

Quantifying antitrust damages

Towards non-binding guidance for courts

Study prepared for the European Commission

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and a multi-jurisdictional team of lawyers led
by Dr Assimakis Komninos**

**With economic assistance from
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Executive summary

Objectives and policy context of this report (section 1)

This report constitutes the final output of a study for the European Commission on the quantification of damages in the context of private enforcement of EU competition law. Oxera has carried out this study with assistance from Dr Walter Beckert, Professor Eric van Damme, Professor Mathias Dewatripont, Professor Julian Franks, Dr Adriaan ten Kate and Professor Patrick Legros. Significant legal input—notably in the form of analysis of existing European case law, regulations, practices and procedures—has been provided by a multi-jurisdictional team of lawyers led by Dr Assimakis Komninos.¹

In order to test the economic methods and models described in this report from a Member State law perspective, Oxera has drawn not only upon the expertise of this core team of advisers, but also that of the Oxera Economics Council,² and of lawyers from a range of legal cultures. In addition, the study has benefited from formal and informal discussions with European Commission staff.

The Commission published its ‘White Paper on Damages Actions for Breach of the EC Antitrust Rules’ in April 2008 (the White Paper). This emphasises the principle, as established in EU case law, that any citizen or business suffering harm as a result of a breach of EU antitrust rules (Articles 101 and 102 of the Treaty on the functioning of the European Union, TFEU) must be able to claim reparation from the party responsible for the breach. Victims are entitled to compensation for actual loss (*damnum emergens*) and for loss of profit (*lucrum cessans*), plus interest from the time the damage occurred until the capital sum awarded is actually paid.

A major policy concern that the White Paper seeks to address is that, ‘to date in practice victims of EC antitrust infringements only rarely obtain reparation of the harm suffered’ (p. 2). One of the obstacles to damages actions is the quantification of damages. In the staff working paper accompanying the White Paper, the Commission has set itself the objective to ‘provide pragmatic, non-binding assistance in the difficult task of quantifying damages in antitrust cases, both for the benefit of national courts and the parties’ (p. 60). This report is aimed at assisting the Commission in developing such guidance.

Any guidance on antitrust damages calculations in the European context needs to consider at least two objectives.

- Finding the most accurate answer possible—the desire to determine the real damage value as closely as possible, which is embedded in the full-compensation principle that guides the White Paper.

¹ Dr Assimakis Komninos, White & Case LLP Brussels until August 2009, now Commissioner and Member of the Board of the Hellenic Competition Commission. The following lawyers have assisted in providing legal input, notably in the form of analysis of existing European case law, regulations, practices and procedures: Christoph Arhold, Charles Balmain, Silvia Belovicova, Jacob Borum, Gonçalo Coelho, Katarzyna Czapracka, Anthony Dawes, Jaime Garcia-Nieto, Suzanne Innes-Stubb, Ivo Janda, James Killick, Stefan Mahoney, Grant McKelvey, David Nilsson, Mark Powell, Ian Reynolds, John Reynolds, Alexandra Rogers, David Smales, Kai Struckmann and Andreas Toth. The economic concepts, methods, models, analysis, insights and findings forming the basis of this report and presented herein do not represent the views of these lawyers, nor of White & Case LLP or its clients.

² An Oxera Economics Council meeting in Brussels on March 20th 2009 was devoted to the topic of quantifying antitrust damages. In addition to the academic advisers mentioned above, the meeting benefited from the presence of Dr Estelle Cantillon, Dr Natalia Fabra, Professor Bruno Jullien, Professor Abel Mateus, Professor Massimo Motta, and Professor Carl Christian von Weizsäcker. This report does not represent the views of the academic advisers, the Oxera Economics Council or its members.

- Removing obstacles to private damages actions as a matter of better and more effective access to justice, through approaches that are clear and easy to apply and that fit within the existing EU and national legal frameworks.

The economics literature provides a toolkit of methods, models and techniques that can be used for the quantification of damages. These can be both theoretical and empirical. They come from diverse fields within economics and finance—in particular, industrial organisation (IO), corporate finance, and econometrics. Part of this report is aimed at providing a succinct overview of the toolkit of economic methods, models and techniques for damages calculations.

This study also identifies a range of further insights provided by the economics and finance literature and by legal precedent. The intended use for these insights is as an aid and complement to the use of particular methods, models and techniques in the economics toolkit. They can serve as general background information. In specific cases they may be used as a cross-check of the damages estimate, to provide initial insight into the likely nature and scope of the damage, or to facilitate the estimation of damages in situations where limited data is available.

Throughout, the report illustrates current practice in damages actions in courts across Europe (and beyond) by describing some of the different legal approaches in different jurisdictions and providing concrete case examples, and by relating these to the concepts presented in the report.

Conceptual framework for damages estimation (section 2)

Stages in the damages estimation

The conceptual framework for damages estimation has two main stages.

- **First, determining the counterfactual scenario.** Calculating the damage arising from an antitrust infringement requires an assessment of what would have happened in a hypothetical scenario where the infringement had not taken place—this is commonly referred to as the ‘but for’ or counterfactual scenario. This is often the central stage in any damages estimation. Developing an accurate counterfactual requires a detailed review of the following questions.
 - What type of competition law infringement is causing what type of harm? For example, is it a cartel causing an overcharge harm, or exclusionary conduct causing a fall in sales or lack of market access?
 - What types of claimant have been harmed? For example, are they end-consumers or intermediate producers who purchased goods from the cartel, or are they competitors of the infringing party?
 - What is the market and industry context in which the harm has arisen, and what impact does this have on the counterfactual analysis? For example, is this a mature or new market?
- **Second, moving from the factual/counterfactual to a final value.** This stage involves converting the difference between the factual and the counterfactual into a final damages value. For example, if the counterfactual analysis has estimated the average annual overcharge of a cartel, and the cartel infringement lasted five years, the estimate needs to be aggregated over those five years. The question of applying interest would also be addressed as part of this stage.

Harm from hardcore cartel agreements

The main harm arising from hardcore cartels is that parties further down the supply chain pay more for the product than they would have paid in a non-cartelised market. The higher price would normally also result in existing customers purchasing lower volumes, and/or in customers who would have purchased the product at the non-cartelised price not purchasing at all.

It is convenient to express the cartel overcharge as a percentage of the actual price or revenue of the cartel. For example, if the cartel price is €125 and the counterfactual price is €100, the overcharge would be 20% (€25 is 20% of €125). This makes it easy (and intuitive) to calculate the total amount of overcharge by applying the percentage to the amount that the buyer actually paid for its purchases.

Direct purchasers of the cartel can be either sellers themselves (intermediate producer or distributor firms located one level further downstream in the supply chain) or end-consumers. Both would have faced the overcharge. However, the ultimate harm caused to particular direct and indirect customers by the overcharge (and also the effect on the volume purchased) will depend on the extent to which the price increase caused by the cartel is passed along the supply chain. The question of pass-on does not affect the calculation of the overcharge in itself, only the distribution of that harm along the supply chain (see below under 'Further insights').

Harm from exclusionary conduct

Several damages claims in relation to exclusionary conduct have been made in courts across Europe, in both follow-on and stand-alone actions. Despite the number of forms that exclusionary behaviour can take, for the purposes of damages actions the effects are broadly similar across all these forms. Existing competitors may be prevented from competing effectively in the market or may be forced to exit altogether. Potential competitors may be prevented from entering the market (or be restricted to small-scale entry). Buyers in the market (be they end-consumers or intermediate downstream producers or distributors) may be harmed by exclusionary conduct if the reduction in competition leads to higher prices, a reduction in choice, and/or a reduction in quality.

Harm to customers may be difficult to identify or may not yet have manifested itself—for example, where an infringement is established before competitors were weakened or forced to exit the market, such that consumers have not suffered the full consequences of diminished competition. Most (but not all) damages actions in Member States have thus far been brought by competitors rather than by purchasers.

The effect on competitors will typically be to limit their market presence, to force them to exit the market altogether (if they are already in the market), or to prevent them from entering the market in the first place. Harm in these cases will be expressed not only as actual losses (*damnum emergens*) suffered by these competitors, but also as lost profit (*lucrum cessans*). Courts usually have a high degree of discretion in awarding damages for lost profit, and some courts may be more or less restrictive than others.

From an economic perspective, harm to competitors from an exclusionary infringement may arise through increased costs and/or reduced revenue, resulting in a reduction in profit or an increase in loss. From a legal perspective it is important to determine in each specific case whether this effect falls under actual loss or lost profit, as the evidentiary requirements may be different. The economic framework presented in the report can be used to quantify either.

From the counterfactual stage to a final damages value

The next step in the analysis is the calculation of the final value of the damage, which requires the results from the counterfactual analysis to be input into a financial valuation model. This involves two main elements: the summation of the losses from the different types

of harm claimed (where applicable), and the summation and movement of losses over time, including the application of interest.

As regards the latter, an infringement (such as a cartel) may have lasted many years. The counterfactual analysis may have generated an overcharge estimate in monetary terms for each year, and the yearly cash flows would have to be added up. From an economic perspective, this involves uprating and/or discounting cash flows to take into account the time value of money. Furthermore, part of the harm may be suffered even after the anti-competitive practice has ceased. Depending on the legal rules and the facts of each specific case, those future losses may need to be included in the damages calculation, again using discounting.

Legal rules and practices regarding the award and calculation of interest vary significantly across jurisdictions, and across cases within jurisdictions. Various jurisdictions require statutory rates of interest to be used for certain periods of uprating. In some jurisdictions, the economic principles of uprating and discounting, as set out in the report, may be given greater consideration at the final stage of the quantification.

Quantifying damages: methods and models (section 3)

The economics and finance literature has developed a wide array of methods and models for quantifying damages. This report uses the terms ‘methods and models’ in a broad sense, with the intention to encompass all possible methods, models, tools, techniques, frameworks and approaches.

What to look for in a model

To understand how robust a model is and how it can be used, there are three important issues to consider:

- the data used;
- the assumptions made;
- the inference that can be drawn from the outputs.

Most models need to be calibrated (ie, populated with actual data and parameters) using some form of input data so that they reasonably represent the reality of the world they are describing. Different models will require different data and in some cases assumptions can be substituted for data if it is not available. A model will only be as good as the quality of the input data used to populate it.

Many of the assumptions made in models are implicit (and, when presenting analysis based on these models, should be made explicit insofar as this is possible and reasonable). Models also vary in the degree to which they rely on economic theory to provide their assumptions.

As all models are stylised representations of the real world, the estimates they produce are dependent on both the data and assumptions used. As such, the actual value of the damage suffered cannot be determined with absolute precision. Courts in some jurisdictions have explicitly acknowledged this unknowability of the actual damage value, and do tend to accept estimations that are reasonable but not perfect.

What can economic methods and models say about the issue of causation?

The focus of this study is on the quantification of damages, and not specifically on the issue of causation. Nevertheless, econometrics can help address the issue of causation.

Econometric analysis does not prove causality as such, but seeks to identify statistically significant relationships between a ‘dependent’ variable—the variable that is to be explained (eg, demand for a product)—and various explanatory variables (eg, the price of the product and consumer income). For example, a model may show that a competitor’s sales have

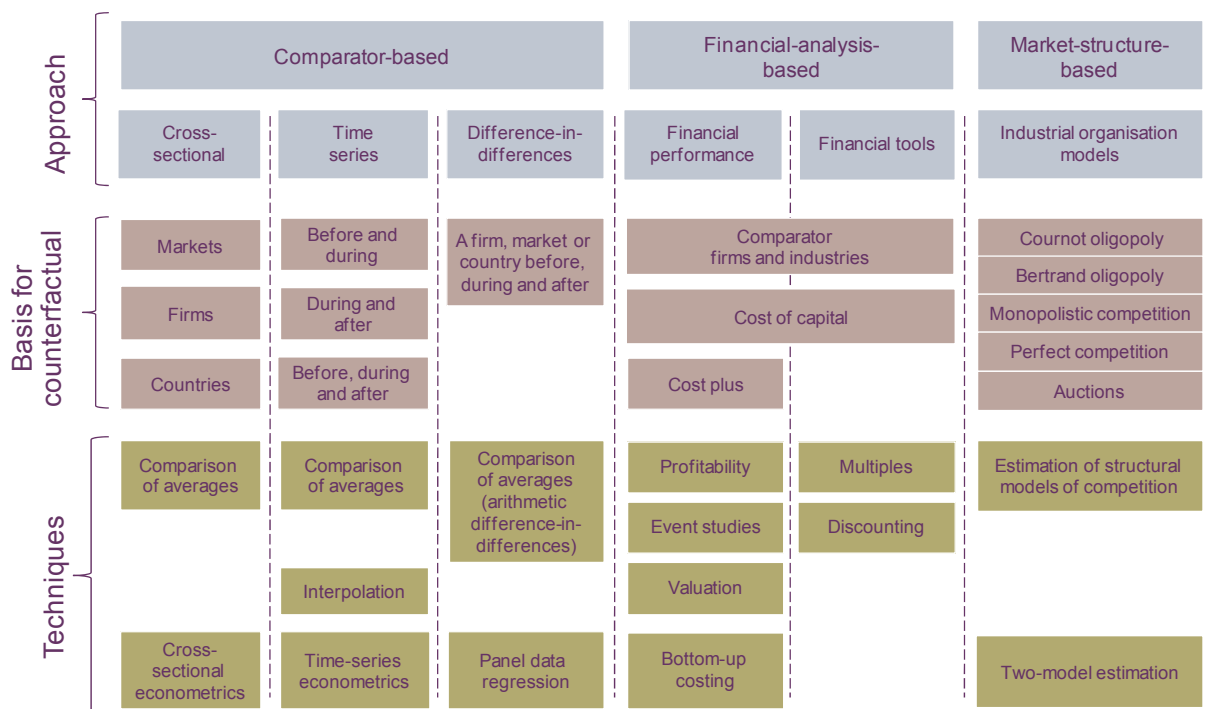
fallen during the period of an exclusionary abuse, but fail to address other possible explanations for that fall in sales, such as a general drop in sales in the market during the period, the entry of a new competitor, or managerial incompetence. A good econometric model would seek to ‘control’ for those other explanations as much as possible—ie, incorporate them into the model as additional explanatory variables. That way, the various effects can be isolated from one another, and the model may well show that, while the other factors explain some of the sales loss, the remainder of the loss is explained by the infringement. This applies irrespective of which party bears the burden of proof regarding such other causal factors under the relevant legal framework.

Classification of methods and models

This report presents a classification of the methods and models into three broad groups: comparator-based, financial-performance-based, and market-structure-based. It has considered other groupings of methods and models presented in other contexts (eg, previous studies for the European Commission, German and US case law, and the economic literature). This new classification draws clearer distinctions between what is being used as the counterfactual in each method and the precise estimation technique.

The classification presented below is divided into three levels. The first identifies the approach. The second level identifies the basis for the counterfactual that underlies each of the approaches. The third level then summarises the estimation techniques that can be used within each approach.

Figure 1 Classification of methods and models



Source: Oxera.

The three approaches within the classification are set out briefly below. In principle, each can be used for quantifying damages for any type of antitrust infringement. They are not mutually exclusive and in fact can often complement each other, as indicated in the report.

- **Comparator-based approaches.** These use data from sources that are external to the infringement to estimate the counterfactual. Broadly this can be done in three different ways: by cross-sectional comparisons (comparing different geographic or product markets, also referred to as the ‘yardstick’ or ‘benchmark’ approach); time-series

comparisons (analysing prices before, during and/or after an infringement); and combining the above two in ‘difference-in-differences’ models (eg, analysing the change in price for a cartelised market over time, and comparing that against the change in price in a non-cartelised market over the same time period). Various techniques are used to analyse this comparator data, ranging from comparing averages, to panel data regression.

- **Financial-analysis-based approaches.** These models have been developed in finance theory and practice. They use financial information on comparator firms and industries, benchmarks for rates of return, and cost information on defendants and claimants to estimate the counterfactual. There are two types of approach that use this information. First are those that examine financial performance. These include assessing the profitability of defendants and/or claimants and comparing this against a benchmark; event studies of how stock markets react to information; and bottom-up costing of products to estimate a counterfactual price for them. The second type is a group of more general financial tools, such as discounting, multiples (which is another approach to undertaking discounting and valuation), and methods that can be used alongside the other categories of methods and models.
- **Market-structure-based approaches.** Based on IO theory, these use a combination of theoretical models, assumptions and empirical estimation (rather than comparisons across markets or over time) to arrive at an assessment of the counterfactual situation. This approach involves identifying models that best fit the relevant market, and using them to provide insight into how competition works in the market concerned and to estimate the counterfactual price (or volumes). The models can be calibrated using the econometrics techniques described under the comparator-based approaches.

Comparator-based approaches

Comparator-based methods and models—where the counterfactual is based on comparable product and/or geographic markets—can vary in their degree of sophistication, as the following examples illustrate.

- **Comparison of averages.** This simple technique observes the average price in an unaffected comparator group as an estimate for the counterfactual price. For example, if there are five comparator markets with an average price of €10, then €10 is a simple estimate of the price that would have prevailed in the relevant market in the absence of the infringement. This price can then be compared with the actual price charged in the relevant market—eg, €12—to estimate the overcharge (€2, or 16.7% of the cartel price in this example). It is good practice to present such comparisons with suitable statistical tests that inform about their robustness.
- **Interpolation.** This simple method builds on a comparison of averages in that the prices from both the pre- and post-infringement periods are used to estimate the counterfactual price. Interpolation requires joining the price points before and after the relevant period to indicate what the prices would have been in the intervening period.
- **Regression techniques.** These techniques are more complex statistical methods that can be used to explain the variation in a variable (eg, price) with a number of other explanatory factors. They require access to reliable data observations. These techniques address a shortcoming of simple comparisons of averages, in that they can take into account factors other than the infringement that may cause the price difference. For example, a regression may analyse the effect on price of several variables, including characteristics of the firm or its market such as input costs, product quality and size of the firm, in addition to the effect of the infringement itself.

Cross-sectional comparisons (across product or geographic markets) have the advantage that, if chosen correctly, the comparator gives a view of what would have happened in a

market with no infringement. Unlike comparisons over time, cross-sectional comparisons are unaffected by uncertainty about when an infringement started or ended.

The alternative source of a comparator is data over time. Although this approach is often described generically as ‘before and after’, a distinction can be made between before and during, during and after, and before, during and after. Time-series comparisons have the advantage of including like-for-like firms or markets since they refer to the same firms or markets in both the factual and counterfactual cases. As far as possible, other explanatory factors should be taken into account to ensure that the difference between the periods is not biased by any external factors.

The difference-in-differences technique aims to avoid a shortcoming of cross-sectional and time-series approaches—ie, the assumption that any unexplained difference is due solely to the infringement. Difference-in-differences estimators control for what would have happened without the infringement by examining what changed over time for the infringement and non-infringement markets, followed by a comparison of those differences.

Financial-analysis-based approaches

In practice, in damages cases there is not always a clear-cut distinction between finance and non-finance methods, since a form of financial analysis is often involved at some stage of the analysis.

There are several ways in which financial analysis can be used in the counterfactual stage of the damages estimation.

- The deterioration in the financial performance of claimants as a result of the infringement can be used to provide an estimate of the harm caused to them.
- The improvement in the financial performance of the defendant as a result of the infringement can provide an estimate of the benefits derived from the infringement. From a legal perspective, this is not a direct basis for determining compensatory damages, but in certain circumstances it may be used to inform the valuation of the damage suffered by the direct victims of the infringement (eg, in overcharge cases).
- Various techniques can be used for both types of analysis of financial performance—in particular, profitability analysis and valuation, and event studies on share prices. Counterfactual profitability in these cases can be determined on the basis of returns earned by comparator companies, for example from other industries with similar risk characteristics and market structure. The use of comparators as a benchmark for profitability is common practice in financial analysis.
- The counterfactual price level can also be estimated by assessing the cost of production of the infringing parties, and combining this with information and assumptions on counterfactual margins. The approach generates a counterfactual price per unit by estimating the cost that would be incurred by a firm operating in the counterfactual market and adding to this a return that reflects the degree of competition in the counterfactual.

A number of practical considerations need to be taken into account when applying financial-analysis-based methods. One important advantage of such methods is the greater likelihood of availability of financial data from company accounts (subject to relevant disclosure rules). Using financial analysis can also present certain challenges. For example, distinguishing the impact of external factors from the impact of the infringement on financial performance can sometimes be difficult. Other practical challenges relate to the use and interpretation of accounting data, and to the issue of cost allocation when there are common costs (such as general overhead costs or shared machinery) and the damages action refers to one product of the business only.

Market-structure-based approaches

IO theory has developed a range of generally recognised models of competitive interaction and firm behaviour that predict a variety of outcomes, ranging from the least competitive (monopoly) to the most competitive (perfect competition). These models can be used to estimate or simulate market outcomes—typically in terms of prices and volumes—in either the factual or the counterfactual scenario, or both, thus providing information on the quantification of the damage.

As with some of the financial-analysis-based approaches discussed above, these market-structure-based approaches differ from the comparator-based approaches, in that they use a combination of theoretical models, assumptions and empirical estimation (rather than comparisons across markets or over time) to arrive at an assessment of the counterfactual situation. The use of IO models in damages estimations can range from the theoretical—where models are used to provide information on, or understand, certain market dynamics conceptually—to more empirical—where they are calibrated for the actual market in question in order to then estimate counterfactual values of the relevant variables.

The resulting damages estimate will be influenced to a large extent by the choice of the counterfactual model. In particular, the more competitive the model adopted for the counterfactual, the greater will be the difference between the factual and counterfactual prices and volumes. Any results from the estimation should be tested for such sensitivities.

There are two principal ways of using the IO models in quantifying antitrust damages.

- **The ‘one-model’ approach (estimation of a structural model of competition).** This approach uses an IO model to estimate the counterfactual, using the factual outcomes as inputs. The counterfactual model is calibrated using an estimate of demand and supply features of the market. The information to calibrate the model comes either from the factual or is based on assumptions about what the counterfactual is expected to look like given the nature of the case. The counterfactual model estimates are then compared against the factual.
- **The ‘two-model’ approach.** IO models are adopted for both the factual and counterfactual scenarios. By specifying the model for the factual, such as monopoly (eg, approximating joint profit maximisation by firms in a cartel), characteristics of demand can be inferred from observable data in the factual, such as prices, quantities and costs. The counterfactual outcomes can then be expressed as a ratio to the factual (eg, counterfactual prices might be estimated as being equal to two-thirds of the factual). Less estimation is required when using two IO models rather than one; however, this is replaced by a greater reliance on assumptions.

Further insights from economics and finance to aid the use of methods and models (section 4)

In addition to the conceptual framework and the classification of methods and models, this report discusses some further insights provided by the theoretical and empirical economics and finance literature that can assist in deriving a damages estimate.

The insights are grouped into categories that link them to the different stages of the conceptual framework of a damages claim, as set out in section 2 of the report. Some of the insights are based mostly on economic theory; for example:

- what market structure may suggest about the magnitude of the overcharge;
- how the volume effect from a cartel may be theoretically related to the overcharge; and
- how the overcharge harm to purchasers from exclusionary conduct may be theoretically approximated.

Another group of insights can assist in situations where limited data is available; for example:

- using market prices to approximate firm-specific prices; and
- using yield to approximate price to fill in gaps in data series.

Two of the insights are summarised in more detail below: one related to empirical evidence on the possible magnitudes of cartel overcharges, and one related to the theory and empirical data on the pass-on of overcharges.

Insights into the existence and possible magnitude of cartel overcharges

Empirical economic data gives some indication as to the orders of magnitude of overcharges observed in past cartel cases. However, the amount of the overcharge in any particular damages case would ultimately need to be determined pursuant to the requirements of applicable national law. It is possible that a cartel, even if it were found to infringe Article 101, was ineffective and hence that the overcharge was negligible or zero.

Several empirical studies on cartel overcharges have been undertaken to date. The empirical economic data indicates that the majority of cartels that have been studied have a positive overcharge. The economic literature also provides indications of the orders of magnitude of overcharges of past cartels.

This empirical data needs to be interpreted with caution. Not all studies would qualify as sufficiently robust (see below for a filtering exercise carried out by Oxera to focus on peer-reviewed published studies only). It may also be that the empirical studies tend to focus on cartels that have been operational and are most likely to have had an impact on the market; if this is the case then many cartels with no effect will not have been captured in these studies (although, as shown below, a small but significant number of the cartels studied had no overcharge).

A recent study by Connor and Lande (2008) has used a large dataset on cartel overcharges. In this report, Oxera has tested the sensitivity of the Connor and Lande results by removing a large number of observations based on a number of criteria, in particular focusing only on estimates obtained from peer-reviewed academic articles and chapters in published books.

In the distribution of cartel overcharges across this adjusted dataset of 114 observations, the overcharge range with the greatest number of observations is 10–20%. Oxera finds that in this dataset the median overcharge is 18% of the cartel price—not far from the 20% found by Connor and Lande. However, since the variation in observed overcharges is large, it is informative to consider the distribution of overcharges and not only the median or average. In 93% of the past cartel cases in the sample, the overcharge as a percentage of the cartel price is above zero. This supports the theory that, in most cases, the cartel overcharge may be expected to be positive, although it also indicates that there is a small but significant proportion of cartels (7%) where there is no overcharge. Whether a particular cartel falls into this category would need to be explored on a case-by-case basis.

Two recent cases in Germany discuss whether it is appropriate to assume that a cartel overcharge is positive. In a vitamins cartel case, the Landgericht Dortmund (Dortmund Regional Court) applied the *prima facie* rule that a market price was generally lower than a cartel price.³ In a cement cartel case, Berliner Transportbeton, the German Federal Court of Justice for civil and criminal matters (Bundesgerichtshof) stated that the threshold for showing that a cartel did not accrue any economic benefit from its activity would be higher

³ LG Dortmund O 55/ 02 Kart Vitaminkartell III, Decision, April 1st 2004, para 26.

the longer the cartel's duration and the greater its geographic area.⁴ The court thus concluded that prices in the cartel were likely to be higher than in a competitive market.

Insights into pass-on of overcharges

This insight focuses on how to quantify pass-on. It does not address the extensive policy debates surrounding pass-on, such as whether the passing-on defence should be allowed; nor does it comment on the legal question of who bears the burden of proof in relation to pass-on.

Economic theory has identified certain relationships between cost changes (such as changes in input prices) and price changes. In essence, these relationships follow from the standard models of competition, oligopoly and monopoly in which there is a certain relationship between price and (marginal) cost. On this basis, the report describes several insights from economic theory regarding the likely pass-on rate in various market situations.

A distinction must be made between firm-specific and industry-wide cost increases. Under the conditions of perfect competition, an overcharge that affects all competitors in a downstream market (industry-wide) would be passed on in full. This result (which can seem counterintuitive) simply follows from the fact that, under perfect competition, prices equal marginal costs in equilibrium. In contrast, for a cost increase that affects only one, or some, of the competitors in the market, the expected pass-on rate would be 0%, since those competitors that do not face the increase can leave their prices unchanged. This may also be the case if, for example, an entire industry is affected by the overcharge but that industry competes with another industry that uses a different upstream input not subject to the overcharge and that can therefore leave its prices unchanged.

A well-known theoretical finding is that a monopolist with linear demand and constant marginal cost passes on exactly 50% of the cost increase. This may appear counterintuitive since the monopolist would seem to have obvious reasons to pass on cost increases in full (or not to pass on any cost decreases). The reason, however, is related to the notion of profit maximisation—if costs change, so does the profit-maximising price. Results that are in between perfect competition and monopoly are typically obtained in oligopolistic markets.

In principle, it is possible to estimate empirically the actual pass-on rates of relevance to the case at hand. This would require access to data on actual prices and costs at the relevant layers of the supply chain. If, in any specific case, empirical measurement is not feasible due to practical reasons, the theoretical insights into pass-on presented here may still be useful in approximating likely pass-on effects for that case.

In some cases the overcharge may have caused significant changes in the dynamics of competition in the downstream market—eg, smaller operators may have been forced to exit. In theory, this may give rise to a pass-on rate greater than 100% since increased downstream concentration may have led to higher downstream prices (although the term 'pass-on' is not accurate in such a situation, as in reality a chain of events has taken place). Such factors would need to be assessed on a case-by-case basis.

Certain pricing practices may mean that the theoretical pricing behaviour driven by profit maximisation does not apply, at least in the short run. For example, in some industries companies price on a cost-plus basis, while in others there may be explicit contracts through which increases in input costs are agreed to be passed on in full to purchasers. On the other hand, there are industries where prices tend to be changed on an annual (or other periodic) basis, and not continually in response to cost changes. Again, this would have to be assessed for each specific case at hand.

⁴ Oberlandesgericht Düsseldorf, Berliner Transportbeton I, KRB 2/05.

The insights into pass-on presented in the report relate to the overcharge harm. Cartels and other antitrust infringements leading to higher prices will normally cause volume effects as well. Such volume effects may give rise to additional antitrust harm, which is different in nature from the overcharge harm and can be claimed separately.

Arriving at a final damages value (section 5)

Choice of method or model

In theory, there is no reason for preferring one type of method or model over another. The methods and models presented in this report cannot be ranked. Rather, the choice of approach will depend on the details of each case, and, from an economic perspective, there are two main factors that will influence this:

- the availability and quality of data and information;
- the availability and quality of the basis of the counterfactual used in a particular model.

In addition, in practice these considerations about choice of approach will also be dependent on the applicable legal rules—for example, those related to the required levels of evidence and to burden of proof.

All methods and models rely on the data and information that is available to calibrate them. When more data is available, a wider range of methods and models can in principle be used in any given situation. Several of the more complex methods and models require significant amounts of data in order for them to be used at all (eg, difference-in-differences panel data regressions), while many of the simpler approaches can be used with more limited data (eg, difference-in-differences comparisons of averages).

The simpler approaches that are straightforward to understand and calculate, such as comparisons of averages, are useful when the basis for the counterfactual is of a high quality. When there are important factors that mean that the comparator may not mirror the counterfactual, these simple approaches should be employed with care since they could over- or underestimate the counterfactual variables.

Choosing a single damages value

In any given case it is likely to be possible to apply more than one approach, using different models—and different assumptions within those models—and taking advantage of a range of available information. Furthermore, both claimants and defendants may offer differing estimates, perhaps using different approaches. However, ultimately, the court needs to decide on the specific amount of damages (if any) to be awarded.

The economics literature has identified that, when presented with multiple estimates of the same variable, two main solutions are available for selecting a single value.

- **Identifying one method or model for the case at hand.** This involves focusing on the method or model that is most appropriate. The output from this model is then used as the best estimate of the harm.
- **Pooling model results.** This involves combining into a single value the results of each of two or more of the methods and models. One approach—which, according to the empirical economics literature, has been shown to be robust—is simply to take the mean average of the available forecasts. For example, if three robust models predict that the damages award should be €10.1m, €11.2m, and €12.0m, the pooled model result, using a simple mean average, would be €11.1m. This combined value can then be used as the best estimate of the actual harm.

While pooling has several advantages, it does need to be applied with care. It is most frequently used in cases where a single forecaster is attempting multiple approaches (eg, an

expert in a damages action pooling across all estimates), or where multiple forecasters are all attempting to estimate the same value for the same purpose (eg, a group of court-appointed experts).

Overall, the conclusion is that a range of methods and models can in principle be used for estimating the various types of damage that might result from antitrust infringements. The choice of approach will depend on the details of each case, and, in particular, on the availability and quality of data and information, and the basis of the counterfactual. In any given case, it may well be possible to apply more than one approach. The primary focus in any particular case would normally be on whether specific methods or models have been applied reasonably and robustly to the case at hand. The court can then either identify a preferred model for the case, or 'pool' a selection of reasonable and robust model results to arrive at a final damages value.

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1 Introduction

1.1 Objectives and policy context of this report

This report constitutes the final output of a study for the European Commission on the quantification of damages in the context of private enforcement of EU competition law. Oxera has carried out this study with assistance from Dr Walter Beckert, Professor Eric van Damme, Professor Mathias Dewatripont, Professor Julian Franks, Dr Adriaan ten Kate and Professor Patrick Legros. Significant legal input—notably in the form of descriptions analysis of existing European case law, regulations, practices and procedures—has been provided by a multi-jurisdictional team of lawyers led by Dr Assimakis Komninos.⁵

In order to test the economic methods and models described in this report from a Member State law perspective, Oxera has drawn not only upon the expertise of this core team of advisers, but also that of the Oxera Economics Council,⁶ and of lawyers from a range of legal cultures. In addition, the study has benefited from formal and informal discussions with European Commission staff.

The study should be considered in the context of the European Commission's policy objective to facilitate effective private enforcement of the EU antitrust rules (Articles 101 and 102 TFEU, dealing with restrictive agreements and abuse of dominance, respectively). Private enforcement in this context refers to bringing private actions claiming compensation for harm caused by infringements of Article 101 or 102.⁷ These can either be 'follow-on actions'—subsequent to a finding of infringement by a court or competition authority—or 'stand-alone' or 'original actions'—where the claimant does not rely on a pre-existing infringement decision/judgment and still needs to prove the infringement.

Following the publication of a Green Paper (December 2005) and an extensive consultation process, the Commission published its 'White Paper on Damages Actions for Breach of the EC Antitrust Rules' in April 2008 (the White Paper).⁸ The White Paper, and its accompanying Commission staff working paper, emphasise the following main principle behind damages claims under Articles 101 and 102, as established in EU case law:

Any citizen or business who suffered harm as a result of a breach of EC antitrust rules (Articles 81 and 82 of the EC Treaty [now Articles 101 and 102 TFEU]) must be able to claim reparation from the party who caused the damage. This right of victims to

⁵ Dr Assimakis Komninos, White & Case LLP Brussels until August 2009, now Commissioner and Member of the Board of the Hellenic Competition Commission. The following lawyers have assisted in providing legal input, notably in the form of analysis of existing European case law, regulations, practices and procedures: Christoph Arhold, Charles Balmain, Silvia Belovicova, Jacob Borum, Gonçalo Coelho, Katarzyna Czapracka, Anthony Dawes, Jaime Garcia-Nieto, Suzanne Innes-Stubb, Ivo Janda, James Killick, Stefan Mahoney, Grant McKelvey, David Nilsson, Mark Powell, Ian Reynolds, John Reynolds, Alexandra Rogers, David Smales, Kai Struckmann and Andreas Toth. The economic concepts, methods, models, analysis, insights and findings forming the basis of this report and presented herein do not represent the views of these lawyers, nor of White & Case LLP or its clients.

⁶ An Oxera Economics Council meeting in Brussels on March 20th 2009 was devoted to the topic of quantifying antitrust damages. In addition to the academic advisers mentioned above, the meeting benefited from the presence of Dr Estelle Cantillon, Dr Natalia Fabra, Professor Bruno Jullien, Professor Abel Mateus, Professor Massimo Motta, and Professor Carl Christian von Weizsäcker. This report does not represent the views of the academic advisers, the Oxera Economics Council or its members.

⁷ Private enforcement also comprises other remedies—in particular, permanent and preliminary injunctions, restitution, actions for the declaration of nullity, other declaratory relief and raising the nullity of unlawful contracts by way of defence. As the Commission's policy initiative of relevance here is limited to damages claims, the study does not address these other remedies, although they may also raise questions of quantification (notably the remedy of restitution).

⁸ See European Commission (2005a) and (2008a). These and related documents can be found on the Commission's website at: <http://ec.europa.eu/competition/antitrust/actionsdamages/index.html>.

compensation is guaranteed by Community law, as the European Court of Justice recalled in 2001 and 2006.⁹

Victims of an EC competition law infringement are entitled to full compensation of the harm caused. That means compensation for actual loss (*damnum emergens*) and for loss of profit (*lucrum cessans*), plus interest from the time the damage occurred until the capital sum awarded is actually paid.¹⁰

As for the concepts '*damnum emergens*' and '*lucrum cessans*', Advocate General Capotorti defined them in the following terms in his Opinion in *Ireks-Arkady* (1979):

It is well known that the legal concept of 'damage' covers both a material loss *stricto sensu*, that is to say, a reduction in a person's assets, and also the loss of an increase in those assets which would have occurred if the harmful act had not taken place (these two alternatives are known respectively as *damnum emergens* and *lucrum cessans*).¹¹

A major policy concern that the White Paper seeks to address is that, 'to date in practice victims of EC antitrust infringements only rarely obtain reparation of the harm suffered' (p. 2).

The Commission's consultation process and subsequent debates have identified a range of obstacles to the enforcement of the victims' rights to damages. These obstacles are often derived from legal and procedural rules in Member States, which in turn give rise to legal uncertainty. They relate to matters such as access to evidence, the definition of damages, the availability of the passing-on defence, the standing of indirect purchasers and end-consumers, collective redress mechanisms and the costs of damages actions.¹²

In the White Paper the Commission has proposed a number of policy choices in relation to these matters, and further policy initiatives are being considered in parallel with the current study (those initiatives fall outside the scope of the current study). The Commission has stated that:

The primary objective of this White Paper is to improve the legal conditions for victims to exercise their rights under the Treaty to reparation of all damage suffered as a result of a breach of the EC antitrust rules. Full compensation is, therefore, the first and foremost guiding principle. (p. 3)

One of the obstacles to damages actions discussed in the White Paper and the accompanying Commission staff working paper is the quantification of damages. The Commission notes in the latter that:

According to the case law of the Court of Justice, in the absence of any further Community rules concerning the calculation of damages, it is for the domestic legal system of each Member State, and ultimately for the national judge, to determine the requirements the claimant has to fulfil when proving the amount of the damage suffered as a result of a competition law infringement, the preciseness with which he has to prove that amount, the methods that can be used in calculating the amount and the consequences of not being able to fully respect the requirements set. (p. 60)¹³

⁹ See European Commission (2008a), p. 2. The Court of Justice judgments referred to are Case C-453/99, *Courage Ltd. v. Bernard Crehan* [2001] ECR I-6297, and Joined Cases C-295/04 to C-298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I-6619. More detail on these cases is provided in Boxes 2.4 and 4.2.

¹⁰ See European Commission (2008b), p. 57, as based on Joined Cases C-295/04 to C-298/04, *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I-6619. This emphasis on the full-compensation principle does not preclude other bases for damages claims if they are compatible with national laws, such as exemplary or punitive damages—see European Commission (2008b), pp. 57–58.

¹¹ Case 238/78, *Ireks-Arkady GmbH v. Council and Commission* [1979] ECR 2955, at 2998.

¹² European Commission (2008b), pp. 8–10.

¹³ However, when laying down the applicable rules for the enforcement of Union rights, Member States are under an EU law obligation to respect both the principle of equivalence and the principle of effectiveness. One limitation on Member States noted

The White Paper states that far-reaching calculation requirements could be disproportionate to the amount of damage suffered and can constitute an obstacle to bringing an antitrust damages action and to obtaining compensation. During the consultation following the Green Paper there was wide support for the development of further guidance on the calculation of antitrust damages. The Commission now intends to draw up a damages calculation framework, with the objective stated in the staff working paper accompanying the White Paper being to:

provide pragmatic, non-binding assistance in the difficult task of quantifying damages in antitrust cases, both for the benefit of national courts and the parties. (p. 60)

This report is aimed at assisting the Commission in developing such guidance.¹⁴

The focus of the report is on the quantification of harm suffered. It is not on other relevant aspects of damages actions, such as proving the infringement (which would be required in original private actions) and proving a causal link between the infringement and the harm. Nonetheless, the methods and models for damages estimation that are discussed in the report can also be informative for those other aspects—in particular, for the requirement of the causal link. For example, econometric models typically seek to ‘control’ for all possible factors (variables) that may impact on the variable in question (eg, the reduction in profit of a victim of an infringement), and thereby to isolate the impact of the infringement itself from other explanatory factors. While not proving causation as such, these models can be used to draw inferences on the likely causes. Where relevant, these issues are further discussed in the report (see in particular section 3).

1.2 Different objectives in the development of guidance

1.2.1 Different objectives

Any guidance on antitrust damages calculations in the European context needs to consider, and possibly strike a balance between, different objectives. In simple terms, two of these objectives can be characterised as follows.

- Finding the most accurate answer possible—the desire to determine the real damage value as closely as possible, which is embedded in the full-compensation principle that guides the White Paper, and is also compatible with the way economists would normally seek to approach quantification problems.
- Removing obstacles to private damages actions as a matter of better and more effective access to justice, through approaches that are clear and easy to apply and that fit within the existing EU and national legal frameworks.

1.2.2 The search for the real damage value

The principle of full compensation implies the need for a certain degree of precision in the damages estimate. The principle would imply that victims of antitrust infringements should be neither over-compensated nor under-compensated.

Calculating exactly the damage arising from an infringement of the antitrust rules would require complete information about what would have happened in a parallel world where the infringement had not taken place—this is commonly referred to as the ‘but for’ or counterfactual scenario. Such complete information is not available.

in the White Paper in this regard is that, under the principle of full compensation, they cannot a priori fix any upper limit on the amount of damages compensation.

¹⁴ In a Resolution dated March 26th 2009, the European Parliament ‘welcomes the White Paper and stresses that the EU competition rules and, in particular, their effective enforcement, require that victims of breaches of the EU competition rules must be able to claim compensation for the damages suffered’ (para 1). In the Resolution the Parliament also ‘welcomes the Commission’s work on a non-binding guidance framework for the calculation of damages’ (para 17).

To get around this, damages quantifications will typically involve describing this counterfactual scenario with a model using simplifying assumptions. The aim of any model should be to produce an estimate of what would have happened ‘but for’ the infringement. All models are necessarily simplifications of the real world and can vary in the degree to which they take into account all possible factors that may influence the counterfactual. This is often driven by data or time constraints.

Nonetheless, despite this ‘unknowability’ of the exact damage, the aim will be to approximate the answer as accurately as possible. This will normally require the use of established economic and financial methods (as described in this report), and will therefore introduce an element of complexity to the legal analysis. The degree of complexity of these methods will be determined by what is required under applicable national law to obtain a damages estimate that is sufficiently robust, unbiased, and has the lowest possible level of uncertainty surrounding it. This is discussed in greater detail in section 3 of this report.

1.2.3 **The aim to facilitate private damages actions as a matter of better and more effective access to justice, and the need for simple approaches, within the EU and national legal frameworks**

As noted in section 1.1, there are obstacles to private actions for antitrust damages across Member States, and in part these are related to evidentiary burdens, lack of access to data, and/or the general difficulty in producing robust damages estimations. The Commission intends to reduce these obstacles by providing guidance on how to calculate damages and by highlighting some of the successful national cases where damages have been paid (be it following a judgment or an out-of-court settlement that may not become public information).¹⁵

As a general proposition, any area of law benefits from simple approaches that are easy to understand and apply. Yet, there is some possible tension between this and the previous objective of approximating the real damage value as closely and robustly. The latter inevitably involves a detailed inquiry into the specific facts of each case, and often requires applying economic and statistical techniques to those facts. This can sometimes create legal uncertainty, and can render the law less effective, particularly in jurisdictions where the courts have limited experience in dealing with complex economic evidence.

As the Commission observed in its staff working paper accompanying the White Paper:

The [damages] calculation could thus become a very cumbersome exercise, arguably a practically impossible or excessively difficult one, if one strictly adheres to the idea that the exact amount of the damage caused by a competition law infringement has to be fully compensated, nothing more, nothing less. (p. 60)

The Commission has therefore indicated its intention to consider the possibility of developing ‘simplified rules of estimation’ and ‘approximate methods of calculations’ in order to assist claimants in proving the damage they have suffered.¹⁶ Again, such methods would have to operate within the legal rules and procedures applicable in each Member State, and always within the confines of EU law.

In this regard, many jurisdictions have developed rules addressing matters such as the distribution of burden proof and the required level of proof, and in doing have had to consider different objectives, as outlined above. Many Member States have in place rules dealing with

¹⁵ For example, in England and Wales, of the 11 damages cases brought before the Competition Appeal Tribunal under sections 47A and 47B of the Competition Act 1998, at least five have been expressly settled: (i) *Healthcare at Home v Genzyme Limited*, Case 1060/5/7/06; (ii) *The Consumers Association v JJB Sports PLC*, Case 1078/7/9/07; (iii) *ME Burgess, JJ Burgess and SJ Burgess (trading as JJ Burgess & Sons) v W Austin & Sons (Stevenage) Limited and Harwood Park Crematorium Limited*, Case 1088/5/7/07; (iv) *NJ and DM Wilson v Lancing College Limited*, Case 1108/5/7/08; and (v) *Freightliner Limited v EWS*, Case 1105/5/7/08. Moreover, at least two other cases are likely to have been settled pursuant to a defendants’ consent order: (1) *BCL Old Co Limited (2) DFL Old Co Limited (3) PFF Old Co Limited v (1) Aventis SA (2) Rhodia Limited (3) F Hoffman-La Roche AG (4) Roche Products Limited*, Case 1028/5/7/04; and *Deans Foods Limited v (1) Roche Products Limited (2) F Hoffman-La Roche AG (3) Aventis SA*, Case 1029/5/7/04. See also Rodger (2008).

¹⁶ See European Commission (2008b), p. 60, and (2008a), p. 7.

the degree of freedom that judges have in calculating damages in special cases or, more generally, when exact quantification is impossible or very difficult. Such rules may reflect to a lesser or greater extent principles of equity, justice, procedural economy and efficiency. Examples of such rules vary—see Box 1.1, which describes a recent damages action in Sweden in relation to abuse of dominance, and Box 1.2, regarding a cartel damages action in Italy.¹⁷ These rules mean that the amount of damages does not have to be proven to the last cent, thus giving the court a more efficient and feasible means of awarding damages. By explaining economic concepts and insights, this report is also aimed at assisting in these situations.

Box 1.1 Damages claim by a competitor regarding exclusionary abuse (Sweden)

Stockholms tingsrätt (Stockholm District Court), Cases T 32799-05 and T 34227-05, *Europe Investor Direct Aktiebolag and others v. VPC*, judgment of November 20th 2008

Actions were brought before the Stockholm District Court by competitors of VPC, the central securities depository in Sweden—ie, the only company that holds information on the share registers of Swedish limited companies.

The claimants argued that VPC's refusal to supply them with full CD-ROM copies of such share registers constituted an abuse of a dominant position and that VPC should be ordered to pay SEK7.6m (approximately €750,000) in damages.

The Stockholm District Court agreed that VPC had abused its dominant position, but awarded damages of only SEK3.9m (approximately €384,000) since full proof had not been presented by the claimants with respect to the quantum of their damages. For example, in relation to rental and employee costs, the court considered that it could not be excluded that office space and staff could have been used by other parts of the claimants' business that were not affected by the abuse. Similarly, because the economy as a whole was in recession during the period when the abuse took place, the claimants were unable to precisely identify which part of the losses were the result of the defendant's abusive conduct, and which part was caused by the general economic downturn. As a result, the District Court made its own estimate of the claimants' damages (at half the amount sought). This was in accordance with Section 35:5 of the Swedish Code of Judicial Procedure, which gives the court discretion to calculate the damages within the limits of reason where insufficient evidence is available or when proof of the exact extent of the loss entails costs or inconvenience disproportionate to the size of the loss.

