's decision in *Illinois Brick Co. v. Illinois* simplified private antitrust suits by denying indirect-purchasers the right to sue in federal court.¹ The Court stated that antitrust laws would be "more effectively enforced by concentrating the full recovery for the overcharge in the direct purchasers rather than by allowing every plaintiff potentially affected by the overcharge to sue for only the amount it could show was absorbed by it."² Supporters of the decision have argued that deterrence is a primary goal of antitrust law and that the

direct-purchaser suit is the most efficient way to impose such a penalty. Opponents claim that the ruling denies compensation to those who most often suffer damages from overcharge by manufacturers with market power, namely consumers.

Following *Illinois Brick*, a number of states enacted statutes that explicitly repeal the case ruling or have interpreted pre-existing antitrust statutes to authorize indirect-purchaser suits. “*Illinois Brick* repealer” provisions have been passed in Alabama, California, the District of Columbia, Hawaii, Idaho, Illinois, Kansas, Maine, Maryland, Michigan, Minnesota, Mississippi, Nevada, New Mexico, New York, Oregon, Rhode Island, South Dakota, Vermont, and Wisconsin. Other states have permitted recovery on behalf of consumers, either in the form of restitution or damages under state consumer protection laws or state unfair trade practices statutes.

The Supreme Court legitimized states’ repeals of *Illinois Brick* in *California v. ARC America Corp* (1989), ruling that the repealer statutes are not preempted by federal law, notwithstanding the federal bar of indirect-purchaser suits.³ Since then many but not all of these suits have been filed as class actions, since indirect-purchasers tend to be numerous and their individual (alleged) harms small. Many cases settle prior to trial, often even before a complete assessment of whether a class should be certified. The uncertain legal terrain, potential damage exposure and cost of litigation, and risk aversion of parties involved often contribute to early settlements.

Among the approximately 20 states with *Illinois Brick* repealer statutes, the extent to which defendants can use downstream pass-through as a defense to refute the fact of injury or to reduce indirect-purchaser

damages varies considerably.⁴ Consideration of downstream pass-through arguments adds to the complexity of the damages analysis; yet to ignore this important determinant of economic relationships can often lead to duplicative recovery of damages.

The variation among states in the treatment of downstream pass-through as a defense may be lessened by the passage of the Class Action Fairness Act (“CAFA”) of 2005. CAFA enables state-based class action suits to be removed to federal court in many circumstances. Once in federal court, the issue of class certification is governed by federal procedure (Fed R. Civ. Proc. 23) as opposed to state procedure.

Economic Analysis

Whether viewed under federal or state standards for class certification, the relevant economic questions are similar: Were all or substantially all class members in fact injured? Are there significant conflicts among class members? Can these issues be investigated using a common method?

Injury is largely determined by the rate at which an alleged overcharge would be transmitted (passed through) from one level of purchasers to the next. These pass-through rates are important determinants of potential damage both “upstream” – the overcharge paid by an indirect-purchaser at the time of purchase – and “downstream” – the overcharge transmitted by the indirect-purchaser to the next entity in the production/distribution chain. Similarly, pass-through analysis will help determine the extent of conflict among class members who transact with each other and, as a result, may transmit (or incur) an alleged overcharge. Finally, because pass-through is often determined by idiosyncratic and localized conditions as well as transaction-specific circumstances, investigating pass-

through will help determine the likelihood that a common method of proof can determine impact and damages on a class-wide basis. Plaintiffs and Defendants have developed a complex set of economic and legal arguments to evaluate upstream and downstream pass-through in the context of assessing the existence (or not) of impact on all class members, of potential conflicts among class members, and of common methods of proof to derive potential damages.

Pass-Through Analysis and Impact

Plaintiff experts who assert that all indirect class members are injured by an alleged overcharge and that damages can be calculated using a common method have often faced significant challenges from the courts. Judicial reluctance to concur with Plaintiffs is illustrated, for example, by the Illinois District Court's certification of a class of direct purchasers under federal antitrust laws, and refusal in the same matter to certify a class of indirect-purchasers under an Alabama statute.⁵ The court linked the issue of impact with that of pass-through within the distribution chain, and determined that tracking an overcharge from manufacturers to wholesalers and on to retailers and consumers was a difficult, individualized process that could not be completed class-wide.

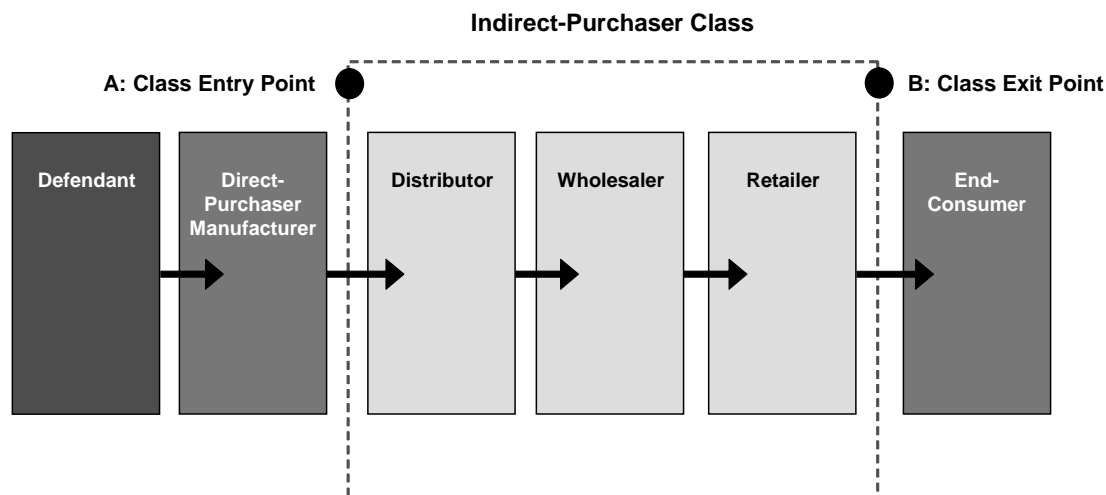
In the hypothetical distribution chain shown in Figure 1, the class may encompass multiple, distinct layers including distributors, wholesalers, and retailers. Plaintiffs would need to argue that all class members were injured by the overcharge (thereby establishing impact) and that transactions among class members were

limited or non-existent (reducing or eliminating conflict). Plaintiffs' impact argument becomes increasingly difficult to sustain, however, as the number of levels in the distribution chain increases. As a result, Plaintiffs may minimize the distinction among levels in the distribution chain within the proposed class or limit the class definition to include only a clearly identifiable layer in the chain (e.g., distributors).

