Theon van Dijk & Frank Verboven, *Quantification of Damages*, *in* 3 ISSUES IN COMPETITION LAW AND POLICY 2331 (ABA Section of Antitrust Law 2008)

Chapter 93

QUANTIFICATION OF DAMAGES

Theon van Dijk and Frank Verboven*

This chapter provides a general economic framework for quantifying damages or lost profits in price-fixing cases. We begin with a conceptual framework that explicitly distinguishes between the direct cost effect of a price overcharge and the subsequent indirect pass-on and output effects of the overcharge. We then discuss alternative methods to quantify these various components of damages, ranging from largely empirical approaches to more theory-based approaches. Finally, we discuss the law and economics of price-fixing damages in the United States and Europe, with the focus being the legal treatment of the various components of price-fixing damages, as well as the legal standing of the various groups harmed by collusion.

1. Introduction

Economic damages can be caused by various types of competition law violations, such as price-fixing or market-dividing agreements, exclusionary practices, or predatory pricing by a dominant firm. Depending on the violation, there are different parties that may suffer damages, including customers (direct purchasers and possibly indirect purchasers located downstream in the distribution chain), suppliers, and competitors. Even though the parties damaged and the amount of the damage may be clear from an economic perspective, in the end it is the legal framework within a jurisdiction that determines which violations can lead to compensation, which parties have standing to sue for damages, and the burden and standard of proof that must be met by plaintiffs and defendants.

Quantification of damages may be required in both public and private enforcement of competition laws. In public enforcement, damages may be quantified as part of the decision by a competition authority regarding the appropriate fine to impose. In addition, victims of cartel activity in some countries may recover damages in the course of the enforcement proceedings by the competition authority. For the most part, however, quantification of damages arises in private enforcement of competition laws. Private enforcement often follows from a finding of a competition law violation by the public authorities. In the United Sates, where private enforcement is much more common than in Europe, the standard of proof for showing an antitrust injury varies depending on the type of case.[1] Once an antitrust injury has been established, plaintiffs

* Lexonomics; Catholic University of Leuven and CEPR.

1. For example, under the 1890 Sherman Act, price-fixing agreements are per se illegal in the United States. This means that prosecutors need to prove beyond a reasonable doubt that an agreement was made but need not prove that the agreement was actually implemented or that it raised prices and caused injury. Only parties that can establish that a price-fixing agreement was the direct and identifiable cause of their injury are said to have antitrust standing. *See* ABA SECTION OF ANTITRUST LAW, PROVING ANTITRUST DAMAGES: LEGAL AND ECONOMIC ISSUES (1996); John M. Connor,

and defendants frequently put forward damages estimates prepared by their economic experts. In addition, quantification of damages is often an important part of the settlement negotiations between the parties.

This chapter provides an overview of the economic principles and methods used to quantify damages. We focus on quantifying the damages associated with price-fixing agreements, although at the end of the chapter we briefly discuss damages due to other competition law violations. We also focus on the damages to a cartel's direct purchasers.[2] Section 2 develops a general economic framework for analyzing the damages experienced by a firm that must pay an artificially high price for an input but has the possibility of passing on at least some of the cost increase in the form of higher output prices. This framework decomposes the damages from collusion into a direct cost effect and two indirect effects. The direct cost effect represents the higher cost faced by the purchaser and is measured as the price overcharge multiplied by the number of units purchased at the collusive price. The indirect effects consist of the pass-on effect and the output effect. The pass-on effect reflects the extent to which the purchaser can shift the burden of the price overcharge to its customers. The output effect refers to the sales that may be lost when part of the price overcharge is passed on to the customers.

After the conceptual economic framework is presented, Section 3 discusses issues related to quantifying the direct cost damages, while Section 4 discusses issues related to quantifying the pass-on effect. Section 5 discusses the difference between the United States and Europe with respect to the legal treatment of the pass-on defense and ends with a policy discussion of the merits of allowing such a defense. Section 6 briefly situates the preceding discussions within the broader context of lost profits analysis in general. Section 7 provides a summary and conclusions.

2. An economic framework for assessing price-fixing damages

The concept underlying most economic damages assessments is that of the "but-for" world. In the case of a price-fixing agreement, the but-for world represents the economic outcome that would have occurred without the agreement. The difference between this counterfactual world and the actual world provides the measurement of damages. For example, in the case where a cartel's direct customer is a downstream firm, economic damages are the difference between the actual profit and the profit the firm would have made in absence of collusion, all else equal.

In principle, price-fixing damages may be determined by considering the impact of the collusive input price on the profits of the purchaser plaintiff. In practice, some jurisdictions consider only the direct impact of the collusive input price on the costs incurred by the purchasers and do not consider subsequent indirect effects on the price and output of the direct purchaser. Consequently, it is instructive to start with a

---

Archer Daniels Midland: Price Fixers to the World (Purdue University, Department of Agricultural Economics, Staff Paper 00-11, 2000).

2. For an extension of our framework to damages on indirect purchasers or consumers we refer to Frank Verboven & Theon van Dijk, Cartel Damages Claims and the Passing-On Defense (CEPR, Discussion Paper 6329, 2007).

framework that decomposes the actual economic damages of the direct purchaser into the direct cost effect and possible indirect effects.

The relevant question is how the increased costs from paying the collusive input price translate into reduced profits. If the input price increase relates to a fixed input, there are no further effects and the damages may be computed as the price overcharge from the cartel multiplied by the quantity of the input purchased by the plaintiff.[3] In contrast, if the input price relates to a variable input, there may be additional indirect effects. The plaintiff may pass on some or all of the variable cost increase by raising its own price. That price increase may in turn lead to a reduction in the output sold by the plaintiff firm.[4]

To understand these various effects more precisely, consider a plaintiff firm charging a price p and selling a total output q. For simplicity, assume that the plaintiff requires one unit of input from the cartel per unit of output and does not need any other inputs. The price of this input prior to collusion, i.e., the but-for price, is constant and equal to c. The plaintiff's actual profits π in the but-for world are then given by the price-cost margin, $p - c$, multiplied by total output sold:

$$\pi = (p - c)q \tag{1}$$

It is now possible to consider the various channels through which a variable cost increase due to a collusive input price affects the plaintiff's profits. Using Δ to refer to a (small) change of a variable from its actual world value, the change in profits $\Delta\pi$ of the plaintiff due to the cartel price can be decomposed into the sum of three possible changes:

$$\Delta\pi = -q\Delta c + q\Delta p + (p - c)\Delta q \tag{2}$$

Note that $\Delta\pi$ represents the profits in the actual (cartelized) world less the profits in the but-for world. We discuss each of the three terms in Equation (2) in turn.