The defendant has appealed the District Court's judgment and the case is currently pending before the Swedish Court of Appeal.

¹⁷ Another example of such rules in Member States is Section 287 of the German Code of Civil Procedure, which provides that a court has a degree of discretion to establish the amount of loss based on its best judgment and by assessing all the circumstances of the individual case—see Box 4.1 for a cartel damages action where this rule has been applied. A similar rule exists in the Netherlands (Article 6:97 of the Civil Code). In Finland, Chapter 17, Section 6 of the Code of Judicial Procedure provides that when no evidence is available, or when it is too burdensome to present such evidence, it is left to the discretion of the court to calculate the amount of damages within the limits of reason.

Box 1.2 Damages claim by a purchaser regarding price fixing (Italy)

Corte di Cassazione (Italian Supreme Court), *Fondiarria SAI SpA v. Nigriello*, judgment of February 17th 2007

This damages claim followed on from a 2000 decision by the Italian competition authority, which found that the members of a car insurance cartel had collectively raised their premiums by 20% between 1994 and 1999 (price fixing).

In its judgment, the Italian Supreme Court held that it is permissible for a judge to use presumptions in order to evaluate the loss suffered by a claimant. Specifically, in this case, the Supreme Court considered it sufficient for the claimant to rely on the infringement decision of the Italian competition authority, to produce its insurance policy and to refer to the loss suffered—ie, the higher premiums, comparing to a hypothetical non-cartelised market (the ‘but for’ test) in order to prove the damage it had suffered.

According to the Supreme Court, the causal link between the anti-competitive conduct and the alleged damage can be established on the basis of ‘probabilistic presumptions’ in order to deduce the relationship between antecedents and consequents, albeit that a judge is always under a duty to take into account any evidence provided by the defendant aimed at rebutting such presumptions and at proving that other factors have caused, or have contributed to causing, the loss.

The Supreme Court also confirmed that when the exact quantum of the loss is difficult to prove, the Italian courts can rely on Article 1226 of the Italian Civil Code and award an equitable amount of damages (*ex aequo et bono*). In that regard, the Supreme Court considered this case as ‘a textbook example’ of where the Italian courts should make use of such a power, due to the fact that it was difficult for the claimant to prove the precise value of the actual loss (essentially the cartel overcharge) that it had suffered.

1.3 Methods and models, and further insights from economics and finance

1.3.1 Methods and models

The economics literature provides a toolkit of methods and models that can be used for the quantification of damages. These can be both theoretical and empirical. They come from diverse fields within economics and finance—in particular, industrial organisation (IO), corporate finance, and econometrics. Determining the counterfactual for damages estimations is not far removed from economic forecasting performed in other contexts (such as demand or price forecasting). Likewise, determining the value loss from an infringement is not very different to financial valuations undertaken in other contexts.

Section 3 of this report is aimed at providing a succinct overview of the toolkit of economic methods and models for damages calculations.

1.3.2 Aiding the use of methods and models: further insights from economics and finance

In order to balance the objective of identifying the actual damages amount with the objective of having simple rules that facilitate damages actions, this report also identifies a range of further insights provided by the theoretical and empirical economics and finance literature.

The intended use for these insights is as an aid and complement to the methods and models in the economics toolkit. At the very least they can serve as general background information. In specific cases they may be used as a cross-check of the damages estimate, or to provide initial insight into the likely nature and scope of the damage in advance of the use of methods and models. In some circumstances, the insights presented in this report can also be used to fill certain gaps in the methods and models, or to facilitate the estimation of damages in situations where insufficient data is available to apply methods and models.

Section 4 sets out these further insights from economics and finance, and discusses the extent to which they have a robust grounding in theory, and whether they have support from empirical evidence and legal precedent. Whether and how these insights are used in practice will ultimately depend on the applicable legal framework and the specifics of each case.

1.4 Emphasis on cartels, exclusionary practices and other types of infringement

The main principles identified by the Commission in the White Paper imply that *all* victims of *all* types of antitrust infringement are entitled to compensation for the damage they suffer. This study is therefore intended to assist in developing guidance for all the different types of antitrust damages cases that may arise.

Nonetheless, some prioritisation within the report seems desirable from both a policy and a practical perspective. Oxera has focused on damages from cartel infringements under Article 101 and damages from exclusionary abuses of dominance under Article 102. Within the category of cartel infringements, the report has placed most weight on the damage arising from the overcharge paid by customers of the cartel. In the current legal frameworks across Member States, it is these types of case where damages actions are most likely to be brought.

It is, however, important to stress that the report also covers other types of damages and other types of harmed parties. Moreover, much of the discussion that refers to harm from cartel overcharges would also be of relevance to harm from excessive pricing under Article 102, and to situations where customers have suffered price increases following an abuse of dominance that has reduced competition in the market. Likewise, the discussion on harm from exclusionary abuses is of relevance to any infringement that has exclusionary effects—for example, vertical agreements under Article 101.

1.5 Approach to the study

The study has not been undertaken in a vacuum—the analytical process and outputs of the study are firmly rooted in the following sources.

- **The latest academic literature and thinking.** The economics literature provides a sound theoretical framework for how to model competitive interactions and analyse the possible theories of harm and corresponding damages, and for assessing important aspects such as the pass-on of overcharges. The corporate finance literature provides a number of tools for business analysis and valuation that are of direct relevance to damages estimations—indeed, economic and financial tools are often not sufficiently integrated into competition analyses, despite the fact that they are both essential for robust damages estimations. The study has therefore attributed considerable importance to integrating both of these areas into the analysis. Finally, the modelling literature provides the relevant quantitative and econometric tools for estimating damages, as well as essential guidance on best practice and the minimum requirements that statistical models should meet.
- **Legal practice and case law.** With the assistance of a strong team of legal advisers, this study has taken account of the existing procedural and substantive requirements concerning the quantification of damages that prevail in many of the Member State courts for whom the report may be of relevance. The study has also endeavoured to ensure that the report reflects current best practice regarding the quantification of damages as it has evolved in multiple jurisdictions—including in Europe and the USA—in both competition law and other fields where relevant.
- **The White Paper and surrounding policy debates.** As noted in section 1.1, this study represents a next step in the European policy debate on private damages actions that has been taking place for a number of years and has resulted in the White Paper. The outputs from this study take into account the research and analysis that has been included in the following documents issued by the Commission during the debate, as listed below.

- The White Paper—European Commission (2008), ‘White Paper on Damages Actions for Breach of the EC Antitrust Rules’, COM(2008) 165, April.
- European Commission (2008), ‘Commission Staff Working Paper Accompanying the White Paper on Damages Actions for the Breach of the EC Antitrust Rules’, SEC(2008) 404, April.
- European Commission (2008), ‘Commission Staff Working Document: Accompanying Document to the White Paper on Damages Actions for the Breach of the EC Antitrust Rules: Impact Assessment’, SEC(2008) 405, April.
- CEPS, EUR, LUISS (2007), ‘Making Antitrust Damages Actions More Effective in the EU: Welfare Impact and Potential Scenarios’, Centre for European Policy Studies, Erasmus University Rotterdam and Luiss Guido Carli, December.
- The Green Paper—European Commission (2005), ‘Green Paper: Damages Actions for the Breach of EC Antitrust Rules’, COM(2005) 672final, December.
- European Commission (2005), ‘Commission Staff Working Paper: Annex to the Green Paper on Damages Actions for the Breach of EC Antitrust Rules’, SEC 2005(1732), December.
- Ashurst (2004), ‘Study on the Conditions of Claims for Damages in Case of Infringement of EC Competition Rules: Comparative Report’, and the supplementary ‘Analysis of Economic Models for the Calculation of Damages’, August.
- The large number of submissions to the Commission in the context of both the Green Paper and the White Paper, as published on the Commission’s website.¹⁸

The studies for the European Commission by Ashurst and CEPS, EUR and LUISS each contain an overview of methodologies for damages estimation. Some national jurisdictions have also developed relevant guidance. For example, the German Bundeskartellamt gives an overview of methods in a 2005 discussion paper on private actions.¹⁹ In the USA, extensive guidance can be found in the ‘Reference Manual on Scientific Evidence’, issued by the Federal Judicial Center.²⁰ The analysis presented in this report takes these previous studies into account.

1.6 Best practice in using economic evidence in courts

In developing guidance to the court (and for legal practitioners in general) on quantifying damages, there is a decision to be made about how far the guidance should go in explaining economic and financial theory and techniques. Oxera considers that it is most useful for the present purposes to develop guidance that equips courts to assess the validity and robustness of economic and financial evidence that is presented to them by asking the right critical questions. To use an analogy, economic evidence can be like a ‘black box’. The objective of this study is not so much to equip courts to understand all the internal workings of the black box, but to allow them to understand some of the basic workings, to have a critical look inside the box, and to shake it and see if it remains intact.

In addition, and as noted above, courts in some Member States have the power to make a damages award on the basis of equity, or on the basis of a best estimate or within reason.

¹⁸ <http://ec.europa.eu/competition/antitrust/actionsdamages/index.html>.

¹⁹ Bundeskartellamt (2005).

²⁰ See Hall and Lazear (2000).

The guidance is also intended to assist judges to make informed decisions in those situations.

Various methods and practices have been developed in different jurisdictions to assist courts and competition authorities in dealing with complex economic evidence, as illustrated below.

- In several jurisdictions some notion of best practice of use of economic and financial evidence has been developed over a number of years. The European Commission, in the context of its public enforcement activities, is currently developing guidance on such best practice. One competition authority that has recently issued best practice guidance is the UK Competition Commission.²¹ The principles behind this best practice fall into the categories of clarity and transparency, completeness, and replicability of results.
- In February 2008 the OECD organised a round table on techniques for presenting complex economic theories to judges.²² Contributions were made by a number of judges and several OECD member states. The round table noted that agencies and courts display varying degrees of sophistication when dealing with economic analyses. Reasons why courts sometimes reject economic evidence include requirements for high standards of proof, a lack of guidance from the authorities, a lack of understanding by the judges, and ineffective presentation of the evidence. Various methods were discussed to help judges understand complex economic evidence—for example, those related to ease of understanding, clarifying assumptions, clarifying the data limitations, and aligning the evidence with the legal case and with the structure of judicial reasoning more generally.
- The OECD (2008) report states that a list of practical questions has been developed in France for judges to ask in order to assess the relevance, reliability and consistency of economic expert analyses. The questions fall into various categories, including: i) is the expert qualified? ii) is the method reliable? (the list refers here to the *Daubert* test in the USA, as discussed below); iii) is the analysis of the expert relevant? and iv) is the analysis of the expert externally consistent?²³
- The English courts have developed procedures for the use of expert evidence in the civil courts, which establish some useful principles.²⁴ The expert has a formal duty to help the court in their area of expertise, and this duty overrides any obligation to the party instructing the expert. In their reports they must be explicit about the boundaries of both their expertise and the available information. The experts from both sides of the dispute are normally expected to hold discussions and to produce a joint statement setting out the issues on which they agree and those on which they disagree (and the reasons for disagreeing). This helps the court to narrow the issues in dispute. Recent experience with original antitrust actions suggests that the system works satisfactorily in many cases, in that judges have expressed that they felt they could rely on the experts.²⁵

²¹ Competition Commission (2009).

²² OECD (2008).

²³ The list of questions has been developed by Professor Frédéric Jenny, a Judge at the Cour de Cassation in Paris and Chair of the OECD Competition Committee. They were presented by Professor Jenny in 'Civil Law Judges and the Economic Content of Competition Law', University College London, May 7th 2009. Oxera would like to thank Professor Jenny for providing this.

²⁴ Ministry of Justice (2009), 'Civil Procedure Rules', Part 35: Experts and Assessors.

²⁵ See, for example, *Chester City Council v Arriva* [2007] EWHC 1373 (Ch): 'I accept Dr [expert]'s opinion, whose evidence I found authoritative, persuasive and convincing'; similarly in Scotland the case of *Calor Gas v Express Fuels and D Jamieson*, Court of Session [2008] CSOH 13: 'I noted the considered and thoughtful way in which Mr [expert] gave his evidence. I am entirely satisfied that he acted throughout as an independent expert offering his opinions to assist the court ... His credentials to give expert evidence on this subject are impressive. On the material issues, I accept all of Mr [expert]'s evidence and his conclusions.'

- US case law has developed the *Daubert* test on the admissibility of scientific evidence, which applies to economic and financial evidence on antitrust damages.²⁶ This test is intended to prevent testimony based on untested and unreliable theories. Specifically, the main relevant aspects of the test are whether: i) the testimony is based on sufficient facts or data; ii) the testimony is the product of reliable principles and methods; and iii) the expert has applied the principles and methods reliably to the facts of the case.²⁷

In several cases since *Daubert*, there has been extensive discussion about the evidence and methods used by damages experts. Some common themes in these discussions are as follows.

- First, expert evidence is more likely to be admitted if it is in line with one of the three ‘common approaches to measuring antitrust damages’ that US case law has recognised—ie, the before-and-after approach, a yardstick or benchmark approach, and regression analysis.²⁸ (See section 3 of this report for an explanation and more refined classification of methods and models for damages quantification).
- Second, and in line with the first point, US courts have accepted the usefulness of regression analysis. In one case it was stated that ‘if performed properly multiple regression analysis is a reliable means by which economists may prove antitrust damages.’²⁹ Indeed, courts to some extent appear to expect experts to conduct a regression analysis in order to produce robust estimates: ‘[the] prudent economist must account for differences and would perform minimum regression analysis when comparing price before relevant period to prices during damage period.’³⁰
- Third, US courts typically test whether the expert’s model takes proper account of the facts of the case, and of any other factors that may influence the estimated effect.

1.7 Report structure

This section has set out the main considerations underlying this report. The structure of the report is as follows (see also Figure 1.1).

- Section 2 provides a conceptual framework for quantifying antitrust damages. What is the nature of the harm suffered by the victim of the antitrust infringement? What are the stages of a damages estimation exercise? What parameters are required in order to quantify the harm, and what type of data and information can be used?
- Section 3 classifies the various methods and models that can be used in quantifying the damage. It describes their main features in intuitive terms, their advantages and disadvantages, and the circumstances in which they can be used in practice in damages actions.
- Section 4 sets out a range of further insights provided by the theoretical and empirical economics and finance literature, and by legal precedent, which can assist in deriving a

²⁶ *Daubert v Merrell Dow Pharma, Inc.*, 509 U.S. 579 (1993). The test has been refined through a number of subsequent rulings, but is still often referred to as the *Daubert* test. The test is also reflected in Rule 702 of the Federal Rules of Evidence. For a more detailed discussion of the test, see Berger, M. (2000), and Cwik and North (2003)

²⁷ See Rule 702 of the Federal Rules of Evidence.

²⁸ *Conwood Co. L.P. v. U.S. Tobacco Co.*, 290 F.3d 768, 793 (6th Cir. 2002). Regression analysis is a generic term for statistical methods that can be used to explain variation in a piece of data with other factors. This report refers more to the term econometric analysis, which is the application of regression and certain other statistical analyses to economic data. See section 3.3 for more explanation.

²⁹ *Petruzzi’s IGA Supermarkets, Inc. v. Darling-Delaware Co.*, 998 F.2d 1224, 1238 (3d Cir.1993).

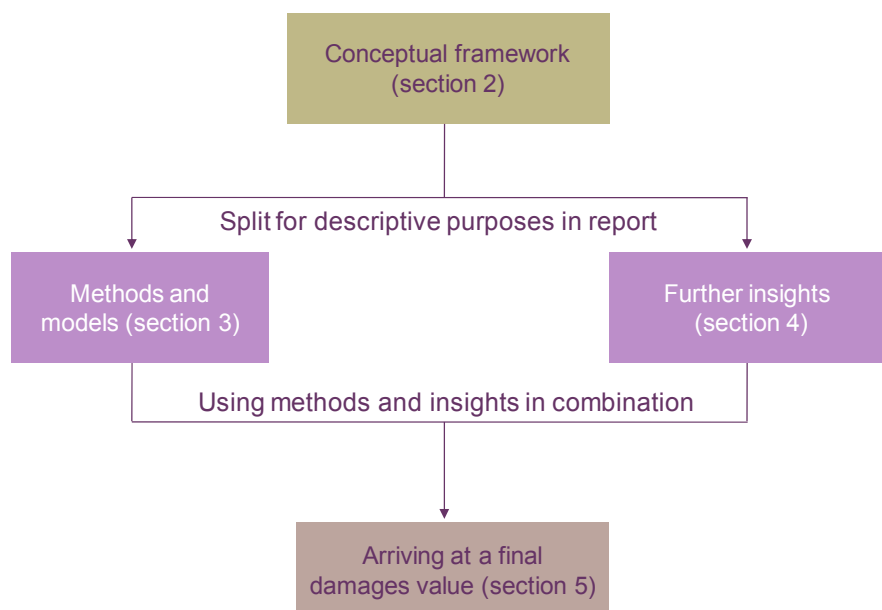
³⁰ *In re Aluminum Phosphide Antitrust Litig.*, 893 F.Supp. 1497, 1507 (D.Kan.1995).

damages estimate. It seeks to follow the structure of the conceptual framework in section 2.

Throughout sections 2 to 4, the report illustrates current practice in damages actions in courts across Europe (and beyond), by describing some of the different legal approaches in different jurisdictions and providing concrete examples in the main text, footnotes and boxes, and relating this to the concepts presented in the report.

- Sections 3 and 4 are, by nature, somewhat modular—they provide overviews of categories. Section 5 draws together sections 2–4, explaining how the court could use methods and models (section 3) together with the further insights (section 4) to arrive at a final value of the damages calculation in line with the conceptual framework (section 2).

Figure 1.1 Report structure



Source: Oxera.

2 Conceptual framework for damages estimation

2.1 Main stages in the damages estimation

The rationale behind the conceptual framework for damages estimation is straightforward: to put a claimant back into the financial position that it would have been in but for the breach of the antitrust rules. This is in line with the compensation principle underlying the White Paper (as discussed in section 1) and the case law of the Union Courts. Achieving such compensation requires a comparison of the position that a claimant is currently in—the factual—with the hypothetical position that the claimant would have been in ‘but for’ the antitrust breach—the counterfactual.

The conceptual framework for damages estimation has two main stages.

- **Determining the counterfactual, or ‘but for’, scenario.** This is often the central stage in any damages estimation. Developing an accurate counterfactual requires a detailed review of the following questions.
 - What type of competition law infringement is causing what type of harm? For example, is it a cartel causing an overcharge harm, or exclusionary conduct causing a fall in sales or lack of market access?
 - What types of claimant have been harmed? For example, are they end-consumers or intermediate producers who purchased goods from the cartel, or are they competitors of the infringing party?
 - What is the market and industry context in which the harm has arisen, and what impact does this have on the counterfactual analysis? For example, is this a mature or new market?

These questions on the counterfactual are addressed below in sections 2.2, 2.3 and 2.4, respectively.

- **Moving from the factual/counterfactual to a final value.** This stage involves converting the difference between the factual and the counterfactual into a final damages value. The steps required in this conversion process depend on how the counterfactual has been determined. One step is to ensure that the damages estimate covers the relevant time period. For example, if the counterfactual analysis has estimated the average annual overcharge of a cartel, and the cartel infringement lasted five years, the estimate needs to be aggregated over those five years. The final step will usually be to convert the aggregated figures (cash flows) over time into one value, expressed as the current value of all those cash flows combined. This requires cash-flow discounting, a standard method in financial analysis. The question of applying interest would be addressed as part of this stage.

This second stage of the conceptual framework is discussed in section 2.5.

In addition to these two main stages, this section covers the issue of data requirements, setting out the parameters and data required to populate the conceptual framework. This is the subject of section 2.6. This then leads into sections 3 and 4, which set out the methods and models and further insights, respectively, which can be used in the quantification of antitrust damages.

2.2 The counterfactual stage: what type of antitrust infringement is causing what type of harm?

Who incurs damage and how this happens will vary according to the type of infringement of competition law. For the purposes of assessing damages, infringements can be grouped into the following categories under Articles 101 and 102:

- hardcore horizontal price-fixing and market-sharing cartels (Article 101);³¹
- exploitative abuses of dominance (Article 102);
- exclusionary abuses of dominance (Article 102) and vertical and horizontal agreements with exclusionary effects (Article 101).³²

Each is examined below.

2.2.1 Harm from hardcore cartel agreements

The primary aim of most cartels is to directly raise the price of the cartel members' output. Indeed, the archetypal cartel agreement is one in which firms collectively fix higher prices. Thus, the core harm arising from this type of antitrust infringement is that parties further down the supply chain pay more for the product than they would have paid in a non-cartelised market.

The higher price would normally also result in existing customers purchasing lower volumes, and/or in customers who would have purchased the product at the non-cartelised price not purchasing at all. Price increases and output decreases typically go hand in hand, as reflected in the downward-sloping demand curve in Figure 2.1. (This is also why price-fixing cartels and output-fixing cartels frequently have equivalent effects.) This reduction in volume harms those would-be purchasers, since they would have been willing to trade at the counterfactual price but not at the cartel price. However, as discussed below, it is often difficult to identify precisely who these would-be purchasers are, which is why, in many circumstances, making a claim for damages for this volume reduction may be more difficult.

Figure 2.1 shows these two direct effects of a price-fixing cartel:

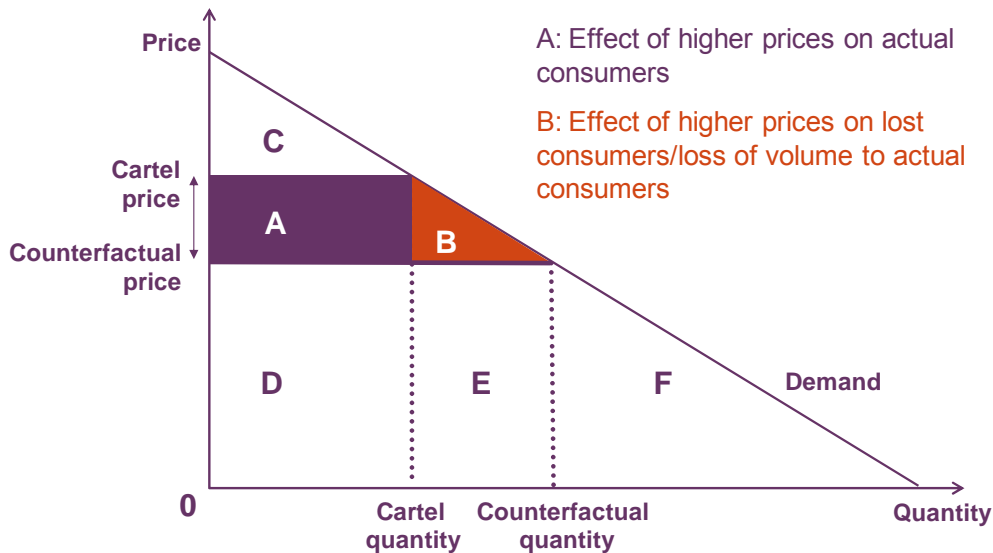
- the overcharge paid on all the units actually sold (rectangle A);
- the lost-volume effect (triangle B).

This illustration is highly stylised (eg, it represents one period, while the cartel may have lasted for many periods), and it makes simplifying assumptions, such as the demand curve being linear.

³¹ This includes bid rigging, as discussed below. Vertical price fixing and retail price maintenance agreements may have similar types of effects to the cartel effects described below.

³² The test under Article 101 is somewhat broader than exclusionary effects since it refers to agreements that appreciably prevent, restrict or distort competition. However, horizontal and vertical agreements that are not hardcore cartels but are nonetheless found to infringe Article 101 can often have exclusionary effects, and therefore may give rise to damages that are conceptually similar to those arising from exclusionary abuses of dominance. Some of these agreements may have restrictive effects that are more similar to cartel effects (eg, they may result in higher prices and lower levels of output), in which case the discussion on cartel damages would be of greater relevance.

Figure 2.1 Stylised illustration of the main effects of a price-fixing cartel



Note: This is a standard representation of a market, with price on the y-axis, quantity on the x-axis, and a downward-sloping demand (which means that buyers will purchase greater quantities at lower prices). Many variations of this representation are possible, based on different assumptions regarding demand, but these would not alter the main effects illustrated here.

Source: Oxera, based on the standard textbook representation.

The cartel overcharge harm

The overcharge, A, is the quantity of actual unit sales by the cartel multiplied by the difference between the actual cartel price and the counterfactual price (ie, the price that would have been charged in the absence of the cartel).

It is convenient to express the overcharge A as a percentage of the actual price or revenue of the cartel. For example, if the cartel price is €125, and the counterfactual price is €100, the overcharge would be 20% (€25 is 20% of €125). The overcharge is sometimes expressed as a percentage of the counterfactual price (in this case 25%). This is equally valid, but it is important to be clear about which basis for the percentage calculation is used, and in this report the first approach is preferred. Expressing the overcharge as a percentage of the actual price makes it easy (and intuitive) to calculate the total amount of overcharge by applying the percentage to the amount that the buyer actually paid for its purchases. For example, if the cartel sold 1m units at a price of €125, the total overcharge would be €25m. If one specific claimant filed a successful damages action, and it could demonstrate that its total purchases from the cartel amounted to, say, €15m over the relevant period, the amount it was overcharged is 20% of €15m—ie, €3m.

This cartel overcharge harm can legally be claimed by customers of the cartel regardless of whether they are end-consumers (if the cartel relates to a consumer product) or intermediate producers or distributors (where the cartel relates to an input). This is further discussed in section 2.4.

The lost-volume effect and other types of harm caused by cartels

The lost-volume effect (as represented by triangle B above) is known in economic theory as a deadweight welfare loss; it represents an inefficiency to the economy as a whole. This deadweight loss is greatest if the counterfactual price is equal to the price under perfect competition, but also arises if the counterfactual represents some other form of competitive, non-cartel interaction, such as oligopoly (see section 3.8). From an economic perspective, this is inefficient as the cartel does not serve those customers who would be willing to pay the price under more competitive conditions.

In practice, follow-on actions for damages in cartel cases are typically brought by parties that were actual (direct or indirect) purchasers of the cartel during the infringement period, and will most frequently focus on the harm caused to them by the overcharge. Damages for different types of harm caused by the cartel, including the volume reduction, possible negative effects on quality and choice, and possible other effects on cost levels, are generally more difficult to quantify and to prove than the overcharge harm.

As regards cases of volume reduction, it may be difficult to identify the harmed parties—this may be less of a problem in the case of an existing customer purchasing lower volumes, but particularly holds for potential customers who did not purchase at all during the infringement period and yet would have purchased the product at the non-cartelised price (see section 2.3). In legal terms, however, victims are entitled to compensation for all types of harm.

Those direct purchasers that are themselves producers or distributors may seek to link the reduction in volume of purchases from the cartel to a reduction in their own sales (and hence reduced profit) in a market downstream, and claim this as a separate (possibly additional) type of harm from the cartel overcharge.

Quantity-fixing, customer-allocation and bid-rigging cartels

Other forms of hardcore cartel agreement may cause the same types of harm as a price-fixing cartel.³³ Some hardcore cartels target quantities directly, rather than prices. For example, certain industries find it easier to monitor quantities, and thereby agree volume quotas rather than prices. However, as discussed above (and shown in Figure 2.1), restrictions in output will, in most circumstances, result in a corresponding rise in the price paid and thus cause a similar harm to that caused by price-fixing cartels. Likewise, customer-allocation cartels give each cartel member a degree of monopoly power over their allocated customers, which allows them to restrict output and increase price.

Bid rigging is a specific type of cartel agreement that shares many similarities with price- and quantity-fixing cartels. For example, if all cartel members agree on bid prices in relation to a specific project, the effect may be similar to that of a direct price-fixing cartel. However, the assessment of the harm caused by a bid-rigging cartel also needs to take into account the fact that competition may be taking place within an auction framework, rather than within a more traditional market framework (see section 2.4 on types of markets; it should be noted that bid rigging is not confined to ‘bidding markets’).

In certain circumstances, if the bid-rigging cartel fails to include one firm, it is possible that this would undermine the bid-rigging behaviour in the auctions, bringing prices down to competitive levels. At the same time, the clearer rules in such auctions may make it more straightforward to analyse what would happen in the absence of the bid-rigging cartel; in other words, the counterfactual may be somewhat more straightforward to determine in bid-rigging cases than for other types of cartel.

Dynamic cartel effects

In addition to the price and quantity effects illustrated in Figure 2.1, cartels can have longer-term effects on market structure and market functioning. The reduction in rivalry between firms can result in lower levels of innovation and a slowing-down in the rate at which improvements in efficiency are achieved, or at which inefficient firms exit the market. Higher cartel prices may also have a distortive effect in downstream markets—for example, if certain purchasers can no longer afford high input prices and downstream concentration consequently increases.

³³ As noted earlier, there are other types of horizontal agreements that fall outside the meaning of the above use of the term ‘hardcore cartel’ and that may produce different effects; for example, a collective boycott could produce exclusionary effects.

All of these longer-term effects may have to be taken into account in the damages estimation, since they may affect the counterfactual price. For example, the counterfactual price may have been even lower (and hence the overcharge even higher) if the market had seen cost-reducing innovations in the absence of the cartel. However, such factors can be taken into account only in circumstances where estimating these effects is really feasible, where this would not detract from estimating the direct overcharge effect (by making the analysis overly complicated), and where it is legally possible to include these effects, since it may be difficult to demonstrate a causal link between the infringement and the alleged longer-term harm.

The issue of pass-on of the cartel overcharge

Figure 2.1 above shows the overcharge and lost-volume effect of a cartel on *direct* purchasers. These can be either sellers themselves (intermediate producer or distributor firms located one level further downstream in the supply chain) or end-consumers. Both would have faced the overcharge. However, the ultimate harm caused to particular direct and indirect customers by the overcharge (and also the volume effect) will depend on the extent to which the price increase caused by the cartel is passed along the supply chain. This is a significant and complex issue with any antitrust damages claim (the issue of the passing of cost or price changes up the supply chain may also arise). The question of pass-on does not affect the calculation of the overcharge in itself, only the distribution of that harm along the supply chain.

The issue of whether the passing-on defence—whereby a defendant can reject a damages claim by a direct purchaser on the basis that the latter has passed on any cost increases further downstream—should be allowed is a separate policy debate that is addressed in the White Paper. The Commission has stated that, in line with the compensation principle, the passing-on defence should be permitted (European Commission 2008a, pp. 7–8). Pass-on is further discussed in section 4.4.

2.2.2 Harm from exploitative abuses of dominance

There have been relatively few cases of exploitative abuse of dominance found by competition authorities or courts, either at the EU level or in the Member States. The most common form of exploitative abuse (to the extent that such abuses occur) is excessive pricing.³⁴

In theory, the harm caused by excessive pricing is similar to that caused by cartels: a firm with significant market power restricts output and raises prices. This leads to the same two types of harm as in a cartel case. An overcharge harm is caused by higher prices being paid by parties further down the supply chain (represented by area A in Figure 2.1). A volume-loss harm is caused by the reduction in consumption triggered by these higher prices (area B). The guidance developed in this report on assessing the cartel overcharges is therefore to a great extent directly applicable to excessive pricing cases. (It should be noted that certain other competition law infringements, such as resale price maintenance, can also lead to overcharge harm.)

There may be a difference in relation to the counterfactual. In the case of a cartel, the counterfactual will usually be one in which several firms compete with one another (although, as noted above and further discussed in section 3, the intensity of this competition can vary). In contrast, where there is an exploitative abuse of dominance, there will often be some other factor (such as strong economies of scale or high barriers to entry) which means that the counterfactual market situation may not be a particularly competitive one. This may make it more difficult to identify an appropriate benchmark price level for the dominant firm (indeed,

³⁴ The Court of Justice established the main principles for excessive pricing cases in *General Motors v. Commission* (26/75) [1975] ECR 1367 [1976] 1 CMLR 95. The European Commission has brought few cases since. Several excessive pricing cases have been dealt with in Member States such as Spain, the Netherlands and the UK—see Consejo de la Comisión Nacional de Competencia (2008); NMa (2005); and England and Wales Court of Appeal, *Attheraces v British Horseracing Board* [2007] EWCA Civ 38. (In these last two cases the defendants were ultimately cleared of the excessive pricing allegation.)

this difficulty is one reason why few excessive pricing cases are brought and even fewer are successful).

Harm caused by non-price exploitative abuses—eg, offering excessively low quality³⁵—may generally be difficult to quantify.

2.2.3 Harm from exclusionary conduct

Exclusionary abuses of dominance can take many forms. As is highlighted in the European Commission's guidance on Article 102 enforcement priorities, these include exclusive dealing, tying and bundling, predation, refusal to supply and margin squeeze.³⁶ Similarly, exclusionary agreements also take many forms, including selective distribution, exclusive supply, and exclusive customer allocation.³⁷ Several damages claims in relation to exclusionary conduct have been made in courts across Europe, in both follow-on and stand-alone actions—see the various examples described in this sub-section and elsewhere in the report.

Effects on customers and competitors

Despite the number of forms that exclusionary behaviour can take, for the purposes of damages actions the effects are broadly similar across all these forms. If successful, exclusionary conduct stifles the competitive process. Apart from the broader negative impact this may have on the economy as a whole (eg, dampening of competitive dynamics; reduction in efficiency and innovation), it can lead to various kinds of harm to specific parties.

- Existing competitors may be prevented from competing effectively in the market or be forced to exit altogether, while potential competitors may be prevented from entering the market (or be restricted to small-scale entry). This can affect their profits or value relative to the situation in which there is no exclusionary conduct.
- Buyers in the market (be they end-consumers, or intermediate downstream producers or distributors) may be harmed by exclusionary conduct if the reduction in competition leads to higher prices, a reduction in choice, and/or a reduction in quality.

As regards the latter, the harm to purchasers from exclusionary conduct may be difficult to identify or may not yet have manifested itself—for example, where an infringement is established before competitors were weakened or forced to exit the market, such that purchasers have not suffered the full consequences of diminished competition. Yet, there are cases in Europe where purchasers have claimed damages in the event of exclusionary conduct—see Box 2.1 for a recent example in Spain. This was a claim by a potential purchaser that had intended to develop a profitable business by obtaining access to the product concerned (football rights); it was not a claim by an actual purchaser.³⁸

³⁵ See, for example, Case C-179/90, *Merci convenzionali porto di Genova SpA v. Siderurgica Gabrielli SpA* [1991] ECR I-5889.

³⁶ European Commission (2008d).

³⁷ See, for example, European Commission (2000), pp. 137–229.

³⁸ An example, from the UK, where an actual purchaser made a claim following an abuse of dominance finding (in this case, a claim for an overcharge following price discrimination among customers by a dominant supplier) is Case 1106/5/7/08, *Enron Coal Services (in liquidation) v. EWS*, judgment of March 12th 2009, Competition Appeal Tribunal (subsequently appealed to the Court of Appeal),

Box 2.1 Damages claim by a potential purchaser in relation to exclusionary conduct (Spain)

Juzgado de Primera Instancia de Madrid (Madrid Court of First Instance), *Antena 3 Televisión SA v. Liga Nacional de Fútbol Profesional*, judgment of June 7th 2005; overturned by Audiencia Provincial de Madrid (Madrid Court of Appeal), judgment of December 18th 2006

This damages claim followed on from a 1993 decision by the Spanish competition authority, which considered that the defendant had illegally excluded the claimant from the tender for the right to broadcast football matches in Spain.

Antena 3 sought to recover damages for the loss of profit in relation to advertising income which it could have derived from broadcasting the football in Spain. On the basis of a report submitted by experts, Antena 3 claimed €34m–€36m. This figure was calculated by subtracting the costs that Antena 3 would have incurred in obtaining the rights to broadcast the matches and advertising proceeds from the alternative programmes that it transmitted in the place of the football, from the revenue that it would have generated from advertisements during the matches. In its judgment, the Madrid Court of First Instance partially accepted Antena 3's claims and awarded €25m in damages. However, the judgment was subsequently overturned by the Madrid Court of Appeal on the grounds that Antena 3 experts' quantification of the damage was flawed.

Antena 3's experts had based their calculation of the value of the football rights on the purchase price of the re-transmission rights of the football matches (the reasonable price of football), which they defined as a 'price that a rational investor, from a financial point of view and in the framework of free competition in the market not altered by any of the anticompetitive conducts ... would have paid in 1990 to have access to the potential benefits derived from the football broadcasting'. In relation to this finding, the Madrid Court of Appeal reached the following conclusions.

- The 'reasonable price' benchmark constitutes a mere hypothesis. This price is neither the market price nor the price of similar previous transactions.
- The price for football rights could have been even higher than the final price paid by the winner of the bid.
- The experts had admitted that i) their report was based on pure economic theory and not actual facts such as market prices; ii) they did not have specific experience of the football market; and iii) the model they used to calculate the 'reasonable price' was only an example and the price could have been calculated using other methods.
- The fact that Antena 3 made an offer that was six times higher than the 'reasonable price', and that the experts considered it 'appropriate' at that time to acquire the rights, distorts the hypothesis of the reasonable price.

Furthermore, one independent expert suggested that the method used by the Antena 3 experts was controversial. Although their approach was logical from the perspective of calculating how a reasonable investor deals with its portfolio, it could not be used to explain the functioning of the entire market. The independent expert added that the intangible value of football rights requires their value to be determined by the market price or recent similar transactions. Other aspects of the Antena 3 experts' report were also found to be inaccurate.

- The court did not consider there to be only three competitors active in the market and claimed that other companies (not necessarily active in the television market) could also have participated in the bid. It provided the example of companies that act as intermediaries and obtain a benefit on the resale of the rights.
- The court agreed with one independent expert who held that the profitability established in the experts' report far exceeded the average profitability of Antena 3.
- Finally, the court disagreed with the Antena 3 experts' report insofar as it calculated profits on the basis of three hours of football broadcasting, preferring the finding of another independent expert, who held that in practice the benchmark is two hours.

In sum, the Madrid Court of Appeal considered that Antena 3's lost profit must be proved with rigour and that it was unacceptable to award damages where proof of such loss is derived from an expert report that is based on theory and runs counter to reality. An appeal against this latter judgment was rejected by the Tribunal Supremo (Spanish Supreme Court) in a judgment dated April 14th 2009.

The harm caused by exclusionary practices will often be suffered most directly by competitors of the infringer. Indeed, most original and follow-on damages actions in Member States have thus far have been brought by competitors rather than by purchasers—for example, in court cases in Sweden (see Box 1.1 in section 1), Denmark (Box 2.2), France (Box 2.3), Spain (Box 3.2 in section 3), and Germany (Box 3.10).

Box 2.2 Damages claim by a competitor regarding exclusionary abuse (discriminatory pricing and rebates) (Denmark)

Østre landsrets (Eastern High Court of Denmark), *Forbruger-Kontakt a-s (Søndagsavisen a-s) v. Post Danmark A/S*, judgment of May 20th 2009

This damages claim followed on from a September 2004 decision of the Danish Competition Commission, which found that, between January 2004 and May 2005, the Danish postal service had abused its dominant position in the market for unaddressed mail by applying different prices and rebates to its own customers and those of the claimant. As a result, the claimant lost three major customers to the Danish postal service and one-third of its turnover.

In its judgment, the Eastern High Court found that the claimant had suffered harm not only between January 2004 and June 2005 (when the Competition Commission approved commitments by the Danish postal service regarding a new pricing structure), but also after June 2005 since, as a result of the abusive conduct, it was more difficult for it to recapture its former customers.

The court awarded the claimant DKK75m (around €10m) in damages based on the following factors.

- It estimated the counterfactual development in the claimant's price based on the development in the claimant's costs.
- Regarding the counterfactual volume of unaddressed mail that the claimant would have distributed in the absence of the abuse, the court relied on the amount actually distributed by the Danish postal service for the three customers in the relevant period (while making deductions for certain distributions that the claimant would not have been able to carry out).
- In calculating the claimant's direct costs, the court considered that the 'separate method', whereby production costs are calculated for each distribution unit, was the most accurate.
- In calculating the claimant's indirect costs, the court took into account the fact that the claimant should have made savings on personnel and administration expenses as a result of the loss of the three customers. The court thus applied the principle that a claimant should mitigate its losses.

The effect of exclusionary conduct on competitors will typically be to limit their market presence, to force them to exit the market altogether (if they are already in the market), or to prevent them from entering the market in the first place. Harm in these cases can be expressed not only as actual losses suffered by these competitors (such as extra costs incurred in order to supply customers; see, for example, Boxes 4.7 and 4.8 which describe cases in Germany and Italy respectively), but also as lost profit. This is in line with the compensation principle described in section 1. The concept of lost profit is further discussed below.

Box 2.3 Damages claim by a competitor regarding exclusionary abuse (France)

Cour d'Appel de Paris (Paris Court of Appeal), *S.A. Mors v. S.A. Labinal*, judgment of September 30th 1998

In an initial 1993 judgment, the Paris Court of Appeal found that the defendant had entered into an agreement contrary to Article 101(1) and abused its dominant position contrary to Article 102, with the sole purpose of eliminating its only competitor, Mors, from a tender to supply tyre pressure measuring equipment to British Aerospace.

Subsequently, in a 1998 judgment, the Paris Court of Appeal ruled on the quantum of damages, awarding Mors FF34.2m in damages for the losses caused by Labinal's infringements. The calculation of damages was based exclusively on the report of the court-appointed expert, with the court confining itself to assessing whether the expert's conclusions were reasonable and supported by statements made, or documents supplied, by the parties.

The expert used the 'but for' test—ie, asking what Mors's position would be in the absence of Labinal's anti-competitive conduct—and considered that Mors had incurred the following harm:

- additional administrative and commercial costs;
- loss of opportunity to participate in other tenders; and
- the inability to recover one-off costs.

However, the expert did not consider that Mors should be awarded damages for loss of opportunity to enter adjacent markets since it had failed to prove that it would have entered these other markets had Labinal's anti-competitive practices not taken place.

The concept and quantification of lost profit (legal and economic perspective)

Firms that are already in the market that is directly affected are, in legal terms, relatively close to the conduct, meaning that it is usually easier for them to substantiate and bring a damages claim. A damage estimation in this situation would seek to identify what profit the victim would have made in the absence of the infringement, in the 'normal' course of business.³⁹ Firms that were not already in the market, but that were nonetheless excluded from it, may still be relatively close to the conduct, but they need to be able to show that they were indeed excluded by this conduct and that there is a sufficient causal link between the exclusion and the harm they have suffered.

This conceptual framework for lost profit is in line with paragraphs 95 to 97 of the *Manfredi* ruling,⁴⁰ where the Court of Justice of the European Union stated that national legal systems cannot exclude the possibility of obtaining reparation for pure economic loss (in the form of lost profit) as this would be incompatible with the right to damages guaranteed by Article 101 (see also section 1.1):

It follows from the principle of effectiveness and the right of any individual to seek compensation for loss caused by a contract or by conduct liable to restrict or distort competition that injured persons must be able to seek compensation not only for actual loss (*damnum emergens*) but also for loss of profit (*lucrum cessans*) plus interest ... Total exclusion of loss of profit as a head of damage for which compensation may be awarded cannot be accepted in the case of a breach of Community law since, especially in the context of economic or commercial litigation, such a total exclusion of loss of profit would be such as to make reparation of damage practically impossible ...

³⁹ This principle is common in the legal frameworks on breach of contract in many Member States. For example, the Czech Commercial Code, Section 381, states that: 'Instead of profit actually lost, the aggrieved (injured) party may demand compensation based on the *profit attained as a rule in fair business conduct* in the aggrieved party's line of business, under conditions similar to those in the breached contract' (emphasis added). In the competition law context, see, for example, Chapter 10 of Möllers and Heinemann (2007), which gives an overview of how the legal systems in various jurisdictions (Austria, Denmark, England, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Poland, Portugal, Spain and Sweden) would treat a lost-profit damages claim by a victim of an exclusionary abuse of dominance. The authors conclude that the countries reviewed allow for a claim of lost profit by a competitor (sometimes on a specific legal basis for the claim under the competition law, and sometimes on grounds drawn from civil tort law), but in many countries it is considered that causation is often difficult to demonstrate in these cases.

⁴⁰ Joined Cases C-295/04 to C-298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I-6619. See also Box 4.2.

As to the payment of interest ... an award made in accordance with the applicable national rules constitutes an essential component of compensation.

In practice, claimants may not always be able to prove the exact quantum and/or a causal link between the unlawful conduct and the alleged lost profit (*lucrum cessans*) because of difficulties in establishing whether such losses were due to the anti-competitive practice of an infringer or to other factors (eg, incompetence, lack of resources, luck, or external conjunctural economic factors). In this context it is notable that a recent European General Court judgment on a damages action (outside the area of competition law) stated that:

the evidentiary requirements in respect of loss of potential earnings are less stringent than those in respect of actual loss, in so far as it is necessary to examine the existence of damage and the assessment of that damage in the light of the normal course of events and real probabilities, not theoretical ones.⁴¹

Most legal systems take a relatively pragmatic approach when assessing lost profit. Courts usually have a high degree of discretion in awarding damages for lost profit, and some courts may be more or less restrictive than others (see the example of the *Crehan* case in Box 2.4, where English Court of Appeal took a much more restrictive view than the High Court).

Box 2.4 Damages claim by a co-contractor regarding vertical agreements with exclusionary effects (UK)

High Court of England of Wales, Court of Appeal of England of Wales, House of Lords, *Crehan v Inntrepreneur Pub Company (CPC) & Anor* [2003] EWHC 1510 (Ch) [2004] EWCA Civ 637 [2006] UKHL 38

The claimant was a public house landlord who, in 1991, entered into an exclusive contract with Inntrepreneur to lease two public houses on condition that he stocked only its beers. After two unsuccessful years, Inntrepreneur terminated his tenancy and sought to recover money owed to it by the claimant. The claimant subsequently counterclaimed that the beer tie agreement infringed Article 101 and sought to recover the following heads of damages:

- losses that he suffered during the period of the lease between 1991 and 1993—£57,000 (approximately €85,000);
- future profits he would have made in the period between 1993 and 2003 in the absence of the beer tie—£900,000 (approximately €1,334,000);
- the value in 2003 of the untied leases had he wished to sell these on—£360,000 (approximately €534,000).

Both the High Court and the Court of Appeal accepted that if liability were established, the claimant would have been entitled to recover in full the losses suffered during the period of the two-year lease. However, the Court of Appeal took a more restrictive approach than the High Court in relation to the recoverability of future profits that the claimant would have made between 1993 and 2003 (ie, up until the date of the High Court's judgment). Specifically, the High Court (albeit hypothetically as it dismissed the case on other grounds) calculated the total lost profit due to the claimant as £1,311,500 (approximately €1,950,000). The lost profit figure included: i) the losses actually suffered from 1991 to 1993; ii) profits that would have been made from 1993 to 2003; and iii) the value of a lease in 2003 if free of a tie). In contrast, the Court of Appeal held that the claimant would have been entitled to only £131,336 (approximately €195,000) in damages. The main point of difference between these two judgments is the treatment of the lost profit between 1993 and 2003. While the High Court was prepared to award this, the Court of Appeal considered that this was too speculative as it would have required the court to estimate the hypothetical profits of a hypothetical business. Instead the Court of Appeal awarded damages reflecting the value of the lease free of a tie in 1993.