Defendants, on the other hand, would likely emphasize the distinctions among class members. They would argue that for all members to be damaged, the initial overcharge would have to be partially absorbed at each level of the chain and partially passed through from wholesalers to ultimately reach retailers. Defendants would further argue that although an overcharge may pass-through the first two layers of class members, if pass-through does not stop with the third layer, only those purchasers situated further downstream would incur damage, leaving the Plaintiff class without a cause for action.

Differing levels of competition within the distribution chain will also influence Plaintiffs' impact argument. If upstream pass-through (Point A on Figure 1) is high, resulting in a large portion of the overcharge reaching the class members, Plaintiffs' expert will need to show that downstream pass-through (Point B on Figure 1) is low. When downstream pass-through is high, the overcharge that reaches the plaintiff class will flow out of the plaintiff class, leaving end consumers with the bulk of the damage claim. Of course a low upstream pass-through would reduce the amount of overcharge extending to the class.

Figure 1: Sample Distribution Chain



Under a scenario in Figure 1, determination of multiple pass-through among class members and pass-through into and out of the proposed class will typically present significant opportunities for Defendants to argue that individual inquiry is most appropriate. However, certain jurisdictions (Minnesota, for example) frown upon downstream pass-through arguments, at least at the class certification stage.⁶ Other jurisdictions (Iowa, for example) recognize the importance of downstream pass-through defenses, but have shifted the burden of proof to the Defendants, thereby significantly complicating the Defendants' arguments.⁷

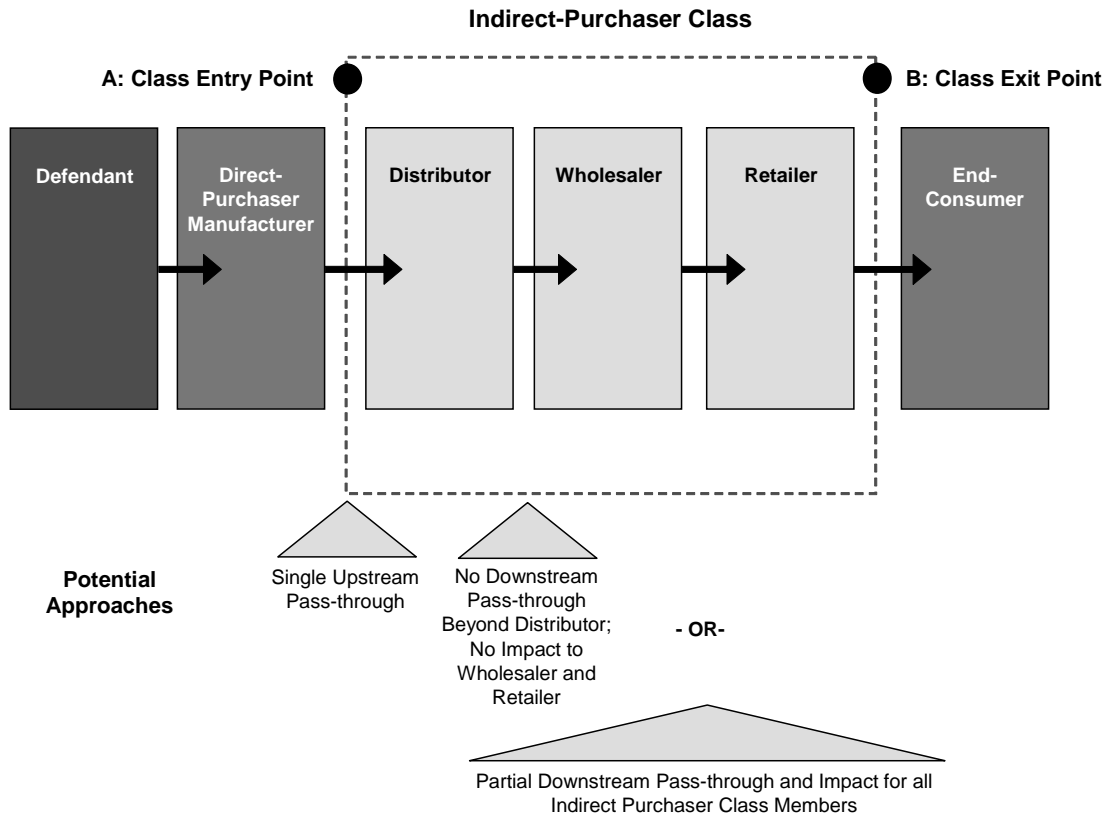
Pass-through Analysis and Conflict

Beyond the issues associated with analysis of impact, cases involving multiple layers of distribution within a class also raise significant issues of conflict among members of the class. If Plaintiff counsel must choose among alternative strategies that materially favor one subgroup within the putative class over another, the adequacy of representation can fairly be questioned. This would be the case if, for example, members of the Plaintiff class transact with each other. If such transactions result in the

seller passing the overcharge on to the buyer, the buyer is damaged and the seller will have reduced or eliminated any damage. If, on the other hand, the seller is unable to pass the overcharge on to the buyer, the overcharge and associated damage will be borne entirely by the seller. Experts may reasonably disagree on the extent of the pass-through and, therefore, may offer different opinions on the degree of damages to each class member.