Direct cost effect. The first term ($-q\Delta c$) is the direct cost effect of the cartel on the plaintiff's profits. It represents the increase in variable cost per unit due to the cartel (Δc) multiplied by the total output of the plaintiff. Equivalently, it is the *price overcharge* (the cartel price minus the but-for price), multiplied by the total inputs purchased by the plaintiff from the cartel.[5] This effect on profits is negative and forms the basis for damages claims in both the United States and Europe.

---

3. One could argue that an increase in fixed costs may lead to additional effects because the increased costs reduce the incentives for innovation or product development. For simplicity, we do not consider such dynamic effects in this chapter.
4. In the case where the plaintiffs are final customers, there are no subsequent price effects to be considered and damages equal the price overcharge times the number of units of the cartelized input actually purchased.
5. This equivalence follows from the assumption that the plaintiff requires one unit of input from the cartel per unit of output, and does not require any other inputs. However, it is straightforward to extend this framework to more general constant marginal cost technologies with several inputs. *See* Verboven & van Dijk, *supra* note 2.

The second and third terms of Equation (2) refer to the indirect effects from the collusive price, i.e., the subsequent effects on the plaintiff's price and output that follow from the increase in the variable costs per unit associated with the price overcharge (Δc).

Pass-on effect. The second term ($q\Delta p$) is the increase in revenue that follows if some of the cost increase is passed on in the form of higher prices (Δp). The impact of the pass-on effect on profits is typically positive ($\Delta p > 0$), thus acting to counteract at least some of the direct damages. The pass-on effect may then be used as a starting point for computing a discount or an offset to the direct cost damages claims, provided the legal jurisdiction allows for the consideration of such factors.

Output effect. The third term ($(p - c)\Delta q$) is the lost profit associated with any lost sales. It is comprised of the reduction in output due to the cartel (Δq) multiplied by the price-cost margin in the but-for world ($p - c$). The output effect is typically negative, unless the plaintiff's market is perfectly competitive ($p = c$). As the plaintiff's market becomes less competitive, the importance of the output effect increases. If the plaintiff is a pure monopolist, the negative output effect will completely counteract the positive pass-on effect.[6] The output effect is frequently ignored by the parties, even when the pass-on effect is considered. Unless the plaintiff's market is perfectly competitive, this is incorrect and may lead to significant understatement of lost profit damages.

Based on this general economic framework, we now discuss empirical methods to assess price-fixing damages. We focus on methods to assess the direct damages from the collusion because this has a strong legal basis in the United States and Europe. (See Section 5 for a discussion of differences in antitrust standing between the United States and Europe.) In addition, we discuss methods to assess the pass-on effect. From a purely economic standpoint, the pass-on and output effects should always be considered, but in most jurisdictions they are not considered in calculating direct purchaser damages. The same economic concepts are involved, however, in indirect purchaser claims, and some jurisdictions allow such claims.

3. Quantifying direct cost damages

This section discusses practical empirical approaches to measuring the direct cost damages suffered by customers who purchased products from cartel members. These damages should be computed over the entire period during which the collusion took place.[7] The challenge primarily lies in estimating the price overcharge, which is the difference between the actual price charged during the collusive period and the hypothetical price that would have occurred but for the collusion.

There are two general approaches for assessing the price overcharge. The first approach quantifies the price overcharge by comparing the actual cartel prices to prices

6. For a more detailed analysis of the relationship between the pass-on and the output effect in a general economic framework, see Verboven & van Dijk, *supra* note 2; *see also* George Kosicki & Miles B. Cahill, *Economics of Cost Pass Through and Damages in Indirect Purchaser Antitrust Cases*, 51 ANTITRUST BULL. 599 (2006).

7. For an overview of empirical studies affecting cartel success and longevity, see Margaret C. Levenstein & Valerie Y. Suslow, *What Determines Cartel Success?*, 44 J. ECON. LIT. 43 (2006); *see also* John M. Connor & Yuliya Bolotova, Cartel Overcharges: Survey and Meta-Analysis (Purdue University, Department of Agricultural Economics, Working Paper, 2005).

that have not been tainted by collusion. These benchmark prices may include pre- or postcartel prices, prices in comparable markets, or prices in the same market in comparable countries. The second approach directly constructs the but-for price using analytical methods. The methods range from a simple cost-plus framework to a complete simulation analysis that involves building an economic model of the market under conditions where there is no collusion.[8]

3.1. Assessing the price overcharge using benchmark prices

The first approach to estimating the overcharge is largely empirical and does not require making specific economic assumptions about the market. In econometric terms, this approach may also be referred to as a reduced form approach (as opposed to a structural modeling approach). Within this approach, the "before-and-after" and the "yardstick" methods can be distinguished.

The before-and-after method. In this method the prices that prevailed before and after the collusive period are used to estimate the prices that would have emerged during the collusive period had the collusion not taken place. To the extent that cartel prices differ in a statistically significant way from the pre- and postcartel prices, it may be possible to attribute the difference to collusion. The before-and-after approach is usually implemented within a multiple regression framework in which one estimates the price over the entire period (conspiracy and benchmark period) and includes an indictor (or "dummy") variable that is equal to one during the conspiracy period and zero otherwise. The estimated coefficient associated with this dummy variable then measures the amount of the price overcharge. For this interpretation to be valid, however, control variables that account for other factors that affect prices must be included, particularly if there is chance that these factors are correlated with the conspiracy period. Failure to include such controls may result in an inference of significant damages when in fact prices simply reflect changes in competitive market conditions.