The case was subsequently appealed to the House of Lords, which overturned the Court of Appeal's finding that the beer tie agreement infringed Article 101 (as such, the issue of quantum of the damage did not need to be addressed in this ruling).

⁴¹ Cases T-3/00 and T-337/04 *Athanasios Pitsiorlas v. Council and European Central Bank* [2007] ECR II-4779, para 300.

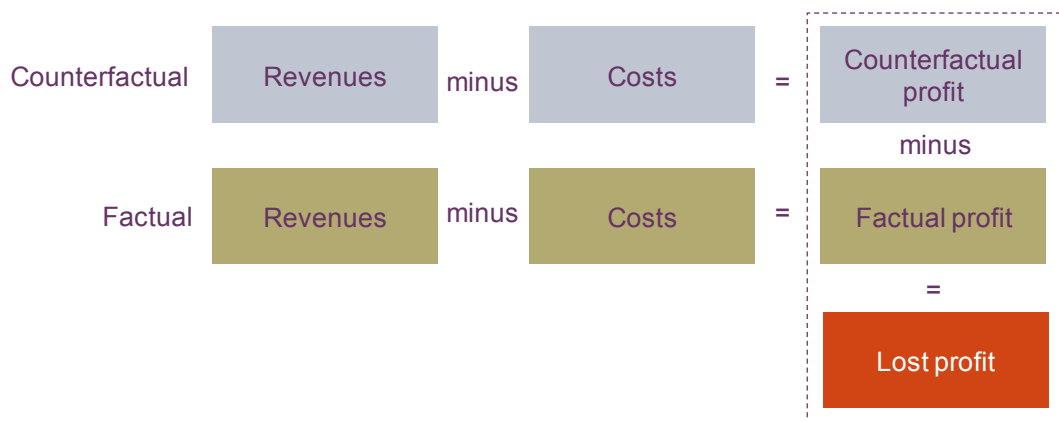
From an economic perspective, harm to competitors from an exclusionary infringement may arise in either or both of the following ways:

- increased costs (where costs include both cash cost items, such as input goods, and other more general items, such as the cost of financing the business);
- reduced revenue (where the infringing conduct affects the price and/or sales volumes).

The effect of increased costs and reduced revenue is a reduction in profit or an increase in loss. From a legal perspective, it is important to determine in each specific case whether this effect falls under actual loss (*damnum emergens*) or lost profit (*lucrum cessans*), as the evidentiary requirements may be different. The economic framework presented here can be used for either or both (the use of the term 'lost profit' in the framework below should therefore not be interpreted in the legal sense of *lucrum cessans*).

The basic economic framework can be illustrated graphically as in Figure 2.2. As this demonstrates, the damages are calculated as the difference between the factual and the counterfactual profit of the company. To take a simple example, if the victim of the infringement had actual revenues of € 10m and actual costs of €8m, its actual profit would be €2m. If its counterfactual revenues in the absence of the infringement would have been €15m and its counterfactual costs €12m then its counterfactual profit is €3m and the lost profit €1m.

Figure 2.2 Economic framework for calculating the effect of the infringement on profits



Note: As explained in the text, the term 'lost profit' as used in this economic framework can in principle comprise both the legal concepts of actual loss (*damnum emergens*) and lost profit (*lucrum cessans*).
Source: Oxera.

This framework can be used directly to quantify damages. It does not specify which party legally bears the burden of proof at each step of the quantification. As such, the framework is neutral regarding this legal question, and can also be applied in situations where, under the applicable legal rules, the burden of proof for some of the relevant factors falls upon the defendant.

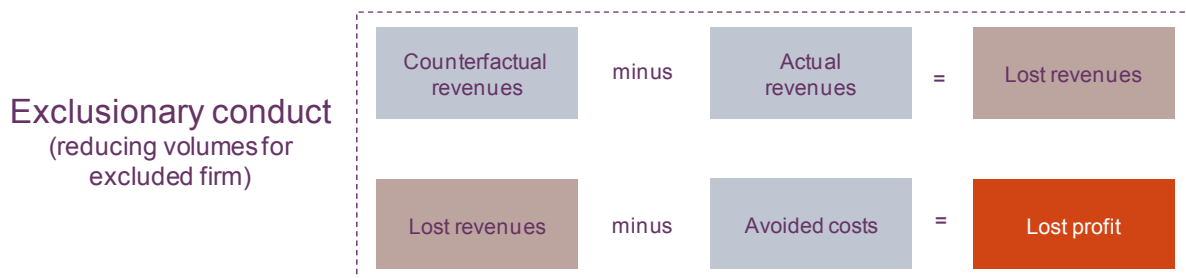
The framework can be rearranged as illustrated in Figure 2.3, which shows a simpler expression for the fall in profit for a firm that has suffered reduced volumes due to being partially or fully excluded from a market.⁴²

The lost revenue in Figure 2.3 is calculated as the difference between the counterfactual and factual revenues. The costs avoided due to the infringement are then deducted from the lost

⁴² Figure 2.3 does not show the situation where the main harm from the exclusionary conduct has been to raise competitors' costs (and hence indirectly reduce their volumes). That situation is best captured in Figures 2.2 and 2.4.

revenue to obtain the fall in profit.⁴³ This re-arranged expression has the advantage (compared with that in Figure 2.2) of requiring less detailed knowledge of the company's cost structure. This is because it is not necessary to calculate all the costs that the company would have incurred in the relevant period; instead, the focus is on the costs that the company did not incur because of the infringement—ie, the avoided costs. Following the above simple numerical example, lost revenues would be €5m (€15m of revenue in the counterfactual minus €10m in the factual), and avoided costs €4m (€12m of cost in the counterfactual minus €8m in the factual), giving a fall in profit of €1m.

Figure 2.3 Re-arranged economic framework for calculating harm from exclusionary conduct (equivalent to Figure 2.2)



Note: As explained in the text, the term 'lost profit' as used in this economic framework can in principle comprise both the legal concepts of actual loss (*damnum emergens*) and lost profit (*lucrum cessans*).

Source: Oxera.

In practice, damages actions may refer to the above economic framework, either in part or in full. This will often be driven by the applicable legal rules in the jurisdiction in question, particularly as regards evidentiary requirements and burden of proof (see also Boxes 1.1 and 1.2). Two further practical considerations are as follows.

- In many cases, the effect on profits (whether actual loss or lost profit in the legal sense) is approximated by reference to variables such as lost volumes, lost customers, or lost market share (see the various examples provided in this section and section 4.3). Nonetheless, those quantifications are (or should be) implicitly consistent with the conceptual framework in Figures 2.2 and 2.3—for example, damages claims based on an estimation of lost sales volume will usually be translated into a negative effect on profits by applying some average counterfactual profit margin to each unit of sales lost.
- Depending on the burden of proof and other practical considerations, claimants may not always (have to) quantify each box in Figure 2.3. For example, they may present an estimate of lost revenues but not (all) avoided costs, and claim damages on that basis. (Although, in practice, there are many cases where avoided costs are explicitly considered—eg, the Danish case described in Box 2.2—and where lost-sales volumes are multiplied by some average counterfactual profit margin; likewise, the avoided costs are implicitly included in the calculation.)

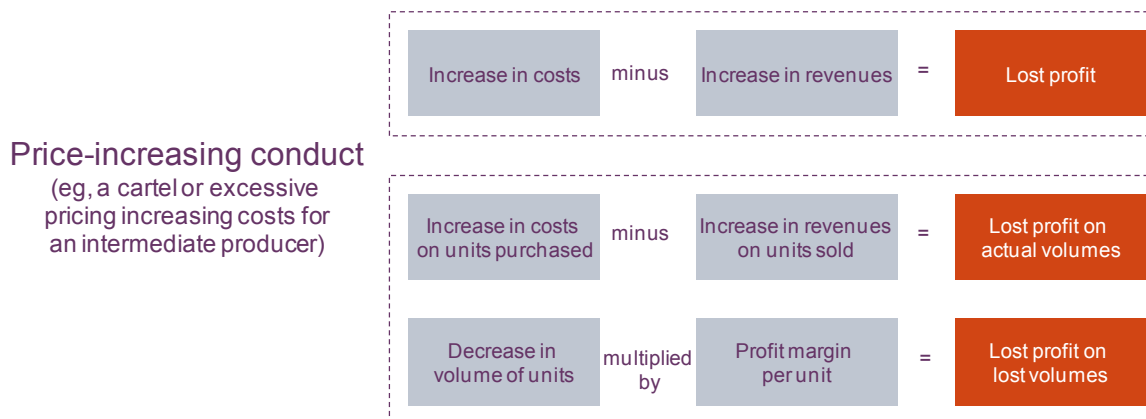
Effect on profit from infringements that increase input prices

Figure 2.2 can also be re-arranged to capture the effect on profit from infringements that increase input prices—see Figure 2.4. This applies to exclusionary conduct that has, at some stage, the effect of raising prices for purchasers, and to exclusionary conduct that has the effect of raising rivals' costs in downstream markets—a common theory of harm in abuse of dominance cases. The logic of Figure 2.4 also applies to the effect on profit of the

⁴³ For example, if volume falls, various costs that vary with volume (eg, fuel or input materials) will fall. A company that experiences a reduction in sales due to exclusionary conduct by a rival will in this sense have an offsetting benefit from a cost reduction, and this cost saving should, in theory, therefore be deducted from the lost revenue to obtain the lost profit, as illustrated in Figure 2.3. Again, this conceptual framework does not specify which party has the burden of proof for each of these aspects of lost profit in the legal proceedings.

downstream purchasers of a cartel. From a legal perspective, it is not necessary to express cartel overcharge harm explicitly in terms of reduced profit to the business when making a damages claim for overcharges; purchasers in cartel or exclusion cases who have paid an overcharge remain free to limit their claim to the actual loss suffered (*damnum emergens*), or to claim only part of the lost profit (*lucrum cessans*).

Figure 2.4 Re-arranged economic framework for calculating harm from price-increasing conduct (equivalent to Figure 2.2)



Source: Oxera.

In the top section of Figure 2.4, the fall in profit of the company is calculated as the increase in its costs minus the increase in its revenues (again, the figure does not show which party legally bears the burden of proof for each of these steps). In the case of a cartel or anti-competitive increase in an input price, the increase in costs to the downstream purchaser (the box to the left) will often be equal to the overcharge. The increase in revenues (the middle box) will include the pass-on of this overcharge to the victim's own customers (pass-on is achieved through raising price, and in the damages estimation the higher revenues thus achieved may conceptually have to be offset against the higher costs caused by the infringement in question).

The lower part of Figure 2.4 is equivalent but splits the profit effect from a higher price into three components: the increase in costs on units actually purchased (the overcharge effect); the increase in revenues on units actually sold downstream (which covers the pass-on effect); and the effect of lost volumes of sales downstream due to the price increase upstream. Within this framework, the total profit effect would equal the sum of the fall in profit from actual volumes and the fall in profit on lost volumes.⁴⁴

Other harmed parties

Finally, exclusionary conduct may also have effects on other parties besides purchasers and competitors (as discussed in more detail in section 2.3 below). For example, suppliers upstream of the conduct may suffer lost sales (and thus reduced profits) to firms excluded from the market. These excluded firms would have purchased more from those suppliers in the absence of the abuse or agreement. Box 2.5 gives an example of a case in Lithuania where the claim was made by a competitor to the customers of the infringing party. However, it may be difficult in practice for parties who are not purchasers or competitors of the infringers to bring successful damages claims due to causation or foreseeability problems, depending on the legal system concerned.

⁴⁴ The framework therefore includes the overcharge and volume effects, but not necessarily other effects such as loss of quality or choice. A formal derivation of the representation of lost profit in the lower part of Figure 2.4 is provided in van Dijk and Verboven (2006); and Verboven and van Dijk (2009).

Box 2.5 Damages claim by a competitor to the purchaser of the infringer regarding an abuse of dominance (Lithuania)

Lietuvos apeliacinis teismas (Lithuanian Court of Appeal), *UAB Siauliu tara v. AB Stumbras*, judgment of May 26th 2006

This damages claim followed on from a 2002 decision by the Lithuanian competition authority, which found that the defendant had abused its dominant position in the market for the supply of strong alcoholic beverages by making marketing payments to wholesalers in return for them favouring its products.

The claimant, a wholesaler which did not receive any such marketing payments, sought to recover three heads of loss:

- unpaid marketing fees in relation to products which the claimant had actually purchased from the defendant during the period of the infringement;
- lost profit due to lower purchases and sales of the defendant's products;
- unpaid marketing fees in relation to products that the claimant would have purchased but for the infringement.

When quantifying damage, the expert appointed by the first-instance court concluded that the claimant was entitled to recover damages only in relation to the unpaid marketing fees for products that it had actually purchased from the defendant during the period of the infringement. However, the court chose not to follow its expert's opinion and awarded damages under all three heads of loss, albeit that the amount was reduced in light of the fine imposed on the defendant by the Lithuanian competition authority, the risks inherent in any commercial activity, and the hypothetical nature of lost profit claims.

By contrast, the Lithuanian Court of Appeal reduced the amount of damages awarded to the claimant since it considered that

- the expert had been right to conclude that the claimant was entitled to recover damages only in relation to the unpaid marketing fees for products that it had actually purchased from the defendant during the period of the infringement;
- the first-instance court's decision to disregard his findings was unjustified;
- the claimant had failed to prove the losses it was seeking to recover under the last two heads of damages set out above.

2.3 The counterfactual stage: who has been harmed?

The discussion above sets out the main types of harm caused by competition law infringements. The next step is to consider the different parties that may have been harmed.

This starts from the premise of the Court of Justice's statement that, under Article 101, it is open to 'any individual to claim damages for loss caused to him by a contract or by conduct liable to restrict or distort competition',⁴⁵ provided that 'there is a causal relationship between the latter and the harm suffered' (see also the discussion in section 1).⁴⁶ The Court of Justice has also stated that, in the absence of EU rules, it is for the legal system of each Member State to prescribe the detailed rules governing the application of the concept of causal relationship.⁴⁷

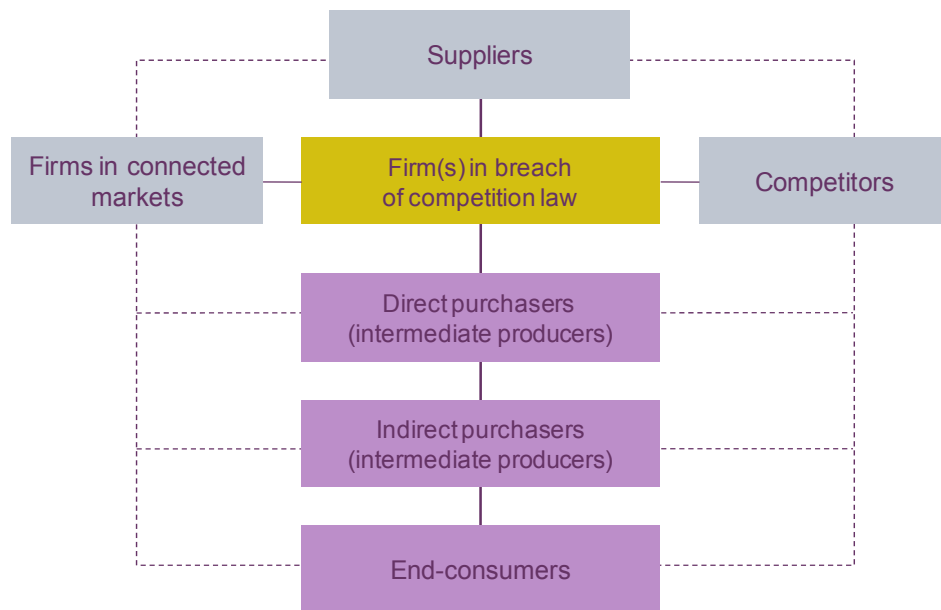
Figure 2.5 sets out various categories of potentially affected parties in a typical supply chain, presented in respect of their relationship with the firms that have committed the breach of competition law.

⁴⁵ Case C-453/99 *Courage Ltd. v. Bernard Crehan* [2001] ECR I-6297, para 26. See also Box 2.4.

⁴⁶ Joined Cases C-295/04 to C-298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I-6619, para. 63 (see Box 4.2 for more detail on this case). See also Case C-421/05 *City Motors Groep NV v. Citroën Belux NV* [2007] ECR I-659, para 33.

⁴⁷ Joined Cases C-295/04 to C-298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I-6619, para 64.

Figure 2.5 Which parties may be harmed by a breach of competition law?



Note: The supply chain will differ across industries. For example, in some cases end-consumers may be direct purchasers of the infringers. The term 'intermediate sellers' can refer to intermediate producers, distributors or retailers.

Source: Oxera.

- **Direct purchasers (customers), which are intermediate sellers (producers, distributors or retailers).** These are the customers that purchase goods or services directly from the infringers. Several damages actions by direct purchasers are discussed in this report—see, for example, Box 4.1 on a German cartel case and 4.2 on an Italian cartel case. The extent and ways in which direct customers suffer harm may depend on whether they pass on any harm (in particular, any overcharge harm) to their own downstream customers, and the extent to which direct customers lose sales downstream as a result of higher prices upstream. The pass-on issue is discussed in section 4.
- **Indirect purchasers, which are intermediate sellers (producers, distributors or retailers).** These are customers that purchase goods or services from a supplier that is downstream of the infringer. Indirect purchasers are affected by the infringement if its effects (in particular, the overcharge) are passed downstream rather than absorbed by the supplier further up the supply chain.
- **End-consumers.** End-consumers purchase either directly or indirectly from the infringers. In cases where there is an overcharge and they purchase directly, end-consumers will have suffered the full extent of the overcharge harm. By contrast, if they purchase indirectly, the extent of the overcharge that they face may have been diluted by successive layers of intermediate producers not passing on the full overcharge. An example of a damages action by (or, rather, on behalf of) end-consumers is provided in Box 3.4 (an Austrian cartel case).

In addition to paying the overcharge, customers (be they intermediate purchasers or end-consumers) may have purchased less of the product as a result of the overcharge and/or purchased less-preferred alternative products that were not affected by the overcharge. This further, volume, harm is the same as that suffered by 'counterfactual' customers, with the advantage that existing customers can be more easily identified (although proving causation may not be straightforward). Customers may also have suffered from reduced quality or choice.

- **‘Counterfactual’ customers.** These are the potential customers who would have purchased goods directly or indirectly from the infringers in the absence of the infringement—as represented by area B in Figure 2.1. In other words, they are customers who are willing to pay the counterfactual price, but are not being served at the higher price that results from the infringement. They have suffered harm too, in the sense of not purchasing the product at all or having to purchase less-preferred alternative products.⁴⁸ However, these counterfactual customers are also often difficult to identify and establishing causation may not be easy.⁴⁹
- **Competitors.** These are the firms that compete with the infringers directly. They may include actual competitors already in the market, and potential competitors whose entry into the market was prevented by the conduct. In theory, competitors are more likely to have suffered harm in cases of exclusionary anti-competitive practices than in cartel cases or in cases of exploitation (where competitors may actually have benefited from higher prices, even if they did not take part in the unlawful conduct). Several cases where competitors have claimed to have been harmed are discussed in this report—see, for example, Boxes 1.1 (a case in Sweden), 2.2 (Denmark), 2.3 (France), 3.2 (Spain), 3.6 (France), 3.7 (Denmark), 3.8 (Germany), 4.3 (France), 4.4 (Switzerland), 4.5 (Italy), 4.7 (Germany), and 4.8 (Italy).
- **Suppliers.** Suppliers to the infringing parties may also have suffered harm. For example, as set out in section 2.2 above, cartels usually result in lower levels of output owing to the higher prices they fix. This may mean that fewer inputs are required, thereby reducing the volumes sold by suppliers.
- **Firms in connected markets.** Participants in connected markets can also be affected by an antitrust infringement in a particular market. This holds in particular for suppliers of complementary goods⁵⁰—for example, if a brick cartel has raised costs to the construction industry such that there is less construction activity, other suppliers to the industry are potentially harmed as well, as their sales volumes may fall. In contrast, suppliers of substitute goods might benefit. Continuing the brick cartel example, suppliers of substitute products, such as structural timber, might benefit from increased demand from the construction industry in response to the higher brick prices.⁵¹

2.4 The counterfactual stage: what is the market and industry context?

The type of market and industry under investigation is an important determinant of both who is damaged and how they are damaged. There are two main dimensions to this:

- the first is the type of market under investigation (eg, whether it is a consumer goods market or an intermediate goods market);

⁴⁸ To take a hypothetical example based on a real case, in the private schools cartel case in the UK, those who could no longer afford to send their children to private schools at the inflated price may possibly have been more harmed than those who paid the higher price and did send their children to those schools. See Office of Fair Trading (2006).

⁴⁹ Most actual claims against cartels do not make a claim on behalf of these ‘counterfactual’ customers, instead focusing only on customers that did buy at the higher price. For example, the damages case against the trans-Atlantic passenger fuel surcharge cartel was brought on behalf only of those passengers who actually flew (the claim was only for the overcharge). See United States District Court, Northern District of California, San Francisco Division; case M-06-1793-CRB: settlement agreement between Plaintiffs and British Airways, PLC, February 2008; settlement agreement between Plaintiffs and Virgin Atlantic Airways, LTD, February 2008. Similarly, the damages case against the French mobile phone cartel also focuses only on the overcharge paid by actual customers. See Conseil de la Concurrence (2005).

⁵⁰ Two goods are complementary if an increase in the price of one good leads to a fall in demand of the other good (and vice versa). This is the opposite of substitute goods, where an increase in the price of one good leads to an increase in demand for the other (as customers switch from one to the other after the price increase).

⁵¹ If two products are sufficiently close substitutes, they would normally be considered part of the same relevant market, and the point about connected markets does not completely apply. However, products can also be more remote substitutes (eg, if switching is more gradual over a longer time period), and in these cases there can be cartel effects on connected markets. Nonetheless, it may be difficult to cover such effects in a damages claim due to issues of remoteness and causation.

- the second is, within that type of market, what its particular features are (eg, the number of firms operating, the way in which prices are determined, and other specific industry characteristics).

The relevance and impact of these factors will normally have to be assessed on a case-by-case basis. This makes the formulation of general rules difficult. How these factors may affect the estimation of damages suffered by a victim of anti-competitive conduct is set out in what follows.

2.4.1 Types of market

The following sets out five distinctions between market types. For each, a brief description is provided of how the type of market concerned may have an impact on the harm suffered.

- **Intermediate goods versus consumer goods.** When considering an infringement in an intermediate goods market, the role and level of any pass-on of the overcharge will form an important part of the assessment of damages. In contrast, for finished goods/end-consumer markets, there is no further pass-on, as this is the end of the supply chain. For wholesale and input markets, harm may be incurred along a potentially long supply chain. The stage at which the harm is ‘exhausted’ will need to be determined because there has been no further pass-on beyond that stage. Pass-on is further discussed in section 4.4.
- **Mature versus rapidly evolving markets.** The duration of an anti-competitive harm is likely to differ between mature and evolving markets. In quickly evolving markets, where technology and market participants are likely to be changing more rapidly, any harm is likely to be less long-lived than in mature markets. On the other hand, harm from certain types of exclusionary conduct may be significant and long-lasting in rapidly evolving markets if it results in technological ‘lock-in’ to a particular product or standard, as this may mean that the effect of the conduct at an early stage of the market can persist for a long time. Some of the cases discussed in this report (mostly involving exclusionary conduct) were in relatively dynamic markets, such as football broadcasting in Spain (see Box 2.1), directory enquiries in Spain and Germany (Boxes 3.2 and 4.6 respectively), and data transmission services and telephony services in Italy (Boxes 4.5 and 4.8 respectively).
- **Differentiated versus homogeneous goods.** This distinction can have a bearing on the nature of competition in the market. Homogeneous goods markets are potentially more fiercely competitive, but may also lend themselves more to (tacit) collusion—and this in turn can affect the amount of harm suffered. Furthermore, the outcome in homogeneous goods markets can sometimes be more predictably modelled than in differentiated product markets, and therefore the counterfactual competitive price or output may be more easily determined, and the pass-on rate may be more straightforward to calculate. These issues are discussed in greater detail in sections 3.8 (on industrial organisation (IO) models) and 4.4 (on pass-on).
- **International markets versus national or local markets.** The geographic scope of a market can be important when identifying the harm caused by an infringement. Cross-border competitive dynamics can differ from those in national markets. Furthermore, in cases of international cartels the estimation of the damages may need to take into account various data issues arising from this (eg, currency differences and differences in taxation). Section 4.1, which provides further insights into cartel overcharges, addresses the possible distinction between national and international cartels.
- **Bidding markets versus traditional markets.** In bidding markets, competition is often ‘for the market’ rather than ‘in the market’, and competition for the market can often take place only infrequently (eg, bidding for long-run franchises). Thus, exclusionary conduct can have long-running effects (eg, continuing long after the conduct has ceased), whereas the same conduct may have shorter-lived effects in more traditional markets.

Bidding markets also need to be modelled differently than traditional markets when assessing the counterfactual price through a simulation exercise. Sometimes the outcome in bidding or auction markets can be more predictably modelled than 'normal' oligopoly markets (see section 3.8 on IO models).

Care should be taken to avoid confusion between bidding markets and bid rigging (see also section 2.2 above). Not all bid-rigging cases take place in bidding markets (eg, bid rigging can occur in various tendering processes which would not typically be classed as bidding markets), and not all antitrust violations in bidding markets are forms of bid rigging (eg, the exercise of unilateral market power).

2.4.2 Features within the market and industry

There are several important features to consider within most types of market and industry.

- **Market structure.** The basic structural characteristics of a market, such as the number and size of the competitors, the rate of exit and entry, and the development of market volumes (ie, whether the market has been expanding or shrinking over time), are important to understanding the nature and magnitude of the harm. Similarly, it is relevant to review the underlying features of the product, whether it has any substitutes and complements, and the extent of differentiation and customer loyalty. These factors can have important implications for market structure, and hence the nature and magnitude of the harm (see further section 3.8 on market-structure-based approaches to quantify damages).
- **Pricing.** To understand the influence of the infringer's pricing over time, it will often be necessary to examine common pricing practices in the industry in order to identify the drivers of the changes in pricing. For example, are products typically sold at list prices, or at individually negotiated prices? Is there a simple per-unit pricing structure, or are more complex methods used? If volume discounts are characteristic of an industry, an increase in average price could be caused by the claimant reducing the volumes of products it purchased from the infringer. Thus, the tariff structures prevailing at all levels of the supply chain can be important.
- **Costs.** As well as understanding the drivers of prices, it is important to examine what influences the cost of production. A main consideration is what proportion of costs is fixed and what proportion is variable. Economies of scale within an industry indicate the extent to which changes in prices can be explained by the changes in certain categories of costs. As noted in section 2.2, the concept of avoided costs may be relevant when determining the effects of an infringement on profit. Further discussion on the assessment of costs is provided in sections 3.6 and 3.7.
- **Business models and financing structures.** Certain particular characteristics of the companies in the industry in question could also be of importance when estimating the harm. One example is the treatment of working capital. In industries such as construction and retail, working capital is typically a relatively large part of the overall financing of the business, and therefore the impact of an antitrust infringement on working capital could represent an additional source of value loss in itself.
- **Supply chain.** The structure of the supply chain and the relationship between suppliers can be relevant to determining the structure of both pricing and costs of production in an industry. In order to assess the harm caused by the infringement, it may be necessary to examine the degree of vertical integration, and the contractual and commercial relationships which exist between suppliers, manufacturers, distributors and customers in the supply chain. Important features could include the typical length of contracts, the ease of switching (by both downstream and upstream firms), and the level of concentration and market power held by firms at each stage of the supply chain.

2.5 From the counterfactual stage to a final damages value

2.5.1 Application of the financial valuation model

The next step in the analysis is the calculation of the final value of the damage, which requires the results from the counterfactual analysis to be input into a financial valuation model. This involves two main elements: the summation of the losses from the different types of harm claimed (where applicable), and the summation and movement of losses over time, including the application of interest.

- **Summation of different losses, if the damages claim involves different types of harm** (eg, an overcharge and a loss of volume harm in a cartel damages case). The summation of the losses is conceptually straightforward, provided that all the input values are consistent. The different losses must be expressed in monetary (cash-flow) terms and must refer to the same time period (eg, cash flows in year X).
- **Summation of losses over time, if the damages claim stretches over multiple years.** An infringement (eg, a cartel) may have lasted many years. The counterfactual analysis may have generated an overcharge estimate in monetary terms for each year, and the yearly cash flows would have to be added up. From an economic perspective, this involves uprating and/or discounting cash flows to take into account the time value of money. Furthermore, part of the harm may be suffered even after the anti-competitive practice has ceased. Depending on the legal rules and the facts of each specific case, those future losses may need to be included in the damages calculation, again using discounting.

From a legal perspective, the uprating of cash flows is closely related to the application of interest to damages estimates. The compensation principle means that antitrust damages awards should also include ‘interest from the time the damage occurred until the capital sum awarded is actually paid’.⁵² This requires moving cash flows between time periods in accordance with the legal rules (for example, from the year in which a harm occurred to the year in which the damage is paid), which in essence is a form of uprating. The principles of uprating and discounting, as set out here, also capture the application of interest, and are therefore in line with the compensation principle.

Legal rules and practices regarding the award and calculation of interest vary significantly across jurisdictions and across cases within jurisdictions. One specific issue that arises with applying interest is that various jurisdictions require statutory rates of interest to be used for certain periods of uprating (see further below). Where this is the case, the application of the financial valuation model can be relatively straightforward—ie, statutory interest is applied to the relevant past harm over the relevant time period to obtain a final damages estimate—but may not always be reflective of economic realities (see, also, the further insights presented in section 4.5). In some jurisdictions, the economic principles of uprating and discounting, as set out below, may be given greater consideration at the final stage of the quantification.

2.5.2 Uprating and discounting cash flows and determining interest

As noted above, from an economic perspective, any summation or movement of cash flows over time needs to take account of the time value of money—€1 today is worth more than €1 tomorrow. This is a fairly standard approach to valuation and investment appraisal, and requires the use of an appropriate discount rate. This sub-section sets out the basic logic behind discounting of cash flows and determining the appropriate discount rate. Some further

⁵² European Commission(2008b), p. 57, as based on Joined Cases C–295/04 to C–298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I–6619.

specific issues in discounting in sections 3.6 and 3.7 (on financial-analysis-based approaches), and in section 4.5 (further insights into arriving at a final value).⁵³

The logic of the time value of money is also captured in the legal principle of compensation. As noted by the European Commission:

With regard to the payment of interest, the Court refers to its earlier judgment in the 1993 Marshall case. In that judgment, the Court stated that ‘full compensation for the loss and damage sustained ... cannot leave out of account factors, such as the effluxion of time, which may in fact reduce its value. The award of interest, in accordance with the applicable national rules, must therefore be regarded as an essential component of compensation’. The Court’s objective is thus clearly to ensure that the victim is given the real value of the loss suffered. The reference in Manfredi to the payment of interest should therefore be understood as covering the whole period from the time the damage occurred until the capital sum awarded is actually paid.⁵⁴

Applying interest on damages is one form of uprating cash flows in the quantification of damages and is based on the same underlying economic and finance principles. Again, legal rules and practices on applying interest differ across Member States. In some jurisdictions this issue is largely confined to applying statutory interest, while in other jurisdictions the principles of uprating and discounting as set out below may be given greater consideration.

The basic logic of uprating and discounting

In simple terms, if an infringement has caused the victim a loss of €100 during each of the past five years, each year’s loss needs to be uprated using the discount rate to determine the current (present) value of this harm suffered. Suppose that the discount rate is 10% per year. The harm from the first of the five years (ie, the first €100) needs to be uprated five times, which is conceptually comparable to paying cumulative interest on that amount for five years.⁵⁵ The current value of that amount is €161.05 (€100 times 1.10 to the power of 5). The harm from the second year needs to be uprated for four years (€100 times 1.10 to the power of 4, which equals €146.41), and so on. The present value of the total harm over the five years is €671.56.⁵⁶

If it is demonstrated, and accepted by the court, that the infringement, even if it has ceased, will still cause some losses to the victim in the subsequent three years (eg, because the victim cannot immediately recover the market position it would have had in the absence of the infringement), those future losses form part of the harm suffered. They need to be added to the present value of the harm over the first five years. Suppose the losses are €75, €50 and €25, and the same discount rate applies. The €75 occurs in the current year, so does not require uprating or discounting. The €50 occurs next year, so needs to be discounted once, and is worth €45.45 in present terms (€50 divided by 1.10). The €25 in two years’ time is worth €20.66 in present terms (€25 divided by 1.10 to the power of 2). The present value of the total harm over the whole eight years (five past years, the current year and the two future years) is now €812.68.

⁵³ The principles of discounting and discount rates are explained in any standard finance textbook. See, for example, Brealey, Myers and Allen (2008). Conceptually, the discount rate should take into account the time value of money, inflation and risk. The time value of money reflects the fact that individuals typically value consumption today more than consumption tomorrow. Inflation means that prices rise over time and hence the same nominal amount of money decreases in value. Finally, future expected lost profits are uncertain. When calculating the value of the damage today for expected lost profits in the future, the uncertainty in expected lost profits needs to be accounted for through the risk component of the discount rate.

⁵⁴ European Commission(2008b), para 187. The cases referred to in this quote are Case C-271/91, *Marshall v. Southampton and South West Hampshire Area Health Authority* [1993] ECR I-4367, para 31, and Joined Cases C-295/04 to C-298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I-6619.

⁵⁵ See below on how to determine the discount rate, and on how Member States may prescribe statutory interest rates for uprating over certain periods.

⁵⁶ For simplicity, this example assumes that the cash flows occur on January 1st of each year. Another assumption is that the interest rate is compounded—ie, the calculation includes interest on accumulated interest from prior periods (see section 4.5).

From the above example it follows that the choice of discount rate can have a significant influence on the damage value. If the discount rate was 5% instead of 10%, the present value of the damage from the five past years would be €580.19 instead of €671.56. If it was 15% the value would be €775.37. In general, the higher the discount rate, the greater the present value of the past losses when uprated at the discount rate, but the smaller the present value of the future losses when discounted at this rate.

Choice of discount rate

Various jurisdictions require that statutory rates of interest—generally prescribed by civil or contract/tort law provisions—be used for certain periods of uprating (ie, moving a sum of money from an earlier period to a later period, such as for late payment of the damages after the award).⁵⁷ The legal framework concerned will determine which part of the cash flows in the damages valuation should be uprated by the statutory interest rate, and for which cash flows (if any) a discount rate can be chosen based on economic criteria.

Economic and finance theory have developed a range of principles on how to determine the discount rate (see also sections 3.6 and 3.7). However, conceptually, regardless of which specific discount rate is used, the principle that victims of an antitrust infringement are entitled to interest as part of the compensation is accounted for by virtue of using uprating and discounting.

In the context of damages valuation, it may be appropriate to use the cost of capital for the claimant as the discount rate for *future* expected losses. The cost of capital represents the required rate of return on which investment decisions are based. This discount rate takes into account the time value of money (ie, money in the future is less valuable than money today) and the business risk of the claimant (ie, the fact that future factual and counterfactual scenarios, and hence estimates of losses, are uncertain). Discounting expected future losses would provide an estimate of their value as at the award date.

Although the concept of the cost of capital is less well defined in the case of individual consumers (as opposed to companies), the principles underpinning the choice of the discount rate remain the same. Therefore, the appropriate discount rate should reflect consumers' rate of inter-temporal substitution (ie, how they trade off having one particular amount of money at present with having some other amount in the future). One possibility is to use the social time preference rate.⁵⁸

As to *past* (historical) losses, from an economic perspective there are several possible approaches to uprating these, as detailed below (the appropriate rate depends on the specific legal and economic aspects of each case).⁵⁹

- The statutory interest rate if this is prescribed by the applicable legal rules.
- The cost of capital of the claimant—during the period in which the damages were incurred, a claimant earning 'normal' returns would have earned profit consistent in the long run with the cost of capital (see the discussion in sections 3.6 and 3.7). Thus, damages uprated at the cost of capital would capture the expected return that the claimant could have earned on the reduced profits had they been available for investment—ie, it compensates investors for the use of their capital.

⁵⁷ The date from which interest can be claimed varies across Member States, and can refer to the start of the infringement, the start of the legal action, or the date of the award. An overview of the different practices is provided in Ashurst (2004), p. 86, although the situation may have changed in some Member States since 2004.

⁵⁸ The social time preference rate is a well-accepted concept in public policy cost-benefit analysis, involving the evaluation of alternative time profiles of consumption. It is the rate at which individuals are willing to trade off consumption over time. It is usually defined as the sum of the pure rate of time preference and the product of the elasticity of the marginal utility of consumption multiplied by the expected growth rate of consumption. See, for example, Sugden and Williams (1978).

⁵⁹ See, also, Oxera (2006) and Noble, Mahendran and Makhkamova (2006).

- The risk-free rate—this is usually approximated by the rate on a virtually risk-free investment such as a government bond. The rationale for this is that the repayment of damages is certain once awarded (subject to any inability by the defendant to pay), thus ensuring that the claimant is compensated for the time value of money, which is conceptually equivalent to paying interest.⁶⁰

Each of these approaches to uprating and discounting is consistent with the legal principle that victims of antitrust infringements are entitled to interest on damages suffered. This is because each of the possible discount rates encapsulates the notion of interest as compensation for the time value of money.

2.6 Variables and data sources for the damages estimation

In any damages estimation exercise, deriving a counterfactual (as discussed in sections 2.2 to 2.4) and moving from that to a final value (as discussed in section 2.5) requires a range of variables to have values assigned to them. This can be done by estimation using various methods and models (discussed in section 3), possibly aided by some further insights from economics and finance (discussed in section 4). To conclude the conceptual framework, this sub-section sets out what those variables are, the typical data used to estimate them, the other types of data generally used, and the possible sources of that data.

In this sub-section it is useful to distinguish the terms ‘variable’ and ‘data’: variable is used to describe the values that are used in the damages estimation, while ‘data’ is used to describe different types of input information. In some instances data may be used directly to populate a variable (eg, data on a firm’s revenues might be used to populate a factual revenue variable), while in others data may instead be used in an estimation process, which in turn produces an output used as a variable (eg, data is input into a regression, the outputs of which might be used to populate an overcharge variable).

The variables required to estimate damages will vary from case to case, depending on factors such as the nature of the infringement, the legal framework in the jurisdiction concerned, and the nature of the burden of proof that is on the party concerned (this will often differ between claimants and defendants at different stages of a damages action). Often the following variables are relevant:

- factual and counterfactual prices;
- volumes;
- costs;
- the rate of pass-on between each stage of the supply chain;
- the discount rate (and/or the statutory interest rate—see section 2.5);
- other financial parameters (such as inflation rates—see sections 3.6 and 3.7).

For example, in a price-fixing cartel, factual and counterfactual prices charged by the cartelists are normally required variables that need to have values assigned to them; the difference between these two is the overcharge. The factual volumes are usually also required—multiplying the factual volumes by the overcharge provides the total overcharge harm (represented by area A in Figure 2.1). A discount rate is then usually required to convert the stream of cash flows over the relevant period into a final damages value.

⁶⁰ An example where a court preferred one discount rate over another is *Fishman v. Estate of Wirtz*, 807 F.2d 520 (7th Cir. 1986) in the USA. The original claim uprated historical cash flows at the risk-free rate (in this case they were negative as the claimant had to commit additional equity to the business in the counterfactual scenario). The Court of Appeal agreed with most aspects of the valuation analysis (multiples and comparators), but not with the uprating approach. It held that historical cash flows (which in this case reflected equity contributions) needed to be uprated at the cost of equity capital to reflect the fact that the claimant would have incurred an opportunity cost of capital on the committed equity. Further methodological aspects of this case are discussed in section 3.6.

If the claimant is an intermediate producer, distributor or retailer, the rate of pass-on (at both that level of the supply chain and any previous intermediate stage) is also normally a required variable to determine the ultimate overcharge harm, as some of the harm may have been passed on. As intermediate sellers are firms rather than individuals, certain financial parameters may also be required, such as the corporate tax rate, in order to populate the financial valuation model.

Tables 2.1 and 2.2 summarise the variables of relevance for quantifying three of the most commonly claimed types of harm arising from antitrust infringements:

- the overcharge paid on units purchased from a cartel;
- the harm caused by a reduction in the volume of units being purchased due to price rises caused by a cartel;
- the profit lost by a competitor due to exclusionary conduct.

The lists in the tables are designed as guides to variables that are of main relevance when considering these types of case. As such they are not intended as either a list for claimants or defendants (indeed, these lists make no assumptions regarding which parties bear the burden of proof concerning particular variables). Instead, they are perhaps better characterised as a checklist for courts to consider when evaluating cases.

Table 2.1 Variables of main relevance to estimating damages from cartels

Variable representing the harm	Other relevant variables when claimant is direct purchaser and intermediate seller	Other relevant variables when claimant is indirect purchaser and intermediate seller	Other relevant variables when claimant is end-consumer
Overcharge paid on units that are purchased	<ul style="list-style-type: none"> Factual and counterfactual prices charged by the cartelists, or value of overcharge Factual volumes purchased Discount rate Pass-on rate for that stage of the supply chain Financial parameters 	<ul style="list-style-type: none"> Factual and counterfactual prices charged by the cartelists, or value of the overcharge Pass-on rate for each stage of the supply chain above Factual volumes of the cartelised good purchased Discount rate Pass-on rate for that stage of the supply chain Financial parameters 	<ul style="list-style-type: none"> Factual and counterfactual prices charged by the cartelists, or value of the overcharge Pass-on rate for each stage of the supply chain above Factual volumes of the cartelised good purchased Discount rate
Harm caused by a reduction in the volume of units being purchased	<ul style="list-style-type: none"> Factual and counterfactual volumes purchased, or lost/reduced volume of units purchased Profit margin per unit Discount rate Financial parameters 	<ul style="list-style-type: none"> Factual and counterfactual volumes purchased, or lost/reduced volume of units purchased Profit margin per unit Discount rate Financial parameters 	<ul style="list-style-type: none"> Factual and counterfactual volumes purchased, or lost/reduced volume of units purchased Difference in consumer benefit caused by not purchasing units (and instead purchasing an alternative good) Discount rate

Note: These variables are identified in the conceptual framework discussed in this section. The next step is to assign values to them, based on certain data sources (see text below), by estimation using various methods and models (as discussed in section 3), possibly aided by further insights from economics and finance (discussed in section 4).

Source: Oxera.

Table 2.2 Variables of main relevance to estimating damages from exclusionary conduct

Variable representing the harm	Other relevant variables when claimant is competitor
Fall in profits	Factual and counterfactual volumes sold by the competitor Factual and counterfactual prices charged by the competitor Avoided costs if volumes are reduced Discount rate Financial parameters

Note: These variables are identified in the conceptual framework discussed in this section. The next step is to assign values to them, based on certain data sources (see text below), by estimation using various methods and models (as discussed in section 3), possibly aided by further insights from economics and finance (discussed in section 4).

Source: Oxera.

Once the required variables have been identified, they need to be populated. As noted above, and further set out in sections 3 and 4, this can be done using methods and models, in combination with further insights from economics and finance. Input data of varying types is required for all of these approaches.

The concept of input data is a broad one: it encompasses detailed datasets on the actual prices charged and volumes of output produced, and structural features of the market, such as the number of firms and their relative sizes.

Similarly, the sources for this data are potentially very broad. Various elements are typically available in the public domain (eg, interest rates, which can be used to calculate an appropriate discount rate); others may be in the possession of a claimant (eg, invoices detailing prices paid and volumes purchased); and some may be available only from defendants (eg, revenues, costs and volumes sold for a particular product line). Table 2.3 summarises the typical sources of various types of data.

Table 2.3 Typical data sources used for damages estimations

Typical source	Typical data	Typical documents
Competition authority	Dates for the infringement, which parties were involved, how the infringement operated	Press releases, official decision documents
Public domain	Public domain pricing information, observable counterfactual market, demand elasticity estimates, ¹ inflation rate	Industry studies, industry/government statistical publications, price comparison websites, commercial databases specific to an industry, statutory accounts ²
Claimants	Intermediate producer: payments, volumes purchased, cost structure (eg, proportions of fixed and variable costs) End-consumers: payments, volumes purchased, willingness to pay/elasticity (eg, via survey) ¹	Management accounts, invoices Invoices, surveys, sworn statements
Defendants	Revenue, volumes, market share, prices, input costs, cost structure	Management accounts, sales databases, customer relationship management systems
Other parties in the supply chain	Payments, volumes purchased, cost structure	Management accounts
Statutory sources	Statutory interest rates, corporate tax rates and rules, sales tax rates and rules, other taxes	Government departments or courts that determine the statutory rates, tax authorities

Note: ¹ Demand elasticity is a commonly used summary measure of the sensitivity of demand to price. It is defined as the percentage change in quantity divided by the percentage change in price. For example, if the elasticity is -2 , a 10% price increase would result in a 20% reduction in quantity. ² Various sources provide access to wide ranges of data. For example, subscription services such as Datastream and Bloomberg provide access to company accounts data, and various statistical and financial markets data. Other sources, such as Eurostat and various EU Member State government statistical offices, also provide data of varying types about industries.

Source: Oxera.

3 Quantifying damages: methods and models

The economics and finance literature has developed a wide array of methods and models for quantifying damages. This report uses the terms ‘methods and models’ in a broad sense, with the intention to encompass all possible methods, models, tools, techniques, frameworks and approaches. These terms frequently have different meanings to different professions or fields of science, so using one single term in this report would not be appropriate. Because the economics literature uses the term ‘model’ more commonly, this section also uses that term more often, but it should be interpreted in the same comprehensive manner.

This section presents a summary of the methods and models, broken down into three broad categories:

- comparator-based methods and models (sections 3.3 to 3.5)
- financial-analysis-based methods and models (sections 3.6 and 3.7)
- market-structure-based methods and models (section 3.8).

All methods and models use data (see section 2.6) and make assumptions (see this section) in order to quantify the different types of antitrust damages that may be claimed in courts, in line with the conceptual framework described in section 2. They can be used to determine overcharge and volume-loss harm in cartel cases and other types of infringements where such harms occur, and to determine reductions in profits and value to competitors and harm to purchasers in exclusionary infringement cases.

The use of these methods and models can be complemented with the further insights from economics and finance, as discussed in section 4.

This section sets out, for each of the three categories, how the methods and models work, which assumptions they rely on, and for which type of damages estimation they can be used or have been used. This is done in sections 3.3 to 3.8. Section 3.1 examines at a conceptual level what methods and models are and what they do, and section 3.2 explains the rationale behind the categorisation into the three categories.