Given the product distribution chain in Figure 1, Defendants are likely to emphasize significant potential conflicts among putative class members whereas Plaintiffs will downplay levels of distribution within the chain to avoid any potential conflict among members. For example, in an *Illinois Brick* repealer state without limitations on pass-through analysis, Plaintiff experts may argue that market conditions imply full pass-through up to, but not beyond, the class. However, if Plaintiffs argue that distributors were affected by the full overcharge without any pass-through to downstream levels, wholesale and retail members of the class arguably will not suffer impact. But if Plaintiffs argue that partial pass-through characterizes each level of the chain of distribution, *all* members of the class may

Figure 2: Plaintiff Approach



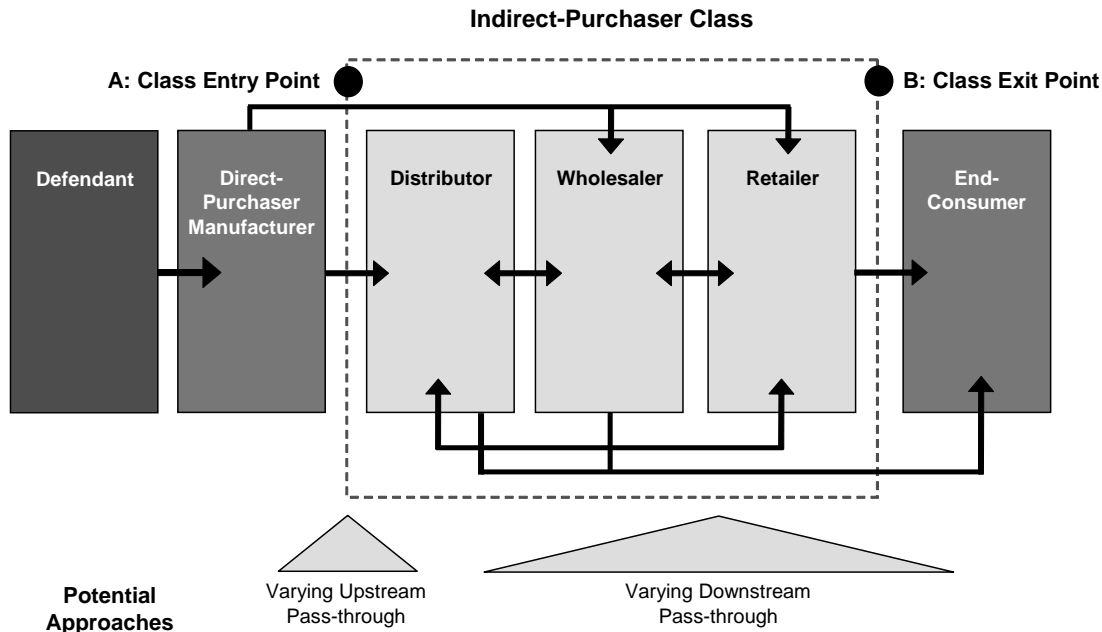
claim damages resulting from a fraction of the initial overcharge. Distributors would then have lower claims, all else being held equal, than if Plaintiff experts argued that 100 percent of the overcharge passed through to the distributor level and remained at that level (see Figure 2). These reasonable alternatives could significantly affect the distribution of damage awards among class members as well as the total award claimed, thus presenting challenges for Plaintiff counsel.

In contrast, Defendant experts may present a scenario characterized by varying levels of pass-through among class members, which requires individualized inquiry (illustrated in Figure 3). Conflict over alleged damages among potential class members is likely in this scenario, and certain class members may lack standing. Upstream pass-through

for any given member is likely to vary with, among other things, its position in the distribution chain. An expert may find it difficult to identify common methods to calculate pass-through and determine damages.

Defendants could use Plaintiff discovery (interviews, deposition testimony, and review of individual transactions) to demonstrate a complex distribution chain. This, in turn, could help Defendants show idiosyncratic pass-through across multiple levels of distribution. However, Plaintiffs could use tools such as regression analysis to demonstrate that pass-through can be easily calculated at each level of the chain using a class-wide approach. Diagnostic tests to ensure that a single regression analysis is appropriate across class members would be useful in determining the accuracy

Figure 3: Defendant Approach



of the pass-through rates suggested by the regression approach.

When a putative class includes members who trade with one another, Plaintiffs are likely to face challenges in proving impact as well as adequacy, unless pass-through is unambiguously identifiable up and down the chain of distribution. In past cases, evidence of such transactions among class members has at times resulted in denial of class certification.⁸

Pass-through and Common Method of Proof

From an economic perspective, for a class to be certified, a common method of proof must be used to evaluate the likelihood and extent of impact as well as conflict among Plaintiffs. Furthermore, the existence of a common method to calculate actual damages to class members must also be demonstrated. On all three dimensions (conflict, impact, and extent of damage), the issue of pass-through will be a central determinant of class standing.

In the Plaintiffs’ ideal scenario, class members do not trade with each other, upstream pass-through is equal to (or very near) “one,” and downstream pass-through is equal to (or very near) “zero.” Further, Plaintiffs can establish this ideal scenario using standard, common methods. This state of the world may not often be observed in indirect-purchaser suits initiated by intermediaries, because transaction patterns among class members are often complex and upstream and downstream pass-through rates are likely to be similar. If both pass-through rates are high, end-consumers experience most of the overcharge; if both are low, direct purchasers bear most of the injury.

In the Defendants’ ideal scenario, class members would buy and sell to one another, and both upstream and downstream pass-through rates will be near either “one” or “zero.” To the extent this scenario is more likely to occur in reality, common methods of proof would fail and certifying a class should therefore be more difficult. The complexity of intra-class transactions often

requires an individualized inquiry (e.g., a review of actual transactions, one at a time). Moreover, the extent of pass-through is likely to vary across class members; this may require a review of transactions to track an overcharge through the production/distribution process.

Conclusion

The key economic issues for determining class certification in intermediate indirect-purchaser lawsuits correlate with the legal standards of adequacy, typicality, commonality, and predominance. These issues involve the amount of overcharge passed on to class members (upstream pass-through), and the extent to which class members pass on their overcharge to end-consumers (downstream pass-through). State laws differ as to whether and how pass-through may be analyzed to determine impact and measure damages. Clearly, analysis of pass-through can be complex, and is further complicated when class members transact with one another because of the increased likelihood of conflicts among them.

By carefully considering the nature of interactions among class members and integrating legal and economic concepts effectively, Plaintiffs and Defendants are more likely to achieve decisions consistent

with the characteristics of the market and the pattern of transactions. Doing so successfully, however, requires that litigators understand and invoke the economic underpinnings of class certification arguments, including the often complicated issues associated with upstream and downstream pass-through.

¹ Illinois Brick Co. v. Illinois, 431 U.S. 720 (1977).

² Id at 735.

³ California v. ARC America Corp., 490 U.S. 93 (1989).

⁴ For a discussion of the varying state standards for class certification, see Page, William H. "Class Certification in the Microsoft Indirect Purchaser Litigation," 1 J. Competition Law & Econ. 303 (2005) Available at SSRN: <http://ssrn.com/abstract=671048> or DOI: 10.2139/ssrn.671048.