For example, suppose that one has data on prices during and after the cartel period, and suppose that there was an increase in imports starting around the time the cartel ended. These imports would likely result in reduced prices regardless of whether there had been a cartel. Therefore, a failure to control for these imports would lead one to confuse normal competitive pressure with a cartel breakdown, thereby overstating the effect of the collusion. More generally, the before-and-after approach should include any determinants of price that changed during the period of observation. These variables include demand factors (e.g., gross domestic product, prices of substitutes) and cost factors (e.g., input prices, capacity usage).

More sophisticated versions of the before-and-after method allow for a statistical determination of the beginning and the end of the cartel period (endogenous structural break analysis), as well as gradual price changes around the beginning and the end of the

8. *See, e.g.*, John M. Connor, *Global Cartels Redux: The Amino Acid Lysine Antitrust Litigation (1996)*, *in* THE ANTITRUST REVOLUTION 252 (John E. Kwoka, Jr. & Lawrence J. White eds., 4th ed. 2004); EMILY CLARK, MAT HUGHES & DAVID WIRTH, STUDY ON THE CONDITIONS OF CLAIMS FOR DAMAGES IN CASE OF INFRINGEMENT OF EC COMPETITION RULES: ANALYSIS OF ECONOMIC MODELS FOR THE CALCULATION OF DAMAGES (Ashurst Study for the European Commission, 2004).

cartel period (dynamic analysis).[9] While such refinements are sometimes important, these methods are significantly more complex and may involve a loss of transparency.

Several authors have recently suggested that a comparison of the actual and postcartel prices may lead to an underestimation of the price overcharge. Connor argues that implicit or tacit collusion is more likely after explicit collusion because firms may have learned ways to coordinate their behavior during the period of explicit collusion.[10] Harrington shows that because damages estimates may be based in part on postcartel prices, there is an incentive for parties to price above the noncollusive level in the postcartel period.[11] Both arguments suggest that precartel price information is the more appropriate benchmark.

The yardstick method. The yardstick method is similar in spirit to the before-and-after method. It compares the cartel price to prices in similar markets where there are no allegations of collusion. These yardsticks can be other product markets in the same state or country that are similar in terms of demand, cost, and market structure conditions, or they can be the same product markets in other states or countries. As in the before-and-after approach, it is necessary to control for as many differences across the markets, states, or countries as possible (e.g., differences in income, input costs, capacity usage, etc.).[12]

3.2. Assessing the price overcharge when benchmark prices are not available

The second approach to estimating price overcharges constructs the competitive but-for price using information about cost and demand conditions in the market during the collusive period. There are several methods that can be characterized in this way: the cost markup approach, simulation analysis, and critical-loss analysis. Each approach then attempts to predict the price in the market under the assumption that there is no collusion.

Cost markup method. This method involves collecting information on production costs and estimating the competitive price on the basis of some measure of costs per unit plus a markup for "reasonable" profit. Various cost measures have been used in this approach, including short-run incremental costs, long-run incremental costs, or average unit production costs. Which of these is most appropriate in a particular case depends in part on the time horizon taken in the analysis. From an economic perspective, fixed costs should not play a role in determining the optimal price in the short run. In the long run, however, price must be set in a way that covers all costs.

Cost data are typically derived from the accounting systems or management information systems of the companies involved. However, attention should be given to

---

9. For a discussion of these approaches, see Joseph E. Harrington, Jr., *Detecting Cartels*, *in* HANDBOOK OF ANTITRUST ECONOMICS (Paolo Buccirossi ed., 2008).
10. *See* Connor, *supra* note 8.
11. *See* Joseph E. Harrington, Jr., *Post-Cartel Pricing During Litigation*, 52 J. INDUS. ECON. 517 (2004).
12. *See, e.g.*, John E. Lopatka, *Overcharge Damages for Monopolization of New Economy Markets*, 51 ANTITRUST BULL. 453, 490 (2006). Lopatka notes that the yardstick approach was used by the plaintiffs' experts to estimate damages in consumer class action lawsuits against Microsoft.

the fact that accounting cost data are not the same as economic cost data.[13] For example, an accounting system amortizes fixed costs and generates annual depreciation costs that will be different from those associated with economic depreciation, which represents the actual decline over time in the market value of an asset.

The costs per unit of production plus a "reasonable" profit markup are then taken as an estimate of the competitive price. In utilizing this method, one must keep in mind that the but-for world may be characterized by imperfect competition and that the noncollusive price may be well above both long-run marginal and average cost. In addition, unit costs may be inflated as the cartel lowers output below the competitive level.

There is no simple way to determine a "reasonable" profit margin to be added to the production costs, but such determinations are typically made on the basis of the firm's weighted average cost of capital.[14] In addition to difficulties involved in estimating a firm's cost of capital, it is important to keep in mind that even in highly competitive markets firms should be able to earn profits for superior efficiency or innovation, and that without these incentives there is the potential for productive and dynamic inefficiencies. Moreover, while competition is a dynamic process that leads to a long-run equilibrium characterized by "reasonable" profits, various factors may disturb this adjustment, and short-run profits may be temporarily higher or lower than long-run profits.

Simulation analysis. Another approach to quantifying damages when benchmark price data are not available is to specify an economic model that incorporates information on demand and cost conditions and the nature of oligopolistic behavior in the market under consideration. Such an economic model can be calibrated using information on observed prices and margins, price elasticities of demand, cost structures, and market shares. When the model is completely specified in this way, it is possible to carry out counterfactual simulations, i.e., ask how the equilibrium prices would change once the collusion no longer exists. This simulation approach could also be used to provide information about margins in the but-for world that could then be applied to specific cost data.

The simulation approach has proven to be a useful tool in merger analysis,[15] and an important advantage is that it makes the economic assumptions more transparent. The main challenge in applying the simulation approach is the specification of the nature of oligopolistic behavior. The simulation results may be sensitive to how one models

---

13. For more on the difference between accounting and economic cost data, see Franklin M. Fisher & John J. McGowan, *On the Misuse of Accounting Rates of Return to Infer Monopoly Profits*, 73 AM. ECON. REV. 82 (1983).