This section is, by nature, somewhat modular. It does not map directly onto the conceptual framework described in section 2. Instead, section 5 draws sections 2 to 4 together, explaining how the court could use methods and models (section 3) together with the further insights from economics and finance (section 4) to arrive at a final value of the damages calculation in line with the conceptual framework (section 2).

3.1 What are methods and models?

For antitrust damages quantification the aim of any method or model is to produce an estimate of what the world would have looked like without the infringement—the counterfactual scenario—and to assess the harm suffered by the victim of the infringement.

No model can fully describe and predict the complete range of complex interactions that occur between individuals and firms when a transaction takes place, but nor is it intended to do so. Instead, models can be thought of as more like maps that make simplifications of the real world to make it understandable and interpretable. The simplifications made will depend on the intended use of the map. A geological map will make very different simplifications to a road atlas, despite both describing the same piece of land, because they are being used for different purposes. In the same way, the simplifications made in models will vary depending on the purpose of the model. As such, all models are stylised representations of the world.

Models typically make simplifying assumptions based on theory about how individuals and firms interact in markets. Some of these assumptions can then be tested using the input data relevant to the case. If the assumptions and data match that of the real world sufficiently, the predictions about the counterfactual from the model (eg, on what the counterfactual price or market share would have been) are likely to represent unbiased estimates of the outcomes observed in the real world.

3.1.1 What to look for in a model

To understand how robust a model is and how it can be used, there are three important issues to consider:

- the data used;
- the assumptions made;
- the inference that can be drawn from the outputs.

Data used

Most models need to be calibrated (ie, populated with actual data and parameters) using some form of input data so that they reasonably represent the reality of the world they are describing and about which they are making predictions. The data can relate to transactions, individuals, firms or markets. Different models will require different data and in some cases assumptions can be substituted for data if it is not available.

As noted in section 2.6, the concept of input data is a broad one: it encompasses detailed datasets on the actual prices charged and volumes of output produced, and structural features of the market, such as the number of firms and their relative sizes. Section 2.6 also discusses the wide range of sources of data that may be available.

A model will only be as good as the quality of the input data used to populate it. Thus, it is important to ensure that the sourcing of data is free from potential biases, and that the data used is consistent over time and over units (firms, business units or individuals). Data will be biased if the sample is drawn in a way that is not representative of the ‘population’ it is meant to represent.⁶¹ Indications that the data is inconsistent might include unexplained jumps in the series or the variance (or spread of the range) of the series changing over time.

A sophisticated model based on unreliable or biased data is likely to be less robust than a simpler model based on better data. A critical question for a court to ask when reviewing a model is therefore whether the data used is of sufficient quality and reliability, and whether a simpler model relying on less, or more easily available, data could be used.⁶²

Assumptions made

There are many methods and models to describe the impact that an infringement of competition law might have. The robustness of each of these models partly depends on the validity of the assumptions that the model uses in the situation to which it is being applied. For example, a model might determine the overcharge for one particular year and then assume that the effect of a cartel is to levy a constant overcharge throughout the lifetime of the cartel, while in reality the cartel might have become more effective over time (ie, the

⁶¹ For example, data from a survey may be biased if the survey is conducted in a location that tends to have different types of people passing through it at different times. Thus, carrying out a survey at a railway station on a weekday morning is likely to yield a different sample of travellers (mainly commuters) than if the same survey were carried out at the same railway station during the day at the weekend (mainly leisure travellers). This may bias the answers to the questions since the sample is not truly random and hence not representative.

⁶² An example of a court rejecting a model on the basis of the quality of the data used can be found in *Vernon Walden, Inc. et al v. Lipoid GmbH et al*. Civ. No. 01-4826(DRD) United States District Court for the District of New Jersey, November 15th 2005 (a case of price discrimination with alleged anti-competitive harm to a competitor downstream). The court found that the plaintiff’s expert’s ‘damages calculations are not based on authoritative industry data or recognized financial data. The very foundations of his calculation is based on the deposition testimony, estimates, feelings and beliefs of [a representative of the plaintiff] who will be a principal beneficiary of the trebled damages sum of \$5,187,573’.

overcharge increases over time). In this situation the assumption will lead the model to predict an incorrect overcharge.

Common types of assumption include the following.

- The assumed shape of the relationship between variables—eg, the relationship between price and demand could be assumed to be linear or non-linear.
- The assumed ‘shape’ of the harm suffered—eg, can the harm be modelled as an absolute amount, a constant proportion of the price, or as increasing or decreasing over time?

Many of the assumptions made in models are implicit (and should be made explicit insofar as this is possible and reasonable when presenting analysis based on these models). Models also vary in the degree to which they rely on economic theory to provide their assumptions. At one end of the spectrum are models that rely purely on economic theory to predict what will happen in a given situation, while at the other end of the spectrum are ‘data-mining’ exercises, which identify patterns in the data and only then seek to explain them.

A pragmatic approach is to consider models that draw on theory, and to construct hypotheses that can then be tested using the available data. It is important to state as explicitly as possible which assumptions the model relies on, and how sensitive the results are to changes in the assumptions.

Inferences drawn

As all models are stylised representations of the real world, the estimates they produce are conditional on both the data and assumptions used, as discussed above. The estimates will therefore vary with these assumptions and with the data used, leading to a range of likely estimates. As such, the actual value of the damage suffered will not be knowable with absolute precision (as also discussed in sections 1.2 and 1.3).

Courts in some jurisdictions have explicitly acknowledged this unknowability of the actual damage value, and have tended to accept estimations that are reasonable but not perfect. Box 3.1 provides an illustration of what some courts have said on the degree of precision expected in damages actions.

Box 3.1 Statements by courts on the precision of damages estimates

The evidentiary requirements in respect of loss of potential earnings are less stringent than those in respect of actual loss, in so far as it is necessary to examine the existence of damage and the assessment of that damage in the light of the normal course of events and real probabilities, not theoretical ones.

European General Court in Cases T-3/00 and T-337/04 *Athanasios Pitsiorlas v. Council and European Central Bank* [2007] ECR II-4779.

The antitrust cases are legion which reiterate the proposition that, if the fact of damages is proven, the actual computation of damages may suffer from minor imperfections.

US court in *South-East Coal Co. v. Consolidation Coal Co.*, 434 F.2d 767, 794 (6th Cir.1970).

The vagaries of the marketplace usually deny us sure knowledge of what plaintiff's situation would have been in the absence of the defendant's antitrust violation.

US court in *J. Truett Payne Co., v. Chrysler Motors Corp.*, 451 U.S. 557, 565, 101 S.Ct. 1923, 68 L.Ed.2d 442 (1981).

The role of the court in making an assessment of damages which depends upon its view as to what will be and what would have been is to be contrasted with its ordinary function in civil action of determining what was ... In short one cannot expect much in the way of accuracy when the court is asked to re-write history. I would only add one general comment: quantification of damage in a case such as the present (of a patentee manufacturer) is a much harder, and less certain, task than I had hitherto thought. Although I have had to reach an answer I do not pretend it is an accurate measure of the damage, of what would have been. It is just the best assessment I can make. Moreover a number of aspects of the claim show that damage can potentially be large even if an infringer's sales are comparatively low. I have in mind particularly the effect of price depression on the patentee's sales, lost profits when lost sales affect marginal profits, and the loss of sales of articles or services associated with the patented goods. And of course all these heads have their own uncertainties of quantification.

The Patents Court in the UK, in *Gerber Garment Technology Inc v Lectra Systems Ltd.* [1995] R.P.C. 383, March 20th 1995.

To understand what can be robustly inferred from the estimates based on the data and assumptions, models can be tested against the following two criteria.

- Does the model generate unbiased estimates of what would likely have happened without the infringement?
- Do the estimates have the lowest possible level of uncertainty surrounding them?

An unbiased estimate is one where the expected value is not materially different to the actual harm. The estimated value using any particular dataset or assumption may vary, but if (hypothetically) the procedure is undertaken many times, the average difference between the estimated and actual harm should be small.

Depending on the method or model used, there may be additional conditions that need to be met—standard statistical tests can be applied (see sections 3.3–3.5)—but all models should at a minimum be able to show that the estimation results are unbiased and not overly sensitive to the assumptions used.

For example, when examining a particular econometric model there is a suite of diagnostic tests that can be used to evaluate whether the model is likely to provide unbiased

estimates.⁶³ In addition, statistical models can give additional information, known as confidence intervals, indicating the range which covers the actual value (as opposed to the estimated value) with a given degree of certainty (eg, a 95% confidence interval is often used, indicating that there is a 5% probability of the range not covering the actual value).

The inference that can be drawn from a model also depends on the variables included. If an important variable that influences the process has been omitted from the model, the estimates may be inconsistent and biased, since in reality they may vary with the omitted variable. For example, if, when predicting the counterfactual amount of cement sold in a cartel case, the effect of a boom in the construction industry was not accounted for, the model might incorrectly ascribe the whole price increase of cement to the effect of the cartel. A properly constructed econometric model would take account of both explanatory factors and would be able to isolate the cartel effect on price from the boom effect on price.

Some variables that are known to be of some potential relevance may not be included in the model because the data is not available or because the variable has such a small impact on the outcome that it is not necessary (ie, it is a random component that does not bias the estimate). However, the aim of the model should be to produce an estimate of the counterfactual where the omission of certain factors is not likely to significantly bias the result.

3.1.2 What can economic methods and models say about the issue of causation?

The focus of this study is on the quantification of damages, and not specifically on the issue of causation. As discussed in section 2, quantifying the harm and showing a causal link between the harm and the infringements are typically key parts of any damages action. They are therefore often closely linked, even if conceptually they can be seen as separate steps. What, if anything, can economic methods and models used for quantifying damages say about causation?

Econometric analysis seeks to identify statistically significant relationships between a 'dependent' variable—the variable that is to be explained (eg, demand for a product)—and various explanatory variables (eg, the price of the product and consumer income). The fact that one variable is dependent and the others are explanatory is a result of model construction, which is usually based on theory (ie, theory suggests that demand for a product depends on price). The econometric analysis itself does not prove causality as such; it tests whether the relationship between the variables is statistically significant. If the model is constructed with two completely unrelated variables that happen to have a high correlation (ie, they move similarly over time—eg, inflation and accumulated rainfall), then the econometric model may still identify a statistically significant relationship but one that is economically meaningless.

Nevertheless, econometrics can help address the issue of causation because it can take into account many possible explanatory factors (subject to data availability). This is important for damages actions since the difficulties in proving causation frequently arise when a model purports to show a relationship between two variables but ignores other explanatory variables. For example, a model may show that a competitor's sales have fallen during the period of an exclusionary abuse, but fail to address other possible explanations for that fall in sales, such as a general drop in sales in the market during the period, the entry of a new competitor, or managerial incompetence. A good econometric model would seek to 'control' for those other explanations—ie, incorporate them into the model as additional explanatory variables. That way, the various effects can be isolated from one another, and the model may well show that, while the other factors explain some of the sales loss, the remainder of the loss is still explained by the infringement. This applies irrespective of which party bears the burden of proof of causation under the relevant legal framework.

⁶³ These include tests for functional form, constant variance, normally distributed errors, correlation in the errors and the model's ability to explain variation in the data series.

In US antitrust damages cases, where the use of econometrics is more common than in Europe (see section 1.6), the issue of causation is often dealt with in this way. First, courts sometimes actually require a regression analysis in order to have robust estimates and isolate the effects of the infringement from other effects.⁶⁴ Second, in various US cases, economic evidence has been rejected on the basis that it did not sufficiently account for other possible explanations for the harm.⁶⁵ Third, in a number of other cases, the evidence was accepted because the model did sufficiently account for other explanations in addition to the infringement.⁶⁶

The economics literature has developed models that can isolate multiple effects from one another. A common approach to causation here is to use a process of elimination to rule out the other factors that may otherwise lead to a bias in the estimation of the variable under consideration. Models such as error correction mechanisms can be used to identify how relationships between variables evolve and to isolate the effect of one variable from that of another. Other models attempt to isolate the effect of the wrongful act from other factors using a comparator (control) group for which the only consistent difference with the claimant's (treatment) group is that it was affected by the infringement. If this is the only difference between the two groups then it might be reasonable to assume that this difference relates only to the infringement?

To sum up, econometrics can help address the issue of causation because it can take into account all (or most) possible explanatory factors (subject to data availability). In several court cases, econometric evidence has been accepted because the model did sufficiently account for other explanations in addition to the infringement, thus allowing the court to isolate the effect of the infringement itself.

3.2 Classification of methods and models

This sub-section presents a classification of the methods and models available into three broad groups: comparator-based, financial-analysis-based, and market-structure-based.

3.2.1 Previous classifications

In drawing up this classification, Oxera has considered other groupings of methods and models presented in other contexts.

- The 2004 Ashurst study on antitrust damages in 2004 for the European Commission offers five categories: before and after, yardstick, cost-based, price prediction using regression analysis, and theoretical modelling of oligopoly.⁶⁷
- The CEPS, EUR, LUISS (2007) study on the impact of policy options for damages actions, also for the Commission, offers a slightly different grouping. Like the Ashurst study it includes before and after, yardstick, cost-based approaches, and oligopoly

⁶⁴ As cited in section 1.6, in one case a court stated that the 'prudent economist must account for differences and would perform minimum regression analysis when comparing price before relevant period to prices during damage period'. In *re Aluminum Phosphide Antitrust Litig.*, 893 F.Supp. 1497, 1507 (D.Kan.1995). Regression analysis is a generic term for statistical methods that can be used for explaining the variation in data using other factors. This report refers more to the term econometric analysis, which is the application of regression and certain other statistical analyses to economic data. See section 3.3 for more explanation.

⁶⁵ For example, in *Stelwagon Mfg. Co. v. Tarmac Roofing*, 63 F.3d 1267 (3d Cir. 1995), the expert's opinion was not accepted as it 'failed to sufficiently link any decline in Stelwagon's MAPs sales to price discrimination. The sales may have been lost for reasons apart from price discrimination—reasons that [the expert]'s analysis apparently did not take into account'. A similar legal issue in this context is that damages can be claimed only to the extent that they are caused by the infringer's illegal conduct, not by the infringer's legal conduct. Models quantifying damages should also separate those effects. For example, one of the reasons a US court excluded the damages expert's testimony in *Concord Boat Corp v Brunswick Corp*, 207 F.3d 1039 (8th Cir. 2000), a case involving exclusionary practices, was because 'it did not separate lawful from unlawful conduct'.

⁶⁶ For example, *Conwood Co., L.P. v. U.S. Tobacco Co*, 290F.3d 768 (6th Cir. 2002), a case of alleged monopolisation.

⁶⁷ Ashurst (2004), p. 17 *et seq.*

modelling, but it adds the difference-in-difference and critical-loss-analysis approaches.⁶⁸

- The Bundeskartellamt offers a simpler grouping of three categories: a yardstick/ comparison market, cost-based approaches, and oligopoly simulation.⁶⁹ The German Federal Court appears to have taken the view that the yardstick approach is in principle superior to the other methods, albeit that the other approaches can be used when the yardstick is not possible.⁷⁰
- US case law has explicitly identified three ‘common approaches to measuring antitrust damages’: the before-and-after approach, a yardstick or benchmark approach, and regression analysis (see also section 1.6).⁷¹

3.2.2 A new classification

A new classification has been developed in this study—comparator-based, financial-analysis-based and market-structure-based—which captures the various elements in the other groupings in a structured, refined and comprehensive manner. The classification draws clearer distinctions between what is being used as the counterfactual in each method, and the precise estimation technique.

For example, before-and-after and yardstick are two different types of comparator-based approach; the former involves making comparisons over time, the latter across product or geographic markets. Both can use the same or similar estimation techniques, such as comparison of averages and econometrics (regression). Using the term ‘yardstick’ or ‘benchmark’ for comparisons across markets only and not over time is inaccurate.

Similarly, the regression analysis grouping as such does not clarify the basis for the counterfactual it can be used with. Since it uses data both over time and across markets or countries (as well as more generally), it cuts across the before-and-after and yardstick groupings.

The classification presented in Figure 3.1 is divided into three levels. The first identifies the approach. The second level identifies the basis for the counterfactual that underlies each of the approaches. The third level then summarises the estimation techniques that can be used within each approach. The note to the figure explains how previous classifications map onto this one.

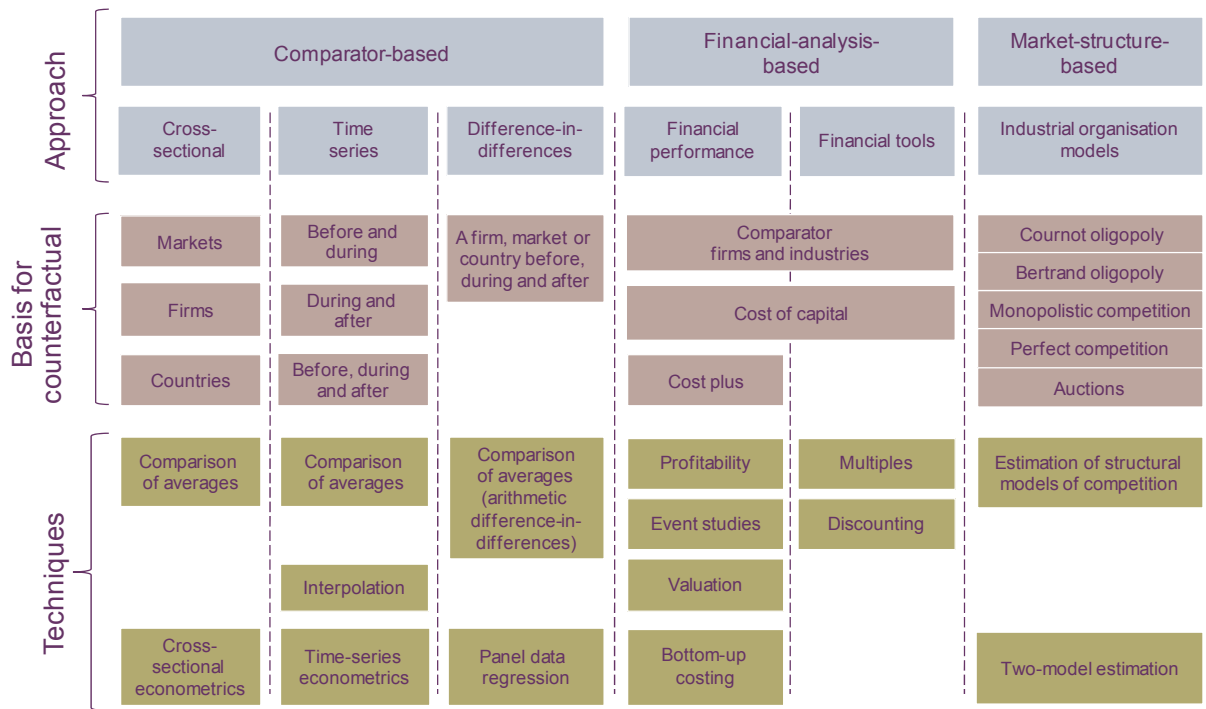
⁶⁸ CEPS, EUR, LUISS (2007), pp. 441–56. A similar classification to the one in this study is provided by van Dijk and Verboven (2006).

⁶⁹ Bundeskartellamt (2005), pp. 20–24.

⁷⁰ Judgment of the German Federal Court of Justice (BGH) June 19th 2007, KRB 12/07. The preference for the yardstick approach is discussed in Friederiszick and Röller (2008).

⁷¹ See *Conwood Co. L.P. v. U.S. Tobacco Co.*, 290 F.3d 768, 793 (6th Cir. 2002).

Figure 3.1 Classification of methods and models



Note: The categories from previous classifications fit into this classification as follows. Before and after falls under 'time series'; yardstick or benchmark falls under 'cross-sectional'; cost-based approach falls under 'financial performance'; regression analysis falls largely under the 'comparator-based approaches', but can also be used for the 'financial-analysis-based approaches' and 'market-structure-based approaches'; oligopoly modelling and critical-loss analysis fall under 'market-structure-based approaches'.
Source: Oxera.

The three main approaches within the classification are set out briefly below. In principle, each can be used for quantifying damages for any type of antitrust infringement. They are not mutually exclusive and in fact often complement each other, as indicated throughout this section and discussed further in sections 4 and 5.

- **Comparator-based approaches.** These use data from sources that are external to the infringement to estimate the counterfactual. Broadly, this can be done in three different ways: by cross-sectional comparisons (comparing different geographic or product markets, also referred to as the yardstick or benchmark approach); time-series comparisons (analysing prices before, during, and/or after an infringement); and combining the above two in 'difference-in-differences' models (eg, analysing the change in price for a cartelised market over time, and comparing that against the change in price in a non-cartelised market over the same time period). Various techniques are used to analyse this comparator data, ranging from comparing averages, to panel data regression—see sections 3.3 to 3.5.
- **Financial-analysis-based approaches.** These models have been developed in finance theory and practice. They use financial information on comparator firms and industries, benchmarks for rates of return, and cost information on defendants and claimants to estimate the counterfactual. There are two types of approach that use this information. First are those that examine financial performance. These include assessing the profitability of defendants and/or claimants and comparing this against a benchmark; event studies of how stock markets react to information; and bottom-up costing of products to estimate a counterfactual price for them. The second type is a group of more general financial tools, such as discounting (a concept that is introduced in section 2.5), multiples (which is another approach to undertaking discounting and valuation), and methods that can be used alongside the other categories of methods and models—see sections 3.6 and 3.7.

- **Market-structure-based approaches.** These are based on industrial organisation (IO) theory and use a combination of theoretical models, assumptions and empirical estimation (rather than comparisons across markets or over time) to arrive at an assessment of the counterfactual situation. This approach involves identifying models of IO theory that best fit the relevant market, and using them to provide insight into how competition works in the market concerned and to estimate the counterfactual price (or volumes). The models can be calibrated (ie, populated with data) using the econometrics techniques described under the comparator-based approaches. Such models can either be used individually, and be calibrated to represent the counterfactual, or can be used in ‘pairs’, with one model representing the factual and the other the counterfactual—see section 3.8.

Methods and models to quantify other forms of harm

Other forms of harm from antitrust infringements, such as loss of quality or choice, can also be quantified, although this can often be more complex than estimating the overcharge, lost volumes and lost profits. In many cases the methods and models described in this report can be used, but in others different types of methods and models may be required.

Evidence from surveys can be used to estimate consumers’ willingness to pay for product attributes, such as enhanced features or quality of service that may have been affected by an infringement. In such cases, evidence from stated-preference questions regarding what consumers would do if offered certain choices is combined with revealed-preference data on what consumers actually do, in order to produce estimates of consumers’ valuation of product attributes.⁷² This may even be undertaken for product attributes that do not actually exist in the marketplace, but that may have existed in the counterfactual. In this way, the effect of the infringement on product attributes such as quality may be measured. An example of where this has been applied is in estimating how much consumers are willing to pay for the different attributes of a taxi service, such as driver quality and vehicle type and cleanliness, in assessing the impact on consumer welfare of taxi regulation.⁷³

Economic models can also be used to estimate the effect of loss of choice in a market by inferring what the price would be for demand in the market to be zero.⁷⁴ However, such models are less well developed in economic theory and their application should be treated with caution.

This report does not go into further detail on methods and models to quantify these other forms of harm.

3.2.3 Selecting which methods or models to use

The remainder of this section sets out the range of methods and models that can be used for estimating the variables required for the quantification of damages. The choice of which methods or models to use will depend on the specific details of each case, and as such no general guidance on which to choose in particular circumstances can be provided.

Two key factors will typically influence the choice of methods or models in specific cases.

- **The availability and quality of data and information**—for example, more data usually makes a greater range of approaches possible.
- **The availability and quality of the basis of the counterfactual on which many models are based**—for example, in some cases a high-quality cross-sectional comparator may be available (eg, a closely matching cross-country comparator available for a cartelised market, where it is likely that there is no similar infringement in

⁷² See, for example, Hensher, Rose and Greene (2005).

⁷³ Oxera (2003).

⁷⁴ See, for example, Hausman (1994).

that comparator country), while in other cases it may not (eg, a close match is available, but there is some evidence of a similar infringement in the comparator country, potentially ‘contaminating’ the available data).

This issue is explored in greater depth in section 5.1, within the broader discussion about how to arrive at a final damages value. Section 5 also sets out in more detail how the different methods and models can be used in combination with one another, and with the further economic insights described in section 4.

3.3 Comparator-based approaches: cross-sectional

3.3.1 Three sources of comparison

These models use data from sources that are not affected by the specific infringement or any other similar infringement to estimate the counterfactual scenario. There are three sources of comparison:

- comparisons across product or geographic markets are **cross-sectional** in nature, also known as the yardstick or benchmark approach (the prices of firms from a different geographic or product market, for example)—discussed in this sub-section;
- comparisons over **time** (prices of firms in the same market but in a pre-infringement period)—discussed in section 3.4;
- comparisons over both time and cross-sections can also be made to control for differences between the cross-sectional groups and the periods of time (this is referred to as **difference-in-differences**)—discussed in section 3.5.

This comparator class of models is intuitively appealing in that it uses information from actual transactions in markets where there is no infringement to form the basis of the counterfactual. Such models can also take into account observable (and to some extent, certain unobservable) differences between the market concerned and the comparator. They can therefore separate the effect of the infringement from that of other possible explanatory factors, such as changes in market size, market structure, firm size, and input costs.

Comparator-based models can also be used to estimate the counterfactual, albeit with less precision, through simple approaches (eg, comparison of averages or simple regression) that have a relatively low data requirement. This data requirement increases with the requirement for improving the precision of estimates of the counterfactual.

Comparator models, if not corrected, assume that all of the difference between the factual and estimated counterfactual relates to the presence of the infringement. This assumption might bias the effect of the estimates of the infringement if there are other factors that coincide with the presence of the infringement but that are not accounted for in the modelling. This bias can be mitigated by ‘controlling’ for other potential causes of differences between the groups, which means including those other causes as additional explanatory variables in the model.

Cross-sectional models aim to estimate the effect of the infringement by comparing data in the relevant market with data from other markets not affected by the infringement.

Pure cross-sectional models do not take into account the effects of data over time and are ideally based on data which is all from the same time period (eg, a specific month or year), such as the data in Figure 3.2.

Figure 3.2 Example of cross-sectional data

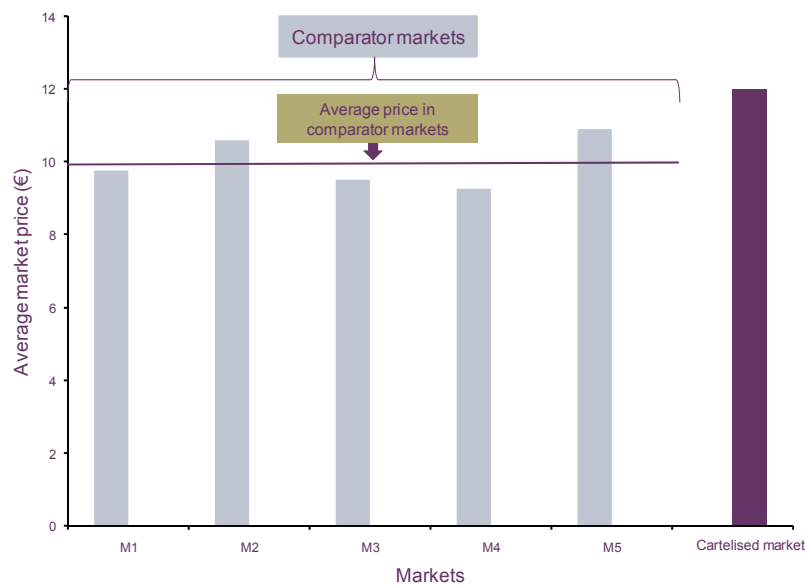
		Company (i)															
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
Time (t)	1			X												X	
	2		X	X								X					
	3	X	X	X	X			X									
	4			X						X			X				
	5	X	X	X		X					X			X			
	6			X	X	X	X	X	X	X	X	X	X	X		X	
	7			X	X	X	X	X	X	X	X	X	X	X		X	
	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	11			X	X	X	X	X	X	X	X	X	X	X			
	12		X	X	X	X	X	X	X	X	X	X	X				

Note: The Xs represent data observations. The cross-sectional dataset highlighted here contains data observations across companies A to O for one period only—period 9. The figure assumes that all these companies are potentially relevant comparators, but for simplicity does not address whether these companies operate in the same or a different relevant market.
Source: Oxera.

When using cross-sectional models, the implicit assumption is that, all else being equal, any observed differences are due to the presence of the infringement. This assumption means that it is crucial to ensure that comparisons are made on a like-for-like basis.

Once appropriate comparators have been selected, a comparison can be made between the factual (ie, data from the market involved in the infringement) and the counterfactual (data from unaffected markets). Figure 3.3 provides an example of a cartel price being compared with data from unaffected markets. In this example, the price in the cartelised market is €12 while the average price in comparator markets is €10, implying that the overcharge could have been around €2.

Figure 3.3 Example of a cross-sectional comparison



Source: Oxera.

3.3.2 Choice of comparator

The comparisons can be made between firms, product markets or geographic areas, depending on the extent of the infringement and the data available.⁷⁵ The ideal cross-sectional comparison includes data from only the relevant market and data from unaffected groups that are otherwise similar. If a regional infringement had the effect of increasing prices nationally, comparing data from the two regional markets within the country would be likely to give a biased estimate of the damage since the comparator groups would be ‘contaminated’ by the effect of the infringement. Such a cross-region comparison may not be suitable in that case, and comparisons with other national markets, or other methods, may be more appropriate.

For example, in a case relating to a German paper wholesaler cartel, both the higher regional court and the German Federal Court of Justice felt unable to use cross-sectional comparisons between cartelised and other regional markets for paper wholesaling for the purposes of estimating the overcharge (see Box 3.10).⁷⁶ Both courts were concerned that there was some evidence of cartels existing in all or most of the regional markets, and that these markets were therefore potentially contaminated. As such, only limited reliance could be placed on comparisons with the markets.

3.3.3 Advantages and disadvantages of cross-sectional comparisons

Cross-sectional comparisons have the advantage that, if chosen correctly, the comparator gives a view of what would have happened in a market with no infringement. Unlike comparisons over time, cross-sectional comparisons are unaffected by uncertainty about when an infringement started or ended.

The strength of a cross-sectional comparison lies in how like-for-like the comparison is and how many of the differentiating factors have been controlled for in the modelling. For example, in a US case concerning a refusal to deal with a prospective purchaser of the Chicago Bulls basketball franchise by the Chicago stadium owner, the claimant’s expert calculated the counterfactual fair market value of the Chicago Bulls franchise using the recent sales prices of ‘comparable’ National Basketball Association franchises.⁷⁷ Factors considered in the comparability of the franchises, and ultimately accepted by the court, included the size of the home city; the degree of population growth in the home city; the city’s interest in basketball; and whether the franchise was an ‘expansion’ franchise.

Likewise, in the *Conduit* case in Spain involving exclusionary practices, the court considered it acceptable to take the UK market as a reference to calculate lost market share of the victim in Spain, given the similarities between the two markets (although the damage estimate itself was not accepted by the court)—see Box 3.2.

A potential disadvantage of these models is that they rely on the assumption that any remaining differences are due solely to the actions of the cartel, when in reality there may be other differentiating factors that have not been tested for.

⁷⁵ For example, in *Conwood Co., L.P. v. U.S. Tobacco Co*3, 290F.3d 768 (6th Cir. 2002), a monopolisation case, the expert used a different geographic (but same product) market as well as a different but closely related product market as comparators. In *Apollo Theater Foundation Inc. v. Western International*, United States District Court of New York, 02 Civ 10037 (DLC), May 5th 2005, an expert for the claimant used a range of past exclusive trademark licence fees from other firms and markets to estimate reasonable royalty rates in patent disputes, which were then used to calculate the counterfactual licence fees. See section 4.6 for a discussion of using industry prices as an approximation for firm prices.

⁷⁶ Oberlandesgericht Düsseldorf (Higher Regional Court of Düsseldorf), VI-Kart 3/05, Judgment of March 27th 2006. Judgment of the German Federal Court of Justice (BGH) June 19th 2007, KRB 12/07.

⁷⁷ *Fishman v. Estate of Wirtz*, 807 F.2d 520 (7th Cir. 1986).

Box 3.2 Damages claim by a competitor regarding exclusionary abuse—use of cross-country comparison (Spain)

Juzgado de lo Mercantil Madrid (Madrid Commercial Court), *Conduit Europe, S.A. v Telefónica de España S.A.U*, judgment of November 11th 2005

The Madrid Commercial Court was asked to decide whether the conduct of the incumbent Spanish telecoms operator, Telefónica, amounted to an abuse of a dominant position in the market for subscriber directory enquiries, and whether this conduct entitled one of its competitors, Conduit, to be awarded compensation.

The case arose following the liberalisation of the market for Spanish directory enquiries in 2003. As part of the liberalisation process, Telefónica was required to facilitate entry of competitors by providing them with accurate subscriber data. However, when the claimant requested the necessary information from Telefónica, it was provided with inaccurate and incomplete data, leading it to incur additional expenditure relating to the cost of sourcing alternative data and data cleansing.

The claimant therefore sought damages of €6m as compensation for the additional expenditure incurred and for lost profit. The claimant provided a detailed econometric study in which Conduit's lost market share in Spain was computed based on an econometric model that took the UK as a comparator market. Both markets were opened to competition at similar times, having been previously controlled by the incumbent telephony operator. In the UK, other operators rapidly gained market share, while in Spain the incumbent retained the largest share in the market. The econometric model controlled for relative prices and advertising intensities in both markets, and found that, based on the UK comparison, Conduit would have gained a greater market share in Spain in the absence of the exclusionary conduct by Telefónica.

While the Madrid Commercial Court accepted that Telefónica had abused its dominant position in the relevant market by supplying Conduit with defective or incomplete information, which constituted an indispensable input for gaining access to the relevant market, it ordered Telefónica to pay Conduit only €670,000 in damages, corresponding to the direct extra costs incurred by Conduit. In so ruling, the Madrid Commercial Court dismissed Conduit's econometric analysis of lost profits from the lower quality of service resulting from the abuse. Among other reasons, the court considered that the econometric analysis had not properly taken account of a number of other factors explaining Conduit's performance in Spain.

The Commercial Court's judgment was upheld by the Audiencia Provincial de Madrid (Madrid Court of Appeal) in a ruling dated May 25th 2006. An appeal against this latter ruling was declared inadmissible by the Tribunal Supremo (Spanish Supreme Court) in a judgment dated December 16th 2008.

Note: More detail on the econometric analysis undertaken for Conduit, and a critique of the court's reasons for rejecting it, is provided in Martínez-Granado, M. and Siotis, G., 'Sabotaging Entry: An Estimation of Damages in the Directory Enquiry Service Market', forthcoming in *Review of Law and Economics*.

3.3.4 Techniques

The following estimation techniques can be employed to derive the counterfactual price using cross-sectional comparators.

- **Comparison of averages.** This technique observes the average price in an unaffected comparator group as an estimate for the counterfactual price. For example, if there are five comparator markets with an average price of €10 (as in Figure 3.3 above), €10 is a simple estimate of the price that would have prevailed in the relevant market in the absence of the infringement. This price can then be compared with the actual price charged in the relevant market—eg, €12—to estimate the overcharge (€2, or 16.7% of the cartel price in this example).⁷⁸

The measure of the average price could be the arithmetic mean, median or the mode price in the comparator market, as explained in Box 3.3.

⁷⁸ From a legal perspective a party may also argue that the relevant comparison is with the highest comparator price or with the lowest comparator price. From an economic perspective it is more robust to take the average of all the comparator prices that are deemed relevant for comparative purposes.

Box 3.3 Measures of average price

Mean. The mean price in the comparator group is the arithmetic mean of the prices, which is calculated by dividing the sum of all observations (here price points) by the number of observations. For example, if there are ten prices observed in the comparator market, the mean price would be the sum of the ten prices divided by ten.

Median. The median price is identified such that 50% of the firms in the comparator group charge a price below this (median) price and 50% charge above it. In other words, it is the price charged by the middle-ranked firm.

Mode. The modal price is one that is observed the most in the comparator group, and hence is the 'most common' price in the market.

The choice among the three measures would depend on the nature of the market and the pricing pattern (ie, the distribution). In a market with ten firms, if nine firms charge €10 and one firm charges €25, the modal (or median, as they are the same in this example) price of €10 might be a more accurate representation of the market price than the mean price of €11.50.

Whichever metric is used, the counterfactual price can then be compared with the actual price charged in market with the infringement in order to calculate the overcharge. The same method can be used to estimate the reduction in volume resulting from the infringement (ie, volumes would have to be compared across comparator markets) or any other variable of interest (eg, market share of the victim of an exclusionary practice compared with its share in markets where it has been able to compete freely).

If there is sufficient data on prices (or on the relevant variable other than price), a statistical test can then be undertaken to check whether the counterfactual price is significantly different (in the statistical sense) from the actual price charged. Testing for statistical significance is good practice in economics and statistics. It helps in understanding the uncertainty surrounding an estimate and informs about how much weight should be placed on the analysis. A statistical test accounts for the variation in the prices in the comparator group, while testing whether the actual price in the market in which the infringement occurred is similar to the average price in the comparator group.⁷⁹

For example, if the variance of prices in the comparator group is large, even if the factual price in the market concerned is greater than the average price in the comparator market, the difference may not be statistically significant, and if it is not statistically significant it cannot be treated as a robust finding. To continue with the above illustration, if the factual price was €12 and the average of the comparator markets was €10 then the overcharge may be estimated to be €2. However, the weight placed on this estimate of the overcharge may depend on the uncertainty surrounding the estimate of the counterfactual. If the confidence interval ranges from €5 to €15 then less weight might be placed on the analysis than if the confidence interval suggests a range of €9 to €11. Note that in many situations a significant difference may not be found. This does not necessarily mean that there is no damage, but the variation of the comparator makes it difficult to robustly identify the overcharge. In such cases more sophisticated techniques may have to be used to try to control for other factors causing the variation.

The comparison of averages, as well as being simple and easy to use, is useful if the comparator market is 'sufficiently similar' to the market in question.⁸⁰ However, it may be

⁷⁹ One such test is the t-test, which is a standard test for statistical significance and assumes that the sample of prices is taken from an underlying normal distribution. See Greene (2008); and Wooldridge (2005).

⁸⁰ To inform the extent of comparability between the groups, techniques such as cluster analysis are useful. (Cluster analysis is a statistical technique that identifies, in a dataset, groups of observations that have similar characteristics.) See Everitt, Landau and Leese (2001); and Kaufman and Rousseeuw (2005).

difficult to find two markets that are sufficiently similar, and the average price of a market with a different structure (eg, number and size of firms) is unlikely to be reflective of the price that would have been charged in the absence of the infringement.⁸¹ Again, more sophisticated approaches may have to be used instead.

- **Regression techniques.** Regression techniques are statistical methods that can be used to explain the variation in a piece of data using other factors. These techniques address one of the main shortcomings of a simple comparison of averages—ie, finding markets that are sufficiently similar—by controlling for differences in market or firm characteristics in the relevant and comparator markets.⁸² Among the different possible models, ordinary least squares (OLS) regression is widely used for such purposes.⁸³

When dealing with endogenous variables (those where the causality runs in both directions—ie, the variables influence each other mutually), techniques such as instrumental variables or two-stage least squares may be more appropriate. In such analyses, data on the key determinants of price (which may include prices of competing products and costs) in both markets is used to estimate the impact of these determinants.

Having ensured that the comparison is made using the correct model, the impact of the infringement can be captured by including an indicator variable to differentiate between the two markets.⁸⁴

When a regression technique is used, the analysis will be based on an implicit or explicit equation such as the stylised example below, which uses firm-level data from both markets. On the left-hand side of the equation is the variable to be explained, in this case price—thus, the variable Y_i represents the price of firm i . On the right-hand side of the equation are all the variables that can explain price. Thus, X_i includes characteristics of the firm or its market, such as input costs, product quality and size of the firm—these are factors other than the infringement that may influence price, and hence should be controlled for. D_i is the ‘dummy’ variable which is equal to 1 if firm i belongs to the market where the infringement takes place, and is equal to 0 if the firm belongs to the comparator market, and e_i is a random element that affects the price of firm i (it is standard practice in regression analyses to test for random elements).

$$Y_i = \alpha + \beta X_i + \delta D_i + e_i$$

The model can be estimated when sufficient datapoints are available for all the Y and X variables (the D values are taken directly from what is known about the infringement). The regression analysis seeks to identify the statistical relationship between these

⁸¹ See, for example, *El Aguila Food Products et al v. Gruma Corporation et al.*, No. 04-20125, United States Court of Appeals for the Fifth Circuit, 131 Fed. Appx. 450; 2005 U.S. App. LEXIS 8944; 2005-1 Trade Cas. (CCH) P74,788, May 17th 2005, a case involving exclusionary practices, where the claimant’s expert was criticised for not attempting to ‘demonstrate the reasonable similarity of the plaintiff’s firm and the businesses whose earnings data he relied on as a benchmark’.

⁸² The importance of accounting for other factors that might affect the market outcome is apparent from a number of decisions where courts have rejected the expert’s estimate for the above reason. See, for example, the Spanish case discussed in Box 3.2; and various US cases such as *Sunlight Saunas, Inc. v. Sundance Sauna, Inc.*, 427 F. Supp. 2d 1022 (D. Kan. 2006), *Concord Boat Corp. v. Brunswick Corp.*, 207 F.3d 1039 (8th Cir. 2000); *Vernon Walden, Inc. et al v. Lipoid GmbH et al* Civ. No. 01-4826(DRD), and *Craftsmen Limousine, Inc. v. Ford Motor Co.*, 363 F.3d 761 (8th Cir. 2004). Nevertheless, there are many cases in the USA in which the courts did accept expert evidence where it had been shown that other explanatory factors had been sufficiently controlled for. For example, in *Conwood Co. v. U. S. Tobacco Co.*, 290 F.3d 768 (6th Cir. 2002), the court accepted that the expert, in his regression analysis, had tested for ‘all plausible explanations’ for the claimant’s low market share.

⁸³ OLS does this by fitting a ‘line of best fit’, which minimises the squared distance between the actual observation and the predicted value. OLS and the other regression techniques discussed below are commonly used by economists, and explained in econometrics textbooks such as Greene (2008); Wooldridge (2005); and Gujarati (2009).

⁸⁴ The indicator variable is known as a ‘dummy’ variable, which takes a value of 0 for the comparator data and a value of 1 for data from the infringement market.

variables. The parameters that are estimated in the model are an intercept term (α),⁸⁵ the relationship between the characteristics of the firms in the market (X_i) and the price (β), and the estimated size of the overcharge effect (δ).

The coefficient of main interest in this regression is δ (linked to the variable of concern D_i), which represents the average change in price due to the fact that a firm belongs to the market where the infringement has taken place. As stated above, this technique then assumes that any difference between the markets, given other factors X_i , is due to the infringement.

In the model described above, the assumptions are that:

- the relationship between Y and X is linear;
- the impact of the infringement is a constant amount across all firms (i);
- the errors (e_i) are uncorrelated with X_i or D_i with a mean of zero.

In essence, this approach is similar to a simple comparison of average prices, but it allows, at least in part, the isolation of that element of the difference in prices which is due to the anti-competitive conduct and not due to other factors that might affect prices, such as differences in firm size or product quality. Regression analysis therefore generally leads to more robust results than simple price comparisons.

3.4 Comparator-based approaches: time series

3.4.1 Before, during and/or after comparisons

The alternative source of a comparator is data over time. If a whole market is affected by the infringement and other markets are not deemed to be robust comparators, data from unaffected sources may not be readily available.

Although this approach is often described generically as ‘before and after’ (see section 3.2), it is important to make an explicit distinction between three types of comparison that can be made using time-series data.

- **Before and during.** An unaffected period before the infringement can be compared with the period during the infringement.
- **During and after.** An unaffected period after the infringement can be compared with the period during which the infringement took place. (An example of the use of this comparison is given in Box 3.4, which relates to a price-fixing cartel in Austria.)
- **Before, during and after.** Both comparisons can be made if data both before and after the infringement is available.⁸⁶

⁸⁵ If all the other variables on the right-hand side of the equation are zero, the variable on the left-hand side takes the value of this intercept term. This should not be interpreted as a base price, as any systematic error in the data or modelling across all observations will end up in this term in that situation.

⁸⁶ These variants have been used in several damages cases. For example, in two German cases—LG Dortmund 0 55/ 02 Kart Vitaminkartell III, Decision, April 1st 2004, and Oberlandesgericht Düsseldorf, Berliner Transportbeton I, KRB 2/05, Decision: June 28th 2005—the courts used the price *after* the termination of the cartels to estimate the overcharge and the consequent loss incurred by the claimants. In a case in the USA—*Apollo Theater Foundation Inc. v. Western International*, United States District Court of New York, 02 Civ 10037 (DLC), Decision: May 5th 2005—in order to estimate damages for lost profits, the costs and advertising revenue trends of Apollo in a period *before* the infringement were used to calculate projected revenues and costs for the infringement period.

Box 3.4 Damages claim by customers regarding a price-fixing cartel—during-and-after comparison (Austria)

Landesgericht für Zivilrechtssachen Graz (regional civil court of Graz), *Bundesarbeitskammer v Powerdrive Fahrschule Andritz GmbH*, judgment of August 17th 2007

This damages claim followed on from a 2005 judgment by the Austrian Cartel Court, which imposed fines of €75,000 on five driving schools for price fixing. The Cartel Court found that, for a period of two months, the schools had charged identical prices for the most popular driving courses, which was an infringement of the Austrian Cartel Act. According to the Austrian courts, the relevant provisions in the Act constitute a ‘protective law’ (*Schutzgesetz*) in terms of Section 1311 of the Austrian Civil Code.

The claim was brought by the Bundesarbeitskammer (the Federal Chamber of Workers) on behalf of customers of the driving schools who had suffered damage as a result of the cartel. The Bundesarbeitskammer argued that the loss suffered by customers could be quantified as the 22% difference between the price charged by the driving schools during the two months of the cartel’s duration (which was identical for the cartel members) and the lower price once the cartel had ended (based on an average price calculated at that time). In this regard, the court did not elaborate further, but stated that the prices charged by the cartel members fell from around €1,140 to around €900 once the authorities had initiated the investigations.

The judgment was fully confirmed by the Graz Court of Appeal.

A time-series model typically compares data on companies (or markets) involved in the antitrust infringement in a particular period with data on the same companies (or markets) in a period without the violation. Figure 3.4 shows what time-series data might look like for a company (C) being investigated for an antitrust infringement.