⁵ Coutroulis, Chris S. and D. Matthew Allen, "The Pass-On Problem in Indirect Purchaser Class Litigation." *The Antitrust Bulletin*, vol. XLIV, no. 1, Spring 1999, pp. 189-190.

⁶ Gordon v. Microsoft Corp., No. 00-59994, 2001 WL 366432, *5, 11 (Minn. Dist. Ct. Mar. 30, 2001).

⁷ Farmers Coop. Elev. Co. v. Akzo Nobel, Inc., No. LA-CV-35453, Op. at 18 (Iowa Dist. Court Carroll County Mar. 12, 2004).

⁸ Sugai Prods. v. Kona Kai Farms, No. 97-00043, 1997 WL 824022, 1997-2 Trade Cases P 72,008, (D. Hawai'i, November 19, 1997).

Assigning Market Shares in Technology Markets: Why 1/N is Rarely the Right Answer

Ashish Nayyar and Michael A. Williams
ERS Group

Introduction

Technology markets play an important and growing role in antitrust enforcement and litigation. Prominent cases include the European Commission's decision relating to Digital and Olivetti regarding the market for reduced instruction set computer ("RISC") technology;¹ the FTC's complaint against Summit and VISX for the licensing of technology related to laser vision correction;² Gemstar's litigation with EchoStar, Pioneer, and Scientific-Atlanta regarding intellectual property used to produce interactive program guides for cable and satellite television systems;³ the FTC's complaint against Rambus for the licensing of technology used in computer memory chips;⁴ and Broadcom's recent antitrust complaint against Qualcomm regarding intellectual property used in the production of wireless phones.^{5,6}

A technology market consists "of the intellectual property that is licensed . . . and its close substitutes – that is, the technologies or goods that are close enough substitutes significantly to constrain the exercise of market power with respect to the intellectual property that is licensed."⁷ A technology market can constitute a relevant antitrust market when "rights to intellectual property are marketed separately from the products in which they are used."⁸ Technology markets are unusual in that generally no physical product or service exists.⁹ Instead buyers and sellers transact

for ideas, i.e., intellectual property rights ("IP").

We provide an economic analysis of the assignment of market shares to firms competing in technology markets. The assignment of market shares in technology markets is challenging because, often, metrics such as capacity or sales revenues cannot be used. Likely due to the difficulty in assigning market shares in technology markets, the 1/N rule, whereby each supplier of IP is assigned an equal share of the market, has been advocated for technology markets. We examine the theoretical underpinnings of the 1/N rule, and find that it is rarely appropriate when assigning market shares in technology markets.

Assigning Market Shares in Technology Markets is Challenging

In an antitrust context, the goal of assigning market shares is "to accurately and usefully indicate the relative sizes of competitors in the market."¹⁰ The *Horizontal Merger Guidelines* states the DOJ and FTC position that "[m]arket shares will be calculated using the best indicator of firms' future competitive significance."¹¹ In other words, the goal of assigning market shares is to determine the relative sizes of firms in an antitrust market based on their likely future competitive significance.

As noted above, assigning market shares for technology markets is challenging because, often, there is no direct way to measure shares. As a preliminary matter, shares cannot be assigned in physical terms through the measurement of sales, shipments, production, capacity, or reserves, since the intellectual property in question has no such physical constraints on its use. Moreover, quite often, market shares cannot be assigned on the basis of monetary terms, e.g., royalty payments, because many

transactions are based, at least in part, on non-monetary components. For example, many trades occur in technology markets on the basis of royalty-free (or royalty-reducing) patent cross-license agreements. Thus, the European Commission faced an example of a transaction in a technology market with no direct monetary payments in its analysis of the proposed agreement between Digital and Olivetti. Digital agreed to grant certain RISC technology to Olivetti on the conditions that Olivetti would (1) commit to using Digital's technology on all its non-Intel computer hardware and software and (2) purchase computer systems from Digital.¹² Given these facts, attempting to assign a market share to Digital in the relevant technology market on the basis of royalty payments would be problematic since at least one such important transaction occurred with no direct royalty payment. An additional problem encountered in attempting to assign market shares to firms in technology markets is that patents are often licensed in bundles, making it difficult to determine the component of royalty payments attributable to a particular technology.

The 1/N Rule For Assigning Market Shares

Likely as a consequence of the difficulty in assigning market shares in technology markets, the 1/N rule, whereby each supplier of IP is assigned an equal share of the market, has been advocated in the antitrust literature, endorsed by antitrust agencies in certain circumstances, and utilized in practice. Thus, according to Werden (2002),

The ability to compete is often determined mainly by intangible assets, such as intellectual property rights related to critical technologies, established brands, and reputations for superior performance. But there is only one

scenario in which market shares commonly are assigned on the basis of intangible assets. That scenario is referred to by the antitrust cognoscenti as a "one-over- n market."

There are two essential characteristics of such markets: (1) a finite number of entities possess a readily identifiable set of assets essential for successful competition; and (2) the extent of ownership or control over the essential assets does not distinguish among these entities in any important way. In the clearest case, all competitors have the same costs, and each can supply the entire market demand. In markets with these two characteristics, each competitor is assigned the same market share, so with n competitors, their shares are $1/n$.¹³

Also according to Werden (2002),

Candidates for the assignment of $1/n$ shares include markets for technologies or innovation and Schumpeterian industries, in which competition occurs largely through the introduction of new products or technologies and competition is apt to be more "for the market" than "in the market."¹⁴

In addition, antitrust agencies have also endorsed the 1/N rule in certain circumstances. Thus, according to the *IP Guidelines*:

When market share or other indicia of market power are not available, and it appears that competing technologies are comparably efficient, the Agencies will assign each technology the same market share.¹⁵

The *IP Guidelines* also appear to implicitly apply the 1/N rule when discussing an “antitrust safety zone” for licensing arrangements. According to the *IP Guidelines*:

Absent extraordinary circumstances, the Agencies will not challenge a restraint in an intellectual property licensing arrangement that may affect competition in a technology market if (1) the restraint is not facially anticompetitive and (2) there are four or more independently controlled technologies in addition to the technologies controlled by the parties to the licensing arrangement that may be substitutable for the licensed technology at a comparable cost to the user.¹⁶

Finally, the authors have observed the use of the 1/N rule for assigning market shares in technology markets in practice.¹⁷

Why 1/N is Rarely the Right Answer in Technology Markets

In this section, we argue that the 1/N rule is rarely the right answer when assigning market shares in technology markets. Our analysis proceeds in two steps. First, we discuss why it is generally unlikely that alternative suppliers in technology markets are equally likely to win future contests. Second, in contrast to the notion that the 1/N rule is appropriate when there is competition “for the market” rather than “in the market,” we argue that competition “for the market” arises precisely in those circumstances where the 1/N rule is most likely to be the wrong answer.