14. For more on "reasonable" profit margins and cost of capital estimation, see U.K. OFFICE OF FAIR TRADING, ASSESSING PROFITABILITY IN COMPETITION POLICY ANALYSIS (Economic Discussion Paper No. 6, 2003) (a report prepared for the U.K. Office of Fair Trading by Oxera).

15. For early U.S. applications, see Jerry Hausman, Gregory Leonard & J. Douglas Zona, *Competitive Analysis with Differentiated Products*, 34 ANNALES D'ÉCON. STAT. 159 (1994); Gregory Werden & Luke Froeb, *The Effects of Mergers in Differentiated Products Industries: Structural Merger Policy and the Logit Model*, 10 J.L. ECON. & ORG. 407 (1994). For a European application, see Marc Ivaldi & Frank Verboven, *Quantifying the Effects from Horizontal Mergers in European Competition Policy*, 23 INT'L J. IND. ORG. 669 (2005).

actual cartel behavior as well as behavior in the but-for world. For example, in describing litigation related to the lysine cartel, Connor points out that the defendants put forward the argument that the lysine industry has an oligopoly structure and that conditions are such that implicit price coordination would keep prices substantially above the long-run competitive price.[16] In contrast, plaintiffs tend to argue that the market without collusion would be intensely competitive and that the cartel's impact was therefore considerable.

While disputes about the appropriate specification of oligopolistic behavior may limit the usefulness of this approach, the advantage is that the modeling exercise helps to focus debate over the factors that shape competition in the market at issue. On balance, the simulation approach tends to be quite useful, especially if it is used as a complement to (rather than a substitute for) a cost-based approach.

Critical loss analysis. This approach calculates the defendant's break-even point for lost sales given a particular price increase and so may provide an upper bound on the price increase that would be profitable for the cartel. To illustrate, suppose the price overcharge has been estimated as, say, 15 percent above the competitive price.[17] Suppose further that, given the typical cost structure and contribution margin of cartel members, the largest reduction in sales the firm could sustain without a reduction in profits would be 30 percent. That is, if more than 30 percent of sales is lost, a 15 percent price increase is no longer profitable.[18] If the actual loss associated with a 15 percent price increase has been estimated at more than 30 percent, then this analysis suggests that the price overcharge estimate of 15 percent is not plausible. Alternatively, one could go further and compute the price increase that would just bring the break-even loss in sales equal to the actual loss. This price increase would represent an economically logical upper bound on any overcharge estimate.

Summary. The price overcharge from collusion can be estimated in various ways, all with different strengths and weaknesses. The competitive benchmark approach has the advantage of relying on "hard evidence" from actual prices pre- or postcollusion, or possibly prices in other comparable markets where no collusion is alleged. This approach requires, however, that there be sufficient data to construct a reasonable competitive benchmark. It is also necessary to control for other determinants of price that have changed over time or differ across markets, but that may be correlated with the collusive period. An in-depth benchmark approach, while simple in principle, may be complex in practice, so it is necessary to keep the assumptions and methods transparent and to conduct a careful sensitivity analysis.

---

16. *See* John M. Connor, *"Our Customers Are Our Enemies:" The Lysine Cartel of 1992–1995*, 18 REV. IND. ORG. 5, 17 (2001).
17. Typically, the overcharge is expressed as a percentage of the actual price, not the but-for price. Any overcharge expressed in terms of the actual price, however, can be transformed into a percentage of the but-for price. For example, an overcharge that represents a 10% reduction from the actual price will represent an 11.1% increase over the but-for price.
18. For a discussion of the formula determining the break-even reduction in quantity, see Barry C. Harris & Joseph J. Simons, *Focusing Market Definition: How Much Substitution Is Necessary?*, 12 RES. L. & ECON. 207 (1989).

When there is no information available to serve as a reasonable competitive benchmark, one may assess the overcharge using more theoretically based approaches, but such approaches will inevitably require additional assumptions. The cost-based method requires the use of accounting information and estimates of a reasonable competitive margin. At the other end of the spectrum, the simulation approach typically avoids the need for accounting cost data, and it has the potential of better modeling the competitive margin based on explicit assumptions about oligopolistic behavior. However, this approach has the risk of culminating in theoretical debates about the most appropriate oligopoly model to use. Critical loss analysis may provide an upper bound estimates of the overcharge, but it is not option for creating a precise overcharge estimate.

3.3. Other issues affecting direct damages

In addition to the main issue of assessing the overcharge from collusion, there are several additional factors that need to be considered to quantify the direct damages. It is necessary to properly define the collusive period and measure the total sales that were subject to the overcharge. In addition, there is the issue of how damages faced by an individual cartel member should relate to the role of that member in the cartel. A final question is whether one should account for the plaintiff's efforts (or lack thereof) to mitigate the effects of the collusion.

Total purchases over the collusive period. Even if a price-fixing agreement has been established, plaintiffs and defendants are likely to disagree on exactly when the agreement started and when it stopped. In addition to direct evidence from diaries, recordings, memos, or e-mails mentioning actual discussions on price, there are statistical techniques to assess the timing and duration of the collusion. An example of such a technique is the structural break analysis referenced previously in Section 3.1. Once the collusive period has been established, the actual sales purchased from cartel members is typically constructed from invoices and other accounting records of the purchaser. Determining the actual sales may be complicated by volume, early payment, and bundled discounts, rebates, and shipping costs.

Individual cartel member's role within the cartel. The role that an individual cartel member played in the cartel may be important in the liability stage of the case, but it could also be taken into account when assessing damages. Some cartel members may have had a leading role in establishing and maintaining the cartel, while other cartel members may have merely been followers. If one wished to differentiate damages according to the roles played within the cartel, the damage share of a single member could be expressed as some deviation from the actual share of sales, i.e., the damages share could be adjusted upwards if that member had a leading role or lowered if the member was more of a follower.[19] While it may be desirable to account for these different roles from the perspective of deterrence, the typical legal practice is to regard

19. For example, the European Commission took into account the roles (leader or follower) played by the various cartel members in determining fines in the vitamins case. *See* Case Comp/E-1/37.5 12, Vitamins, 2003 O.J. (L 6) 1.

each cartel member as having full responsibility for the price overcharges experienced by all purchasers.