Figure 3.4 Example of time-series data

Company (i)

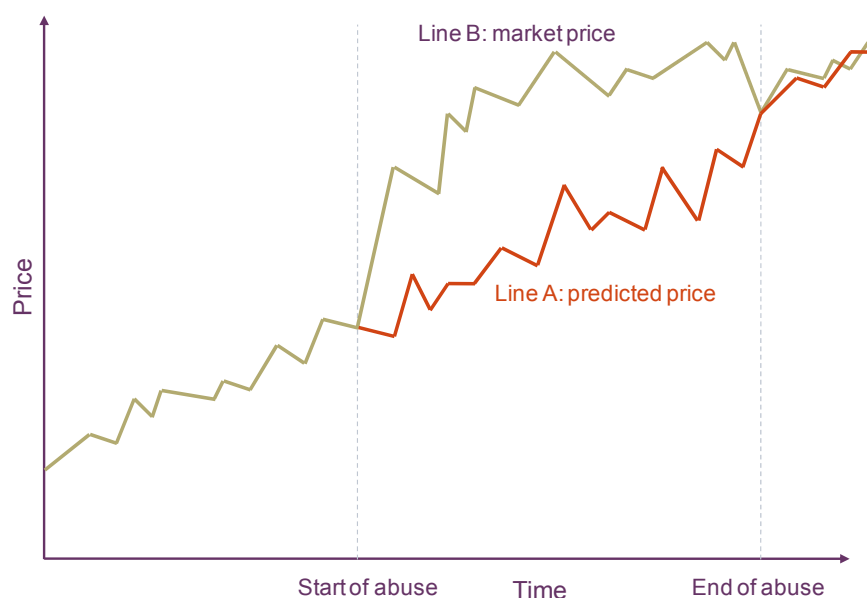
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1			X												X
2		X	X								X				
3	X	X	X	X			X								
4			X						X			X			
5	X	X	X		X										
6			X	X	X	X	X	X	X	X	X	X		X	
7			X	X	X	X	X	X	X	X	X	X			X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11			X	X	X	X	X	X	X	X	X	X			
12		X	X	X	X	X	X	X	X	X	X	X			

Note: As in Figure 3.2, the Xs represent data observations. The time-series dataset highlighted here contains data observations across all periods 1 to 12 for only one company—company C. Source: Oxera.

Figure 3.5 provides an example of how time-series data can be used to estimate the counterfactual position. Line A shows the price at each period as predicted by a time-series model (see below for an explanation of this model). Line B shows the actual price movement over time. In this example, line A is fairly straight, with a few minor changes in the predicted price (eg, due to increases in the underlying costs). If the past pattern of prices has been correctly characterised by the model, one line should be a reasonably close continuation of

the other, both before and after the infringement period. During the infringement period, line A can then be taken as an estimate of what the price would have been in the counterfactual.

Figure 3.5 Example of a time-series comparison



Source: Oxera.

3.4.2 Choice of comparator

Time-series comparisons can use data from before or after the infringement. Ideally, the comparison should be made using information from both pre- and post-infringement periods (as in Figure 3.5) so that more information is used (which increases the likelihood of robust findings), and the model has only to fill in the gap for the period in between. Having data for the periods both before and after the infringement is advantageous in ‘anchoring’ the predicted prices for the infringement period with known data points. Using such data points is likely to improve the performance of the model in providing an unbiased estimate of the path of the counterfactual price (or other variable of relevance, such as sales volume or market share).

In using time-series models it should be recognised that both pre- and post-infringement data have advantages and disadvantages associated with them. For example, one of the advantages of post-infringement data is that it typically covers a recent period, and is therefore often readily available. Another advantage is that it may be easier to identify a reasonably precise date at which the infringement ended—for example, dates cited in the competition authority’s infringement decision. Using post-infringement data may have some drawbacks, however. For example, it may take some time for the cartel behaviour to unwind fully and for the market to return to non-infringement-based pricing. Indeed, in the case of cartels, unwinding may take a substantial period, since knowledge of business secrets revealed during the cartel period may persist for a long time.

In contrast, one of the advantages of pre-infringement data is that the market equilibrium that it represents is not contaminated by the existence of the cartel. However, it may be difficult to ascertain when the infringement began; indeed, some infringements such as cartels may have started gradually. A further disadvantage is that the pre-infringement period is, by definition, historical, and it may therefore be more difficult to obtain data and/or the data that is available may be of poor quality compared with post-infringement data.

The Italian case described in Box 3.5 is an example of two different comparisons being made with the before period, only one of which was accepted.

Box 3.5 Damages claim by a customer (and potential competitor) regarding a collective boycott—before-and-during comparison (Italy)

Corte d'Appello di Milano (Court of Appeal of Milan), *INAZ Paghe srl v. Associazione Nazionale dei Consulenti del Lavoro*, judgment of December 10th 2004

This damages claim followed on from a February 2000 decision by the Italian competition authority, which considered that the collective boycott of the claimant's software packages by the members of the National Association of Employment Consultants constituted a violation of the Italian equivalent of Article 101.

INAZ sought to recover damages for the harm suffered as a result of the National Association of Employment Consultants' illegal behaviour.

In its judgment, the Milan Court of Appeal applied a 'but for' test in order to assess the harm suffered by INAZ as a result of the collective boycott. The court compared the average number of contracts with INAZ terminated by the Association's members in the two years of the collective boycott (1997–98) with the average number of contracts terminated in the years prior to the boycott. On that basis, the court awarded INAZ €148,200 in damages.

As to whether INAZ was entitled to recover damages for the slower growth of its business due to the boycott, while it was able to show that, prior to the boycott, its business was growing at a rate of more than 10% per annum and that this increase had suddenly ceased at the time of the boycott, the court considered that it could not be sure that this growth would have continued at a similar rate. The fact that INAZ's business had grown at a rate of 10% in past years could not be used as a presumption that this growth rate would have continued in the future.

The judgment was confirmed on appeal by the Corte di Cassazione (Italian Supreme Court).

3.4.3 Advantages and disadvantages

Time-series data has an advantage in that the comparison involves like-for-like firms or markets since it refers to the same firms or markets in both the factual and counterfactual cases. However, single-variable time-series models such as ARIMA (autoregressive integrated moving average, see below) assume that all of the unexplained differences (ie, differences in price or volume not explained by the time-series model) between the time periods can be attributed to the infringement. There may be other events that occur at the same time as the infringement and have significant effects on the variable of interest (eg, price or market share), regardless of the existence of the infringement. As far as possible (and as with the cross-sectional comparators discussed above), other drivers of the variable of interest should be controlled for to ensure that the difference between the periods is not biased by any external factors (see further below).

Data over time often displays characteristics not seen in cross-sectional data. For example, there may be a seasonal trend or serial dependence (autocorrelation) in time-series data, which means that a high value now (at time= t) is likely to be associated with a high value tomorrow ($t+1$). This is a potential problem since such patterns may be associated with the difference between the factual and counterfactual. More advanced time-series models can control for such patterns to ensure that the results are not unduly biased.

Time-series comparisons can sometimes be used by claimants to provide support for their argument on causation where a clear pattern is observed. For example, in the *LePage's* monopolisation case in the USA, the court found that the 'impact of 3M's discounts was apparent from the chart introduced by LePage's showing that LePage's earnings as a percentage of sales plummeted to below zero—to negative 10%—during 3M's rebate program', and was satisfied that LePage's had 'introduced substantial evidence that the anti-competitive effects of 3M's rebate programs caused LePage's losses'.⁸⁷

⁸⁷ *LePage's, Inc. v. 3M*, 324 F.3d (3d Cir. 2003).

3.4.4 Techniques

Modelling techniques using a time-series comparator can be based on a univariate (single-variable) or 'pure' time-series model, or on a multivariate (multiple-variable) or deterministic time-series model. A univariate time-series model, unlike cross-sectional regression models, does not attempt to formulate a behavioural relationship between the variable under consideration (eg, price) and other potential explanatory variables (eg, costs). Instead, the historical pattern of the variable of interest itself is used as a predictor of its future values—the aim being to remove all predictable patterns from the data series and incorporate them into the model. A multivariate time-series model, on the other hand, includes other explanatory variables and assesses the relationship between them to predict the relevant variable.

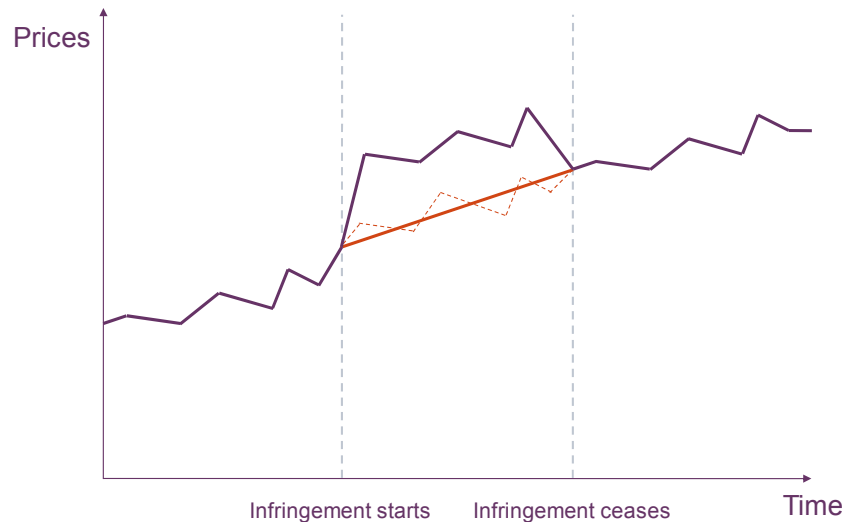
In this context, time-series models can be used to extract information from the prices of the firm(s) in a non-infringement period to estimate what the price would have been in the absence of the infringement. The techniques for this group of comparators, from the simplest to the increasingly sophisticated, are the following.

- **Comparison of averages.** This technique is similar to that described in section 3.3, with the difference being that, in this case, the comparison is between groups differentiated by time. The average price in the market concerned during the infringement period is compared with that in a period without the infringement, which is taken as an approximation for the counterfactual price.⁸⁸ This counterfactual price can be the average price from before or after the infringement period. As before, a statistical test (eg, a t-test) can be conducted to determine whether the difference is statistically significant and, if so, the difference can be interpreted as representing the overcharge.⁸⁹
- **Interpolation.** This technique builds on a comparison of averages in that the prices from both the pre- and the post-infringement periods are used to estimate the counterfactual price. Interpolation requires joining the price points before and after the relevant period to indicate what the prices would have been in the intervening period. Although in its simplest form the connecting line will be linear, seasonal patterns can be incorporated into the model if such seasonality is a feature of the market. Figure 3.6 illustrates this approach, showing both a linear interpolation (the straight red line) and a seasonally adjusted interpolation (the dashed line). Interpolation therefore partially takes into account increases (or decreases) in prices that might occur over time, irrespective of the infringement.

⁸⁸ See, for example, *Hubbards v Simpson*, 41 ALR 509, Federal Court of Australia, Full Court General Division, 1982. The claimant used the sales of its goods in the year preceding the infringement (which took the form of resale price maintenance) to estimate the counterfactual sales. The estimated lost sales were then multiplied by the average selling price of the relevant products over a three-year period (including the year of infringement) to calculate the lost profits. In this case, data from only one year before the infringement was used.

⁸⁹ This method might not be suitable if there were significant changes in other factors across the two time periods.

Figure 3.6 Example of interpolation to determine the counterfactual

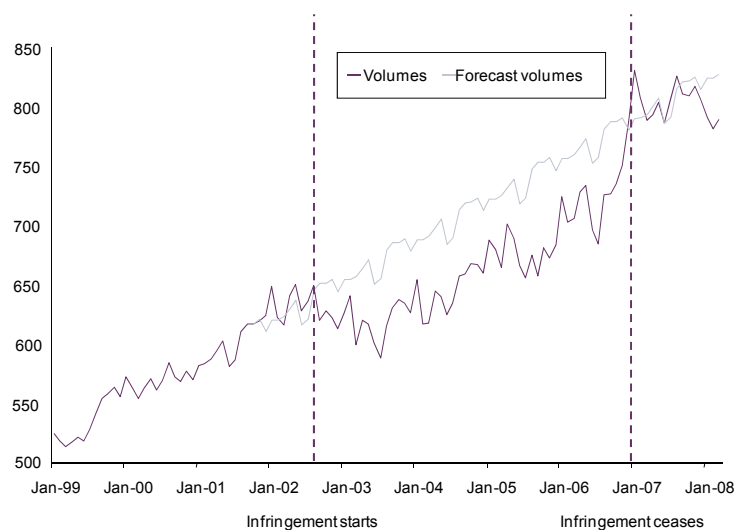


Note: The purple line shows the actual price over time. For the infringement period, the figure shows linear interpolation (the straight red line) and a seasonally adjusted interpolation (the dashed line).
Source: Oxera.

- **ARIMA models.** A widely used pure time-series forecasting approach, autoregressive integrated moving average models use the pattern of past values of the variable under investigation to forecast its future values.

Figure 3.7 illustrates this technique with a hypothetical example. Historical volumes in a market are modelled using an ARIMA technique, which then can be used to forecast volumes during the period of the infringement—October 2002 to January 2007 in this example. The forecasts act as estimates of the counterfactual volumes, which can then be compared with actual volumes to estimate the harm resulting from the infringement (if lost volumes are estimated in this way, they would have to be multiplied by the relevant price in order to determine the lost revenues). If the comparison is between a period during the infringement and a period after, the process can be reversed such that the model backcasts (as opposed to forecasts) to the start of the infringement.

Figure 3.7 Example of forecasting using an ARIMA model

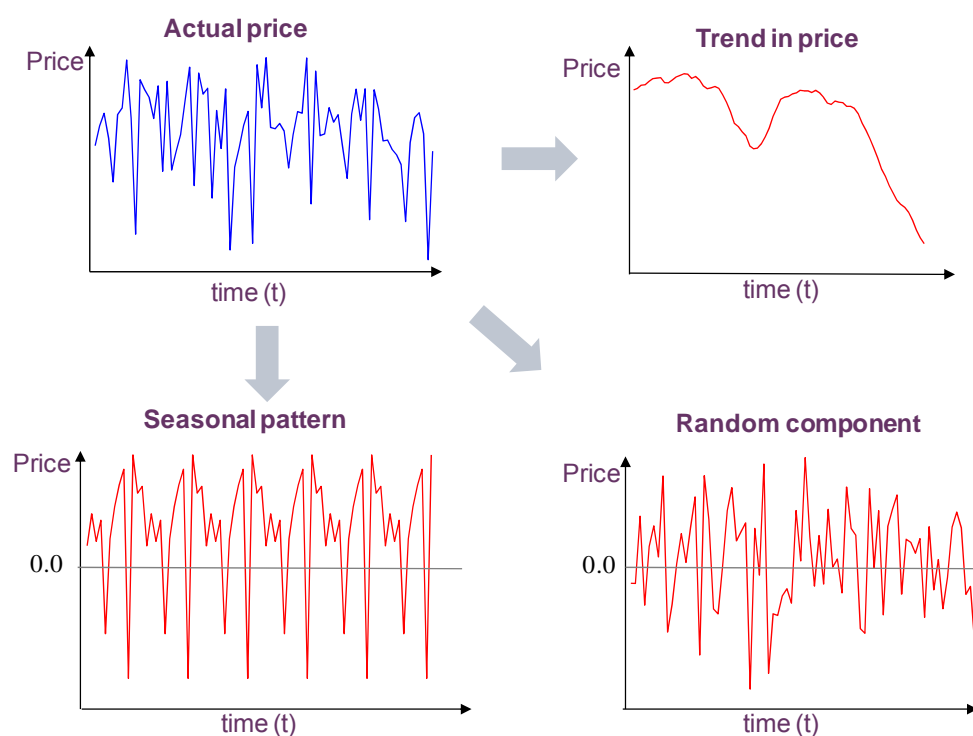


Note: The forecast volumes can be interpreted as the counterfactual volumes.
Source: Oxera.

Some time series exhibit changes in variance over time. These changes tend to be related, with groups of highly volatile observations occurring together, followed by periods of low volatility, before becoming highly volatile again (this is referred to as heteroscedasticity). One approach to modelling changes in variance is generalised autoregressive conditional heteroscedasticity (GARCH). The basic idea of GARCH is that the variance (or volatility) is modelled in terms of past observations and accounts for changes in this volatility. Removing the effect of the changing volatility from a series may make it easier to identify the underlying movements, or, in some cases, the volatility itself may be the variable of interest if the effect of the infringement is to smooth prices in an industry.

- **Structural time series.** This technique is used to decompose a time series (eg, price or volume series in a market with the infringement) into components that can be interpreted as a trend, and other components such as seasonal patterns. The model allows these components to vary over time and can therefore capture their development. For example, by using this technique on volume data in the market in which the cartel occurred, any distinct change in volumes during the cartel period can be observed from the different components. Examination of the trend and cyclical components is especially important since the cartel may have affected the cyclical nature of prices, which is unlikely to be captured by standard ARIMA techniques.⁹⁰ Figure 3.8 shows different components of a series using a structural model.

Figure 3.8 Illustration of components of a series from a structural time-series model



Note: The top-left portion of the diagram shows actual prices over time (in blue). The structural time-series model allows decomposition of the price data into its different components: trend, seasonal pattern and random fluctuations.

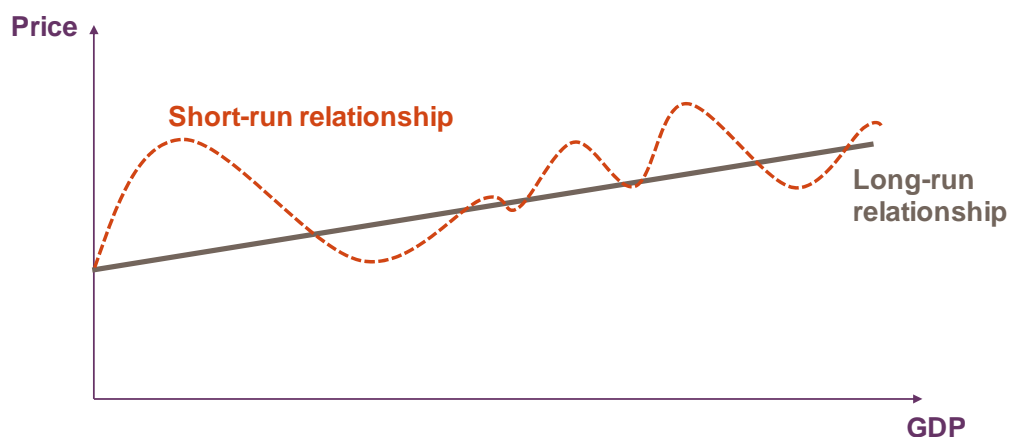
Source: Oxera.

- **Error correction models.** In contrast to pure time-series models involving a single variable, error correction models (ECMs) seek to explain the short- and long-run movements of the series of interest (eg, price or volumes) through the effects of other

⁹⁰ Some dynamic IO models (see also section 3.5) suggest that pricing behaviour by cartels may have a cyclical pattern under stochastic demand conditions—for example, Green and Porter (1984).

explanatory variables. In many cases, economic theory might suggest that certain groups of variables are linked by a long-run relationship—eg, the price in a particular industry at a point in time is likely to be related to the industry cost structure in the long run. However, this relationship may not be evident in the short run, and prices may respond with a time lag—for example, as a result of complexities in the supply chain.⁹¹ Figure 3.9 illustrates the difference between short- and long-run relationships. ECMs decompose the incremental changes in the series into deviations from the long-run relationship and time-lagged short-run movements, and can then be used to forecast counterfactual prices, as with ARIMA models.

Figure 3.9 Illustration of short- and long-run relationships in time series



Source: Oxera.

The explanatory factors should not be affected by the infringement. For example, if the long-run relationship between price and volumes in an industry is used to estimate counterfactual prices using an ECM, this potentially builds some circularity into the model since volumes might also be affected by the infringing firms. This concern can be addressed by modelling both price and quantity using a vector error correction model.⁹²

3.5 Comparator-based approaches: difference-in-differences

3.5.1 What is the difference-in-differences technique?

The difference-in-differences technique aims to avoid some of the shortcomings of cross-sectional and time-series approaches—ie, the assumption that any unexplained difference is due solely to the infringement. Difference-in-differences estimators control for what would have happened without the infringement by examining what changed over time for the infringement and non-infringement markets, followed by a comparison of those differences.

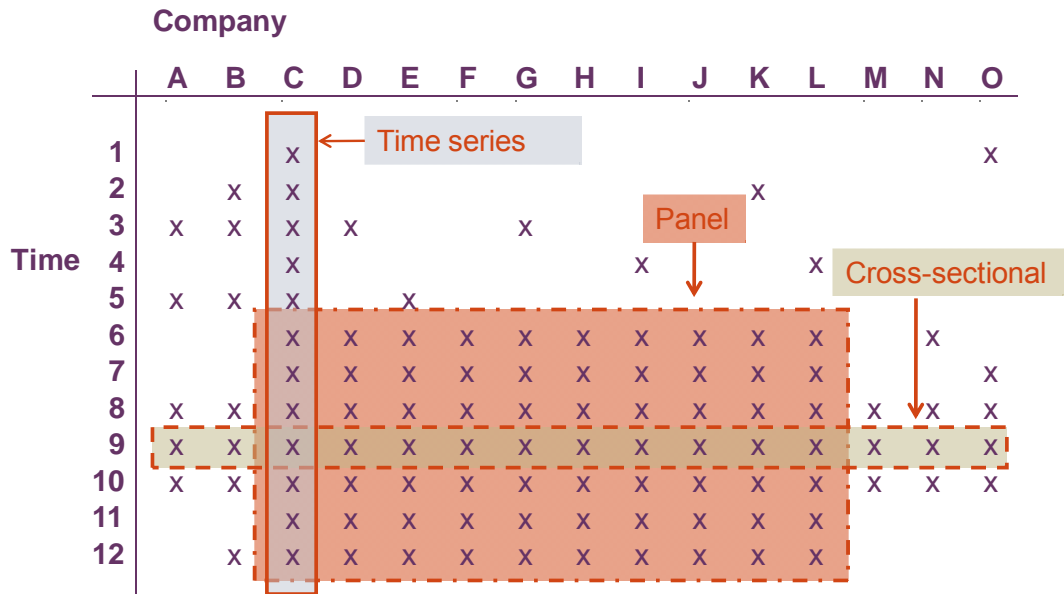
This technique requires data both over time and across cartelised and non-cartelised markets. Figure 3.10 illustrates the type of data required for difference-in-differences approaches, often referred to as panel data.⁹³

⁹¹ For example, in petrol retail it has been observed that prices respond to changes in costs with a lag that typically varies from two to ten weeks. See Bacon (1991) and Duffy-Deno, K.T. (1996). See the discussion on pass-on in section 4.4.

⁹² For further details on time-series models, see Greene (2008); Wooldridge (2005); and Enders (2005).

⁹³ Panel data is not required to be 'balanced'—ie, rectangular, as in Figure 3.11. The techniques can be applied even when data for some firms is missing for certain time periods. See Wooldridge (2002), p. 578.

Figure 3.10 Example of panel data used for difference-in-differences analysis



Note: As in Figures 3.2 and 3.5, the Xs represent data observations. The panel highlighted here contains data observations across periods 6 to 12 and companies C to L. The figure assumes that all these companies are potentially relevant comparators, but for simplicity does not address whether these companies operate in the same or a different relevant market.

Source: Oxera.

3.5.2 Choice of comparator

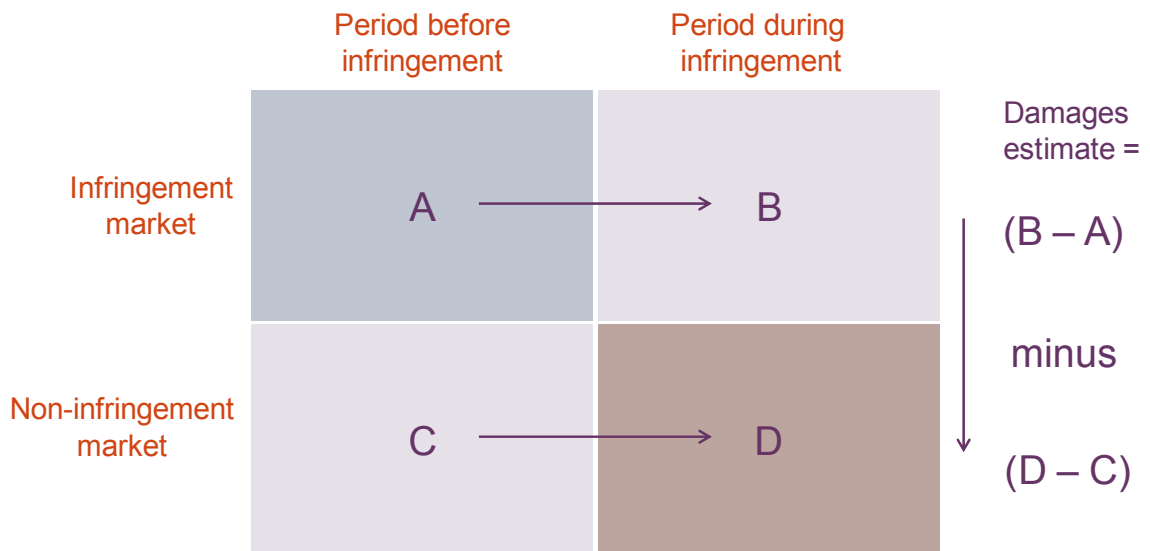
The estimation techniques are similar to those often used for evaluating clinical trials⁹⁴ and the effect of policy choices,⁹⁵ in that one group has a ‘treatment’ applied (the infringement) while another that is not treated is used as a ‘control’ group. The difference-in-differences estimator then compares what happens to each group before and after the ‘treatment’. By using the control group, the estimator removes the effect of any changes that affect both treatment and control groups. Such changes would have introduced a bias in the time-series-based damages estimate.

Figure 3.11 below illustrates how the difference-in-differences estimator can be determined. This technique uses the average price in the treatment group (ie, the infringement market, A) in the period before the infringement, and the corresponding averages for B (infringement market during the infringement), C (non-infringement market before) and D (non-infringement market after). The difference $(B - A)$ reflects the change in prices in the market concerned before and after the infringement, while $(D - C)$ reflects that in the comparator market. Not all of $(B - A)$ may be due to the infringement, since the prices may have changed even without the infringement (eg, due to a change in underlying costs). This change can be assumed to be equal to that in the comparator market as reflected by $(D - C)$. The difference in the differences in the average prices, ie, $(B - A) - (D - C)$, is therefore used to identify separately the change in prices in the relevant market that is due to the infringement.

⁹⁴ See, for example, Krum et al. (1994, and Dehejia and Wahba (1999).

⁹⁵ See, for example, Card and Krueger (1994).

Figure 3.11 Example of difference-in-differences model



Source: Oxera.

The comments relating to the choice of comparator from the cross-section and time-series discussions in the previous two sub-sections are equally valid when selecting the control group and period for the difference-in-differences estimator.

3.5.3 Advantages and disadvantages

Conceptually, the difference-in-differences technique is an improvement on pure cross-sectional and time-series models since it exploits the variations over time as well as across firms. This increased variability helps in the estimation of the effect of the infringement, and can also account for certain key factors that might affect prices in the two markets.⁹⁶

Yet, this approach still cannot distinguish between the impact of the infringement and that of a separate factor that affects the treatment group, but not the control group, in the same way and at the same time as the infringement. For example, if a cartel started in a region of the market in response to a downturn in demand relative to the rest of the market, a difference-in-differences model would not be able to distinguish between the effect of the reduction in demand in that region and the effect of the cartel. This can be controlled for in part by including other explanatory variables that are expected to be related to the downturn.

The data requirement for a difference-in-differences model is greater than that for an equivalent cross-sectional or time-series model since it effectively combines the two approaches.

Techniques

There are two techniques that can be used to implement the difference-in-differences approach.

- **Comparison of averages.** This technique refines the comparison of averages technique described in sections 3.3 and 3.4 by estimating the change in the difference between the prices in the two markets over time.

⁹⁶ A close variant of this method was applied in a US case—*Conwood Co., L.P. v. U.S. Tobacco Co*, 290F.3d 768 (6th Cir. 2002), concerning alleged exclusionary conduct—to argue that the lack of growth of Conwood's market share in the relevant market was caused by the defendant's activities. The expert also compared the claimant's growth in market share across different geographic markets with varying levels of exclusionary behaviour by the defendant to estimate the rate of growth in the counterfactual.

- **Panel data regression.** Panel data models are a more sophisticated version of the comparison of averages technique described above, in that the prices in each box are not simple averages, but are estimated by regression techniques similar to those described in section 3.3.⁹⁷

3.6 Financial-analysis-based approaches: relevance and role

3.6.1 Relevance of financial-analysis-based approaches

This section discusses the set of approaches for quantifying damages that are based on corporate finance theory and practical techniques used in financial analysis. This forms the middle part of the classification of methods and models presented in Figure 3.1.

To identify where financial-analysis-based approaches are relevant it is useful to recall the two main stages of the conceptual framework for damages estimation, as presented in section 2.1.

- **First, determining the counterfactual, or ‘but for’, scenario.** This is often the central stage in any damages estimation (as further set out in the conceptual framework in sections 2.2–2.4).
- **Second, moving from the factual/counterfactual to a final value.** This stage involves converting the difference between the factual and the counterfactual into a final damages value using cash-flow discounting, a standard method in financial analysis (as discussed in section 2.5).

In practice, in damages cases there is not always a clear-cut distinction between finance and non-finance methods, since a form of financial analysis is often involved at some stage of the analysis. In some cases finance methods provide the core of the analytical approach employed in the first stage of the analysis. For example, profitability analysis, which involves comparing factual returns (of claimants or defendants) with an appropriate counterfactual benchmark (eg, returns of comparators), can be used to estimate the damage directly. In other cases, financial analysis tools can be used to address specific issues such as moving from the counterfactual stage to a final damages value—for example, discounting analysis can be used to convert the factual/counterfactual scenarios into a final estimate of the damage.

From an estimation perspective, some of the financial-analysis-based approaches can be seen as one form of application of comparator-based approaches as described in sections 3.3–3.5 above, as counterfactual values are also often derived from comparator markets or time periods. The key feature of financial-analysis-based approaches is the choice of the indicator for which the counterfactual scenario is estimated. While the comparator-based approaches discussed previously are used to estimate a specific counterfactual parameter such as price, volume or market share, financial-analysis-based approaches are concerned with estimating indicators of financial performance, such as profitability or share prices, which can then be translated into the value of the damage.

Financial methods can also be used to estimate counterfactual prices or profits by assessing information on the cost of production, cost of capital, and profit margins of the relevant market participants. This application of financial methods is different from the methods discussed in sections 3.3–3.5 as it does not use comparators from other markets or over time, but rather derives the counterfactual according to a combination of theory, assumptions

⁹⁷ The first-difference estimator uses the difference between prices from two consecutive periods before estimating a pooled model. A fixed-effects panel regression assumes that the unobserved firm-specific element does not change over time and can be estimated within the model. In contrast, a random-effects analysis assumes that the firm-specific factor is not constant but changes in some random manner across firms. All these models attempt to distinguish the effect of such unobserved firm-specific factors on firm behaviour from the effect of factors such as cartel activity. For further details on panel data models, see Wooldridge (2002).

and empirical information on the market itself. The market-structure-based approaches discussed in section 3.8 share this methodological feature.

While the principles of damages valuation are generally similar across different types of case, some of the financial-analysis-based approaches are more applicable in those instances where the parties involved are companies as opposed to individual consumers, since concepts such as profitability, cost of capital and asset valuation are less relevant to the latter.

Sections 3.6 sets out the possible roles of financial analysis in the factual and counterfactual stage of damages cases, before looking at some of the practical advantages and challenges in the use of financial methods for damages cases. Section 3.7 then provides more detail on actual analytical techniques that can be applied in quantifying damages, based on the theory and practice of corporate finance, including profitability analysis and valuation; share price analysis (a form of event study); bottom-up costing analysis; and discounting and the use of financial multiples.

3.6.2 The role of financial analysis in the counterfactual stage of damages estimation

Financial analysis can be used in the counterfactual stage of the damages estimation in several ways.

- The deterioration in the financial performance of claimants as a result of the infringement can be used to provide an estimate of the harm caused to them.
- The improvement in the financial performance of the defendant as a result of the infringement can provide an estimate of the benefits derived from the infringement. From a legal perspective, this is not a direct basis for determining compensatory damages, but in certain circumstances it may be used to inform the valuation of the damage suffered by the victims of the infringement (eg, in cartel cases). See the discussion in section 4.1 of further economic insights into this issue.

Various techniques can be used for both types of analysis of financial performance—in particular, profitability analysis and valuation, and event studies on share prices. These techniques are discussed in section 3.7.

Furthermore, a relevant benchmark would need to be identified for both types of analysis of financial performance, reflecting the profitability in the counterfactual.

- Finally, the counterfactual price level can be estimated by assessing the cost of production of the infringing parties, and combining this with information and assumptions on counterfactual profit margins. The approach generates a counterfactual price per unit by estimating the cost that a firm operating in the counterfactual market would incur and adding to this a return that reflects the degree of competition in the counterfactual.

The profitability-based factual and counterfactuals are discussed below at a conceptual level. The techniques used are described in section 3.7. The techniques employed for bottom-up costing approaches to counterfactual analysis are also discussed in section 3.7.

Financial performance of claimants

The damage incurred as a result of the infringement will in many cases be reflected in the observed financial performance of the claimant. For example, the financial performance of a company would be expected to be adversely affected in the event that it is exposed to an overcharge from its suppliers or to an exclusionary abuse from a competitor. Hence, a comparison of the claimant's actual financial performance with the financial performance that would be expected in the absence of the infringement can be used to provide an estimate of the damage.

Financial performance is usually measured in terms of either profitability—using a measure that relates the absolute profit (revenue minus cost) to the level of investment, assets or sales of the business, as further discussed in section 3.7—or company valuation. Company (or asset) valuation is related to profitability, since valuations of assets are usually based on the expected returns that can be achieved with those assets.

As explained in section 2.2, from a legal perspective it is not necessary for a claimant that has suffered from an overcharge to explicitly make the link between the overcharge and its own financial performance, even if such a link exists in theory. Therefore, the approach of using the financial performance of the claimant to estimate damages is in practice more likely to be employed in exclusionary infringement cases where claimants have suffered a negative effect on profit. Box 3.6 provides an example where an excluded competitor in France claimed damages for lost profit based on its financial performance (a claim that was not accepted in full).

Box 3.6 Damages claim by a competitor following an exclusionary agreement (France)

Cour d'Appel de Versailles (Versailles Court of Appeal), *Verimedia v SA Mediametrie, SA Secodip, GIE Audipub*, judgment of June 24th 2004

This damages claim followed on from a July 1998 decision by the French Competition Council, which found that the defendants had voluntarily delayed the communication of information to the claimant necessary for it to conduct its activities in the market for media services. Since this information could not be obtained from any other source, the Competition Council concluded that the defendants' conduct contributed to raising barriers to entry, thus constituting a breach of the French law equivalent to Article 101.

In its claim, Verimedia sought to recover three heads of damages:

- damage as a result of loss of clientele—€828,103;
- damage resulting from the difference between the business plan and its actual financial results—€2,027,571;
- damage to its commercial reputation—€15,000.

In its judgment, the Versailles Court of Appeal considered that, while the claimant was entitled to recover damages as a result of its loss of clientele, the quantum of those damages should be reduced due to the claimant's lack of knowledge of the business area in which it was starting up, and the lack of precision of certain of its orders. The court therefore awarded only €100,000 to compensate the claimant for the lost opportunity to penetrate the market more quickly (it provided no explanation as to how it arrived at this figure).

Moreover, the court rejected the claim for damage resulting from the difference between the claimant's expected business plan and its actual financial results, considering that since loss of clientele and the non-attainment of expected profits are one and the same loss, they can be compensated only once.

Financial performance of defendants

Similar types of analysis can be applied to value damages on the basis of the financial performance of the defendant, given that the benefits of infringement may be expected to be reflected in the financial performance of the defendant in certain circumstances.

For example, an excessive price charged by a producer engaged in a cartel or an exploitative abuse would be paid by the buyer of the products. Hence, compared with the counterfactual, a certain cash flow would be transferred from the buyer (claimant) to the producer (defendant). Therefore, the financial performance of the producer would be expected to be better than in the absence of the overcharge. The value of the transferred cash flows may provide an estimate of the damage suffered by the claimant. This issue is discussed further in section 4.1 from a legal and economic perspective.

Although in the case of exclusionary abuses the same direct relationship between the profits of the claimant and those of the defendant does not usually exist, the financial performance

of the defendant can still be used to value the damage in some cases. Specifically, it can be used to value the business opportunity which was exploited by the defendant and from which a competitor claimant was excluded.

In this context, it is useful to consider the US case of *Fishman and Illinois Basketball Inc v. Wirtz et al.*, where the defendant excluded the claimant from the ability to acquire an asset by refusing to enter into a contract for provision of supplementary services.⁹⁸

Marvin L. Fishman and Illinois Basketball Inc. (the unsuccessful bidders for the Chicago Bulls professional basketball franchise) brought an action against the Chicago Professional Sports Corporation (the successful bidder), its shareholders, William Wirtz (the owner of the Chicago stadium), and others for refusing to contract with Illinois Basketball Inc. for the lease of the stadium and hence foreclosing competition in the market for the franchise. In this case, the financial performance of the defendant was considered in the damages quantification. The value of the damage to the claimant was calculated as the value of cash flows generated by the defendant from the Chicago Bulls franchise over a given relevant period.

To give another example, Box 3.7 describes a Danish exclusion case in which the financial performance of the defendant was considered in the determination of the harm caused to the competitor claimant.

Box 3.7 Damages claim by a competitor regarding exclusionary abuse (discriminatory pricing) (Denmark)

Højesteret (Danish Supreme Court), Case UFR 2005.2171H, GT Linien A/S (under bankruptcy—subsequently GT Link A/S) v. De Danske Statsbaner DSB and Scandlines A/S (formerly DSB Rederi A/S), judgment of April 20th 2005

De Danske Statsbaner (DSB) is the state-owned train and ferry operator, which owns Gedser Harbour and operated ferry transport services to Germany. As the owner of the harbour, DSB collected harbour fees from another ferry operator, GT Linien, for the use of the harbour. However, it did not collect fees for the use of the harbour by its own vessels since these were exempt from this duty under Danish law.

On appeal, the Danish Supreme Court upheld the Eastern High Court's judgment of June 28th 2002, which found that DSB had abused its dominant position in the market for ferry transport between Denmark and Germany by collecting harbour fees from GT Linien without charging such fees to its own vessels, and that GT Linien was entitled to recover damages.

In quantifying GT Linien's damages, the Danish Supreme Court based its estimate in part on reconstructed accounts of the Port of Gedser prepared on the claimant's behalf, since the defendant was an integrated port authority and did not produce separate accounts. However, while the claimant argued that it should be entitled to recover DKK25m (around €3.3m), the Supreme Court agreed with the defendant that the reconstructed accounts did not sufficiently take into account depreciations, reserves set aside for investments by the port and interest on its invested capital. The Supreme Court therefore awarded the claimant only DKK10m (€1.3m) in damages.

Identifying the relevant counterfactual benchmark for profitability analysis

As discussed above, the analysis of a claimant's or defendant's financial performance requires a counterfactual scenario. Where the damage is estimated using the claimant's profitability, it is necessary to identify and estimate the appropriate counterfactual returns in order to derive the effect on profitability. Where the defendant's profitability is assessed to provide information on the harm to the claimant in a cartel overcharge case, it is equally necessary to identify and estimate the appropriate counterfactual returns. (In exclusion cases, such as the US and Danish examples given above, the defendant's profitability may in itself form the basis for the counterfactual.)

⁹⁸ *Fishman v. Estate of Wirtz*, 807 F.2d 520 (7th Cir. 1986).

There are a number of candidates for an appropriate counterfactual benchmark. In the context of profitability analysis, one potential counterfactual benchmark is the cost of capital. This benchmark assumes that, in the absence of the infringement, the claimant or defendant would earn the cost of capital, which represents the minimum returns required by providers of capital to a business.

In theory, the cost of capital could be seen as an equilibrium rate of return that a company would be required to earn in competitive markets; if the company fails to earn this rate of return, investors will not commit capital to it. Hence, the cost of capital may in certain circumstances be used as a basis for the counterfactual minimum profitability of a claimant in exclusion cases. If the claimant's factual profitability is below the cost of capital (or if it is zero because the claimant has been excluded from the market completely), and it is demonstrated that this is due to the exclusionary infringement, it may be posited that, in the absence of the infringement, the claimant would have earned (at least) the cost of capital, and hence the harm is estimated as the difference between the factual returns and the cost of capital (converted into monetary values).

On the other hand, if companies earn more than the cost of capital, this would, in the longer run, be expected to encourage new entry into the market, thus reducing returns in the market to the cost of capital. However, this is not to say that the cost of capital necessarily represents the counterfactual in cases where the concern is about excessively high returns (eg, where the high returns of defendants are used to quantify harm to victims in a cartel overcharge case).

- First, the counterfactual market structure can be different from perfect competition, and hence companies can be expected to earn a return above the cost of capital even in the absence of the infringement. Section 3.8, which considers market-structure-based approaches, describes how different economic models of competition may be used instead of the perfect competition model to determine the counterfactual.
- Second, the above description of how companies' returns tend towards the cost of capital in competitive markets usually applies over a longer-term period; counterfactual returns can be above the cost of capital in competitive markets if a short time period is considered (eg, there may be windfall gains due to macroeconomic factors, or profits may be temporarily high in dynamic markets).⁹⁹

Instead of using the cost of capital, counterfactual profitability can be determined on the basis of returns earned by comparator companies. Comparators may be drawn from the same industry in which the claimant or defendant operates (but this may have to be from the industry in a different geographic market in the event of the comparator information being 'contaminated' by the infringement), or from other industries with similar risk characteristics and market structure.

The use of comparators as a benchmark for profitability is common in financial analysis. In the context of antitrust damages, a hypothetical example would be a cartel in a minerals industry in which four companies operate globally. The profitability of the cartel members over the cartel period can be measured and then compared with the returns made by companies in another minerals industry that has similar risk characteristics and a similar degree of competition in the market. The difference in profitability can then be taken as one approximation of the excess returns made as a result of the cartel.

The claimant/defendant's actual financial performance during the period before the start or after the end of the infringement can also be used as a benchmark, although it would be necessary to control for other factors affecting profitability over time (such as economic cycles in the market and the economy as a whole).

⁹⁹ For a discussion of the relationship between profitability, the cost of capital and competition in the market, see Oxera (2003).

3.6.3 Practical advantages and challenges of financial-analysis-based approaches

A number of practical considerations need to be taken into account when applying financial-analysis-based approaches.

One important advantage of such methods is the availability of financial data, which is used almost on a daily basis by companies, investors and governments to make business, investment and policy decisions. It is good practice to use this data in a damages action where it is available and relevant.

- All companies listed on a stock exchange produce statutory accounts and other periodic financial reports. Companies that are not listed may also have public accounts. Such accounts are normally audited, which makes the information less likely to be challenged on a factual basis in the context of a damages action. At the very least, data from public accounts can serve as a starting point or cross-check of more detailed analyses.
- Data from public accounts is not always immediately usable (eg, it may refer to a company as a whole, while the damages action refers only to one product or division within the company). However, most companies will use management accounts of some form for internal purposes, and those accounts will normally contain more detailed and directly relevant financial information. Depending on the disclosure and information rules in each jurisdiction, access to such information can be valuable for the damages action.
- Financial markets generate a wealth of data on company share prices and other prices that may be of relevance for financial analysis of damages, such as interest rates and yields on debt securities.

Using financial analysis can also present certain challenges. For example, distinguishing between the impact of external factors and that of the infringement on financial performance can sometimes be difficult. The same degree of caution should be exercised in controlling for other possible explanatory factors as when using the comparator-based approaches described in sections 3.3–3.5.

Moreover, with financial-analysis-based approaches there are challenges in establishing not only the counterfactual but also the factual, since measuring factual financial performance can be less straightforward than, for example, determining factual price levels (see section 3.7 below on techniques for measuring financial performance). However, a robust measurement of the factual based on financial-analysis-based approaches can provide a solid basis for determining the counterfactual as well.

Other practical challenges relate to the use and interpretation of accounting data (section 4.5 provides some further insight into how accounts may be used to derive information of profit margins). Challenges also relate to cost allocation when there are common costs (such as general overhead costs or shared machinery) in a business and the damages action refers to only one product of the business (section 3.7 provides some further discussion of approaches to cost allocation).

3.7 Financial-analysis-based approaches: analytical techniques

3.7.1 Analysis of profitability and valuations

Profitability analysis involves comparing the actual returns earned by parties with the returns that would have been expected in the counterfactual scenario in the absence of the infringement. Similarly, valuation involves comparing the value of the claimant or defendant business (or assets) in the factual and counterfactual scenarios.

Profitability analysis and valuation are widely used in litigation and competition policy.¹⁰⁰ An example is the use of profitability analysis as an indicator of market power or the degree of competition in a market, as these concepts are often defined in terms of firms' ability to raise prices consistently and profitably above competitive levels.

Profitability analysis in the context of quantifying damages involves three steps.

- **Estimation of the factual**—in this case the actual realised returns over the relevant period. As noted in section 3.6, with financial-analysis-based approaches there are also challenges in establishing the factual, since measuring factual financial performance can be less straightforward than, for example, determining factual price levels. Nonetheless, a robust measurement of the factual based on financial-analysis-based approaches can also provide a solid basis for determining the counterfactual.
- **Identification and estimation of the counterfactual**—in this case the benchmark that reflects returns that would be expected in the absence of the infringement.
- **Comparing the factual and counterfactual to give an estimate of the harm**—for claimants, realised returns would be expected to be lower than counterfactual returns; for defendants, realised returns would be expected to be higher than the benchmark.

As noted in section 3.6, valuation is conceptually related to profitability since valuations of assets are usually based on the expected returns that can be achieved with those assets. Profitability of a business or activity is frequently expressed in terms its internal rate of return (IRR), a measure of returns, or as a net present value (NPV) of the cash flows (a measure of value)—see further below.

Factual profitability

When estimating profitability, the following considerations need to be taken into account:

- choice of the appropriate metric;
- choice of the level at which returns should be estimated;
- choice of the time period for estimating returns.

Each is discussed below in turn.

Profitability metrics that can be used in profitability analysis include the NPV, IRR, return on capital employed (ROCE), return on sales (ROS), and industry-specific measures (eg, in the case of credit institutions, margins over cost of debt).

The NPV technique involves discounting the cash flows for a business or activity that are spread out over time in order to obtain the NPV (see section 2.5 for an explanation of the principles of discounting). The IRR technique involves calculating the discount rate which, when applied to the discounting calculation, results in a zero NPV.

In theory, it is appropriate to use the NPV and IRR to measure profitability because these techniques reflect the principles of investment valuation that underpin investment decisions. Specifically, economic activities typically show a pattern of initial investment cash inflows, which are followed by a stream of net revenues or cash outflows. Profitability of an activity can be described as the net increase in value due to that activity, realised over time. The IRR and NPV take into account the cash inflows and outflows of an economic activity over time and the time preference of money.