To begin, we observe that assigning alternative suppliers equal market shares is appropriate in exactly two cases: either

when there are no discernable differences among suppliers or when there are discernable differences among suppliers but the differences are exactly offsetting with regard to winning future contests. In practice, neither of these two cases is likely.

Alternative suppliers can differ in numerous respects. For example, suppliers of IP often have differentiated patent portfolios that may allow suppliers to offer their customers differing bundles of patents. In addition, unless the market at issue is a brand new one, the outcome of historical contests in that market (which is unlikely to be perfectly symmetrical) may provide a basis for differentiating among suppliers. That is, the outcome of historical contests in a market may well reflect unobservable differences among suppliers, and hence may be informative as to suppliers’ ability to prevail in future contests. Furthermore, suppliers may differ in various other dimensions including the ability to provide technical support, the ability to finance marketing campaigns, the expertise of the management team, and prior experience in closely related markets. Finally, a key aspect of technology markets is that they are typically intermediate product markets, i.e., purchasers of IP are usually suppliers that use the IP (along with other inputs) to produce other products and services. An implication is that alternative suppliers in the downstream markets will utilize the IP provided by alternative suppliers in a technology market in different ways. Hence, characteristics of the alternative suppliers in downstream markets, as well as characteristics of the products and services sold in downstream markets, may provide a basis for differentiating among alternative suppliers in upstream technology markets. Given the myriad ways in which alternative suppliers in technology markets may be differentiated, a conclusion that discernable differences in suppliers are exactly

offsetting with regard to winning future contests likely reflects the difficulties in directly measuring market shares in technology markets, rather than any real likelihood that alternative suppliers of IP with differing characteristics are equally likely to win future contests. For the foregoing reasons, we believe that it is generally unlikely that alternative suppliers in technology markets are equally likely to win future contests.

In addition, the notion that the 1/N rule is appropriate when there is competition “for the market” in technology markets does not stand up to scrutiny. The key to understanding why is to recognize that (1) technology markets are typically intermediate product markets and (2) competition “for the market” is typically associated with the consumption of products that exhibit a *consumer lock-in* effect.

Consumer lock-in, whereby consumers of a particular product are unwilling to purchase a different product with similar features at the same price, typically arises due to *network effects* and/or *switching costs*. Network effects refer to the increase in the value of a product to consumers as the number of consumers using that product rises.¹⁸ For example, the value of a telephone network to consumers typically increases as the network expands. Switching costs refer to costs that must be incurred by consumers of a particular product in order to switch to another product. Switching costs may arise naturally (e.g., the costs associated with learning how to use a piece of software or transaction costs) or may be imposed contractually (e.g., the penalty for early termination of a cellular phone service contract or discounts for repeat purchases via “frequent-flyer” programs).¹⁹

A consequence of consumer lock-in is that the size of the installed base for a product matters.²⁰ As more consumers adopt a technology, that technology becomes more attractive to other consumers due to network effects. Over time, the technology may become dominant, i.e., the market may “tip” to that technology. Once tipping occurs, the consumer lock-in effect (i.e., network effects and/or switching costs) tends to keep the technology dominant unless displaced by a significantly improved alternative. In other words, in markets with significant consumer lock-in, marginally better technologies offered by competing suppliers are unlikely to succeed. For an alternative technology to succeed, it must offer a substantial improvement in value to consumers, i.e., enough of an improvement to overcome the network effects and/or switching costs associated with the dominant technology.²¹ In addition, once a significantly improved technology displaces a previously dominant technology, then that improved technology tends to become the dominant technology in the market, once again due to the consumer lock-in effect.²² In markets with significant consumer lock-in, at any given point in time, most or all of the market tends to be dominated by a single technology, and hence suppliers are said to be competing “for the market.” Thus, significant consumer lock-in is usually what causes competition “for the market.” In contrast, in the absence of significant consumer lock-in, there need not be a single dominant technology in a market, and hence many suppliers may compete “in the market.”²³

Given the foregoing understanding of when competition “for the market” is likely, i.e., usually in the presence of significant consumer lock-in, we next analyze why the 1/N rule is particularly inappropriate when markets exhibit significant consumer lock-in. As noted above, technology markets are typically intermediate product markets.

Thus, any consumer lock-in effects will typically arise in downstream markets, i.e., in the markets for products and services produced using the IP purchased in technology markets.²⁴ With regard to downstream markets that exhibit consumer lock-in, there are two possibilities: (1) alternative suppliers have technology with similar value to consumers or (2) one supplier has technology that offers greater value to consumers than that offered by other suppliers. We argue that the 1/N rule is generally inapplicable to the upstream technology market in both cases.

If all suppliers in a downstream market offer technology of similar value to consumers, then the supplier with the largest installed base is more likely to win future contests, and hence the 1/N rule would not apply in the upstream technology market. It may be the case that all suppliers have similar technology, there is no installed base (i.e., the technology is brand new), and in addition there are no distinguishing characteristics that make one supplier more likely to win future contests than another. However, even in this unlikely case, the 1/N rule would not be applicable for very long, since the consumer lock-in effect would favor the supplier who managed to establish the largest installed base.

If, on the other hand, one supplier in a downstream market either has superior technology to begin with or has technology sufficiently superior to preexisting technology to overcome the consumer lock-in effect, then, once again, the 1/N rule would not apply in the upstream technology market. The supplier with the superior technology is more likely to win a future competition in the downstream market, and hence the superior technology is more likely to win in the upstream technology market. It may be the case that one supplier has superior technology while another supplier

has a larger installed base such that the value to consumers from purchasing a product or service produced using the alternative technologies is identical. However, as before, in addition to being unlikely, such a situation would not last for very long, since the consumer lock-in effect would tend to “tip” the market to one or the other supplier.