Plaintiffs' efforts to limit damages. An additional issue in assessing damages is whether parties that are adversely affected by the cartel should be assumed to simply accept the higher collusive price, or should they be assumed to actively limit the damages by purchasing from firms outside the cartel. Strictly speaking, economic damages are the money equivalent difference between a customer's first-best choice in the absence of the cartel, and his first-best choice in the presence of the cartel. It is possible that the actual purchase from the cartel is for some reason not the customer's first-best choice. For example, it may be the case that the customer would have been better off buying an alternative product at a lower price from outside the cartel. Consequently, treating damages as simply the overcharge on a given purchase from a given supplier may result in an overstatement of the true economic damages.

One should of course be skeptical of explanations suggesting that a customer did not actually choose his first-best option in presence of the cartel.[20] On the other hand, there may be strategic considerations that prevent a customer from doing so. For example, if the customer mitigates the cartel price by purchasing elsewhere, the customer still suffers damages but has a much lower chance of receiving compensation. This is because it is hard for customer to establish that he would have purchased from the defendant at a lower price. Section 5 provides a brief summary of the legal standing of the various groups that my have been affected by a collusive price.

4. Quantifying the pass-on effect

As discussed in Section 2, the direct cost effect (the price overcharge multiplied by the amount purchased) may overestimate the amount of damages resulting from the cartel if the plaintiff passes on part of its cost increase in form of higher prices to downstream customers.[21]

We now discuss empirical methods that can be used to measure the pass-on rate.[22] We distinguish between two possible approaches. The first approach uses historical information on the relationship between prices and input costs to assess the extent of pass-on. The second approach is more theoretically based and involves specifying an

---

20. The framework to assess damage set out in Section 2 of this chapter assumes that plaintiffs act rationally. For example, it is assumed that the plaintiff passes on the price overcharge to the degree that it is profit maximizing to do so. Similarly, if the cartelized input price increases, it is assumed that the plaintiff adjusts its mix of inputs in order to maximize profits.

21. Recall, however, that the presence of a pass-on effect also implies the presence of an output effect, which may be especially important when the plaintiff has much market power. For a discussion of methods to adjust the pass-on effect downwards when the output effect is present, see Verboven & van Dijk, *supra* note 2.

22. For an overview of empirical studies of pass-on, see Johan Stennek & Frank Verboven, *Merger Control and Enterprise Competitiveness: Empirical Analysis and Policy Recommendations*, 5 EUR. ECON. 130 (2001). Other empirical considerations related to pass-on are discussed in Samid Hussain, Daniel M. Garrett & Vandy H. Havek, *Economics of Class Certification in Indirect Purchaser Antitrust Cases*, 10 COMPETITION 18 (2001).

economic model of pricing in the plaintiff's industry. Such a model reveals the structural determinants of the pass-on rate, which can be used either qualitatively or quantitatively in the analysis. Note that these two approaches are similar to the approaches discussed earlier in Sections 3.1 and 3.2 in the context of estimating the direct overcharge. The relative merit of these approaches depends on the extent and quality of price and cost data available, as well as the information available to specify an economic model of the industry.

4.1. Assessing pass-on using historical data

This approach makes use of historical data on prices, input costs, and other supply and demand factors affecting price to estimate the degree of pass-on. From an econometric perspective, this is a reduced form approach. That is, the approach enables one to measure the extent of pass-on without specifying a precise economic model that describes how all the economic factors work together. Note that this approach should relate not just the plaintiff's prices to inputs purchased from the cartel but should also account for other input costs that may have varied over the sample period.

The estimated pass-on rate may serve as a basis for computing a discount or an offset to the direct cost damages claims. All else equal, the greater the extent of pass-on, the greater the discount to the direct damages. However, in circumstances where the output effect is likely to be large (i.e., an imperfectly competitive market for the plaintiff's output), it is inappropriate from an economic perspective to adjust only for the pass-on rate. Failure to account for the output effect would understate damages.

4.2. Assessing pass-on using a model of competition

As an alternative to measuring the extent of pass-on using historical information about the relationship between prices and costs, one may specify an economic model of pricing in the plaintiff's industry. Such a model would result in predictions about the extent of pass-on based on the relevant structural characteristics of the industry and could be used to offset some of the direct cost damages from the cartel. Because the primary feature of this approach is the specification of a complete economic model, it is referred to as a structural approach, as opposed to the previous reduced form approach.

This approach requires adding several economic elements that were left unspecified in the general framework outlined in Section 2. That framework essentially introduced only demand and supply (i.e., cost) conditions, without being explicit about how the firms strategically compete with each other. Adding a model of how firms in the industry behave completes the economic model and results in predictions about the pass-on rate and potential reductions to the direct damages caused by the cartel. In some cases, the structural approach may provide analytical formulas to compute the reduction in direct damages. In other cases, numerical or simulation methods must be used. In either case, the predictions about the pass-on rate will depend on structural determinants such as the price elasticity of demand, the curvature of demand (the extent to which the price elasticity is constant), the cost responsiveness to output changes, and the number of competitors. We now discuss the pass-on rate formulas for both perfectly and imperfectly competitive markets.

Perfectly competitive markets. In a perfectly competitive market, the pass-on rate (τ) of a unit cost increase at the industry level can expressed using the following formula:

$$\tau = \frac{1}{1+\varepsilon\omega} \tag{3}$$

where ε is the absolute value of the price elasticity of demand, and ω is the responsiveness of marginal cost to an output increase, i.e., the percentage increase in marginal cost when output increases by 1 percent. In a perfectly competitive market the supply curve coincides with the marginal cost curve, so ω can also be interpreted as the inverse of the elasticity of supply. Equation (3) indicates that the pass-on rate is high when demand is inelastic (low ε) or the supply curve is very elastic (low marginal cost responsiveness ω). Pass-on will be complete in the two extreme cases where demand is perfectly inelastic ($\varepsilon = 0$) or the supply curve is perfectly elastic (cost responsiveness $\omega = 0$). To compute the pass-on rate based on Equation (3), one may collect demand and supply data and estimate the elasticities ε and ω. Alternatively, if sufficient data are not available, one may gather qualitative information on the determinants of these elasticities in the plaintiff's market. For example, one may expect a low elasticity of demand (ε) if there are no obvious substitutes, and a low cost responsiveness (ω) if there are no capacity constraints.