More sophisticated variants of NPV analysis, such as real-option valuation, can also be used. For example, as a result of a restrictive practice in the supply of exploration equipment, an oil

¹⁰⁰ See Oxera (2003).

company may lose an option to explore a new oil field. Option valuation techniques have been developed that could be applied to estimate the value implications of the loss of such options as a result of the infringement.¹⁰¹

To ensure that the NPV and IRR provide accurate estimates of returns, they need to be based on a significant amount of data on cash flows, and assets need to be appropriately valued. This can pose practical (although not insurmountable) difficulties, since accounting conventions (such as on depreciation and valuation of intangible assets) mean that such data on cash flows and economic asset values is not always readily observable from the available statutory or management accounts.¹⁰²

Alternative profitability measures such as ROCE, ROS and gross margins can also be used. ROCE is the profit in a certain accounting period divided by the capital employed in that accounting period; ROS is the profit divided by sales, and gross margins are gross profits divided by sales (for more explanation on margin metrics, see section 4.5). Conceptually they may not be accurate representations of the economic profitability of the business activity concerned—they are more likely to represent ‘snapshots’ of accounting information at certain points in time. Nonetheless, they may provide useful insight if they are interpreted with care and compared with suitable benchmarks over a longer time period. (For example, the ROS of one industry could be compared with that of similar industries over a period of several years—a form of difference-in-differences, as discussed in section 3.5).

The nature of the analysis can be illustrated with an example. The analysis may suggest that, over the period of the infringement, the company adversely affected by an abuse of dominance earned a gross margin of 5%. The average gross margin observed in the same period for companies in the same industry with a similar risk and growth profile was 12%. The difference between the two margins (ie, 7 percentage points) may be attributed to the infringement and could be used to value the damage arising from the infringement (other possible explanations for the difference would also need to be assessed).

Another consideration to be taken into account is the choice of the level of analysis within a company or business. For example, if the claimant produces a single good on the basis of one main input, the cost of which is affected by an exclusionary abuse, it would be appropriate to measure returns for the whole company. However, infringements could also be associated with a product that represents only one cost item among many for the claimant or defendant. In such cases financial performance of the overall company may not be significantly affected by the infringement; hence measuring returns for the overall company may not provide a robust estimate of the damage. In such cases, profitability needs to be measured for the business division affected by (or involved in) the infringement, provided that financial information is available. This may also raise issues of allocation of common costs between products within a company, as further discussed below.

Counterfactual profitability

As discussed in section 3.6, there are a number of candidates for an appropriate counterfactual benchmark. In the context of profitability analysis, one potential counterfactual is the cost of capital. This benchmark assumes that, in the absence of the infringement, the claimant or defendant would earn the cost of capital.

Another basis for the counterfactual is to use returns earned by comparator companies. Comparators could be drawn from the same industry in which the claimant or defendant operates (although this may have to be from the industry in a different geographic market if the comparator information is ‘contaminated’ by the infringement), or from other industries with similar risk characteristics and market structure. While the cost of capital is based on

¹⁰¹ For a more detailed description of the real option valuation approaches, see Damodaran (2002). The term ‘real’ is used to avoid confusion with financial options that are traded in financial markets.

¹⁰² For more discussion on the difference between accounting and economic profitability, and how to reconcile the accounting information, see Oxera (2003).

well-developed theoretical models, such as the capital asset pricing model (CAPM), discussed below, using comparator returns represents a variant of the comparator-based approaches discussed in sections 3.3–3.5.

As discussed in section 3.6, the cost of capital reflects the return required by investors to invest in the company's activities rather than elsewhere. It is usually measured as an appropriately weighted average of different types of capital employed by the firm. For simplicity, this is often restricted to the cost of debt and the cost of equity, and then weighted by the market value of debt and equity. This gives the weighted average cost of capital (WACC).¹⁰³

The required return to equity capital is not directly observable. Different asset pricing models can be used to estimate the cost of equity. The most widely used model in financial analysis, litigation and regulatory settings is the CAPM.¹⁰⁴ This states that the required return on a given asset is determined by the relative contribution of that asset's risk to the risk of the overall market portfolio.¹⁰⁵ Alternatives to the CAPM include multi-factor models such as the Fama–French three-factor model or Cahart's four-factor model.¹⁰⁶

It should also be noted that not all profitability measures described in the previous subsection can be directly compared with the cost of capital. It is appropriate to compare the IRR and ROCE with the cost of capital (and the NPV can be 'compared' by using the cost of capital as discount rate). The ROS and gross margins measures should be benchmarked against the corresponding measures for comparator companies; they are not directly comparable to the cost of capital. It can also be good practice to determine both the cost of capital and comparator returns to check the sensitivity of the results of the profitability analysis.¹⁰⁷

3.7.2 Event studies using share prices

In theory, in this context event study analysis can be used to assess the impact of an infringement on the share price of the claimant or defendant, although this technique is only applicable to businesses that are publicly listed on a stock exchange.¹⁰⁸ In principle, an event study would measure the difference in actual share price performance over the period of infringement with the performance that would have prevailed without the infringement. Such analysis is often carried out to estimate the bid premium in mergers. This analysis is only suitable when there is a clear 'event' that is known to the stock market—eg, an infringement starting or ending. The nature of competition infringements means that it is rare for the start of an infringement to be public knowledge, but the end of an infringement may be more visible since it will often be prompted by enforcement activity.

¹⁰³ The WACC is calculated according to the following formula: $(r_d \times g) + [r_e \times (1-g) / (1-t_c)]$ where: g = gearing, defined as debt/(debt + equity); r_d = the cost of debt; r_e = the cost of equity; and t_c = the corporation tax rate.

¹⁰⁴ An example of the use of CAPM in litigation is *DSG Retail Ltd & Ors v Revenue & Customs*, United Kingdom First Tier Tribunal (Tax) (2009). This concerned transfer pricing litigation on whether the pricing of extended warranties for DSG customers were arm's length. The expert representing HMRC (Her Majesty's Revenue and Customs) used the CAPM to measure the normal returns of the business. However, as part of the litigation, the disagreement on the precise estimates of the CAPM parameters arose. The expert also tried to measure the excess profitability of the business (comparing actual profits to the CAPM-derived benchmark). A disagreement arose with respect to whether it is appropriate to use realised returns to measure expected return on equity. This highlights the importance of conducting financial analysis robustly in litigation cases in general.

¹⁰⁵ According to the CAPM, the cost of equity is $r_f + \text{ERP} \times \text{beta}$, where beta is the risk of an asset relative to the market, r_f = the risk-free rate, and ERP = the equity risk premium. For a standard text on the CAPM, see Brealey, Myers and Allen (2008). For a more detailed description of the CAPM, see Sharpe (1964); Lintner (1965); and Mossin (1966).

¹⁰⁶ See Brealey, Myers and Allen (2008); and Cahart (1997).

¹⁰⁷ An example of a court case where both approaches were used is *Fyffes Plc v DCC Plc*, IEHC 477, High Court of Ireland (2005), where the claimant's stock returns were compared against a range of stock indices—NASDAQ, Dow Jones, FTSE among others—to inform whether the claimant's stock was being priced as an 'old economy' stock or a 'dotcom' stock. The CAPM was then used to choose a 'best fit'. This analysis formed part of the methodology to ascertain whether the claimant's share price was significantly sensitive to the release of financial information, this being a crucial issue of contention in the case.

¹⁰⁸ For firms whose equity is not listed on a stock exchange, this analysis could be applied to yields on listed debt (if available). However, the transition of the impact of the infringement on debt yields into an estimate of the damage could involve complex technical analysis.

This analysis, in the limited circumstances where it is likely to be successful, is based on the assumption that the share price of the relevant party capitalises the impact of the infringement, such as a cartel overcharge or the negative effects of exclusionary behaviour. For example, if there is information revelation to the stock market about the end of a cartel, the share price of the defendant would be expected to decrease to reflect (partly) the value of the future expected forgone super-profits extracted from the claimant, and the cost of associated legal action and reputational damage. However, the first information revealed to the stock market may be only a *probability* of a positive infringement finding (for example, the news of a dawn raid)—the actual infringement finding will only come later. For this reason there is a need to investigate whether the news event (eg, dawn raid) is in fact a clean signal to the market that an infringement has ended. In many cases no such clean signal will be available, for instance, because a cartel has broken up or deteriorated before the dawn raid takes place.

The analysis typically involves the following steps:

- selecting an ‘event window’—the period around the day when the event (eg, the end of the cartel) occurs;
- calculating the parameters of a market model for the evolution of share prices or returns on the basis of an estimation window (ie, a certain time period before the event occurs);
- estimating counterfactual returns for the event window using the parameters of the estimated market model;
- calculating the cumulative abnormal returns by comparing the estimated benchmark returns and the observed returns at the occurrence of the event.

The difference between the observed actual share price after the event and the share price predicted by the market model would represent an estimate of the damage to the defendant caused by the end of the cartel, including associated legal and reputational costs.

The results of this analysis could potentially be used to as a cross-check on the appropriate compensation for damages. In theory, if there is a clean signal to the stock market that a cartel has ended, the change in the share prices of the defendant and the claimants would provide some indication as to the quantum of damages.

A number of academic studies have conducted related analysis in the case of infringements of antitrust law. For example, using *Wall Street Journal* announcements of the Department of Justice’s indictments of price-fixing cases for 127 firms from the period between 1962 and 1982, Bosch and Eckward (1991) highlight the possible sources of the value loss from a price-fixing indictment as the expected ‘legal costs’ in the form of fines and damages; reputational effects that might increase future transaction costs, and the loss of the conspiracy-generated profits.¹⁰⁹ They found that the ‘legal costs’ account for a small fraction of the total stock price reaction. Similar to the methodology described above, the analysis was based on a comparison of the counterfactual and factual returns.

In some ways share price analysis is comparable to the difference-in-differences technique outlined in section 3.5 since it involves using time-series data and comparing returns with an appropriate benchmark (eg, the market returns).

From a practical perspective, in many circumstances it will be challenging to obtain estimates of the damage on the basis of share price analysis. First, it may be challenging to delineate robustly the impact of the infringement on share prices from other exogenous factors. Second, share price analysis may not directly estimate the impact of the infringement, but rather capture the effect of specific events (eg, inspections by competition authorities).

¹⁰⁹ For more examples of the use of event studies in antitrust investigations, see Bizjak and Coles (1995); and Langus and Motta (2007).

3.7.3 Bottom-up costing analysis to estimate the counterfactual price

This technique involves estimating the counterfactual price on the basis of the bottom-up analysis of costs and required returns of the claimant or defendant. Typically, this technique uses an accounting approach that involves adding a mark-up to the unit cost of the product to obtain a counterfactual price. This mark-up could be measured as an absolute increase or a percentage profit margin on the costs (see section 4.5). The resulting counterfactual price is compared with the factual price to obtain the per-unit value of the overcharge by the defendant, or undercharge by the claimant. Box 3.8 describes a damages action in Germany concerning exclusionary conduct where the damages were estimated with respect to costs and a 'normal' profit margin.

Box 3.8 Damages claim by a competitor regarding abuse of a dominant position (tying) (Germany)

Oberlandesgericht Düsseldorf (OLG) (Düsseldorf higher regional court), VI-2 U (Kart) 8/06 (Stadtwerke Düsseldorf), judgment of April 16th 2008

This stand-alone damages claim was brought alongside an action for an injunction prohibiting the defendant from linking its district heating price with its gas and electricity prices.

The claim was brought by a direct competitor of the defendant, which had been bidding for the supply of gas to a particular client. Despite having offered the lowest price for the supply of gas, the claimant lost the bid because the defendant had threatened the client with an increase in its district heating price if it were to source gas and/or electricity from other suppliers.

In its judgment, the Düsseldorf higher regional court considered that the defendant's conduct constituted an abuse of a dominant position in the district heating market and ordered it to cease this practice. It also awarded damages corresponding to the claimant's lost profits in relation to this particular contract, amounting to around 5% of supply costs. The court stated that the claimant provided detailed information about its own supply costs; that the claimant was able to prove that at that time it would have been able to supply the contracted amount of gas; and that under normal circumstances a 5% profit margin would have been expected.

It may often be reasonable to estimate the per-unit cost of the product by dividing the total costs of the relevant business activity of the defendant or claimant by the total volume sold. A mark-up is then applied to the estimated cost to obtain the counterfactual price. To give a highly stylised example, if a company sold 1,000 units of its product in one year and its total cost for the year was €300,000, the per-unit cost would be €300. If these were sold with a gross margin of 10% (reflecting, for example, the profit margins made in comparable competitive markets), this would result in a counterfactual price of €330. This price can then be compared with the factual price.

In practice, several, more detailed, issues should be considered in this analysis, two of which are as follows.

- **Cartelists' costs may be too high.** It may not always be appropriate to use the actual costs incurred by the defendant because they may be different from the counterfactual costs incurred by a firm operating in a more competitive market, for two reasons:
 - the defendant may generate costs inefficiently due to a lack of effective competition in the market;
 - the defendant may restrict output below what it would be in a competitive market, and may therefore not benefit from any economies of scale that are present in the industry (ie, per-unit costs would fall if production were expanded to the competitive level).

It may therefore be necessary to make an adjustment to the defendant's cost data when undertaking cost-plus analysis in order to deal with these problems:

- by making comparisons with the costs incurred by a comparator firm (at either a disaggregated or aggregated cost level), it would be possible to identify the level of inefficiency present in the defendant's business. A downward efficiency adjustment may then be made to the per-unit costs estimated for the defendant;
- the extent of economies of scale in the industry may be estimated and an adjustment made to the per-unit cost estimates to account for the economies of scale that the defendant company has not exploited.

In some cases, it may be difficult to identify these adjustments with reasonable accuracy. While it is important to make the adjustments referred to above, using unadjusted costs will still usually provide a lower limit for the value of the damage since this adjustment will typically make costs lower, and hence damages higher.

- **How to allocate costs?** A further issue may arise if the defendant is a multi-product firm and not all products are subject to the cartel. It is therefore necessary to allocate costs between the different products, and there are established principles and methodologies for doing this (see Box 3.9).

Box 3.9 Approaches to cost allocation

Costs can be allocated in the following ways:

- top-down, these approaches use management accounting systems to allocate costs to activities;
- bottom-up, these approaches use engineering or operational models to construct a hypothetical model for a process or organisation;
- depending on data availability, econometric models may be used to estimate the cost function associated with providing a product or service.

A choice then needs to be made about the cost output of the adopted methodology. Common choices for regulatory and competition purposes are:

- fully allocated costs, where all the costs of providing a product or service are calculated, including a contribution towards fixed costs;
- marginal costs, where the costs of additional (marginal) units of output are calculated;
- long-run incremental costs, where the costs of adding (or removing) a particular increment such as an entire service or product are considered.

3.7.4 Use of discounting analysis

An important aspect of damages quantification is the discounting of the estimated effects on profits, which raises a number of issues, including the choice of the discount rate, an estimation of the discount rate, and specific issues relevant to the application of discounting (eg, timing, cash flows and compounding). Section 2.5 set out the principles of discounting. Below, additional practical issues in discounting analysis are discussed, and section 4.5 presents further insights into discounting in relation to interest and tax rates.

Past and future harm

As discussed in section 2.5, discounting is used to convert future expected lost profits or past realised lost profits into present terms. In cases where the company ceases to exist due to the financial damage incurred as a result of anti-competitive behaviour, it is common practice to estimate, along with the past lost profits, the going-concern value of the company as a substitute for the value of future profits.

There has been some debate in the US courts regarding the date at which the going-concern value must be measured. For example, in *Farmington Dowel Products Co v. Forster Mfg Co*,¹¹⁰ an antitrust case in which the claimant's business was harmed and ceased to exist

¹¹⁰ *Farmington Dowel Products Co v. Forster Mfg Co*, 421 F.2d 61 (1st Cir. 1969).

due to the use of discriminatory pricing practices by the defendant, the court accepted the going-concern value as at the day prior to the company being dissolved. The court did not allow the claim of the going-concern value as at the day of trial, which was more than ten years after the company was dissolved. The court's reasoning was that the profit projections for the ten years would be too speculative in nature.

However, in *Coastal Fuels v. Caribbean Petroleum Corp.*,¹¹¹ the claimant claimed that the time period between the date of the trial and the date when it was forced out of business was not sufficiently long to make the estimate of the projected lost profits excessively speculative, and the court awarded damages that included the going-concern value as of the day of trial. This antitrust case involved price discrimination by the defendant, which, along with an increase in excise tax during the infringement, led to the closing-down of the claimant's business.

Consistent treatment of taxation

An important aspect at the financial modelling stage is the consistent treatment of different components of the quantification. The treatment of taxation can be an important component of the model. In general, the appropriate treatment of taxation of compensation for damages will depend on the applicable legal rules in the relevant jurisdiction.

There are two general considerations in this respect.

- **The approach to damages quantification.** Should quantification of the damage on the basis of the approach set out above be undertaken before or after tax?
- **Taxation of the compensation for damages.** Should compensation for damages be awarded net or gross of potential taxes that a claimant might pay once it receives the compensation?

The damage can be quantified out on a pre- or post-tax basis. Under the former, pre-tax lost profits should be discounted at the appropriate pre-tax discount rate. Under the latter, post-tax lost profits should be discounted at the post-tax discount rate. See section 4.5.

In the absence of the infringement, the claimant would have to pay taxes on the profit it would have made. Hence, if the objective of the award of damages is to return claimants to the position they would have been in the absence of the infringement on a post-tax basis, the quantification of damages should be undertaken on a post-tax basis. Alternatively, if the award of damage compensated the claimant on a pre-tax basis (ie, without taking into account the avoided taxes on lost profits), damages should be quantified on a pre-tax basis. In the latter case, the damages estimate would usually exceed the value lost by the claimant as a result of the infringement by the amount of avoided taxes on the profits that would have been made in the counterfactual.

Once the appropriate compensation for damages is estimated and awarded to the claimant, it may be taxed by the respective authorities. Hence, the question arises of whether the compensation for damages should take into account the impact of this subsequent taxation. Again, the exact treatment of tax will depend on the specific legal framework concerned.

Consistent treatment of inflation

In relation to the treatment of inflation, the financial model can be developed in either real or nominal terms. Under the first approach, real lost profits should be discounted at the real discount rate; under the second approach, nominal cash flows should be discounted at the nominal discount rate. The resulting estimate of the damage should be the same under both approaches provided that the underlying assumptions are consistent. Real and nominal

¹¹¹ *Coastal Fuels v. Caribbean Petroleum Corp.*, 175 F.3d 18 (1st Cir. 1999).

values can usually be transformed from one to the other by applying appropriate inflation indices—either general price indices or more sector- or product-specific indices.¹¹²

From a practical perspective, it may be useful in this context to consider past effects on profits separately from expected future effects on profits. Past reductions in profits are typically estimated in nominal terms because the factual scenario is observed in nominal terms; therefore, it may be more practical to apply the quantification approach for past profits in nominal terms. Future effects on profits could be projected in both real and nominal terms. In certain industries projections are typically available in real terms, and in such cases it may be more appropriate to apply the quantification approach in real terms by using real discount rates. In other industries projections are typically available in nominal terms.

3.7.5 Use of financial multiples

Another example of comparator-based approaches for quantifying damages based on financial analysis is the application of financial multiples to estimate the counterfactual value of the business. Value drivers such as revenue, units of production, book value of assets and cash flows can be used to calculate the multiple for comparable firms or for the industry in question. This multiple can then applied to the claimant or the defendant to obtain the counterfactual value of the firm and the lost value (ie, damage).

Multiples are widely used for valuation by a range of financial practitioners. For example, most valuation reports by brokerage firms contain a separate section on the valuation of companies based on multiples. Financial covenants on debt are also often linked to multiples, and there are a number of antitrust damages cases where valuation of the damage involved a version of multiples analysis.

One example of the application of the multiples analysis is to value the damage as a multiple of the reduction in revenues. This involves estimating a ratio of value to revenues for suitable comparator companies (or that ratio observed historically before the infringement) and applying this ratio to the estimated reduction in revenues. Thus, if the estimated reduction in revenues in one period is €100, this can be converted into the value of the damage by multiplying it by the ratio of 'value to revenues' observed for similar companies—eg, if this multiple is 15, the resulting estimate of the damage would be €1,500. This example assumes that the infringement has a permanent effect—ie, the revenues of €10 are lost every year over a very long time period. In many cases infringements will have a more limited effect over time, and some simple modifications would need to be introduced to this analysis (one approach is to use two multiples, one at the start and one at the end of the period in which the infringement has an effect, and deduct the effect of the second from the effect of the first).

The main advantage of using multiples analysis as a technique for converting lost revenues or a fall in profits into the damages estimate is the ease of application. This approach requires only a single period's (eg, one year) revenues or profits lost due to the infringement and the appropriate revenue or profit multiple (an appropriate discount rate is implied in the multiple for comparators). The value of the multiple can be estimated according to market data for listed companies with similar risk exposures and growth prospects.

Despite the simplicity of the calculation, multiples analysis provides the same estimate for the value of the damage as that obtained using a discounted losses model, under a particular set of assumptions. More specifically, revenue multiples are based on certain assumptions with respect to the profit margin, the growth rate of the business, and the required rate of return—and those assumptions would need to be made explicit in the analysis.

¹¹² For example, in a case described in Reuter, Sultan and Fitzmaurice (1982), the court used a market proxy of 10% to adjust nominal asset values for inflation. This estimate was the rate of inflation of the final product of the supply chain in which the claimant participates (ie, the inflation rate of refined petroleum products on the American market).

3.8 Approaches based on market structure and industrial organisation theory

3.8.1 Industrial organisation models

IO theory has developed a range of models of competitive interaction and firm behaviour that predict a variety of outcomes, ranging from the least competitive (monopoly) to the most competitive (perfect competition). This is illustrated in Figure 3.12.

As explained in this section, these models can be used to estimate or simulate market outcomes—typically in terms of prices and volumes—in either the factual or the counterfactual scenario, or both, thus providing information on the quantification of the damage. For example, in determining the counterfactual in a cartel damages action, some view will often have to be taken on the nature of competition in the market in the absence of the cartel, and a choice can be made among the IO models for that purpose. As with some of the financial-analysis-based approaches discussed in section 3.6, these market-structure-based approaches differ from the comparator-based approaches (sections 3.3–3.5) in that they use a combination of theoretical models, assumptions and empirical estimation (rather than comparisons across markets or over time) to arrive at an assessment of the counterfactual situation.

IO models also provide useful theoretical insights into the issue of pass-on of overcharges, as further discussed in section 4.4.

The use of IO models in damages estimations can range from the purely theoretical—where models are used to provide information on or understand certain market dynamics conceptually—to the empirical—where they are calibrated (populated with data) for the actual market in question in order then to estimate counterfactual values of the relevant variables.

Figure 3.12 Different models of competitive interaction and firm behaviour



Note: The outcome of the Bertrand oligopoly model depends on the degree of product differentiation in the market. Where no differentiation exists (products are homogeneous) the market outcome resembles that of perfect competition.

Source: Oxera.

The most common models cited in the IO literature are as follows.¹¹³

- **Perfect competition.** This is characterised by a large number of firms producing a homogeneous product and by a lack of barriers to entry. There are also a large number of buyers who are able to switch between the suppliers. Producers face strong competitive pressures. They are price takers, and inefficient firms exit the market. This results in prices equalling marginal cost (ie, the cost of producing an additional unit of output) and optimal efficiency.
- **Monopolistic competition.** In this model a large number of producers sell differentiated (rather than homogeneous) goods, so that they compete on product characteristics in addition to price. The differentiation from rivals gives producers some ability to set their

¹¹³ For a comprehensive review of all these IO models, see Shapiro (1989). A comparison of outcomes under different IO models is presented in Chapter 8 of Motta (2004).

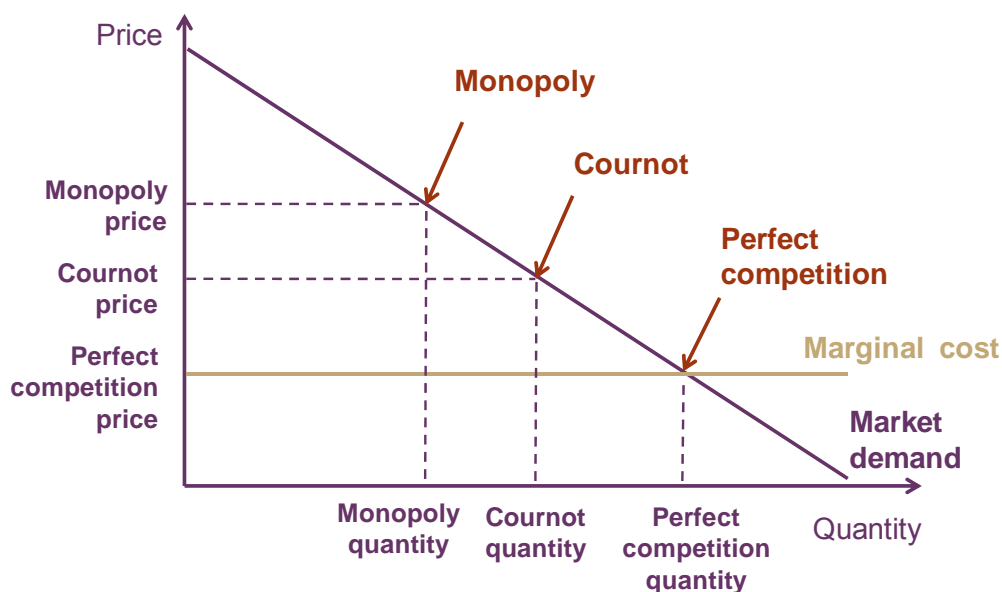
own price above marginal cost (hence the term ‘monopolistic’, which in this respect may be somewhat misleading as there are many competitors). In the long run, because barriers to entry are assumed to be low, average price is equal to average cost in equilibrium.

- **Bertrand oligopoly with homogeneous goods.** Oligopoly models represent rivalry among the few—ie, markets where the number of competitors is sufficiently low that they recognise the mutual interdependence of their actions. In the homogeneous Bertrand model, firms set price (as opposed to quantity), and assume that the price of the other firms remains unchanged. An important assumption of the model is that each competitor can capture the entire market if it sets prices that are lower than those of its competitors (there are assumed to be no capacity constraints). This produces the outcome that, in equilibrium, all firms price at marginal cost (which is the outcome achieved in perfect competition) since any price above marginal cost will be undercut.
- **Bertrand oligopoly with differentiated goods.** In this model goods are differentiated, such that, when a firm increases its price, it does not lose the entire market since some buyers will have a preference for the characteristics of the good. Similarly, when a firm reduces its price, it does not gain the entire market. As a result, price will be above marginal cost in equilibrium—by how much will largely depend on the degree of differentiation and the number of competitors.
- **Cournot oligopoly.** This model is used for markets with a relatively small number of firms that set their quantity (or capacity) before making the pricing decision. Each competitor assumes that the quantity produced by competitors will remain constant and will set its own quantity as a monopolist of the residual demand.¹¹⁴ In equilibrium, this results in prices above marginal costs—by how much depends on the numbers of competitors.
- **Monopoly.** The monopoly is a single-supplier model where the monopolist faces a downward-sloping demand curve (as shown in Figure 2.1) and has control over the market price. The price is set to maximise profits, where marginal revenue equals marginal cost. A perfectly functioning cartel would behave as a monopolist (see further below).

The outcomes under several of these models are illustrated in Figure 3.13. The highest prices and the lowest quantities result if a market is monopolised. In contrast, perfect competition (or Bertrand price competition in a market with homogeneous goods) leads to the lowest prices and the highest quantities—under the standard economic assumptions, this outcome is also associated with maximum total welfare. Cournot oligopoly leads to prices and quantities in between perfect competition and monopoly levels; the exact outcome depends on the number of firms in the market, among other factors. Similarly, Bertrand price competition in a market with differentiated goods leads to an intermediate outcome in terms of prices and quantities, and largely depends on the number of firms or products in the market and the degree of differentiation between them.

¹¹⁴ The assumption on what firms expect their rivals to do can be varied in this model (referred to as ‘conjectural variation’). The standard assumption as described above is that firms do not respond to quantity changes by others. This can be changed to expectations that quantity changes will be fully met by rivals at one extreme (which will result in a monopoly outcome), or, at the other extreme, that changes will be fully offset by rivals (ie, if one firm increases its quantity, it expects others to reduce their quantities proportionately. This results in an outcome resembling perfect competition). Another variation on the standard Cournot model is to assume that products are differentiated rather than homogeneous.

Figure 3.13 Stylised illustration of market outcomes under different IO models



Source: Oxera, based on standard textbook representation.

For the purpose of quantifying antitrust damages, these theoretical results already provide some relevant insight (as discussed below and in sections 4.2 and 4.3). For example, if the counterfactual for a cartel damages case is assumed to be Cournot competition between the cartel members, the counterfactual price will be higher (and hence the overcharge lower) than if the counterfactual is assumed to be perfect competition (where price equals marginal cost). Furthermore, if the actual cartel price were assumed to be the monopoly price (ie, where cartel members maximise joint profits as if they were a monopolist), certain theoretical relationships could be identified with what the counterfactual price would be for each of the other models of competition (see further below).

Dynamic oligopoly models

Models such as Cournot and Bertrand oligopoly are known as static (or one-period) models since the outcomes they predict are achieved if firms have a single interaction. If the interaction between firms is repeated, a different set of outcomes can be achieved. These outcomes are described by dynamic models. Dynamic models can be useful for explaining cooperative behaviour between firms, price wars, and other transitory situations in cartels over time, as well as different types of exclusionary behaviour. The principal types of dynamic model are as follows.¹¹⁵

- **Models of tacit collusion.** If firms interact on a regular basis, they may be able to signal their intentions to competitors without explicit communication.¹¹⁶ This gives rise to the possibility of coordinated behaviour—instead of competing against each other (under Cournot, Bertrand, or some other form), the firms may be able to coordinate their outputs to raise their prices to a jointly profit-maximising level. Thus, an outcome equal, or close, to that achieved by a cartel can in theory be achieved without explicit agreements. In general, the chances of a collusive outcome are greater the smaller the

¹¹⁵ For a review of dynamic IO models, see Shapiro (1989). Dynamic IO models of entry, exit and exclusionary behaviour are discussed in Ordober and Saloner (1989), and Tirole (2002), chapter 8.

¹¹⁶ These dynamic models take one of the static, one-period models (a Cournot or Bertrand variant) as a basis, and then model what happens if these one-period interactions are repeated over time (usually indefinitely). The discussion of static models is therefore still of relevance, as well as helpful in understanding dynamic models.

numbers of firms, the more transparent the prices, and the more similar the product and the firms' cost structures.¹¹⁷

- Following the introduction of tacit collusion, dynamic interactions are necessary for its maintenance. As in cartels (ie, explicit collusion), the individual members involved in the tacit collusion have an incentive to expand their output at the higher price to increase their individual profits, which lowers the overall collusive price and undermines the purpose of the collusion. To sustain collusion over time, any such deviation needs to be discouraged. This is often achieved via a punishment mechanism—an example of which is when all firms return to the competitive scenario following the deviation. The implementation of punishment can give rise to observable periodic price wars. Following the period of punishment, all members return to the collusive situation, and the threat of another period of punishment reduces the incentive to deviate.
- The conditions necessary to form and sustain tacit collusion were examined in the *Airtours* decision by the European General Court, which established relevant legal precedent for such an assessment in the case of mergers.¹¹⁸
- **Models of strategic behaviour and entry deterrence.** Entry and exit can be modelled using dynamic models. These are often based on the interactions between an entrant and an incumbent. The entrant's decision to enter will depend on the (expected) actions of the incumbent post-entry, such as whether the incumbent engages in a price war or accommodates the entry. The entrant's decision is based on weighing the post-entry profits against the cost of the price war. The models typically show that engaging in a price war as such is not rational behaviour for an incumbent once entry has taken place, unless the incumbent makes a sunk investment to engage in the price war, such as an investment in spare capacity. In this case the price war becomes a rational response. Other such models deal with bundling, tying and raising rivals' costs, and can be informative for abuse of dominance cases (see the discussion below on their usefulness for damages estimations).

Auctions and bidding markets

Auctions and bidding markets are more conducive to modelling than traditional markets since the market structure and nature of interaction between firms is often well defined in an auction (particularly if the auction has clear rules).

There is a distinction between auctions and bidding markets. The definition of a bidding market is relatively narrow. Ideal bidding markets are characterised by prices being formed via a bidding (auction) process; infrequent tendering; the value of each individual contract being very significant; contracts being awarded to a single successful bidder; and easy entry.¹¹⁹

The definition of an auction is wider—auctions are a particular type of price-formation mechanism based on parties submitting bids to purchase a product, or tenders to sell a product. There are different types of auction, with the most common distinctions being whether it is an open process or sealed-bids auction, and whether the highest price or second-highest price is paid by the winning bidder. Depending on the particular case (eg, type of auction, type of good, number of competitors), the competitiveness of markets that use auctions can vary. As such, these markets are like most other economic markets, and face the same potential competition problems, such as collusion and exclusionary behaviour.

¹¹⁷ For a review of empirical literature on this issue, see Levenstein and Suslow (2004).

¹¹⁸ Case T-342/99, *Airtours plc v Commission of the European Communities*, June 6th 2002.

¹¹⁹ See, for example, Klemperer (2008).

The outcomes in auctions and bidding markets can be modelled using probabilistic models, which can be augmented with game theory. For example, it can be assumed that each of the players knows about its own characteristics, but its knowledge of the characteristics of other players is incomplete. Each player makes a bid based on its beliefs about the types of other players. If the bidding process is open, each can update these beliefs based on the actions taken by the other players. The equilibrium in this game is reached when the players no longer have an incentive to change their bid given their information about other players.

In the context of an antitrust damages action, this kind of model can be used to simulate the effect on price or output of removing a bidder (eg, in the case of exclusionary conduct), or of changing the bidding behaviour of different players (eg, certain players engaging in 'cover bidding', intended to deliberately lose some bids and win others, while maintaining the impression of fierce competition). For example, given the type of auction and market structure, competitive bids by firms could be modelled; this can then be compared with outcomes in the presence of bid-rigging in order to estimate the detriment arising from this infringing behaviour. Similarly, bidding behaviour of colluding and non-colluding firms could be compared in order to estimate damages.¹²⁰

3.8.2 Selecting the most suitable IO model

Given the variety of IO models available, and that the outcomes of the models can vary significantly depending on the assumptions adopted (eg, the counterfactual prices predicted by the model can range from being equal to marginal costs to generating a substantial mark-up on the marginal cost), the choice of the appropriate model is important when the IO-based approach is used in some form in the damages quantification. As noted previously, for any given factual situation where a cartel or other infringement has led to an increase in price, the more intense the competition is assumed to be in the counterfactual, the higher the estimated damage from the infringement (as the counterfactual price is lower when competition in the counterfactual is fiercer).

The question of choice of IO model usually involves selecting one of the models of competitive interaction discussed above. This is the case when either a static or dynamic model is being used (as noted above, dynamic models also normally use some variant of either Cournot or Bertrand as a basis). A large number of studies in the economics literature have empirically estimated such models of competition (both static and dynamic) for real-world markets, and these same techniques can also be used specifically in the context of antitrust damages actions.¹²¹

Models of strategic behaviour and entry deterrence are less frequently estimated empirically; they are more often used to provide information about how competitive dynamics in markets work, or about what theories of competitive harm can be applied (particularly in abuse of dominance cases).¹²²

The basis for the choice of model should be the consideration of how closely the market type and features of the affected market compare with the structure of, and assumptions behind, each model. The following sets out examples of the market features that could influence the choice of the counterfactual model; this list is not exhaustive, but captures the main relevant features. These features are closely related to the conceptual discussion in section 2.4 on the relevant market and industry context for a damages action. In reality, however, it will often be difficult to identify accurately the theoretical type of competition that best fits the

¹²⁰ Examples from the empirical IO research that have, in broad terms, adopted such approaches include Porter and Zona (1999) and Bajari and Ye (2003).

¹²¹ A review of some of the most prominent empirical research in this area is provided in Harrington (2008). Examples include Slade (1987), Porter (1983), and Genesove and Mullin (2006).

¹²² An example of where dynamic oligopoly models were used in such a way is the *Conduit* case in Spain (see Box 3.2). The experts for the claimants based their conceptual approach to the damages estimation on the findings in various IO models of strategic behaviour and raising rivals' costs, but then proceeded with an empirical estimation of counterfactual market shares based on a cross-country comparison. See Martínez-Granado and Siotis (forthcoming).

market, and testing the sensitivity of the results to the particular choice of model would be appropriate.

- **Pricing.** It is important to consider how prices in the relevant market are formed. For example, if firms compete on price, the most relevant models of competition may be perfect competition, Bertrand oligopoly with homogeneous goods, Bertrand oligopoly with differentiated goods, or monopolistic competition, since in those models firms compete on price. If firms compete on quantities or pre-commit to a certain capacity, Cournot oligopoly would be more appropriate. Finally, if prices are formed via auctions, an appropriate model of auctions or a bidding-market model may be most relevant.
- **Differentiated versus homogeneous goods.** Another important consideration is whether the relevant product is homogeneous or differentiated. If the product is homogeneous, the models of perfect competition, Bertrand oligopoly with homogeneous goods and Cournot oligopoly may be good candidates for the counterfactual. Conversely, if the goods are differentiated, monopolistic competition or Bertrand oligopoly with differentiated goods are likely to be more relevant.
- **Market structure: number of firms.** Different models assume a different number of firms in the market. If, in the relevant market, there are many firms, monopolistic and perfect competition models would seem more appropriate. If, on the other hand, the number of firms in the relevant market is more limited, Bertrand and Cournot oligopolies may be more relevant.
- **Market structure: entry and exit.** Barriers to entry are likely to be closely related to the number of firms in the relevant market. If there are low barriers to entry, the potentially relevant models of competition would be perfect competition and monopolistic competition since they assume that the barriers to entry are low. If the barriers to entry are medium or high such that the resulting number of firms is limited and fixed, variants of Cournot or Bertrand oligopoly are likely to be more appropriate models for the counterfactual.
- **Costs.** The IO models also make different assumptions about the firms' cost structure (eg, the split between variable and fixed costs). For example, if, in the relevant market the majority of costs are variable, the models of perfect competition and Bertrand with homogeneous goods may be suitable. If there are also substantial fixed costs, the possible models are more likely to include Bertrand oligopoly with differentiated goods or Cournot oligopoly. Differences in costs between the firms in the market can also be captured in these models.

Legal precedent on the use of oligopoly models is relatively limited, but highlights the importance of careful model choice for damages claims. In *Concord Boat Corporation v. Brunswick Corporation*, a US case, the expert on the claimant's side applied the Cournot model to determine the counterfactual.¹²³ Under the standard Cournot model with two identical firms in the market, the model predicts that each firm will have a 50% market share. The expert used this as the counterfactual and calculated damages for all periods when the defendant possessed more than 50% market share. This particular use of the Cournot model was criticised by the court on the basis that the model was not adjusted to take into account differences between the quality of the competitors' products, or external shocks that could have led to the defendant possessing a market share of more than 50% in the counterfactual.

Another example is the European lysine cartel case (although this is not a damages action before a court but an infringement decision by the European Commission), where one of the cartelists had used a simulation of a simple Cournot model using industry data as the market

¹²³ *Concord Boat Corporation v. Brunswick Corporation*, 207 F.3d 1039 (8th Cir. 2000), Decision: March 24th 2000.

structure in the counterfactual.¹²⁴ It then estimated the counterfactual price using cost and elasticity estimates from existing studies. The company also relied on a dynamic model, suggesting that the entry of a new competitor in the market had undermined the stability of the cartel. The European Commission considered the conclusions of the Cournot model results to be sensitive to the assumptions made—in particular, those on cost structures and elasticities of demand. The Commission also rejected the arguments of the cartelists based on the dynamic oligopoly model, stating that cartels can also be stable with many more players (and, vice versa, that in other industries three firms could be sufficient to ensure effective competition). It stated that the company's evidence 'is little more than a mechanical application of a particular game-theoretic model', and that: 'In every case the conclusion as to whether an industry can sustain a cartel depends on the facts of the case.'

Is the cartel outcome close to monopoly?

In cartels, a monopoly assumption may sometimes be adopted to represent the factual scenario, the rationale being that firms in a market typically aim to maximise profits. When they join a cartel the aim remains the same—however, the firms effectively jointly coordinate output and prices, thereby jointly maximising profits. The maximum profit that can be made in a market is the monopoly profit. Thus, well-organised and effective cartels may be able to approach the optimum price and output levels consistent with this maximum profit level.

Yet there are several reasons why joint profit maximisation by a cartel may not succeed and therefore not lead to monopoly profits, prices and output levels:

- cheating within the cartel may lead to higher overall output levels and lower prices compared with the joint profit-maximising target;
- coordination problems could prevent the firms from making monopoly profits;
- actions by firms outside the cartel, as well as variable demand conditions, may destabilise the cartel's coordination efforts.¹²⁵

The empirical evidence on this issue is somewhat mixed. It shows that the majority of cartels do result in increased prices—see the discussion in section 4.1. However, while many cartels do raise prices substantially compared with the counterfactual, others raise them by more moderate amounts. Indeed, a number of studies indicate that only some cartels achieve prices that are equal, or close, to the monopoly price.¹²⁶

Another question in this regard is: are prices during the periodic price wars in a cartel close to the counterfactual competitive outcome? In theory, the answer is not clear-cut. At the very least, the level of prices in those periods gives an indication of how low competitors in the market are prepared to go, but such prices may not necessarily be sustainable in a competitive situation in the absence of the cartel, or may exceed the competitive price. A case in Germany in which this question was addressed is described in Box 3.10.

¹²⁴ Case COMP/36.545/F3, Amino acids, 2001/418/EC, June 7th 2000.

¹²⁵ Levenstein and Suslow (2004) show that these three factors are often responsible for the breakdown of a cartel. These empirical findings are echoed in earlier theoretical literature. For example, Green and Porter (1984) develop a model of cartel enforcement, which predicts that periodic bouts of deviation and punishment, taking the form of sharp falls in prices, can be expected even in well-functioning cartels.

¹²⁶ Levenstein and Suslow (2004), p. 30.

Box 3.10 Estimation of a cartel overcharge by the Federal Court of Justice (Germany)

Bundesgerichtshof, paper wholesalers cartel, judgment of June 19th 2007

This judgment did not concern the quantification of damages, but rather related to the estimation of an overcharge by a cartel in the paper wholesale sector. At that time German competition law required fines to be based on an estimate of actual overcharges, which were usually reviewed by courts.

Following a finding of illegal price agreements and infringement of Article 101, wholesalers involved in the cartel were fined €57.6m by the German competition authority in 2004. The cartels spanned ten regions in Germany from 1995 to 2000 and charged higher prices to smaller customers. The defendants appealed against the fine to the Düsseldorf higher regional court, whose decision was partially overturned by the Federal Court of Justice.

In principle, the Federal Court of Justice agreed with the Düsseldorf higher regional court that the overcharge may be estimated as long as there are no indications that the cartel had been entirely without effect. The court was of the view that such estimation should typically be based on the yardstick (ie, cross-sectional comparator-based) approach. However, where there is a risk that these comparable markets may also have been cartelised, other methods should be considered.

The Federal Court of Justice, however, disagreed with the method used by Düsseldorf higher regional court to estimate the overcharge in this case—ie, by comparing the cartel price with the price charged by parties which were attempting to undercut the cartel price. The Federal Court found that such undercut prices could not serve as a reference for the (competitive) market price since they were still dependent on the cartel price. It considered that the prevailing price after the price cuts was likely to be much higher than the competitive price, and therefore that this method would underestimate the overcharge.

In the absence of comparable reference markets, the Federal Court was of the view that the counterfactual price for estimating the overcharge should be established by way of an overall economic analysis, preferably with the help of an independent expert. The judgment suggested a bottom-up cost-based approach where an average profit margin—informed by comparator markets—is added to costs and adjustments are made for buyer power and market structure.

The judgment also stressed the importance of cross-checking the results of an analysis by using other methods such as a comparison with a non-affected market segment or product market (in this case, the market segment of large customers), or the pricing behaviour in the relevant market after the end of the infringement.

3.8.3 Use of IO models in damages estimation

IO models can be used to estimate the counterfactual outcomes and thereby estimate the overcharge and the lost volume effect in damages cases. Competition authorities also often use these models in merger control to simulate the post-merger outcomes which, as with the damages counterfactual, are unknown.¹²⁷ IO models are combined with market data (the factual) to estimate demand and supply, which can then be used to determine market outcomes in the counterfactual.

In antitrust damages actions in practice, the degree to which the theoretical IO models are calibrated can vary. At one extreme, very little actual data is used and the analysis relies mainly on the theoretical models to simulate or predict market outcomes in terms of prices or volumes. Such approaches are discussed in sections 4.1–4.3. They must be used with care as theoretical models may not describe reality sufficiently closely. At the other end of the spectrum, all main parameters of the theoretical model are estimated using actual data. The analysis often focuses on estimating some of the key parameters of the model (such as the sensitivity of demand to price), and relying on assumptions for the other parameters.

¹²⁷ A discussion on the use of these models for merger simulation can be found in Epstein and Rubinfeld (2004) and Werden and Froeb (2008).

Modelling of the factual supply and demand, and making use of data on the factual market outcomes (such as prices and quantities, and other data), enables the estimation of (the relevant part of) the demand curve. Combining this knowledge with an IO model for the counterfactual supply, such as perfect competition or Cournot oligopoly, enables the simulation of the counterfactual price and quantity. This is illustrated in Figure 3.13 above.

The resulting damages estimate will be influenced to a large extent by the choice of the counterfactual model, which determines the counterfactual supply curve, as well as the shape of the demand curve. In particular, as noted above, the more competitive the model adopted for the counterfactual, the further apart the factual and counterfactual supply curves are, and the greater the difference will be between the factual and counterfactual prices and volumes.

For example, for a given factual, assuming a Cournot oligopoly counterfactual will result in a lower damages estimate than if a perfect competition counterfactual were assumed. Assumptions about, and estimates of, the demand curve will also affect the damages estimate—demand can be assumed to be linear or non-linear with price, and can be estimated to be more or less sensitive to price, which would result in a larger or smaller quantity effect of a given price effect (and vice versa).

There are two principal ways of using the IO models in quantifying antitrust damages.

- **The ‘one-model’ approach.** This approach uses an IO model to estimate the counterfactual, using the factual outcomes as inputs. The counterfactual model is calibrated using an estimate of the demand function (often estimated econometrically) and supply-side features (eg, information about costs and industry structure). The information to calibrate the model either comes from the factual or is based on assumptions about what the counterfactual is expected to look like given the nature of the case. The counterfactual model estimates are then compared against the factual.
- **The ‘two-model’ approach.** IO models for both the factual and counterfactual scenarios are adopted. By specifying the model for the factual, such as monopoly (eg, approximating joint profit maximisation by firms in a cartel—see the discussion above), characteristics of the demand curve can be inferred from simple observables in the factual, such as prices, quantities and costs.¹²⁸ The counterfactual outcomes can then be expressed as a ratio to the factual (eg, counterfactual prices might be estimated as being equal to two-thirds of the factual). Less estimation is required when using two IO models rather than one; however, this is replaced by a greater reliance on assumptions.