Conclusion

The 1/N rule for assigning market shares in technology markets, whereby each supplier of IP is assigned an equal share of the market, has been advocated in the antitrust literature, endorsed by antitrust agencies in certain circumstances, and utilized in practice. However, the existence of the 1/N rule likely reflects the difficulties in directly measuring market shares in technology markets rather than any real likelihood that alternative suppliers of IP are equally likely to win future competitions. Our analysis suggests that the conventional wisdom regarding the 1/N rule, i.e., it is appropriate when there is competition “for the market,” is wrong. In our experience, a better approach is to examine the relative success of competing technologies in the downstream markets in which the IP is utilized. That is, even when market shares are not directly measurable in a technology market, the technology choices made by suppliers in downstream markets, and the sales of products and services utilizing those competing technologies, can provide a basis for assigning shares among alternative suppliers in an upstream technology market.

¹ See Digital/Olivetti, 1994 Official Journal (L 309) 24.

² See In the matter of Summit Technology, Inc. and VISX, Inc., No. 9286, (FTC March 24, 1998).

³ See In Re Gemstar Development Corporation Patent Litigation, U.S. District Court, N.D. Georgia, MDL-1274-WBH (1999).

⁴ See In the matter of Rambus, Inc., No. 9302 (FTC June 18, 2002).

⁵ See *Broadcom Corp. v. Qualcomm Inc.*, U.S. District Court, New Jersey, Civil Action No. 05-3350 (MLC) (2005).

⁶ In the interest of full disclosure, we note that Michael Williams was an economics expert and Ashish Nayyar was a consultant for EchoStar, Pioneer, and Scientific-Atlanta in the Gemstar litigation. In addition, Michael Williams was a consultant for the FTC in the Rambus litigation.

⁷ U.S. Department of Justice and Federal Trade Commission, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY, § 3.2.2 (hereinafter “*IP Guidelines*”) (April 6, 1995).

⁸ *IP Guidelines*, § 3.2.2.

⁹ The *IP Guidelines* note that “the owner of a process for producing a particular good may be constrained in its conduct with respect to that process not only by other processes for making that good, but also by other goods that compete with the downstream good and by the processes used to produce those other goods.” *IP Guidelines*, note 19.

¹⁰ Gregory J. Werden (2002), *Assigning Market Shares*, ANTITRUST LAW JOURNAL, vol. 70, pp. 67-104, p. 67.

¹¹ U.S. Department of Justice and Federal Trade Commission, HORIZONTAL MERGER GUIDELINES (revised April 8, 1997).

¹² See Digital/Olivetti, 1994 Official Journal (L 309) 24.

¹³ Werden (2002), p. 85.

¹⁴ Werden (2002), p. 86 (footnotes omitted).

¹⁵ *IP Guidelines*, § 3.2.2 (footnote omitted).

¹⁶ *IP Guidelines*, § 4.3.

¹⁷ Confidentiality restrictions prevent the authors from identifying the cases at issue.

¹⁸ See, e.g., Jeffrey H. Rohlfs (1974), *A Theory of Interdependent Demands for Communications Service*, BELL JOURNAL OF ECONOMICS AND MANAGEMENT SCIENCE, vol. 5, no.1, pp. 16-37.

¹⁹ See, e.g., Paul Klemperer (1995), *Competition when Consumers have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade*, REVIEW OF ECONOMIC STUDIES, vol. 62, no. 4, pp. 515-539.

²⁰ See, e.g., Joseph Farrell and Garth Saloner (1986), *Installed Base and Compatibility: Innovation, Product Differentiation, and Predation*, AMERICAN ECONOMIC REVIEW, vol. 76, no. 5, pp. 940-955, and Michael Katz and Carl Shapiro (1986), *Technology Adoption in the Presence of Network Externalities*, JOURNAL OF POLITICAL ECONOMY, vol. 94, no. 4, pp. 822-841.

²¹ Examples of such improvements include the displacement of typewriters by word processing

software and the displacement of WordPerfect by Microsoft Word.

²² Thus, Microsoft Word, the currently dominant word processing software, replaced the previously dominant word processing software, WordPerfect.

²³ We note that, in general, there is no bright line that separates markets that exhibit competition “for the market” from markets that exhibit competition “in the market.” Thus, for example, although Microsoft Word displaced WordPerfect as the dominant word processing software, WordPerfect continues to exist, although its current sales are miniscule relative to the sales of Microsoft Word.

²⁴ Suppliers may also be vertically integrated, i.e., suppliers in the technology market may also sell the products and services produced using their IP. However, vertical integration does not affect our analysis regarding the appropriateness (or lack thereof) of the 1/N rule for assigning market shares in technology markets.

The Measurement of Economic Damages in Antitrust Civil Litigation¹

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Introduction

A violation of the antitrust laws that has an impact on some participants in the relevant marketplace creates damage. Price fixing, bid rigging, exclusive dealing, bundling, tying, quantity forcing, and many other actions of firms often produce a measurable damage. We discuss appropriate and inappropriate techniques for the measurement of economic damages in civil antitrust litigation. Although the analyses discussed herein are applicable to a broad set of environments, we focus on price fixing.

But-For Pricing Analysis

Consider an industry where a homogeneous product is manufactured by four domestic firms. Demand for the product is relatively inelastic, but demand for the product of a given producer is highly elastic. Specifically, buyers view the products of different producers as very good substitutes for one another but, overall, buyers cannot easily substitute away from the use of this product. Both demand and costs are influenced by a number of distinct factors, only a subset of which are observable, and many of these factors vary through time. Entry is a potential threat, although there are barriers. There are government regulations that influence firms' costs, and the regulatory environment is shifting. Finally, there are foreign producers who will

occasionally sell into the domestic market, depending upon exchange rates and market prices.

Suppose the four firms have pled guilty to participating in a price-fixing conspiracy from 1996 to 2003. A group of plaintiffs has been assembled who wish to seek compensation for the damage they suffered during the conspiracy. How should an economist measure these damages? Specifically, how can an economist make a determination of the price that would have existed in the market had there not been a conspiracy, where the difference between this "but-for" price and the actual price provides a measure of the per unit impact of the conspiracy?

An important observation about this measurement problem, like nearly all measurement problems in economics, is that it is inherently non-experimental. Nevertheless, a starting point is to consider the pure hypothetical of an ideal experimental setting. An experimental approach to this problem would allow an economist to create two distinct and wholly separate marketplaces for the product in question. All factors affecting price in each would be identical, and their effect on price would be observable and measurable. A "treatment" would be applied in one group for a specific period of time, namely, collusion among the firms would occur, whereas in the other group, the control group, non-collusive behavior would remain intact. The realized prices between the treatment and control group would be equal prior to the treatment (collusion) but would differ during the treatment, where the difference would provide a clear measure of the impact of the collusion. Measurement of this difference would be relatively simple. The non-experimental nature of real-world economic data implies that the measurement of the treatment effect (collusion) will likely

be far more complicated than this. What is the nature of these complications and what pitfalls can occur by not taking these into account?