Imperfectly competitive markets. While perfect competition is a useful theoretical benchmark, most firms exercise at least some market power, which is reflected in positive price-cost margins. Market power complicates the analysis of pass-on. In imperfectly competitive markets, the pass-on rate does not depend solely on supply-and-demand elasticities, but also on the way in which the firm's price-cost margin is adjusted as price increases.

An insight from recent oligopoly theory is that the extent to which the price-cost margin is adjusted depends on the *curvature* of the demand faced by the firm. This curvature is sometimes measured by the elasticity of the absolute value of the price elasticity of demand (η), i.e., the extent to which the absolute value of the price elasticity of demand (ε) changes as the price increases. When the price elasticity of demand is constant, $\eta = 0$ and firms find it optimal to keep their *percentage* price-cost markup constant regardless of the cost conditions. This implies that a cost increase would lead to a higher *absolute* price cost-margin, which promotes pass-on.

Alternatively, it is possible that consumers become more price sensitive and spend their budget on other products as price increases, and so $\eta > 0$. In this case firms find it optimal to lower their percentage markups as price increases, and for sufficiently high η will even lower their absolute margins. This discourages pass-on and leads to a result where pass-on is less complete than in a perfectly competitive model.[23]

To illustrate, suppose that the plaintiff sells its product in an industry that can be described by the Cournot model with N firms producing a homogeneous product. Each firm simultaneously and independently chooses its output to maximize its profits, taking

23. A similar result is also found in the tax incidence literature, which predicts that a monopolist absorbs part of a per-unit tax in order to reduce demand-contracting effects associated with pass on of the tax.

as given the outputs chosen by the other firms in the industry.[24] The pass-on rate (τ) is given by the following formula:

$$\tau = \frac{1}{1 + \varepsilon\omega + (\eta - 1)/(\varepsilon N)} \tag{4}$$

Except for the third term in the denominator, this formula is similar to the pass-on rate expression for perfect competition. The third term would cancel out if the number of firms (N) is very large, approaching the situation of perfect competition. With a small number of firms, however, the term is important and captures the extent to which firms may respond to a cost increase by changing their margins. As discussed above, this would depend on curvature of demand, i.e., the elasticity of the elasticity of demand (η). When the elasticity of the elasticity is zero ($\eta = 0$), the third term in the denominator of Equation (4) is negative and the rate of pass-on is higher than under perfect competition. Alternatively, if the curvature of demand is sufficiently high so that $\eta > 1$, then the third term in the denominator is positive and the rate of pass-on is lower than under perfect competition. For example, this would be the case when demand is linear ($\eta = 1 + \varepsilon > 1$).

To summarize, pass-on can be assessed based on a model of competition by a careful quantitative or qualitative assessment of structural factors such as cost responsiveness, the price elasticity of demand, the curvature of demand, and the degree of competition (to assess the way in which optimal margins respond to price changes). As discussed previously, however, a complete assessment of the indirect effects of any subsequent price changes on damages would include attention to both the pass-on rate and the output effect. Under certain circumstances, the output effect has the potential to significantly counteract the reduction in damages that comes through the pass-on effect.[25]

4.3. Pass-on in the Christie's and Sotheby's price-fixing case

To illustrate how pass-on of a cartel price overcharge depends on market-specific circumstances, we briefly discuss the price-fixing arrangement between the auction houses Christie's and Sotheby's between 1993 and 2000.[26] The U.S. Department of Justice (DOJ) and the U.K. Office of Fair Trading both investigated an agreement between Christie's and Sotheby's to fix the commission rates paid by sellers and the premiums paid by buyers. The investigation eventually led to a criminal settlement between the DOJ and Christie's and Sotheby's.

From an economic perspective, one of the most interesting issues relates to the civil settlements. Following a class action suit by Christie's customers, Christie's and Sotheby's each eventually agreed to pay $256 million to settle the claims of the buyers

24. We assume that all standard assumptions for existence and uniqueness of a Cournot equilibrium are satisfied.

25. *See* Verboven & van Dijk, *supra* note 2.

26. *See* Orley Ashenfelter & Kathryn Graddy, *Anatomy of the Rise and Fall of a Price-Fixing Conspiracy: Auctions at Sotheby's and Christie's*, 1 J. COMPETITION L. & ECON. 3 (2005); Victor Ginsburgh, Patrick Legros & Nicholas Sahuguet, How to Win Twice at an Auction: On the Incidence of Commissions in Auction Markets (Working Paper, 2004).

and sellers. This settlement amount was based on certain percentages of the final "hammer" prices paid by buyers and received by sellers. The settlement amount was ultimately divided between buyers and sellers, with the buyers obtaining the larger share of the settlement amount. According to Ashenfelter and Graddy and Ginsburgh, Legros, and Sahuguet, the fact that buyers ended up with the larger share of the settlement was based on a misperception of the incidence of the price overcharges.[27] Economic auction theory predicts that in the type of auctions used by Christie's and Sotheby's, buyers are unaffected by higher premiums (and also higher seller commission rates) because they factor these costs into their bidding behavior. In the ascending auctions used by these auction houses, winning bids are determined by the bidder with the second highest reservation price. When the buyer commission increases, the winning bid is reduced by the amount of the higher commission. In other words, the higher buyer commission is completely passed on to the seller. This specific aspect was neglected in the settlement and led to an overcompensation of the buyers relative to the sellers.

5. Law and economics of price-fixing damages

The legal framework that relates to price-fixing damages claims varies by jurisdiction. The first section below gives an overview of the parties that may suffer damages from an economic perspective. The second and third sections contrast the legal standing of each party in the United Sates and Europe. The fourth section discusses economic arguments pertaining to the issue of a pass-on defense.