The two approaches are discussed in more detail below.

One-model approach: estimation of structural model of competition

To be able to implement the one-model approach, it is necessary to make an assumption about the market structure and other determinants of supply in the counterfactual. An econometric model for demand also needs to be estimated (using the techniques discussed in sections 3.3 to 3.5). Econometric estimation of this demand and supply system enables the price that would prevail in the absence of the anti-competitive behaviour to be determined. Thus, the approach here is to specify the structural competitive model of firms’

¹²⁸ For example, if a monopoly is assumed in the factual, having evidence on the actual cartel margin enables the calculation of the demand elasticity at the actual cartel prices, making use of theoretical relationships that follow from the model of monopoly (in particular, the Lerner equation gives a relationship between margins and the demand elasticity in the profit-maximising equilibrium). Assuming linear demand, by combining this information with data on quantities sold at the cartel prices, the elasticity of demand in the counterfactual can be inferred, and counterfactual outcomes determined, based on an appropriate IO model for the counterfactual.

prices and then to estimate it using cost and demand shifters.¹²⁹ An indicator for a cartel can be thought of as being one of the supply shifters.

A stylised illustration of this approach is a situation in which the perfect competition model is assumed in the counterfactual. In such a case, the competitive price equals marginal costs, which can be determined according to companies' accounts, or otherwise estimated (as also discussed in section 3.6). The demand function can then be estimated in order to determine counterfactual quantities.

In the empirical IO literature, the one-model approach has been applied to determine whether firm behaviour is more consistent with collusion than with competition.¹³⁰ It is also common practice to estimate structural models of competition (and collusion) in markets where prices are determined in an auction.¹³¹ The collusive behaviour in such markets can generally be characterised as bid-rigging. Depending on the application, this approach may enable tests to be undertaken regarding the success of the cartel and an examination of the dynamics of cartel behaviour.

The one-model approach may be used to estimate the effect of exclusionary behaviour as well as cartel behaviour; however, empirical use of models of exclusionary behaviour in damages cases is relatively limited, and it may therefore be difficult to generalise this as a quantification technique for antitrust damages.¹³²

To illustrate the one-model approach, consider the case of bid-rigging in the supply of school milk in Ohio, examined by Porter and Zona (1999), which used data relating to costs (such as distance between the milk processing plant and the school) and on the competitors that were not suspected of colluding to estimate firm bidding behaviour in different circumstances (eg, bids can be expected to increase with the distance to the school).¹³³ The authors found that the estimated equations were different for the suspected colluders and for non-colluders. The estimated bidding behaviour for the non-collusive firms could therefore be used to simulate the counterfactual outcomes.

The one-model approach typically requires modelling and econometric estimation. This can imply a reasonably high degree of complexity, and the specifics of the modelling may vary from case to case. Furthermore, as discussed above, the estimated counterfactual, and hence the final damages estimate, depends on the validity of the assumed IO model for the counterfactual, and on the assumptions about the 'shape' of the demand curve. This requires sufficient evidence and sensitivity analysis to be presented to show that the selected IO model is appropriate for the given case and robust to significant changes in assumptions.

The two-model approach

The two-model approach requires assumptions to be made about both the counterfactual and the factual market structure and conduct. By assuming an IO model for the factual, it is possible to infer the demand characteristics based on data on factual outcomes (eg, cartel prices, quantities, costs) and to simulate the competitive counterfactual outcome.

¹²⁹ Cost and demand shifters are necessary to be able to identify econometrically the demand and supply equations. For example, demand shifters are factors (other than the price of the good in question) that determine change in demand, such as weather conditions in the case of demand for umbrellas.

¹³⁰ For example, a seminal paper by Porter (1983) examines the collusive behaviour of the Joint Executive Committee—a cartel among railroads in the USA in the late 19th century. Porter specified demand and supply equations for the volume of grain shipped—these included demand and supply shifters, with an indicator for cartel activity being one of the supply shifters; the estimated demand and supply equations enabled the calculation of competitive prices. Porter's approach also enabled the dynamics of the cartel to be examined—ie, to determine cooperative and collusive periods, and the respective prices.

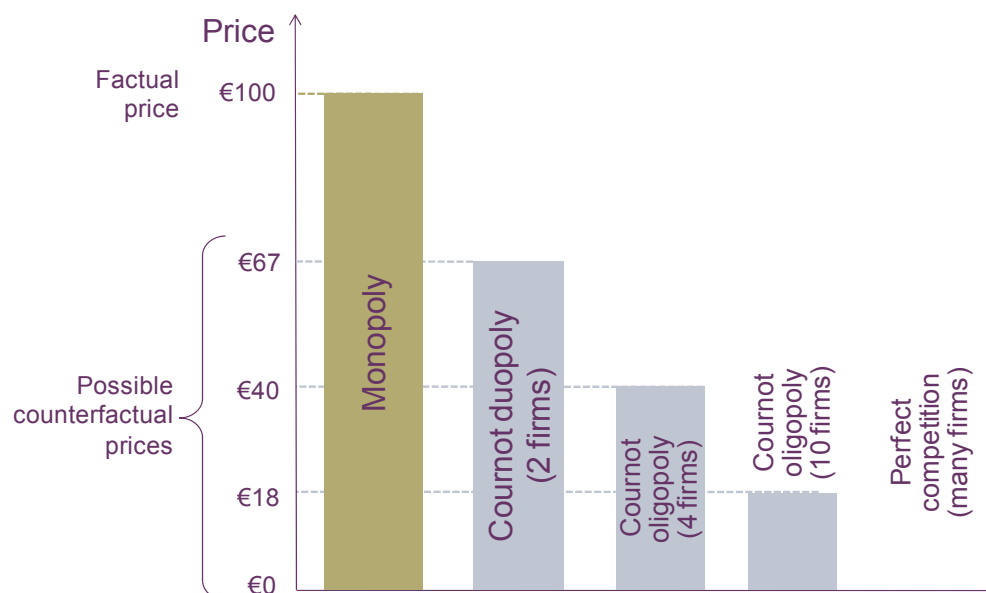
¹³¹ Prominent examples of this approach include Porter and Zona (1999); and Bajari and Ye (2003).

¹³² Examples of studies that do empirically examine aspects of exclusionary behaviour, including modelling of the counterfactual outcomes, are Genesove and Mullin (2006); Clay and Troesken (2002); Burns (1986); and Hall (1990).

¹³³ The purpose of Porter and Zona's analysis was not to estimate the overcharge or damages, but to determine whether bid rigging was taking place.

As an illustration, IO theory can establish the links between the outcomes of different models—for example, the price in a Cournot oligopoly with two firms is equal to two-thirds of the monopoly price under some specific simplifying assumptions (such as zero marginal costs). As a result, using IO models can enable the counterfactual outcomes to be estimated based on observed (factual) outcomes, if the monopoly outcome is assumed to describe the factual and the Cournot oligopoly is assumed in the counterfactual. This is demonstrated in Figure 3.14, for scenarios with a different number of firms. Section 4 discusses the insights from the IO models that can be used for quantifying antitrust damages.

Figure 3.14 Example of using IO models to determine counterfactual prices



Notes: Both models use a linear demand specification of $P = a - bQ$, where P is price, Q is quantity, a is set to 200 and b to 1. Marginal costs are assumed to be zero. The result is that the counterfactual price, based on a Cournot oligopoly model, is lower as the number of firms in the market increases—and hence the overcharge is higher. For example, where the factual price observed is €100 and there are two firms in the market, the counterfactual price predicted by the model is €66.67. Source: Oxera.

A similar approach can be adopted to examine the effect of exclusionary behaviour. For example, the following analysis could be undertaken to determine the price (and quantity) effect of successfully excluding a competitor from the market. Customers of the infringing party could use this as an approximation of the harm they have suffered from this exclusion.

- In the case of homogeneous goods, the effect could be determined by comparing Cournot outcomes in an N -firm market with Cournot outcomes in an $N+1$ -firm market (ie, a ‘reverse merger’ simulation).
- In the case of differentiated goods, the effect could be determined by comparing differentiated goods Bertrand outcomes where there are N varieties or brands in the market with outcomes where there are $N+1$ varieties or brands in the market.

The IO models adopted for the counterfactual and the factual may have various degrees of complexity—they range from relatively simple models with a number of assumptions, to more complex models with potentially more realistic assumptions (eg, enabling asymmetries in costs between firms, introducing product or geographical differentiation, and introducing dynamics). One advantage of this two-model approach over the one-model approach is that it is typically less demanding in terms of data and econometric modelling required, and thus may be preferred in situations where lack of data poses constraints for estimating a fully calibrated model.

4 Further insights from economics and finance to aid the use of methods and models

This section discusses some further insights provided by the theoretical and empirical economics and finance literature (and to some extent by legal precedent) that can assist in quantifying antitrust damages.

As discussed in section 1, the intended use of these insights is to aid and complement the methods and models discussed in section 3. At the very least they can serve as general background information. In specific cases they may be used as a cross-check of the damages estimate, or to provide initial insight into the likely nature of the damage in advance of the use of methods and models. In some circumstances, the insights presented here can also be used to facilitate the calculation of damages when insufficient data is available to apply methods and models. Whether and how these insights are used in practice will ultimately depend on the applicable legal framework and the specifics of each case.

This section also sets out the extent to which the further insights have a robust grounding in economic theory, and whether they have support from empirical evidence and legal precedent. The insights are grouped into categories that link them to the stages of the conceptual framework of a damages claim, as set out in section 2. It should be noted that this is not intended to be an exhaustive exposition of further insights from economics and finance; more such insights can be developed.

- **Harm from hardcore cartel agreements: overcharge.** Section 4.1 presents insights from economic theory and empirics in relation to the possible existence and magnitude of cartel overcharges (linked to section 2.2).
- **Harm from hardcore cartel agreements.** Section 4.2 provides insight from economic theory into the possible lost-volume effect arising from a cartel (linked to section 2.2).
- **Harm from exclusionary conduct.** Section 4.3 discusses further economic insights that can assist in calculating the harm arising from exclusionary conduct, to both customers and competitors (linked to section 2.2). It also addresses the question of which profit margin to use when deploying modelling techniques (linked in particular to sections 3.6–3.8 on financial-analysis- and market-structure-based method and models).
- **Who has been harmed?: pass-on of overcharges.** Section 4.4 presents insights from economic theory and empirics into the pass-on of overcharges (linked to section 2.2 on cartel harm and section 2.3 on which parties may have been harmed).
- **From the counterfactual stage to a final damage value.** Section 4.5 provides insights from finance theory and practice into the interest and tax rates to use when discounting (linked to section 2.5).
- **Data availability and usage.** Section 4.6 includes insights which can assist in situations where limited data is available, and thereby facilitate damages estimations—for example, using market prices to approximate firm-specific prices, and using yield to approximate price to fill in gaps in data series (linked to section 2.6 on variables and data sources for damages estimations).

Section 5 then provides examples of how these further economic insights can be used in damages quantification, in conjunction with the methods and models presented in section 3.

4.1 Harm from hardcore cartel agreements: further insight into overcharges

As set out in the conceptual framework in section 2, the overcharge from a cartel is the quantity of actual sales by the cartel, multiplied by the difference between the actual cartel price and the counterfactual price (ie, the price that would have been charged in the absence of the cartel). This has been represented as area A in Figure 2.1. As also noted in section 2, it is convenient to express the overcharge A as a percentage of the actual price or revenue of the cartel. For example, if the cartel price is €125, and the counterfactual price is €100, the overcharge would be 20% (€25 is 20% of €125).

The economic insights presented here may be of interest when a party or court is seeking to answer the following questions:

- is there likely to have been an overcharge?
- what is the possible magnitude of the cartel overcharge?
- is there a relationship between the illicit gains of the cartelists and the overcharge?

4.1.1 What insights do theory, empirics and precedent provide into the existence and possible magnitude of cartel overcharges?

Economic theory and empirical data indicate that in most (but not all) cartel cases the overcharge is greater than zero. The empirical data also provides some insight into the common orders of magnitude of the overcharge.

Usage: These insights serve as general background to quantifying damages from cartel overcharges. In each specific damages case, the actual amount of the overcharge would ultimately need to be determined pursuant to the requirements of applicable national law.

Following a competition authority decision (or court ruling) that a cartel existed and was operational in the market, it is not unreasonable, based on economic theory, to expect the overcharge of that cartel (represented by area A in Figure 2.1) to have been positive. Empirical data gives some indications as to the orders of magnitude of overcharges observed in past cartel cases. However, the amount of the overcharge in any particular damages case would ultimately need to be determined pursuant to the requirements of applicable national law. It is possible that a cartel was ineffective and hence that the overcharge was negligible or zero. There may also be decisions by competition authorities concerning agreements that infringe Article 101 but that were never implemented. In these cases the overcharge may also be negligible or zero.

Theoretical basis

Economic theory indicates that competition typically results in lower prices than monopoly (see sections 2.2 and 3.8). At its most effective, a cartel means that competitors act jointly as a monopolist, but even if less effective, a cartel can lead to some competition between rivals being eliminated, and therefore for prices to increase (and for volumes to decrease).

Theory also provides insight into the decision-making process that rational firms go through.¹³⁴ In the area of cartels, there has been significant enforcement effort by competition authorities worldwide, and substantial fines and other penalties have been imposed (see section 1.4). Where hardcore cartels have formed using sophisticated methods to circumvent enforcement and penalties (which may not be the case for all price-fixing agreements identified under Article 101), it is not unreasonable to infer that the mere fact that the cartel members took such actions and risks would indicate that they considered it worthwhile—ie, that they expected to be able to eliminate or reduce price competition.

¹³⁴ The trade-offs made by infringers (eg, cartelists) has been examined extensively in the literature. See, for example, Posner (2001), Landes, (1983), and Polinsky and Shavell (2000).

In theory, the general expectation is that the cartelists face a trade-off between the risk of being detected by the competition authorities and the reward from being involved in the cartel activity. The decision of whether a firm or individual engages in activity which breaches antitrust laws can be thought of, in the most basic terms, as a calculation of whether it is profitable to do so—that is, a firm or individual will have an incentive to engage in breaches of Article 101 (or Article 102) when the rewards outweigh the risks.

In a simple model, the firm (assuming that it is risk-neutral) would be expected to commit the breach if the expected additional profit from being part of the cartel (ie, above the profit earned when not being part of the cartel) is higher than the sum of the expected fine if the cartel is detected and the expected damages payout if a private action is launched successfully. A similar logic would apply to an individual within a firm, although this may also depend on whether the jurisdiction in question has criminal sanctions.

These variables are discussed in terms of the firm's expectations—ie, they take into account the absolute values of the fine and the damages payout as well as the probability of being caught, fined and pursued in a damages claim. Thus, according to this theoretical logic, and on the assumption that cartelists are rational firms (and not all firms are always), they would not be taking on the risk of being prosecuted for participating in a cartel if they did not expect to achieve significant extra profits through price increases from this activity.¹³⁵

Again, the theoretical logic may not apply to each individual case.

Empirical data

Several empirical studies exist on cartel overcharges. The empirical economic data indicates that the majority of cartels that have been studied have a positive overcharge.¹³⁶ The economic literature also provides indications of the orders of magnitude of overcharges of past cartels.

Some care is required when interpreting this empirical data. Not all studies would qualify as sufficiently robust (see below for a filtering exercise carried out by Oxera to focus on peer-reviewed published studies only). It may also be that the empirical studies tend to focus on cartels that have been operational and are most likely to have had an impact on the market; if this is the case then many cartels with no effect will not have been captured in these studies (although as shown below a small but significant part of the cartels studied had no overcharges).

Posner (2001) presents the overcharges for 12 cartel cases, with a median value of 28% of the cartel price.¹³⁷ Levenstein and Suslow (2006), based on their review of 16 cartel case studies, find that 'virtually every cartel case study surveyed reports that the cartel was able to raise prices immediately following cartel formation'. A 2002 OECD study based on a survey of cartel cases conducted by its members between 1996 and 2000 finds that the median overcharge was between 13% and 16% of the cartel price (with a variation from 3% to

¹³⁵ This can be expressed in an equation as follows: $(\pi_c - \pi_n) - c(F + IsD) > 0$, where π_c is the firm's profit from being part of the cartel; π_n is the firm's profit when it is not part of the cartel; c is the probability of the cartel being detected (and convicted); F is the fine imposed on the firm if the cartel is detected; I is the probability that a private antitrust action is launched (which is assumed here to occur only as a follow-on action); s is the probability that if a private action is launched it will be successful; and D is the damages payable in the event of a successful private antitrust action. As noted in section 1, an important policy goal of the Commission's White Paper is to increase I —the probability that a private antitrust action is launched—and s —the probability that if a meritorious private action is launched it will be successful.

¹³⁶ There are some studies which suggest that cartels may act to reduce the price. For example, Sproul (1993) studied a sample of 25 US cases and found that, on average (but not for all cases), prices increased over a period of four years following the indictment. The methodology and data used by Sproul have been questioned by various authors, including Werden (2008).

¹³⁷ Like many other studies, Posner (2001) presents the overcharge as a percentage of the counterfactual price (38%, which is equivalent to 28% of the actual cartel price). As explained in section 2, it is convenient to express the overcharge as a percentage of the actual cartel price, as this makes it easier (and more intuitive) to calculate the total amount of overcharge by applying the percentage to the amount that the buyer of the cartel actually paid for its purchases. It is straightforward to rebase the overcharge in order to present it as a percentage of the cartel price using the following rule: the overcharge as a percentage of cartel price = the overcharge as a percentage of the counterfactual price / (1 + the overcharge as a percentage of the counterfactual price).

40%).¹³⁸ Werden (2003) reviews 13 other studies, and arrives at a median overcharge of 15% of the cartel price.

A recent study by Connor and Lande (2008) has used the most comprehensive dataset on cartel overcharges currently available, and is also the most widely cited study on this topic.¹³⁹ It contains 674 observations of average overcharges from 200 social science studies of cartels over the period 1780–2004, and finds that the median cartel overcharge for all types of cartel was 20% of the cartel price. An earlier study by Connor and Lande (2005) suggested that in around 7% of cartel cases there was no overcharge.

Oxera has further examined the dataset underlying the 2008 Connor and Lande study, as well as an additional 350 observations provided by Connor and Lande (thus totalling to more than 1,000 observations),¹⁴⁰ and has tested the sensitivity of the overcharge median and other results by removing a large number of observations that did not meet all of the following selection criteria (reducing the sample size from over 1,000 to 114).

- Cartels which started after 1960—to account for more recent cartels only. Of the original observations, 535 did not qualify under this criterion;
- Cartels where an average estimate of overcharge over the whole cartel period was available (some studies cite only the highest or lowest level of overcharge at any point of the cartel period, and these were consequently excluded). Of the original observations, 50 did not qualify under this criterion.
- Studies where the method for calculating the overcharge was explicitly referred to. Of the original observations, 243 did not qualify under this criterion.
- Estimates obtained from peer-reviewed academic articles and chapters in published books. Estimates from working papers, newspaper articles, government reports, and decisions by courts or antitrust authorities were excluded. Of the original observations, 531 did not qualify under this criterion.

Figure 4.1 illustrates the distribution of cartel overcharges across this new dataset of 114 observations. The range with the greatest number of observations is 10–20%. Oxera finds that in this dataset the median overcharge is 18% of the cartel price—not far from the 20% found by Connor and Lande. The (mean) average overcharge is around 20%, compared with 23% as a percentage of the cartel price in Connor and Lande.¹⁴¹ However, since the variation in observed overcharges is large, it is informative to consider the distribution of overcharges and not only the median or average.

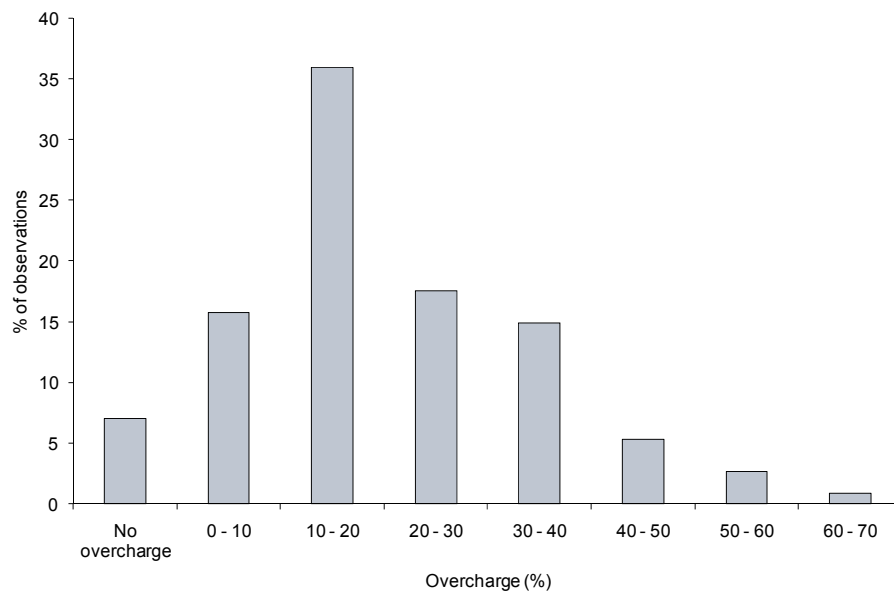
¹³⁸ The median value is based on 14 cartel cases in which the overcharge could be estimated.

¹³⁹ Connor and Lande (2008). Professor Connor has previously published a number of articles using this dataset. Some cases in the dataset refer to purchaser cartels, and the ‘undercharge’ is expressed as an overcharge for those cases.

¹⁴⁰ Oxera is grateful to Professor Connor for providing his dataset for use in this study. It should be noted that Oxera has not verified the original sources themselves that were included in this dataset.

¹⁴¹ Connor and Lande (2008) present the overcharge as a percentage of the counterfactual price, and report a mean average overcharge of 49%. The significance test (t-test) shows that there is no statistically significant difference between Connor and Lande’s original mean overcharge and the new mean overcharge when presented as a percentage of price, which indicates that reducing the sample according to Oxera’s criteria does not significantly change the results (the t-test is a statistical test which uses the distribution of the two underlying datasets to determine whether their means are statistically significantly different from each other).

Figure 4.1 Distribution of cartel overcharges in empirical studies of past cartels: indicative results from new sample selected by Oxera, based on Connor and Lande (2008)



Source: Oxera analysis based on underlying Connor and Lande data described above and selection criteria applied by Oxera.

In 93% of the cases, the overcharge as a percentage of the cartel price is above zero (as in Connor and Lande 2005). This supports the theory that in most cases the cartel overcharge may be expected to be positive, although it also indicates that there is a small but significant proportion of cartels where there is no overcharge (and, as noted above, it may be that the empirical studies tend to focus on cartels that have been operational and that are therefore most likely to have had an impact on the market). Whether a particular cartel falls into this category would need to be explored on a case-by-case basis.

Oxera used the selected sample of 114 observations to test whether certain characteristics of the cartels in question (such as whether they were international or involved bid rigging) generate different levels of overcharge. The indicative results are as follows.

- **International versus national cartels.** The sample includes 52 international and 62 national cartels. International cartels have a larger mean overcharge (26%) than national cartels (16%) (this difference is statistically significant). Connor and Lande (2008) also found that there was a difference between international and national cartel overcharges.¹⁴²
- **Region concerned.** The sample includes 50 US and Canadian cartels, six European cartels (where cartels covered several European countries), nine (single-country) European cartels, seven cartels in other regions, and 42 global cartels. Cartels in the USA and Canada have a smaller mean overcharge (16%) than cartels from the rest of the countries (23%). The six European cartels have a mean overcharge (27%) which is somewhat higher but is not statistically significantly different from the rest of the countries (20%), and which is also based on only a small number of observations. It is

¹⁴² Connor and Lande (2008) find that national cartels have a median overcharge of 17–19%, while international cartels' median overcharge is 30–33%. They posit that this higher overcharge for international cartels is due to greater cartel stability resulting from a reduced threat of entry from overseas (potential) competitors. It is not clear whether this factor would apply as a general rule.

therefore not possible to draw any specific conclusions from these results on cartels in Europe specifically.¹⁴³

- **Bid rigging versus other types of collusion.** The sample includes 42 bid-rigging cartels and 72 other cartels. Bid rigging cartels have a similar overcharge on average (18%) to other types of collusion (22%).
- **Prosecuted versus other cartels.** The sample contains 97 prosecuted cartels and 17 other cartels (which includes a number of legal cartels). There appears to be no significant difference between the two types of cartel (the mean overcharge is 21% for prosecuted cartels and 17% for the other cartels, but this difference is not statistically significant in light of the relatively small sample size on which this comparison of averages is based).

Legal precedent

Two recent cases in Germany discuss whether it is appropriate to assume that a cartel overcharge is positive. In one of the vitamins cartel cases, the Landgericht Dortmund (Dortmund Regional Court) applied the prima facie rule that a market price was generally lower than a cartel price:

The damage of a price cartel consists of the difference between the cartel price and the hypothetical competitive price in the absence of the cartel. According to the experience of life (*Lebenserfahrung*), it can be assumed that a competitive price is lower than a cartel price. The defendant did not show that it would have been different in this case and why. The difference between the competitive price and the cartel price represents a financial damage in the sense of lost wealth.¹⁴⁴

The court found that the fact that prices increased or remained stable during the cartel, but declined as the cartel ceased to operate, supported this proposition. The evidence presented by the defendant did not convince the court that higher input prices led to a proportionate increase in the final consumers' prices. See Box 4.1 for more background on this case.

¹⁴³ The European cartel overcharge studies include, for example, MacKie-Mason and Pindyck (1987); Audretsch (1989); and Albaek, Mollgaard and Overgaard (1997).

¹⁴⁴ LG Dortmund 0 55/ 02 Kart Vitaminkartell III, Decision, April 1st 2004. The quote is a translation by Oxera.

Box 4.1 Damages claim by a customer (direct purchaser) regarding a price-fixing cartel (Germany)

Landgericht Dortmund (Dortmund Regional Court), Case Number 13 O 55/02 Kart – Vitaminpreise, judgment of April 1st 2004

This damages claim followed on from a 2001 decision by the European Commission, which imposed fines of more than €850m on eight vitamin producers for price fixing and market sharing.

The claimant was a confectionary producer that purchased from the defendant synthetic vitamins for a value of approximately €5m.

In its judgment, the Regional Court established that both Article 101 and Section 1 of the German Competition Act have the characteristics of a 'protective statute' (Schutzgesetz) within the meaning of Section 823(2) of the German Civil Code. The court based this conclusion on the fact that it is not only market participants 'directly targeted' by a cartel that can invoke the protective effect of the cartel prohibition, but customers directly and objectively concerned by such breaches can also do so.

As to the quantification of damages, under German law all parties must prove the facts in their favour. This usually involves providing evidence of the differential between the real economic situation and the counterfactual (according to the *Differenztheorie*). In practice, this may be difficult since the determination of exactly what the market price would have been in the absence of the cartel is complicated.

In this case, however, the Regional Court applied Section 287 of the German Code of Civil Procedure, according to which a court can establish, based on its best judgment and by assessing all the circumstances of the individual case, whether and to what extent damages have been incurred. The court followed the prima facie assumption that a cartel price is normally higher than the undistorted market price. Accordingly, the court took as the basis for its calculation of damages the difference between the price charged by the defendants during the cartel and the lower price once the cartel had ended.

An appeal was lodged with the OLG, but the case was settled before the OLG handed down its judgment.

Similarly, in the cement cartel case, *Berliner Transportbeton*, the German Federal Court of Justice for civil and criminal matters (Bundesgerichtshof) stated that the threshold for showing that a cartel did not accrue any economic benefit from its activity would be higher the longer the cartel's duration and the greater its geographic area.¹⁴⁵

The longer and more sustainable a cartel was practised, and the wider the area it was designed to cover, the higher the requirements that have to be imposed on a court if it wants to deny that the cartel agreement produced any economic benefits.¹⁴⁶

The court emphasised that market mechanisms were unlikely to function properly due to the imposition of cartel quotas. Based on 'life experience' (*Lebenserfahrung*), the court thus concluded that prices in the cartel were likely to be higher than in a competitive market.

Box 4.2 discusses the Italian judgment in the landmark *Manfredi* case, in which there was reference to a 'simple presumption' about the likely overcharge.

¹⁴⁵ Oberlandesgericht Düsseldorf, *Berliner Transportbeton I*, KRB 2/05.

¹⁴⁶ Translated by Oxera.

Box 4.2 Damages claim by a customer (direct purchaser) regarding a price-fixing cartel (Italy)

Giudice di pace di Bitonto (Justice of the Peace of Bitonto), *Vincenzo Manfredi v. Lloyd Adriatico Assicurazioni SpA*, judgment of May 21st 2007

This damages claim followed on from a 2000 decision by the Italian competition authority, which found that the members of a car insurance cartel had collectively raised their premiums by 20% between 1994 and 1999 (price fixing). In that decision, the authority had *inter alia* used the yardstick method in calculating the cartel overcharge by comparing the prices in the cartelised Italian market with the average European prices in other European (non-cartelised) markets.

In support of his damages claim, the claimant relied on Article 2043 of the Italian Civil Code and argued that he had suffered harm as a result of the cartel. He quantified the harm by relying on the finding of the Italian competition authority that premiums had been raised by 20% as a result of the cartel. On the basis of a simple calculation (20% increase of premiums for the five years of the cartel's duration), he sought to recover €444.55 in damages.

In the judgment, the Justice of the Peace of Bitonto, adjudicating on the basis of equity further to Article 113(2) of the Code of Civil Procedure, considered that the Italian competition authority's finding as to the 20% overcharge amounted to a 'simple presumption' ('*presunzione semplice*') in the sense of Article 2727 of the Civil Code, and that the defendant had failed to rebut it. The court went further than full compensation by awarding the claimant double damages (€889.10) in order to increase deterrence and to skim off the illegal profits made by the defendant as a result of the cartel.

An appeal is currently pending before the Corte di Cassazione (Italian Supreme Court).

In addition, there are examples of legal provisions or policy documents that contain a form of assumption that the overcharge from a cartel is likely to be greater than zero.

- An amendment to the Hungarian Competition Act provides that injured parties bringing claims against infringers of the Act (or Article 101), which have been demonstrated to have engaged in price fixing, can rely on the rebuttable presumption that 'it shall be deemed that the infringement affected the price by 10% unless the contrary is evidenced.'¹⁴⁷
- In a separate but related area, the cartel fining guidelines issued by the US Sentencing Commission are based on the assumption that cartels impose an overcharge of 10%.¹⁴⁸

These insights from economics and legal precedent serve as general background to quantifying damages from cartel overcharges. In each case, the actual amount of the overcharge would ultimately need to be determined using the methods and models discussed in section 3.

¹⁴⁷ Competition Act (as amended, 2008), Hungary, Section 88/C; applicable to damages arising after September 2008.

¹⁴⁸ US Sentencing Commission Guidelines for the United States Courts, 18 U.S.C. Section 2R1.1, Bid-rigging, Price-fixing or Market-allocation Agreements Among Competitors, Application Note 3.

4.1.2 What does the market structure suggest about the size of the overcharge?

If there is evidence to suggest that the counterfactual market structure has the characteristics of perfect competition or Bertrand oligopoly with homogeneous goods (see section 3.8), the cartel overcharge can be expected to equal the cartel members' price–cost margin (since in competitive markets firms would set prices close to cost). If the counterfactual market structure is more like standard Cournot oligopoly (section 3.8), the overcharge can be approximated by reference to the cartel members' price–cost margin and the number of firms in the market.

Usage: This insight from economic theory may be of assistance in a situation where insufficient data is available to calculate the overcharge arising from a cartel; it uses the market structure to provide a rough approximation of the possible counterfactual price and hence overcharge.

Theoretical basis

As discussed in section 3.8, harm resulting from cartel activity, exclusionary practices or other antitrust infringements can be estimated using IO models. In particular, approximations based on IO models can be developed using the 'two-model' approach, introduced in section 3.8. This approach is least demanding in terms of data required and modelling complexity.

The approximation is derived by comparing outcomes under the factual and the counterfactual market structures (ie, IO models). For example, in a case of a cartelised four-firm market, the factual might be a monopoly model, and counterfactual might be modelled using Cournot oligopoly. A comparison of price outcomes under the two IO models enables a rough approximation of the possible overcharge to be derived.

The two-model approach may be useful in cases where limited data is available for determining the counterfactual outcomes and estimating the damages. In particular, the comparison of two IO models enables the damages approximation to be expressed in terms of observable factual outcomes, such as cartel member profit margins and number of firms.

The results presented below are based on IO models for homogeneous goods markets. Similar approximations can be developed for differentiated goods markets (eg, branded products). All results rely on the assumptions made regarding the chosen IO model.

Empirical estimation

A comparison of prices under factual and counterfactual IO models yields an estimate of the cartel overcharge. Table 4.1 presents the formulae for calculating the relative overcharge in a cartel case for two alternative assumptions on the counterfactual market structure—perfect competition or Cournot oligopoly.¹⁴⁹ The m in the table denotes the price–cost margin of the cartel members. The price–cost margin is defined as price minus marginal cost, divided by price—this is an economic concept of a profit margin, but can be approximated using accounting data, which is often publicly available (see section 4.3).

¹⁴⁹ In order to derive these results, linear demand and symmetric, constant (ie, invariant to quantity) marginal costs are assumed. The assumption of symmetric marginal costs across the colluding firms leads to a prediction of equal market shares under the Cournot oligopoly model. In principle, this assumption could be relaxed, depending on the specifics of a particular damages claim case, but would require more extensive modelling. Similarly, demand assumptions could be modified.

Table 4.1 Cartel overcharge based on IO models for homogeneous goods markets

Assumed counterfactual	Factual = assumed to be monopoly
Perfect competition (or Bertrand price competition with homogeneous goods)	m
Cournot oligopoly with N firms	$m(N-1)/(N+1)$

Note: m is the price–cost margin of the cartel members (defined as price minus marginal cost, divided by price); N is the number of firms in the market. The assumptions on which these counterfactual models rely are explained in the text above this table.

Source: Oxera.

Thus, an overcharge based on static IO models for homogeneous goods markets suggests the following.

- In cases where perfect competition is assumed in the counterfactual, the overcharge relative to price is equal to the cartel members’ price–cost margin, m (first row of Table 4.1). The same result also applies when the counterfactual is Bertrand price competition with homogeneous goods.
- In cases where Cournot oligopoly is assumed in the counterfactual, the overcharge is determined by the number of firms and the cartel margin (second row of Table 4.1). Table 4.2 illustrates this result numerically for combinations of different profit margins and the number of firms. For example, if the cartel margin is 20% and the counterfactual is a three-firm Cournot oligopoly, the cartel overcharge would be expected to be 10% of the cartel price. The overcharge increases as the number of firms in the counterfactual increases (because more firms implies a more competitive counterfactual), and as the cartel profit margin increases (because there is more profit margin to be ‘competed away’ in the absence of the cartel).

Table 4.2 Theory-based overcharge in the case of Cournot oligopoly counterfactual and monopoly factual (overcharge expressed as a percentage of the cartel price)

Cartel margin	Number of firms in the counterfactual								
	2	3	4	5	6	7	8	9	10
10%	3	5	6	7	7	8	8	8	8
20%	7	10	12	13	14	15	16	16	16
30%	10	15	18	20	21	23	23	24	25
40%	13	20	24	27	29	30	31	32	33
50%	17	25	30	33	36	38	39	40	41
60%	20	30	36	40	43	45	47	48	49
70%	23	35	42	47	50	53	54	56	57
80%	27	40	48	53	57	60	62	64	65
90%	30	45	54	60	64	68	70	72	74

Source: Oxera.

These results are based on a comparison of a factual characterised as a monopoly. As noted above, cartels may not be as effective at raising prices as a monopoly. If this is the case, this insight will tend to overestimate the size of the overcharge.

Further practical considerations

- **Using company accounts to estimate profit margins and hence overcharge.** The definition of ‘margin’ in the context of IO models is specific—price minus marginal cost, divided by price. However, various measures of profit margin from company accounts (such as gross margin or operating margin) can also be used to approximate the economic concept of price–cost margin—see the discussion on margins in section 4.3. The correct margin to use also depends on the time frame in question—the longer the time frame considered, the more costs become marginal (incremental—ie, not fixed). Over a longer time period, a direct comparison between price and cost may be less informative than an assessment of profitability (which considers revenues and costs over time), using the methods and models discussed in sections 3.6 and 3.7.
- **From margins to elasticity.** In economic theory, an important relationship exists between the margin and the price elasticity of demand at the cartel price (when cartel behaviour is modelled as monopoly)—the margin at that point is equal to the inverse of the price elasticity of demand at cartel prices.¹⁵⁰ Under certain assumptions, such as profit maximisation, a margin estimate can therefore provide direct information on the demand elasticity, and this in turn can provide information on how the counterfactual price compares with the actual price. For example, if the observed margin is 50%, this relationship implies that the price elasticity is -2 (ie, if prices rise by 10%, quantity demanded falls by 20%).
- **Estimating damages based on IO models for more complex market structures.** Rough approximations similar to those above can be developed for markets with differentiated goods, markets characterised by auctions, or bidding markets. However, they are generally more complex since the underlying IO models are more complex.
- **Critical loss analysis.** It is also possible to use information on the cost structure and profit margins of cartel members to estimate a theoretical upper bound for the cartel overcharge. This involves calculating the defendants’ break-even point for lost sales (ie, where a price rise has a neutral effect on profitability because the loss of customers offsets the extra gain in profit margin from remaining customers), and then calculating the price increase which would make the break-even loss in sales equal to the actual loss. This price increase represents the theoretical upper bound for the overcharge. Any price increase above the upper bound would lead to a sales loss that, in theory, would not be sustainable for the cartel members.¹⁵¹

4.1.3 Is there relationship between illicit gains and cartel overcharge?

The illicit gain obtained by cartelists can be used to help estimate the aggregate overcharge (ie, sum of overcharge across all units of cartelised output sold).

Usage: This insight can be used when the claimant’s data is insufficient to estimate the harm it suffered but the defendant’s data allows the calculation of cartelists’ gains. This insight can also be used in excessive pricing cases, in that the excessive profit made by the perpetrator is an indication of what customers have overpaid.

Theoretical basis

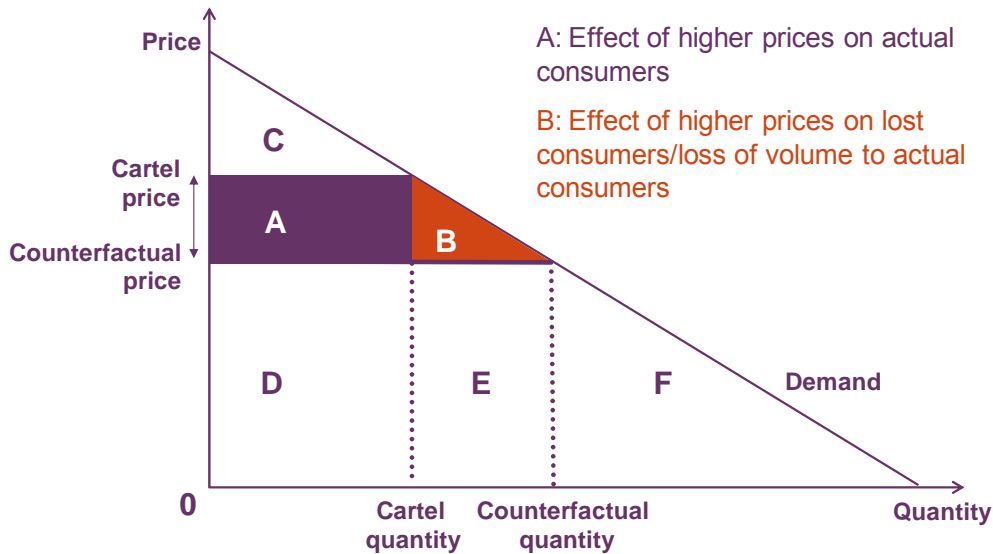
Overcharge harm is the additional payment (ie, the increase in price resulting from the cartel) made by the cartel’s customers to cartel members. Therefore, if the formation of a cartel does not lead to a cost increase among cartel members, these additional payments result in an increase in the cartel members’ profits, which is in theory equal to the additional payments made by customers. Hence, when a cartel includes all industry members, the total illicit gain

¹⁵⁰ This relationship is referred to as the Lerner equation. It arises from examining the pricing behaviour of a profit-maximising monopolist.

¹⁵¹ See van Dijk and Verboven (2006).

(ie, the additional profit resulting from cartel overcharge) is equal to the total additional payments made by direct customers. This is represented as area A in Figure 4.2 (Figure 4.2 is identical to Figure 2.1 in section 2).¹⁵²

Figure 4.2 Stylised illustration of the main effects of a price-fixing cartel



Note: This is a standard representation of a market, with price on the y-axis, quantity on the x-axis, and a downward-sloping demand (which means that buyers will purchase greater quantities at lower prices). Many variations of this representation are possible, based on different assumptions regarding demand, but these would not alter the main effects illustrated here.

Source: Oxera, based on the standard textbook representation.

Illicit gains in this context can be calculated as the difference between cartel profits (the factual) and defendants' counterfactual profits. The majority of methods and models described in section 3 for estimating the counterfactual for the claimant can be used to estimate the counterfactual for the cartel. As a result, a substantial amount of data may be required from the defendant to arrive at the illicit gains estimate. Therefore, this approach would be more appropriate when the data availability for the defendant is of a higher quality than for the claimant.

It is important that the correct counterfactual is established for calculating the illicit gain. Although the comparator-based models do not require a specific assumption about the type of competition in the market in the counterfactual (they do assume that the comparator is not cartelised), the financial-analysis-based and market-structure-based models do. As discussed in section 3, the choice of the counterfactual may have a substantial impact on the damages estimate. In particular, assuming a more competitive market than that which would have existed in the counterfactual can lead to overestimation of the illicit gains and hence overcharge harm, and vice versa.

There are at least two reasons why the sum of illicit gains earned by cartelists may in fact be lower than the total overcharge harm from the cartel.

- **Rising costs.** Although successful in increasing prices, cartelists may not be as successful in controlling their costs, which could increase as a result of inefficiencies associated with lower competitive pressures (such as overinvestment). This may lead to the cartel achieving lower profits, but would not imply that the overcharge harm is any lower than in the case of cartelists achieving full illicit profits.

¹⁵² Competitive price and quantity can represent any type of competition (ie, perfect competition, monopolistic competition or oligopolistic competition).

- This is a separate argument from that of cartelists failing to earn full illicit profits due to being unsuccessful in raising prices—in this latter case there is no overcharge harm.
- **Firms outside the cartel.** In cases where the cartel does not include all industry members, there will still usually be an overcharge, albeit somewhat smaller than if the cartel included all industry members. While the non-cartel firms are not fixing prices/restricting output, they may still benefit from the inflated prices relative to the counterfactual situation. Thus, in this situation it is necessary to sum the illicit profits made by the cartelists, and also to add the additional profits made by the non-cartel participants, as otherwise some of the ‘overcharge’ will be missed. As the non-participating firms have not breached competition law, they are not liable to pay damages to claimants. If the additional profits made by non-cartel firms are missed, this method will result in an underestimation of the damages.

For these reasons, the illicit gains earned by cartelists can represent a minimum estimate of overcharge harm. The illicit gains will not be any larger than the overcharge harm (this is because the illicit gain is a direct transfer from the buyer to the seller).

While this approach involves estimating the illicit gain earned by the cartelists, it is not equivalent to awarding restitutionary damages (ie, an award assessed by reference to the defendant’s gain rather than by reference to the claimant’s loss). Instead, this approach is designed to result in compensatory damages (ie, damages that compensate a claimant for loss suffered as a result of wrongdoing) by taking advantage of the fact that the overcharge gain of the cartelist may in many ways be equal to the overcharge loss of the direct buyers.

Legal precedent

As discussed in section 1, compensation is the main principle behind antitrust damages claims in Europe. Various Member States explicitly or implicitly allow for the gains of the party infringing competition law to be used to assist in the assessment of the compensation due to the harmed party. In the *Devenish* case in the English High Court, the claimant’s expert noted that in this case ‘compensatory and restitutionary damages are likely to be identical’.¹⁵³ German law explicitly provides that the illicit gain may be used as an element of estimating the overcharge—indeed, it also gives guidance as to how the illicit gain should be calculated:

The profit is basically calculated by subtracting the cost of services rendered and the net operating costs incurred from the revenue of sales. Overhead or other operating expenses, that would have been incurred even in the absence of anti-competitive behaviour, are not deductible. When there are multiple harmed parties only the proportional gains are taken into account. The proportion shall be determined by the gain from the antitrust violation against the harmed party or from the subsequent contracts with the victim/claimant.¹⁵⁴

In Denmark lost profits may also be established by considering the infringing party’s ‘improvement of business volume’, as well as the decline in the harmed party’s business.¹⁵⁵ Similarly, in Sweden, it has been suggested that the level of profit made by the infringing party may in some cases serve as a guide to the calculation of compensatory damages.¹⁵⁶

¹⁵³ *Devenish Nutrition Limited & Ors v Sanofi Aventis SA & Ors* [2007] [2007] EWHC 2394, para 76.

¹⁵⁴ Deutscher Bundestag (2004).

¹⁵⁵ See Möllers and Heinemann (2007), p. 502.

¹⁵⁶ Möllers and Heinemann (2007), p. 529.

4.2 Harm from hardcore cartel agreements: further insight into the volume effect

Cartel overcharges can induce lost-volume harm to customers of the cartel, be they end-consumers or intermediate sellers. Economic theory can provide insight into the size of the lost-volume harm relative to the overcharge harm and into the size of the lost volume itself. For example, in otherwise highly competitive markets that have been effectively cartelised, the lost-volume customer harm can be expected to be up to 50% of the overcharge harm (ie, if the overcharge has caused €100 of harm, the lost volume can be expected to have caused up to €50), and the lost volume can be expected to equal the factual volume again (ie, the cartel has halved volume).

Usage: This insight can be used to provide a guide to the possible size of the lost-volume effect when there is limited information to allow it to be directly calculated. It relies on a number of assumptions, such as linear demand. As it is closely related to the estimate of the size of the overcharge, any inaccuracies in the cartel overcharge estimate will also be reflected in the lost-volume effect estimate when applying this insight. In each case, the volume effect would need to be determined pursuant to the requirement of applicable national law.

As discussed in section 2, the lost-volume effect arises from the fact that some purchasers are not willing to pay a higher price resulting from the cartel, and therefore cease purchasing the product. This is an additional harm from the overcharge as these customers would have continued to purchase the product in the absence of overcharge (the total lost-volume effect is shown as area B in Figure 4.2).

In the event that customers are intermediate sellers, the reduction in input purchases may translate into a reduction in sales downstream, which means that they may suffer additional harm from the cartel overcharge since they would be likely to have earned some profit margin on these lost sales (this is shown as the bottom section in Figure 2.4).