Given the absence of an experimental control group that has not received a treatment, a non-collusive “benchmark” is usually taken as a starting point. The benchmark may be a period of time, like the pre-plea period. Or, the benchmark may be a different region where it is reasonable to believe that collusion was absent. In the price-fixing example being considered here, we will assume that the benchmark is the pre-plea period.²

One simple statistical method for attempting to determine a but-for price is regression analysis. The idea is to explain the price of the commodity in question with factors that may influence demand and costs, where special allowance is made for the possibility of an increase in price during the plea period as a consequence of the cartel behavior. In the vernacular of regression analysis, such a regression would include price as the dependent variable and demand and cost shifters as the explanatory variables, together with a cartel “dummy” variable, coded “1” for cartel period observations and “0” otherwise, that indicates the time periods impacted by the cartel. The coefficient of this cartel dummy is supposed to capture the impact on price from the collusive behavior. We argue that this method, although seemingly sensible, is almost always misleading and highly vulnerable to manipulation.

Pitfalls for But-For Analysis

In any statistical analysis of but-for prices, whether or not it is based on the dummy variable approach, particular care must be exercised in assessing the legitimacy of the cost and demand shifters included as

explanatory variables. Consider a typical explanatory variable such as the price of a factor input. If the factor input in question is a commodity used in many industries for multiple purposes then it may indeed be appropriate to include in the simple regression. If instead the factor input is primarily used to manufacture the product in question, then it may be the case that the cartel is not only influencing the price of the product, but is also using its new-found bargaining power to impact the price of the factor input. Of course, the cartel would act so as to depress the price of the factor input. But if this effect of the cartel is ignored and the cartel-impacted factor price is included in the regression analysis, then the resulting but-for price may be biased since part of the effect of the cartel will be absorbed by the cartel-impacted factor price.

Although these concerns apply to statistical analysis generally, the consequences of including such a variable in the usual dummy variable regression approach are worth understanding in a little more detail. Specifically, during the benchmark period, an increase in the factor price will have a particular impact on the price of the product, and since there is no cartel, the cartel can have no impact on this factor price. During the plea period, however, the impact of the factor price on the product price would appear far greater, since the cartel is using its bargaining power to reduce the factor price, while at the same time it is using its market power to raise the product price. The simple dummy variable model forces the response to this factor input to be identical for both periods, with the result that the estimated impact of the tainted factor tends to split the difference between the different impacts of the two periods. This leads to an apparent greater impact being attributed to the tainted factor (though not as large as would be seen in the plea period alone) and a lesser impact being attributed to the cartel.

An economist employed by a defendant may inappropriately reduce a damage estimate by including such variables in his or her statistical analysis.³

Similar phenomena can occur on the demand side of the market. Suppose that firms advertise prior to the collusion solely in an attempt to differentiate their product from other producers (i.e., they are engaged in a “zero-sum game” of pursuing each other’s customers), but when collusion begins, the firms jointly decide to reallocate their advertising funds exclusively to increasing demand for the product as a whole (i.e., instead of “firm X’s product is better than firm Y’s product” the advertising becomes “the industry’s product is good because...”). Of course, it is unlikely that a firm acting non-cooperatively would advertise for the industry as a whole since it could incur the full cost of the advertising while only realizing a fraction of the benefits. In this scenario, the advertising expenditures should have no impact on price during the benchmark period, but during the plea period, advertising expenditures should have a positive impact on price solely due to the cartel’s coordinated efforts in this regard. Inclusion of advertising expenditures in any statistical analysis will capture part of the cartel’s impact in the plea period. As in the cost shifter example above, use of the standard dummy variable regression will force the estimated impact of advertising to be the same across both the plea and ex-plea periods, thus tending to result in an apparent overall impact that splits the difference between the different impacts in the two periods.

The message of these examples is that use of explanatory variables that are impacted by the cartel can easily lead to misleading estimates of but-for prices. The standard dummy variable approach provides an especially fertile framework for generating

misleading results using such variables because of the way it can mask what is going on behind the scenes. One can avoid being misled by always asking whether the included explanatory variables measure marketplace fluctuations that are outside of the influence of the cartel.

Even legitimate cost and demand shifters (those not impacted by the cartel) generally have different impacts on price in different competitive regimes. For example, firms engaging in coordinated behavior may be engaging in supply restrictions to keep prices inflated and so be less responsive to increases in customer demand in terms of the quantity brought to market. They may also have a reduced sensitivity to input prices outside their control. Just as in the above examples, if we estimate the dummy variable regression model described above without explicitly accounting for the different effects of the cost and demand shifters in the collusive period, we will obtain coefficients on the demand and factor price variables that capture not only their own impact, but also in part the impact of the cartel. To obtain an accurate measure of the impact of the cartel, the econometrician must be able to separately account for these differences in response.⁴

Usually it is impossible to accurately measure every legitimate cost and demand factor that may impact prices. Unobservable cost and demand factors thus almost always play a role in price determination. For example, natural gas may be an important input to the firm, but one may not have access to the actual natural gas prices paid by the firm under its contracts. Consequently, this important cost factor is not observable. Just as is the case for observable cost and demand factors, the impact of the unobservable factors may differ between plea and ex-plea periods. Further, the distributions of the

unobservable factors may differ between periods. For example, the price of natural gas may be much higher on average during the cartel period for reasons unrelated to the cartel. Leaving the price of natural gas out of the analysis will potentially result in a highly misleading damage estimate.

Fortunately, however, observable natural gas market price index series can serve to proxy for the unobservable actual price paid, as long as the relation between the actual price and its proxy is not affected by the cartel, usually a plausible assumption. Omitting proxies for important unobservable cost or demand factors whose impact and/or distribution change between periods can thus deliver misleading damage estimates, whereas the inclusion of proper proxies makes it possible to avoid this pitfall.

Interestingly, even though proxies of this sort constitute error-laden measurements of relevant variables, their inclusion in a model that properly separates the impacts of cost and demand factors between the plea and ex-plea periods need not have an adverse impact on the estimated effect of the cartel. Generally, use of such error-laden variables results in “errors-in-variables” bias.