5.1. Groups potentially harmed by collusion

Connor distinguishes five groups that are potentially damaged by collusion.[28] The first group is the direct purchasers (i.e., downstream firms or final customers) who pay the cartel overcharge. The second group is the customers who did not purchase from cartel members but from fringe firms within the same relevant market. These fringe firms may charge a higher price as part of a competitive response to the cartel price. This is the so-called "umbrella effect" of a cartel. The third group consists of the indirect purchasers who potentially pay inflated prices for products that contain the cartelized input, assuming the cartel price is at least partially passed on. The fourth group consists of the purchasers who would have purchased the product had the cartel members priced competitively but who did not purchase at all or who purchased a less preferred alternative. These purchasers make up part of the deadweight loss associated with the cartel price. The final group consists of suppliers to cartel who sell fewer inputs because of the reduced output of the cartel.

5.2. Legal standing in the United States

In the United States, not all the groups potentially harmed by a cartel have standing to sue under the antitrust laws. The first group, direct purchasers, clearly have standing to recover the direct price overcharge they paid and ultimately are entitled to treble

27. *See* Ashenfelter & Graddy, *supra* note 26, at 30; Ginsburgh, Legros & Sahuguet, *supra* note 26, at 4.
28. *See* Connor, *supra* note 1.

damages. Since the Supreme Court's 1968 decision in *Hanover Shoe, Inc. v. United Shoe Machinery Corp.*, a defendant cannot argue the that damages of the direct purchaser were limited because the direct purchaser passed on the overcharge to downstream customers.[29]

In contrast, there is no consensus regarding the second group of purchasers, those who paid an overcharge because of the competitive reaction of fringe firms.[30] In cases where standing is granted to such customers, it is the cartel that is liable for damages, not the fringe players that actually sold to the customers. Quantifying the price overcharge experienced by these direct purchasers may be undertaken using similar economic modeling techniques to those used in the case of direct purchases from cartel members.

Since the Supreme Court's 1977 decision in *Illinois Brick Co. v. Illinois*, the third group, indirect purchasers, have no standing in federal courts.[31] However, indirect purchasers are allowed to make damages claims in a number of state courts.[32] In some of these states, the defendant may introduce evidence regarding downstream pass-on by the indirect purchaser plaintiff as an offset to the damages claim.[33]

Similarly, the fourth group, potential purchasers that were discouraged from buying because of the cartel price, have generally been denied standing in federal courts. This is because of both practical reasons (it might be hard to establish potential buyers) and legal reasons (deadweight losses are not gains to the cartel members).[34] The final group, suppliers to the cartel, are usually not given antitrust standing.

5.3. Legal standing in Europe

A recent study of competition law in the European Union (EU) by Waelbroeck, Slater, amd Even-Shoshan summarizes the potential for damages recovery as follows: "The picture that emerges from the present study on damages actions for breach of competition law in the enlarged EU is one of astonishing diversity and total underdevelopment."[35] In three out of 25 EU member states there is a specific statutory basis for bringing damages actions for European Community (EC) competition law infringement, and in 12 member states there is a basis for national competition law infringement. Consequently, there are a limited number of member states where there are substantive procedural rules governing antitrust damages claims. The study reports

---

29. 392 U.S. 481 (1968).
30. *See* Robert H. Lande, *Are Antitrust "Treble" Damages Really Single Damages?*, 54 OHIO ST. L.J. 115, 147 (1993) ("Courts are split over whether customers of the violator's competitors can successfully sue the offenders on the theory that the offenders were responsible for 'umbrella' effects. As a practical matter, however, umbrella effect damages are rarely awarded against an offending cartel or monopoly, largely because of proof problems.").
31. 431 U.S. 720 (1977).
32. For a list of states that have adopted such statutes, see Ralph Folsom, *Indirect Purchasers: State Antitrust Remedies and Roadblocks*, 50 ANTITRUST BULL. 181 (2005).
33. *See* Kosicki & Cahill, *supra* note 6, at 602.
34. *See* Christopher R. Leslie, *Antitrust Damages and Deadweight Loss*, 51 ANTITRUST BULL. 521 (2006).
35. *See* DENIS WAELBROECK, DONALD SLATER & GIL EVEN-SHOSHAN, STUDY ON THE CONDITIONS OF CLAIMS FOR DAMAGES IN CASE OF INFRINGEMENT OF EC COMPETITION RULES: COMPARATIVE REPORT 1 (Ashurst Study for the European Commission, 2004).

about 60 cases in which damages were awarded, partly on the basis of EC law and partly on national law. At the time of the study, payments had actually taken place in 28 of the cases. Harding and Joshua report that these private actions have faced highly uncertain outcomes and numerous obstacles, largely based on the absence of class action laws.[36] With respect to price fixing in particular, only a few EU nations have criminalized price fixing and the EU seems to be moving slowly in that direction.

Regarding the standing of the various groups potentially affected by a cartel, Waelbroeck, Slater, and Even-Shoshan state that the main limitation on standing in most EU countries was the requirement of "interest" of the plaintiff in bringing the action, meaning that the rights or interests of the plaintiff must be affected or that there is a genuine grievance.[37] Regarding the pass-on defense, they note that there is a lack of case law, but based on general principles of compensation and restitution, a passing-on defense is theoretically possible, with the defendant bearing the burden of proof. In some EU countries (e.g., Denmark, Germany, and Italy) the issue of a pass-on defense has explicitly arisen and was considered possible.[38] Also, indirect purchasers can theoretically sue in most EU countries, as long as they are able to prove a causal link between their damages and the original violation.[39]

5.4. The relationship between the pass-on defense and indirect purchaser damages

The main argument against allowing a pass-on defense is that direct purchasers have a more reliable basis for claiming damages from cartels, and therefore the deterrence effect is larger when only direct purchaser have standing. Landes and Posner describe several reasons for this higher degree of reliability.[40] First, direct purchasers have an informational advantage because they were closer to the cartel. Second, given the complexities involved in allocating damages between direct and indirect purchasers, a system that allows both types of claims creates more uncertainty regarding the damages awards, and the incentives to bring claims may be reduced. Third, indirect purchasers have many small claims whereas direct purchasers tend to have fewer larger claims, and this implies that direct purchasers have a larger incentive to bring claims. Finally, indirect purchasers may not have been harmed if direct purchasers anticipated receiving damages and so did not pass on the higher costs.[41]