However, it can be shown that using properly chosen proxies delivers a cartel effect estimate free of this bias.⁵ The other coefficients no longer necessarily estimate the effects of their associated variables, but this is of no consequence because only the effect of the cartel is of interest.

Another source of misleading damage estimates is the inclusion of variables that follow a similar pattern to (and are therefore highly correlated with) a price that has been affected by the cartel but that are in fact irrelevant to the determination of that price. Consider an intermediate product that is irrelevant to the production of the cartel’s product, but is mistakenly thought to be a factor input. If this “factor input” price

happens to have a trend similar to that of the industry’s product outside the plea period and if its trend happens to accelerate during the plea period when the collusion becomes effective and the product price increases, then this variable will “explain” much of the collusive price movement. But this result is spurious and will lead to a mismeasurement of the but-for price since trending variables “explain” other trending variables even if there is no underlying relationship between the two. Clearly such variables have no legitimate role to play in measuring the effect of a cartel.

It will thus be possible for an economist to “explore” many different variations of the statistical model (for example using the usual dummy variable regression) until “good” results are obtained. This kind of data mining is often difficult for a court to understand.

Avoiding the Pitfalls

There is an alternative methodology that addresses the concerns enumerated above. This approach is based on the fact that it is typically possible to build a predictive model of product price using data from the benchmark period. Specifically, price at a point in time can be predicted by its own lagged values as well as a set of predictors that capture demand fluctuations, cost fluctuations, and other relevant factors, such as the penetration of the domestic market by foreign producers and changes in government regulations. Except for lagged prices, the included predictors should be free of any impact of the cartel, and may be either direct measures of relevant cost and demand shifters or proxies for them. The impact of the cartel on lagged prices is straightforwardly accounted for in the process for computing but-for prices described below. The advantages of including the lagged values of price in this

formulation are numerous. Perhaps most noteworthy is that a lagged value is both predetermined and contains many of the factors influencing price that are difficult to measure.⁶ The predictive model is fitted only to the data of the benchmark period.

Objective statistical criteria are used to determine the inclusion or exclusion of legitimate predictors. These criteria select predictors based on their ability to improve the forecast accuracy of the econometric model during the benchmark period.⁷ Such criteria penalize the practice of including additional variables that may boost the in-sample fit (“R-squared”), but lead to a poor forecast performance.⁸ As the above discussion makes clear, variables that are not directly relevant for price determination, or are not proxies for unobservable relevant cost or demand factors, must not be included in the model.

Once the dynamic predictive model is built, it can be used to generate a counterfactual price over the period that the cartel operated. To construct but-for prices, prices are initialized at their level just prior to the plea (or alleged conduct) period and their predicted values are rolled forward through the plea period. In this process, each subsequent price is predicted using the actual values of the predictors and the forecast (but-for) values of lagged price. The constructed but-for prices directly embody observed market pricing dynamics for the non-conduct period, while accounting for changes in input costs, market demand, and other economic factors outside the cartel’s control during the plea period. In particular, the lagged prices used in this construction are free of the impact of the cartel as they rely solely on variables that are not impacted by the cartel and on the non-cartel predictive price relation.

The dynamic forecast environment further affords an opportunity to check the validity of the model’s predictions. After the cartel ceases operations and the market returns to its long-term growth path following the operation of the cartel, we would expect an accurate dynamic forecast to align with what actually occurred, even though there is nothing anchoring the prediction to the actual price level. This need not be the case, however, if, for example, higher than average profits earned during the cartel increased the likelihood of industry restructuring or merger activity.

Summary

A deep understanding of economic theory and measurement is not required to seriously probe the validity of the inclusion, or exclusion, of certain variables from a statistical model. An attorney can look at any statistical model and determine if it has been estimated using all time periods or only those outside the plea period. If the former, an attorney can check whether a cartel dummy has been included and whether it is included alone or it is fully interacting with all the variables of the model. An attorney can look at any statistical model and identify those variables that are being treated as “explanatory.” An attorney can also make a reasonable judgment as to whether explanatory variables are potentially impacted by the cartel. An attorney can examine whether included variables are appropriate proxies for unobservable cost or demand factors or if they are instead irrelevant variables included to reduce or augment the apparent effect of the cartel. Depending on the results of this examination, an attorney can assess the possibility that the resulting damage estimates are misleading.

To assist in this assessment, we offer the following points in summary.

1) The manipulability of the standard dummy variable approach is due to the misspecification arising from not interacting the dummy variable with the cost and demand shifters. Cost and demand shifters generally have different predictive coefficients in cartel and non-cartel regimes, due to the varying responsiveness of the firms in the industry to these factors between regimes.

2) Regardless of whether or not a dummy variable approach is used, misleading results will arise from including variables impacted by the cartel.

3) Misleading results can also arise from including irrelevant variables whose time paths have shapes similar to that of the price path.

4) A final source of misleading results is the omission of proxies for unobservable cost and demand shifters that are both (a) important determinants of price and (b) have distributions that differ for non-causal reasons between the cartel and non-cartel periods.

5) The predictive model approach works because it effectively includes the necessary interactions by estimating only on ex-cartel data, excludes variables impacted by the cartel, excludes irrelevant variables, and includes proxies for relevant unobservables.

by those supporting a particular side of a case until a “good” result is obtained.

⁴ One means of accomplishing this is to fully interact (i.e., multiply) the dummy variable with each of the cost and demand factors.

⁵ White (2006) supra note 1.

⁶ Using lagged prices to help predict the value of current prices allows for a dynamic pattern of price adjustment.

⁷ Methods of cross-validation hold out a subset of the benchmark period observations from the estimation of the model and then check how well the model can forecast those observations. This process is repeated with different observations held out each time to assess how well the model predicts observations that it has not seen.

⁸ The practice of including additional variables that boost in-sample performance and diminish predictive performance is known as “over-fitting.”

¹ The foundational support for many of the analyses presented in this paper can be found in Halbert White, “Times Series Estimation of the Effects of Natural Experiments,” *Journal of Econometrics*, 2006 (in press).

² Note that once firms have ceased their conspiratorial behavior, there may be lingering effects of the cartel in the marketplace. Thus, post-plea data will require special consideration.

³ The direction of the bias is actually difficult to determine a priori. However, the data can be “mined”

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