In contrast, there are several economic arguments in favor of allowing the defendant to use a pass-on defense and permitting indirect purchasers to pursue damage awards. First, if direct purchasers indeed pass on some or all of the overcharge, then damage compensation to direct purchasers is too large, and compensation to the indirect purchasers who actually paid the overcharge is too small. This may lead to distorted

---

36. *See* CHRISTOPHER HARDING & JULIAN JOSHUA, REGULATING CARTELS IN EUROPE: A STUDY OF LEGAL CONTROL OF CORPORATE DELINQUENCY (2003).
37. *See* WAELBROECK ET AL., *supra* note 35, at 38.
38. *Id*. at 79.
39. *Id*. at 78.
40. *See* William M. Landes & Richard A. Posner, *Should Indirect Purchasers Have Standing to Sue Under Antitrust Laws? An Economic Analysis of the Rule of Illinois Brick*, 46 U. CHI. L. REV. 602 (1979).
41. *Id*. at 605.

prices and a reduction in allocative efficiency.[42] Second, the lack of a pass-on defense may distort the incentives of direct purchasers to reveal the cartel. For example, consider the simple example where the direct purchasers sell their products in a perfectly competitive with a perfectly elastic supply curve. In the short run, the direct purchasers may have little incentive to reveal the cartel because they are able pass on the entire overcharge to their own customers. When the cartel is finally revealed in the long run, they can still pursue their claims for direct damages. Third, direct purchasers may be less inclined to bring damage claims than indirect purchasers because of the direct and ongoing relationship they maintain with their direct suppliers. Cartel members may be able to effectively retaliate against direct purchasers, which may deter them from bringing damages claims. Finally, Schinkel, Tuinstra, and Rüggeberg develop a theoretical model that shows that under certain circumstances when only direct purchasers are allowed to bring damages claims, the upstream cartel can "bribe" direct purchasers not to bring damage claims. That is, under certain circumstances, direct purchasers may be better off than if they received treble damages, and cartel members make higher profits than in absence of the cartel.[43]

In the above discussion there is an explicit connection between the existence of a pass-on defense and the antitrust standing of indirect purchasers. In other words, the conventional view is that if the pass-on defense is allowed, then this necessarily implies that indirect purchasers should be entitled to make damages claims. Otherwise, some of the damages caused by the cartel will not be paid to downstream customers. Conversely, if the pass-on defense is not allowed, then indirect purchasers should not be entitled to make damages claims because of the potential double counting of damages. In our view, however, it is not necessary to link these two positions. The reason is that in practice antitrust law does not consider only damages schemes that reflect the lost profit damages (to all parties) caused by the cartel. This is clearly illustrated by the practice of allowing treble damages. It may therefore be desirable to address the issue of the pass on defense and the standing of indirect purchasers separately. To the extent that the goal of competition policy is deterrence, this position suggests that it could still be logically consistent to prohibit a pass-on defense and at the same time give indirect purchasers standing to claim damages.

6. The lost profits framework in general

The analysis of the pass-on and output effects presented in this chapter is a specific application of the more general lost profits framework that is at the heart of most damages calculations involving competition law violations.[44] Moreover, while this chapter has focused on damages suffered by customers of the defendant, many lost profits analyses involve other firms that are rivals of the defendant. Practices that may

42. *See* Robert G. Harris & Lawrence A. Sullivan, *Passing on the Monopoly Overcharge: A Comprehensive Analysis*, 128 U. PA. L. REV. 269 (1979).

43. *See* Maarten Pieter Schinkel, Jan Tuinstra & Jakob Rüggeberg, Illinois Walls: How Barring Indirect Purchaser Suits Facilitates Collusion (CeNDEF, Working Paper Series 05-10, 2005).

44. *See generally* Robert E. Hall & Victoria A. Lazear, *Reference Guide on Estimation of Economic Losses in Damages Awards*, *in* REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (2d ed. 2000).

result in a competition law violation for which lost profits may be recovered include a refusal to supply, tying, exclusive dealing, and predatory pricing.

A survey of the various techniques that have been used to conduct lost profits analyses is beyond this scope of this chapter, but all the techniques ultimately involve some comparison of actual revenues and costs with the revenues and costs that would have occurred but for the violation.[45] In some lost profits analyses, questions may arise as to whether the plaintiff appropriately took steps to mitigate damages. If not, an additional adjustment to the actual revenues and costs must be made to allow for mitigation. Data sources utilized in lost profit analyses in general include company profit and loss statements, strategy and marketing documents, production reports, historical stock price data, and balance sheet information. In addition, depending on the jurisdiction, some lost profits estimates may also include prejudgment interest to account for the time between the violation and the award of damages.[46]

7. Conclusions

This chapter has provided an overview of the quantification of damages from competition law violations, with a focus on price-fixing cases. We have set out a general economic framework for quantifying damages, distinguishing between the direct cost effect (price overcharge) and the indirect pass-on and output effects. We have also discussed alternative methods to quantify these various components, ranging from largely empirical approaches to more theory-based approaches.

In addition, we have also discussed the law and economics of price-fixing damages and provided an overview of the legal standing of various groups harmed by collusion in the United States and in Europe. In our view defendants should be allowed to use a pass-on defense and indirect purchasers should be allowed to make damages claims. This approach is appropriate from a purely economic point of view because it allows for damages awards based on the actual damages caused and suffered. We believe the general economic framework we have presented for analyzing indirect pass-on and output effects can in fact be implemented using well-established methodologies. Consequently, the complexity of damages calculation should not be a barrier to taking this approach to direct and indirect damages. Finally, taking account of the pass-on and output effects would make damages assessment in price-fixing cases consistent with damages assessments in other cases where a lost profits approach is normally used.

45. For an overview, see CLARK ET AL, *supra* note 8.

46. *See* Hall & Lazear, *supra* note 44, at 297.