This discussion considers how features of market structure can be used, in conjunction with the market-structure-based models and in the absence of higher-quality data, to approximate the size of the lost-volume effect.

Theoretical basis

As discussed in sections 3.5 and 4.1, economic models can be used to estimate damages resulting from cartel activity, including the lost-volume effect. In particular, the ‘two-model’ approach, where the counterfactual volumes and prices are presented as proportions of factual volumes and prices, is least demanding in terms of data requirements and modelling complexity.

Similar to using IO models to calculate cartel overcharge, the lost-volume effect is calculated by comparing volumes under the counterfactual scenario with volumes under the factual scenario. As in section 4.1, the results presented below are based on IO models for homogeneous goods markets. More complex approximations would need to be developed for differentiated goods markets (eg, branded products).

Empirical evidence and estimation—harm to customers from lost volumes

As regards customer harm, if demand is linear, the area of the volume-loss effect (B in Figure 4.2) in cash terms is equal to the reduction in quantity multiplied by the overcharge, all divided by two (since the area of a triangle is half of a square/rectangle). The lost-volume effect triangle describes the maximum loss to those customers who did not purchase. When there are no second-best alternative products, or these products are substantially inferior to the cartelised product, customers bear a loss equal to, or close to, the triangle.

This calculation requires information on counterfactual quantity and counterfactual price, which may not be readily available. To bypass the requirement for this information, and instead impose a selection of assumptions, the lost-volume effect triangle can be calculated

as a proportion of a cartel overcharge rectangle (represented by area A in Figure 4.2).¹⁵⁷ Two results are of particular note from these calculations.

- If the factual can be characterised as a monopoly (eg, effective joint profit maximisation among the cartel firms) and the counterfactual can be characterised by either perfect competition (eg, there are many firms in the market competing vigorously to supply a homogeneous good) or Bertrand oligopoly with homogeneous goods, the lost volume effect triangle is equal to half of the overcharge rectangle. For example, if the cartel overcharge was estimated to be €100, the lost-volume effect would be €50. The logic of this example is that a monopoly/cartel typically produces half the volume of a perfectly competitive market under some standard assumptions, and the area of a triangle (the €50) is half that of an equivalent rectangle (the €100).
- If the factual can again be characterised as a monopoly, but the counterfactual is best characterised as a Cournot oligopoly (a less vigorous form of oligopolistic competition), the lost-volume effect triangle depends on the number of firms. The relative lost-volume effect triangle increases as the number of firms in the market increases.¹⁵⁸ This is because the larger the number of firms in the market, the more competitive the outcome would have been in the counterfactual, and therefore the greater the volume loss effect arising from the loss of that potential competition. As the number of firms becomes very large, the outcome approximates the perfect competition outcome described above (ie, the lost-volume effect triangle is equal to 50% of cartel overcharge).

Table 4.3 illustrates this. For example, if there are three firms in the cartel (covering the whole of the market), and the cartel overcharge is estimated to be €100, the lost-volume effect would be one-quarter of this (ie, €25). If there are five firms in the cartel, the lost-volume effect would be equal to one-third (ie, €33).

Table 4.3 Lost-volume effect triangle as a proportion of the overcharge rectangle, based on Cournot oligopoly counterfactual and monopoly factual

Number of firms	Cartel lost-volume effect triangle as a % of overcharge rectangle
2	16.7
3	25.0
4	30.0
5	33.3
6	35.7
7	37.5
8	38.9
9	40.0
10	40.9
11	41.7
12	42.3
13	42.9
14	43.3
15	43.8
16	44.1
17	44.4
18	44.7
19	45.0
20	45.2

Source: Oxera.

¹⁵⁷ To derive these results, linear demand curve and symmetric, constant (ie, invariant to quantity) marginal costs are assumed.

¹⁵⁸ Specifically, the lost-volume effect triangle as a proportion of the overcharge rectangle is equal to $(N-1) / 2(N+1)$ in this situation, where N represents the number of firms in the counterfactual.

Empirical evidence and estimation—harm to intermediate sellers from lost volume

In the case of intermediate sellers, information on the lost volume itself (defined as the difference between factual and counterfactual volumes) is important for the calculation of the harm, as is information on how this lost volume in purchases then translates downstream into lost sales for the purchaser (this second point is not addressed as part of this insight; more insight into lost volume and lost profit estimations is provided in section 4.3 for exclusionary abuses).¹⁵⁹

Similar to the customer harm discussion above, it is possible to overcome the requirement for this information, and instead impose a selection of assumptions to arrive at the lost volume.¹⁶⁰ In order to do this it is necessary to know, or have an estimate of, the overcharge, and for this estimate to be consistent with the assumptions used here. (If the overcharge is derived using the two-model approach then the assumptions are consistent.)

Two results are of particular note from these calculations.

- If the factual can be characterised as a monopoly (eg, effective joint profit maximisation among the cartel firms) and the counterfactual can be characterised by either perfect competition (eg, there are many firms in the market competing vigorously to supply a homogeneous good) or Bertrand oligopoly with homogeneous goods, the lost volume is equal to the factual volume. For example, if the factual volume is 100 units, the lost volume would also be equal to 100 units, making the counterfactual volume 200 units.
- If the factual can again be characterised as a monopoly, but the counterfactual is best characterised as a Cournot oligopoly, the lost volume depends on the number of firms. The relative lost volume increases as the number of firms in the market increases.¹⁶¹ This is because the larger the number of firms in the market, the more competitive the outcome would have been in the counterfactual, and therefore the greater the volume loss effect arising from the loss of that potential competition. As the number of firms becomes very large, the outcome approximates the perfect competition outcome described above (ie, that the lost volume effect is equal to 100% of the factual volume).

These results are not affected by the degree of pass-on by intermediate sellers. This is because they hold whatever elasticity of demand the cartelists face (this elasticity may well be affected by the degree of pass-on). What matters is that the assumptions used to derive the model results hold.

¹⁵⁹ In many instances, the volume of input units purchased by an intermediate seller is equal to the number of output units that it sells (eg, a clothes retailer). However, in other instances, the relationship may be more complex (eg, coal being used as an input by a steel manufacturer), thus potentially requiring further analysis of how inputs translate into outputs.

¹⁶⁰ As before, in order to derive these results, linear demand curve and symmetric, constant (ie, invariant to quantity) marginal costs are assumed.

¹⁶¹ Specifically, the lost volume as a proportion of the factual volume is equal to $2XV$ in this situation, where X represents the lost-volume effect triangle as proportion of overcharge rectangle (ie, the percentages given in Table 4.4) and V represents the factual volume.

Table 4.4 Lost volume as a proportion of factual volume, based on Cournot oligopoly counterfactual and monopoly factual

Number of firms	Lost volume as a proportion of factual volume (%)
2	33.3
3	50.0
4	60.0
5	66.7
6	71.4
7	75.0
8	77.8
9	80.0
10	81.8
11	83.3
12	84.6
13	85.7
14	86.7
15	87.5
16	88.2
17	88.9
18	89.5
19	90.0
20	90.5

Note: For example, if the number of firms in the market is three, the lost volume is 50% of the factual volume.
Source: Oxera.

4.3 Harm from exclusionary conduct: further insight into harm and lost profit

As discussed in section 2.2, exclusionary conduct can lead to harm which includes overcharge and lost-volume effects, and which can affect both end-consumers, intermediate sellers and competitors. This section explores three insights relating to this:

- what economic theory suggests about how large the overcharge harm to purchasers arising from exclusionary conduct may be;
- what legal precedent says about the harm from exclusionary conduct to competitors and how it can be practically calculated;
- since profit margins are relevant when calculating the harm from exclusionary conduct through financial-analysis-based and market-structure-based approaches, the third insight explores the measures of profit margin that are useful in which situations.

4.3.1 How large is the overcharge harm to purchasers from exclusionary conduct?

If the counterfactual market structure can be assumed to be relatively similar to Cournot competition (explained in section 3.8), it is possible to gain some insight into the likely size of the overcharge from exclusionary conduct by using three parameters: the number of firms participating in the market in the factual; the profit margins earned by those firms in the factual; and the number of firms participating in the market in the counterfactual.

Usage: This insight can be used to provide an approximate indication of the likely overcharge by using only those three parameters. Thus, it is suitable for situations where only limited data is available, and for use as a cross-check for other estimates.

Theoretical basis

As discussed in section 3.8, the least demanding among the market-structure-based approaches in terms of data requirements and modelling complexity is the ‘two-model’ approach. This can be used to provide insight into the possible effects of exclusionary behaviour on purchasers (be they end-consumers or intermediate sellers).

In the case of an exclusionary conduct, the harm to purchasers may arise from an effective elimination of competition such that the number of firms in the market is smaller in the factual than in the counterfactual scenario. Typically, IO models predict higher prices and lower quantities in the factual (unless there are factors such as strong economies of scale, which mean that costs and prices may be lower with fewer competitors). Thus, there is an ‘overcharge’ to purchasers in the market, similar to a cartel overcharge. As noted in section 2.3, the harm to purchasers from exclusionary conduct may be difficult to identify or may not yet have manifested itself—for example, where an infringement is established before competitors were weakened or forced to exit the market, such that purchasers have not suffered the full consequences of diminished competition. The insight presented here is based on a situation where the harm to purchasers has begun to manifest itself.

This overcharge can be approximated by reference to a factual scenario with N firms in the market, and a counterfactual with $N+1$ (if only one firm was excluded) or any higher number of firms in the market. This approximation effectively requires that firms are either able to access the market and compete or have been completely excluded. It is therefore most useful when examining a period of time once the exclusion has occurred, the market structure has been altered, and the firm(s) that engaged in the exclusion has(have) begun to reap the benefits from this in the form of reduced competition (in addition purchasers may suffer from a lost-volume effect, similar to that discussed in section 4.2). As also noted in section 2.2, this stage may not be reached (eg, if a competition authority intervenes before competitors are weakened or forced to exit), such that this harm to purchasers may not always materialise.

Empirical estimation

A Cournot oligopoly in a homogeneous goods market has been adopted to illustrate how this insight can be derived. The overcharge caused by the exclusion of one firm is determined by comparing the outcomes under a Cournot oligopoly with N firms in the factual, and a Cournot oligopoly with $N+1$ firms in the counterfactual. This yields an overcharge equal to m divided by $(N+2)$, where m is the factual margin.¹⁶²

The overcharge increases as the factual margin caused by the exclusion increases, but decreases as number of firms rises. For example, when (factual) margins are 40% and there are two firms in the factual, the overcharge is 10% (calculated as 40% divided by four, in line with the above formula). When factual margins are 40% and there are four firms, the overcharge is 7% (calculated as 40% divided by six). Table 4.5 illustrates the level of overcharge for this model for different profit margins and numbers of firms in the factual. This can be used as a useful benchmark in exclusionary cases.

Similar overcharge approximations can be derived for situations where the exclusionary conduct leads to the exclusion of more than one firm. For example, Tables 4.5 and 4.6 present the overcharges for cases where exclusionary conduct results in one and two fewer firms, respectively.

These results assume that firms are completely excluded from the market. If, instead, firms are weakened or marginalised by the conduct, but remain active within the market, then a somewhat smaller effect can be expected because the marginalised firm can still be expected to exert some (albeit limited) competitive pressure.

¹⁶² Using the formula set out in Table 4.1. This relies on assuming symmetry of firms, constant marginal cost, and linear demand.

Table 4.5 Overcharge in the case of exclusionary behaviour in Cournot oligopoly with N firms in the factual and N+1 firms in the counterfactual (%)

	Number of firms in the factual, N							
	1	2	3	4	5	6	7	8
Margin earned in factual								
10%	3.3	2.5	2.0	1.7	1.4	1.3	1.1	1.0
20%	6.7	5.0	4.0	3.3	2.9	2.5	2.2	2.0
30%	10.0	7.5	6.0	5.0	4.3	3.8	3.3	3.0
40%	13.3	10.0	8.0	6.7	5.7	5.0	4.4	4.0
50%	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0
60%	20.0	15.0	12.0	10.0	8.6	7.5	6.7	6.0
70%	23.3	17.5	14.0	11.7	10.0	8.8	7.8	7.0
80%	26.7	20.0	16.0	13.3	11.4	10.0	8.9	8.0
90%	30.0	22.5	18.0	15.0	12.9	11.3	10.0	9.0

Note: It is assumed that there would be one more firm in the counterfactual compared with the factual.
Source: Oxera modelling.

Table 4.6 Overcharge in the case of exclusionary behaviour in Cournot oligopoly with N firms in the factual and N+2 firms in the counterfactual (%)

	Number of firms in the factual, N							
	1	2	3	4	5	6	7	8
Margin earned in factual								
10%	5.0	4.0	3.3	2.9	2.5	2.2	2.0	1.8
20%	10.0	8.0	6.7	5.7	5.0	4.4	4.0	3.6
30%	15.0	12.0	10.0	8.6	7.5	6.7	6.0	5.5
40%	20.0	16.0	13.3	11.4	10.0	8.9	8.0	7.3
50%	25.0	20.0	16.7	14.3	12.5	11.1	10.0	9.1
60%	30.0	24.0	20.0	17.1	15.0	13.3	12.0	10.9
70%	35.0	28.0	23.3	20.0	17.5	15.6	14.0	12.7
80%	40.0	32.0	26.7	22.9	20.0	17.8	16.0	14.5
90%	45.0	36.0	30.0	25.7	22.5	20.0	18.0	16.4

Note: It is assumed that there would be two more firms in the counterfactual compared with the factual.
Source: Oxera.

In these examples all firms have equal market shares in both the factual and counterfactual; this is a product of using the homogeneous good Cournot model. For example, when the factual number of firms is two, each firm has a 50% market share; in the counterfactual with four firms (N+2), each firm has a 25% market share. These assumptions can be altered—eg, allowing some firms to have cost advantages over others such that they will have a higher market share in the Cournot equilibrium. Such modified assumptions may complicate the analysis to some extent.

4.3.2 How has harm to competitors from exclusionary conduct been assessed by courts in Europe?

A variety of cases in Member States have been brought by competitors claiming damages caused by exclusionary conduct, under the headings of actual loss (*damnum emergens*) and lost profit (*lucrum cessans*) of other firms. This legal precedent provides some insight into the types of lost profit claim that are accepted or rejected by courts (there is wide variation in this regard). It also highlights how the three approaches outlined in section 3 have been used in practice.

- **Comparator-based:** these approaches, typically employed in exclusionary abuse cases, relate to the experience of the claimant in a non-infringement period or in another market, or to the experience of the defendant during the infringement period in the relevant market.
- **Financial-analysis-based:** these approaches are sometimes used as a bottom-up approach by accounting for the costs and/or assets of the claimants or defendants.
- **Market-structure-based:** assumptions are used about certain market outcomes in the counterfactual based on economic theory and observed market characteristics.

Usage: this precedent provides additional insight into how the approach described in section 2.2 (and in particular Figure 2.3), and the methods and models set out in section 3, can be, and have been, used in practice.

As explained in section 2.2, a damages claim by a competitor for exclusionary conduct would seek to identify what profit the victim would have made in the absence of the infringement, in the 'normal' course of business. In legal terms, this can take the form of both actual loss (*damnum emergens*) and lost profit (*lucrum cessans*).

In practice, claimants may not always be able to prove the exact quantum and/or a causal link between the unlawful conduct and the alleged lost profit (*lucrum cessans*), due to difficulties in establishing whether such losses were due to the anti-competitive practice of an infringer or to other factors (such as incompetence, lack of resources, luck, or external conjectural economic factors).

Most legal systems take a relatively pragmatic approach when assessing lost profit. Courts usually have a high degree of discretion in their damages award for lost profit, and some courts may be more or less restrictive than others (see the example of the *Crehan* case in Box 2.4 in section 2, where English Court of Appeal took a narrower view than the High Court).

Various approaches have been used in court cases across Europe involving exclusionary conduct. They can be classified under the following categories, which are linked to the classification of methods and models set out in section 3:

- comparator-based;
- financial-analysis-based;
- market-structure-based.

Each of these is examined in turn below.

Comparator-based approaches

As discussed in sections 3.3 to 3.5, the comparator-based approaches can involve either time-series or cross-sectional comparators, or both. Most of the cases reviewed used one or the other, depending on the specifics of the cases and the data available.

Time-series approaches

If the claimant was active in the relevant market in a period prior to the exclusionary conduct, its experience during that period can be used to estimate what the experience would have been in the absence of the foreclosure (a before-and-during comparison). This approach can also be used when the claimant is active in the market during the infringement period since the harm arising from an exclusionary conduct may not necessarily be a complete

foreclosure. The harm in this case would be a reduction in profits relative to the pre-infringement period.

This approach was used in the Italian case discussed in Box 3.5, and in the Swedish case described in Box 1.1.¹⁶³ In the latter, the defendant, VPC, is the central securities depository in Sweden and the sole source of information on share registers of Swedish limited companies. The claim was with regard to VPC's refusal to supply the claimants, which were competitors, with full information on the share registers. To quantify the damages for lost profits, the claimant used 1999 as the year of reference when the defendant did not restrict access to the input. The court made its own estimate of the damages, with reference to lost revenue and avoided costs to calculate lost profits.

A before-and-during comparison was also employed in the French case discussed in Box 4.3 below, where the court awarded damages from lost operating income by comparing the claimant's profits in the year preceding the infringement with those in the period of the infringement.

Box 4.3 Damages claim by a competitor regarding an exclusionary agreement (France)

Tribunal de Commerce de Paris (Paris Commercial Court), *Eco System SA v Peugeot SA and Peugeot SA*, judgment of October 22nd 1996

This damages claim followed on from a 1991 decision by the European Commission, which found that the defendants had infringed Article 101 by distributing a circular to all the agents forming the Peugeot distribution network in Belgium, France and Luxembourg, giving instructions to approved dealers and resellers in those three countries to suspend deliveries to the claimant and to cease registering orders for new Peugeot vehicles from the claimant, whether on its own account or on behalf of its principals.

In its claim, Eco System sought to recover two heads of damages:

- damages resulting from a loss of operating income—FF37,846,513;
- damages resulting from a loss of goodwill—FF 61,112,100.

In its judgment, the Paris Commercial Court, while awarding Eco System damages, only partially accepted its claims.

In relation to Eco System's alleged loss of operating income, the court awarded damages only for the period during which the circular was in force and not, as requested by the claimant, after the withdrawal of the circular.

As regards the alleged loss of goodwill, no damages were awarded because full proof had not been presented by Eco System with respect to that head of damage.

In using the profits or operating income of the claimant prior to the infringement as a comparator, one important consideration is the number of years the claimant has been in the relevant business (whether in the same or different geographic market). For example, if the claimant is a relatively new entrant in the specific area of business, its experience may be uncertain since it is possible that it would have been unsuccessful due to lack of knowledge of the business. Box 3.6 in section 3 presents the details of a case in France where the award of damage was reduced due to such an issue.¹⁶⁴

Cross-sectional comparisons

An example of a cross-sectional comparison in the Swiss case is discussed in Box 4.4.

¹⁶³ Corte d'Appello di Milano (Court of Appeal of Milan), INAZ Paghe srl v. Associazione Nazionale dei Consulenti del Lavoro, judgments of November 23rd and December 10th 2004; and Stockholms tingsrätt (Stockholm District Court), Cases T 32799-05 and T 34227-05 – *Europe Investor Direct Aktiebolag and others v. VPC*, judgment of November 20th 2008.

¹⁶⁴ Cour d'Appel de Versailles (Versailles Court of Appeal), Verimedia v SA Mediametrie, SA Secodip, GIE Audipub, judgment of June 24th 2004.

Box 4.4 Damages claim by a competitor regarding exclusionary practices (Switzerland)

Handelsgerichts des Kantons Aargau (Commercial Court of the canton of Aargau), *Allgemeines Bestattungsinstitut v. Kanton Aargau*, judgment of February 13th 2003

The defendant, the canton of Aargau, entered into an agreement with Caminada AG, a privately owned funeral parlour, whereby the latter was afforded the right to provide certain services that were normally incumbent on the cantonal hospital, including the exclusive right to provide social and psychological assistance to bereaved families.

The claimant, which ran the only other privately owned funeral parlour in the canton, brought proceedings against the cantonal authorities under the Swiss Federal Law on Cartels and other Restrictive Practices (the Swiss Cartel Act), claiming that the grant by the cantonal authorities of such an exclusive right distorted competition since it resulted in Caminada AG holding a de facto monopoly in the market for social and psychological assistance to bereaved families.

In its judgment, the Commercial Court of Aargau ruled that the conduct of the cantonal authorities was in breach of both Articles 5 (cartel agreement) and 7 (abuse of a dominant position) of the Swiss Cartel Act, and declared the agreement null and void.

Furthermore, the Commercial Court held that the claimant was entitled to recover damages and that, in evaluating that loss, the court would apply Article 42(2) of the Swiss Obligations Act, which grants the Swiss courts discretion to estimate damages where these cannot be exactly calculated. The court therefore first calculated the profit that an ordinary funeral parlour would make in the event of a death. It then estimated the average number of deaths recorded by the cantonal hospital (521 cases) which would have been assigned to the claimant's parlour in the absence of the cantonal authorities' illegal conduct. Finally, the court checked its estimation by comparing it with the market share of a newly established funeral parlour in another canton (25 % in the first year).

The Commercial Court also accepted that, under Article 12(1)(c) of the Swiss Cartel Act, the claimant was in principle entitled to seek restitution of the profits made by the canton—ie, its reduced staff costs as a result of the agreement—and that the claimant could seek to recover the whole amount of the illegal profits, even though there were other competitors equally affected by the canton's anti-competitive conduct. However, the court also found that under Swiss law, a claim for damages and a claim for restitution of illegal profits are mutually exclusive and that the claimant had to choose between the two claims.

The actual experience of the claimant in a different but comparable market was used by the expert in the Spanish case discussed in Box 3.2.¹⁶⁵ To estimate the counterfactual scenario, the experience of the claimant in the UK was used since the Spanish and UK markets for directory enquiries were considered similar and were liberalised at around the same time. However, the claim for lost profits was dismissed as Conduit failed to demonstrate causation beyond reasonable doubt. The damages award compensated the claimant only for the increase in direct costs from acquiring information from more expensive alternative sources.

The actual experience of the defendant has been used in the USA as well as various cases in Europe.

In the US case of *Fishman and Illinois Basketball Inc v Wirtz et al* (see also section 3.6), the actual experience of one of the defendants, the Chicago Professional Sports Corporation (CPSC) was used by the court to estimate the lost financial gain to the claimant.¹⁶⁶ The value of CPSCs net assets were then adjusted for predictable differences between CPSC and Illinois Basketball Inc. This case therefore used both financial analysis and comparator-based approaches to estimate the damages.

¹⁶⁵ Juzgado de lo Mercantil Madrid (Madrid Commercial Court), *Conduit Europe, S.A. v Telefónica de España S.A.U.*, judgment of November 11th 2005.

¹⁶⁶ *Fishman v. Estate of Wirtz*, 807 F.2d 520 (7th Cir. 1986).

This approach was also used by the court (albeit in conjunction with other assumptions) in the case discussed in Box 2.2 involving the Danish postal service.¹⁶⁷ The claimant alleged loss of three major customers due to discriminatory pricing and targeted rebates by the Danish postal service. In estimating the counterfactual quantity of unaddressed mail, the court assumed that it was equal to the amount actually distributed by the Danish postal service for the three customers in the relevant period. This value was then adjusted for certain distributions that the claimant would not have been able to undertake.

Another example is the Italian case discussed in Box 4.5, where the experience of the defendant was considered in combination with the position of the claimant in a non-exclusionary period.

Box 4.5 Damages claim by competitors regarding an exclusionary abuse (Italy)

Corte d'Appello di Roma (Rome Court of Appeal), *Albacom S.p.A. and others v. Telecom Italia S.p.A.*, judgment of January 20th 2003

These damages claims followed on from a 2000 decision by the Italian competition authority, which found that Telecom Italia had abused its dominant position in the market for data service transmissions by pricing certain indispensable broadband transmission technology at such a level that its competitors were prevented from competing at the wholesale level.

The claimants sought to recover two heads of loss:

- damage to their commercial reputation;
- damage as a result of loss of customers.

In its judgment, the Rome Court of Appeal considered that while the claimants had failed to prove that they had suffered any loss of commercial reputation, they were entitled to recover damages resulting from their exclusion from the market during the period of Telecom Italia's exclusionary conduct.

In quantifying the damage, the Court of Appeal started by i) multiplying the number of contracts involving the relevant broadband transmission technology entered into by Telecom Italia during the period of the exclusionary conduct by their average annual value; and ii) dividing that sum by the claimants' market share before the start of the infringement.

In order to avoid excessive and unfair compensation of the claimants, and based on analysis conducted by the Italian telecommunications regulator, which considered that Telecom Italia's return on capital was over 12%, and on the higher costs and innovative nature of the market in which the abuse took place, the Court of Appeal awarded the claimants only 10% of the amount obtained under tests i) and ii).

The total amounts of damages awarded were as follows: Wind—ITL847,805,500 (approximately €437,468); Albacom—ITL2,543,415,000 (approximately €1,312,402); and Cable & Wireless—ITL339,122,000 (approximately €174,987).

Financial-analysis-based approaches

Box 3.6 in section 3 provided an example in France where an excluded competitor claimed damages for lost profit based on its financial performance (a claim that was not accepted in full).¹⁶⁸

Box 3.7 described an exclusion case in Denmark where the financial performance of the defendant was considered in order to determine the harm to the competitor claimant.¹⁶⁹ In quantifying the claimant's damages, the Danish Supreme Court based its estimate in part on the reconstructed accounts of the defendant (prepared on the claimant's behalf), since the

¹⁶⁷ Østre landsrets (Eastern High Court of Denmark), *Forbruger-Kontakt a-s (Søndagsavisen a-s) v. Post Danmark A/S*, judgment of May 20th 2009

¹⁶⁸ Cour d'Appel de Versailles (Versailles Court of Appeal), *Verimedia v SA Mediametrie, SA Secodip, GIE Audipub*, judgment of June 24th 2004.

¹⁶⁹ Højesteret (Danish Supreme Court), Case UFR 2005.2171H, *GT Linien A/S (under bankruptcy - subsequently GT Link A/S) v. De Danske Statsbaner DSB and Scandlines A/S (formerly DSB Rederi A/S)*, judgment of April 20th 2005.

defendant was an integrated port authority and did not produce separate accounts. However, while the claimant argued that it should be entitled to recover DKK25m (around €3.3m), the Supreme Court agreed with the defendant that the reconstructed accounts did not sufficiently take into account depreciations, reserves set aside for investments by the port, and interest on its invested capital. The Supreme Court therefore awarded the claimant only DKK10m (€1.3m) in damages.

Several cases have based the damages award on an estimation of the costs incurred by the claimant. Boxes 4.6 and 4.7 discuss two such cases in Germany.

Box 4.6 Damages claim by a customer and downstream competitor regarding an abuse of a dominant position (Germany)

Oberlandesgericht Düsseldorf (Düsseldorf higher regional court), telephone directory data, judgment of May 16th 2007

This stand-alone damages claim was brought in conjunction with an action for restitution for unjust enrichment.

The case arose following the liberalisation of the market for German directory enquiries. As part of the liberalisation process, Deutsche Telekom was required under the German Telecommunications Act (Telekommunikationsgesetz, TKG) to facilitate entry by providing competitors with subscriber data at a certain price. However, when the claimant sought to obtain such data from Deutsche Telekom, it was charged a higher price than that set out in the TKG.

Both the court of first instance and the Düsseldorf higher regional court accepted that Deutsche Telekom's conduct constituted an abuse of a dominant position, and that the claimant was entitled to recover damages corresponding to the higher price that it had been charged by the defendant, as well as restitution of unjust enrichment corresponding to the forgone interest in relation to the overpayment (pursuant to §812 of the German Civil Code).

The amount of damages was calculated using the difference method (*Differenzmethode*) and Deutsche Telekom was ordered to pay €39,758,329.47, based on the difference between the fees it charged the claimant for the data and the price set out in the TKG.

The amount of the unjust enrichment in relation to the interest gained on the overpayment was determined by applying the average market rates published by the German Central Bank, and Deutsche Telekom was ordered to pay €12,284,465.07.

The OLG's judgment was appealed to the Bundesgerichtshof (German Federal Court of Justice) which, in October 2009, held that the OLG had not considered all the relevant facts. The case will therefore return to the OLG for reconsideration.

Box 4.7 Damages claim by a competitor (and purchaser) regarding a refusal to supply (Germany)

Oberlandesgericht Düsseldorf (Düsseldorf higher regional court), VI-U (Kart) 29/03, U (Kart) 29/03, judgment of May 5th 2004

The appeal concerned a damages claim brought by an electricity supplier in response to the regional network provider's refusal to grant access to its electricity network. The original claim was brought by a company wishing to supply electricity by accessing the defendant's network. The claimant and the defendant were downstream competitors in the market for electricity supply. The defendant initially denied the claimant's request for access to the network, and the claimant had to supply its customers via a 'cooperation agreement' with the defendant, under which the claimant had to purchase electricity from the defendant in order to comply with its own supply obligations under the agreements with its clients. The parties finally entered into a network access agreement in June 2002.

The claimant claimed €10,492.52 in damages amounting to the additional costs it had incurred by having to pay the defendant to supply its customers during the interim period, since the prices charged by the defendant were higher than the remuneration the claimant received from its own clients.

The claimant was initially only partly successful in its claim; however, on appeal, the Düsseldorf higher regional court found that the defendant's refusal to grant network access constituted an abuse of a dominant position (being the owner of the only electricity network in the region), and awarded the full €10,492.52 claimed amount in damages plus interest. The fact that the defendant's prices were higher than the claimant's remuneration was not in dispute. The parties also agreed that the claimant could have complied with its supply obligations, at least on a break-even basis, had it been able to use the defendant's network.

The French case discussed in Box 2.3 also assessed damages based on the claimant's additional costs and inability to recover one-off costs. However, the claim was rejected for damages for lost opportunity for the competitor to enter adjacent markets due to a lack of proof that such entry would have occurred in the counterfactual.¹⁷⁰

Box 3.8 provides an example of a damages action in Germany concerning exclusionary conduct where the damages were estimated with respect to a calculation of costs and a 'normal' profit margin.¹⁷¹

The Italian case in Box 4.8 further illustrates how counterfactual costs and profits for the claimant have been analysed by court-appointed experts. The experts were able to calculate the claimant's actual losses on the basis of documented costs that the claimant had incurred. More difficult was the calculation of the claimant's two other heads of loss—lost profits and loss of opportunity.

¹⁷⁰ Cour d'Appel de Paris (Paris Court of Appeal), S.A. Mors v. S.A. Labinal, judgment of September 30th 1998.

¹⁷¹ Oberlandesgericht Düsseldorf (Düsseldorf higher regional court), Stadtwerke Düsseldorf, judgment of April 16th 2008.

Box 4.8 Damages claim by a competitor regarding abuse of dominance (Italy)

Corte d'Appello di Milano (Court of Appeal of Milan), *Telystem SpA v. Telecom Italia SpA*, judgment of December 24th 1996

This damages claim proceeded in parallel with an investigation by the Italian competition authority, which concluded in 1995 with the authority adopting a decision stating that Telecom Italia had abused its dominant position by preventing the claimant from entering the market for services for closed user groups.

The claimant wished to provide a service that would have linked the telephone exchanges between its customers' offices using a network infrastructure exclusively composed of switching nodes and dedicated lines leased from the defendant. The claimant was to pay the defendant a fixed charge for the lease of dedicated local and trunk lines, while its own customers would pay for the use they actually made of the lines. However, despite repeated requests, the defendant refused to lease the lines required to link the head offices of the claimant's customers.

In its judgment, the Milan Court of Appeal accepted that the defendant's conduct was anti-competitive and that damages should be awarded. In order to quantify the claimant's actual losses (*damnum emergens*), lost profits (*lucrum cessans*), and loss of opportunity (*perdita di chance*), the court appointed an independent group of experts.

The experts were able to calculate the claimant's actual losses on the basis of documented costs that the claimant had incurred. More difficult was the calculation of the claimant's two other heads of loss. In relation to lost profits, the experts took into account a business plan drawn up by the claimant, but considered the claimant's projected figures relating to the acquisition of new customers to be too high. Moreover, they considered that the claimant's future expansion would have been limited by the fact that it had not made sufficient investments in publicity and other promotional activities, by the lack of direct and incentivised sales staff, and by the significant delays between the signing of new contracts and the activation of the service.

Similarly, as regards loss of opportunity, the damages sought by the claimant were significantly reduced as the experts considered that the claimant's argument that, had it successfully entered the market, it would have availed itself of significant first-mover advantages was doubtful because there were no barriers to entry into that market, and because it would have been difficult for the claimant to ensure customer fidelity and thus substantial profit margins. As the court highlighted, every market entry and presence is with time neutralised by more competition: any first-mover advantage would have quickly eroded and was indefensible in both the medium and long term.

Market-structure-based approaches

The estimation of harm to the competitor can be facilitated by appropriate assumptions based on the characteristics of the market and economic theory.

In the Spanish case discussed in Box 2.1—which involved a complaint by a customer, not a competitor—the court awarded damages assuming equal market shares for the three players in the counterfactual.¹⁷² Although the court did not explicitly assume a particular model of market behaviour such as Cournot or Bertrand, the assumption of equal market shares can be generated by a symmetric Cournot or Bertrand model.

Antena 3 claimed damages from lost profits due to denial of access rights to images for football games by LNPF. The lost profits were calculated from estimates of counterfactual revenue and costs. To estimate the counterfactual revenue, the court assumed that the claimant's market share would have been one-third since there were only three channels that should have had access to the images. This was then multiplied to an estimate of total market size to arrive at the counterfactual revenue for the claimant. The counterfactual profits were calculated by subtracting an estimate of the avoided costs from this revenue value.

¹⁷² Juzgado de Primera Instancia de Madrid (Madrid Court of First Instance), *Antena 3 Televisión SA v. Liga Nacional de Fútbol Profesional*, judgment of June 7th 2005; overturned by Audiencia Provincial de Madrid (Madrid Court of Appeal), judgment of December 18th 2006.

4.3.3 Which profit margin should be used when estimating damages?

Profit margins are often an important input into the quantification of damages; they can be calculated using relatively limited financial data in many cases.

Usage: Margins can be used in a range of techniques, such as those outlined below.

- **Lost-sales volume.** In many cases lost profits due to exclusion are calculated using a lost-sales volume estimation. This is usually translated into a lost-profit figure by applying some average counterfactual profit margin to each of the unit of sales lost (see the discussion in section 2.2).
- **Market-structure-based approaches.** In most IO models the price–cost margin is an important parameter of the model. In the two-model approach (see sections 3.8 and 4.1), the overcharge caused by the exclusion can be estimated with the help of a price–cost margin (see discussion above in this sub-section).
- **Cost-plus analysis.** As discussed in sections 3.6 and 3.7, a bottom-up approach to estimating the counterfactual price could also be applied. This involves adding a ‘reasonable’ margin to the costs in order to obtain the counterfactual price.

Conceptually, margins aim to reflect the profitability of the business and are usually expressed as the percentage of revenue that is available after accounting for various measures of marginal costs. They can also be expressed as a ratio of profits to the total revenue of the business.

Another important conceptual issue is the time frame of the analysis. In the short run the profit margin earned by a firm on each additional sale is typically higher as a large number of costs are fixed and invariant to extra output. In the longer run, more costs become variable (eg, additional production facilities could be built, or existing ones closed), meaning that longer-run margins are typically lower than short-run margins.

In general, statutory accounts, which consist of a profit and loss statement and a balance sheet, can be used to obtain data for estimating a selection of useful margins. Similarly, management accounts, which normally provide a more detailed breakdown of various accounting measures by region and division, can be used to obtain margins for specific parts of the business. Figure 4.3 presents a stylised example of a profit and loss statement from statutory accounts, along with an illustrative example, and describes some of the types of margins that could be useful in a damages quantification exercise.

Figure 4.3 Stylised example of margin information in statutory and management accounts

Profit and loss statement		Numerical example
	Revenue	€ 100
	less Costs of sales	-40
1	Gross profit	60
	less Overheads	-20
	Earnings before interest, tax, depreciation and amortisation (EBITDA)	40
	less Depreciation and amortisation	-5
2	Earnings before interest and tax (EBIT)	35
	less Interest to debt holders	-10
	Profit before tax	25
	less Corporation tax	-5
3	Profit after tax (net profit)	20
	less Dividends to equity holders	-10
	Retained earnings	10

1	Gross margin
2	Operating margin
3	Net profit margin

Note: This stylised example is for illustrative purposes only. Retained earnings are the proportion of net profits that are held back by the firm rather than being distributed to owners as dividends.

Source: Oxera.

Profit margins can typically be classified into three broad categories, as described in Table 4.7.

Table 4.7 Types of margin and their relevance (examples linked to Figure 4.3)

Formula	Numerical example	Typical description
Gross profit margin		
$(\text{revenue} - \text{direct costs}) / \text{revenue}$	$(100 - 40) / 100 = 60\%$	Illustrates the profit that a company generates from its core activities, per unit of revenue—eg, often in the IO two-model approach, a gross profit margin is used to estimate the cartel overcharge
Operating profit margin		
$(\text{revenue} - \text{direct costs} - \text{indirect expenses}) / \text{revenue}$	$(100 - 40 - 20 - 5) / 100 = 35\%$	Represents the proportion of the company's revenue that is left after accounting for direct and indirect costs, but before accounting for taxes and interest payments. For example, in the cost-plus approach, if both direct and indirect costs are estimated, the operating profit margin could be added to these costs to estimate the counterfactual price
Net profit margin		
$(\text{revenue} - \text{direct costs} - \text{indirect expenses} - \text{interest payments} - \text{tax}) / \text{revenue}$	$(100 - 40 - 20 - 5 - 10 - 5) / 100 = 20\%$	Reflects the proportion of revenue that is available to the investors or equity holders as dividends or for retention of earnings—eg, net profit margin is useful while undertaking cost-plus analysis when all forms of expenses (direct, indirect, depreciation, interest payments and tax) are estimated. A net profit margin could be added to this sum to obtain the counterfactual price

Source: Oxera.

The choice of margin often depends on the type of variables being considered in the analysis. For example, in a cost-plus analysis, the margin used depends on the nature of costs being analysed. If the counterfactual cost of goods sold is being measured or estimated, gross margin is often added to these costs to obtain the relevant price, whereas if all operating expenses and non-operating costs are cumulatively estimated, net operating margin is generally used.

The choice of margin sometimes depends on the nature of the business. For example, to identify relevant comparators for a business in a capital-intensive industry, it could be more appropriate to focus on the gross margin since the net profit could vary substantially according to the treatment of depreciation. Similarly, in an industry where businesses are particularly labour-intensive, pensions may be an important form of cost and may be treated as a non-operating expense. To capture the effect of such costs on profitability, the net operating margin will often be considered while making comparisons, as gross margins may fail to account for such costs.

4.4 Who has been harmed? Insight into pass-on of overcharges

If the overcharge faced by a claimant is A—where A is the absolute monetary amount or price it has paid for the upstream input and represents a marginal cost (see Figure 4.2)—the following is suggested by economic theory.

- Where the claimant competes to a significant degree with other companies that operate in a downstream market, and that have not been affected by the overcharge (eg, because they purchase their input from another source not affected by the infringement), it is unlikely to have passed on any of the overcharge A.
- Where virtually all of the direct competitors of the claimant have been affected by the overcharge, and they operate in a highly competitive downstream market, the pass-on rate for the claimant is likely to be close to 100% of the amount of overcharge.
- Where virtually all of the direct competitors of the claimant have been affected by the overcharge, and they operate in the downstream market with a limited degree of competition, the pass-on rate for the claimant is likely to be in the region of 50% of the overcharge, or more (it will be close to 50% if the degree of competition is limited, and increase towards 100% as the degree of competition increases).
- Where the overcharge represents a fixed cost to the claimant (ie, a cost that does not vary with the claimant's own output), the pass-on rate is less clear-cut.
- The overcharge A can be passed on along multiple layers of the supply chain.
- Where a purchaser has passed on (a proportion of) the overcharge, it may still have suffered a volume harm resulting from that pass-on (which is a separate type of harm).

Usage: These insights may help to identify the level in the supply chain (direct or indirect purchasers) at which the overcharge harm from an anti-competitive practice (a cartel or other type of infringement leading to higher prices) has manifested itself. They may also help identify the possible order of magnitude of the pass-on in the absence of a specific empirical estimation of the degree of pass-on for the specific case at hand.

This section discusses some further economic insights into the question of pass-on of overcharges. It focuses on how to quantify pass-on. It does not address the extensive policy debates surrounding pass-on, such as whether the passing-on defence should be allowed.¹⁷³

Theoretical basis

Economic theory has identified relatively straightforward relationships between cost changes (such as changes in input prices) and price changes. In essence, these relationships follow from the standard models of competition, oligopoly and monopoly—discussed in section 3.8—in which there is a certain relationship between price and (marginal) cost. In all these models, firms are assumed to maximise their profit given a certain level of marginal costs and the degree and nature of competition they face. The resulting equilibrium prices in these models can be expressed as a function of marginal cost (eg, in perfect competition, equilibrium prices equal marginal cost—see further below). With the use of 'comparative statics', these results can then be used to infer what happens to price if costs change.¹⁷⁴

Cost pass-on refers to the proportion of a cost change that is translated into a change in the final price. It can be represented by two measures.

- **Percentage pass-on rate.** This measures the absolute change in price expressed as a percentage of the absolute change in the marginal cost—if costs increase by ten units and the price increases by five units, the pass-on rate would be 50%.

¹⁷³ The policy debate is addressed at length in the White Paper and the accompanying Commission staff working paper. In the USA the issue was also debated in Antitrust Modernization Commission (2007), chapter III.

¹⁷⁴ Comparative statics means that these models are in reality static, or are one-period, models, and that pass-on rates are determined by comparing different equilibria in these models at different levels of cost.

- **Pass-on elasticity.** This gives the percentage change in price divided by the percentage change in marginal cost—eg, if costs increase by 20% and the price increases by 15%, pass-on elasticity would be 0.75.

Both measures have the same theoretical basis and are closely related. However, the percentage pass-on rate is more straightforward to determine and interpret. It fits together with the conceptual framework for determining the overcharge harm, as set out in section 2.2 (and, in particular, Figure 2.1). The percentage pass-on rate can be applied directly to the total overcharge, A , which is determined in line with that conceptual framework.¹⁷⁵

The focus in this approximation is therefore on the percentage pass-on rate—ie, the ratio of the change in price to the change in the marginal cost. In this case, the change in marginal cost is represented by the overcharge for the upstream input resulting from an infringement. The overcharge is expressed in terms of an absolute monetary value or price, and the pass-on percentage can be directly applied to the overcharge. For example, if the overcharge is €3.0m, and the pass-on rate is 50%, €1.5m of the overcharge has been passed on.

A distinction must be made between firm-specific and industry-wide cost increases. Under the conditions of perfect competition, an overcharge that affects all competitors in a downstream market (industry-wide) would be passed on in full. This result (which can seem counterintuitive) simply follows from the fact that, under perfect competition, prices equal marginal costs in equilibrium.¹⁷⁶

In contrast, for a cost increase that affects only one, or some, of the competitors in the market, the expected pass-on rate would be 0%, since those competitors that do not face the increase can leave their prices unchanged. This may also be the case if, for example, an entire industry is affected by the overcharge, but that industry competes with another industry that uses a different upstream input not subject to the overcharge and that can therefore leave its prices unchanged. For example, sugar and high-fructose corn syrup compete in many downstream markets but use different inputs, so may be affected by upstream cartels in different ways. Likewise, an upstream cartel operating only in Europe may distort downstream competition if European purchasers compete with non-European producers unaffected by the cartel. This step in the damages analysis will therefore often require a careful definition of the downstream product and geographic market and an assessment of competition in the market.

A well-known theoretical finding is that a monopolist with linear demand and constant marginal cost passes on exactly 50% of the cost increase. This may appear counterintuitive since the monopolist would seem to have obvious reasons to pass on cost increases in full (or to not pass on any cost decreases). The reason, however, is related to the notion of profit maximisation—if costs change, so does the profit-maximising price.¹⁷⁷

Results that are in between perfect competition and monopoly are typically obtained in oligopolistic markets. In the standard Cournot oligopoly model (with constant marginal cost and linear demand), the pass-on rate for an (average) industry-wide cost change can be expressed as $n / (n+1)$, where n is the number of firms. Therefore, for two firms the pass-on

¹⁷⁵ The percentage pass-on rate is defined as $(\Delta p) / (\Delta c)$. The pass-on elasticity is $(\Delta p/p) / (\Delta c/c)$. Therefore, the percentage pass-on rate is equal to the pass-on elasticity rate multiplied by the price–cost mark-up p/c . Because price is always greater than, or equal to, cost (otherwise there can be no equilibrium in these models), the percentage pass-on rate is always greater than or equal to the elasticity (if expressed as a fraction). Because in most theoretical models the price–cost mark-up depends on price elasticities and market share, the expression for the pass-on elasticity also depends on these factors, which complicates matters unnecessarily for the present purposes. Pass-on elasticities are discussed in Stennek and Verboven (2001).

¹⁷⁶ All downstream firms that remain in the market therefore see no change in profit level (economic profit remains zero as prices equal marginal cost). The cost increase could, however, lead to a reduction in downstream output or the exit of a number of downstream suppliers. This may give rise to a different kind of damages claim from the overcharge effect.

¹⁷⁷ Different cost and demand assumptions yield slightly different results from the 50% rate. With convex demand the monopolist passes on more than 50%; with concave demand it passes on less than 50%. With non-constant marginal costs, the 50% rule still applies to the *net* cost change at the new output level. For more detail, see ten Kate and Niels (2005).

rate is two-thirds, while for seven firms it would be seven-eighths. The pass-on rate increases with the number of firms, which is consistent with the 50–100% range identified in the approximation. The standard Bertrand oligopoly model with homogeneous goods has the same outcome as perfect competition, and pass-on is 100%.

Pass-on of cost increases that do not affect all competitors in an oligopolistic market gives rise to greater theoretical complications. In the Cournot model, a supplier facing a firm-specific cost increase would still remain in the market and pass on its higher costs, but would lose market share as a result (hence the damage it suffers is of a different nature from the overcharge).¹⁷⁸ Theory also suggests that if there is a significant degree of competition from unaffected downstream firms, the pass-on is most likely to reflect the perfect competition model, where pass-on of firm-specific cost changes is likely to be close to zero.

Empirical evidence and empirical estimation

Empirical studies on pass-on rates in antitrust damages cases are relatively rare.¹⁷⁹ Other fields in the economic literature where pass-on has been studied empirically include tax incidence, exchange rate movements, and transmission of prices of intermediate goods. These fields provide some support for the insights presented here.

- Various studies have found that virtually 100% of changes in the price of intermediate inputs are passed on to the downstream price where the downstream market is highly competitive. These studies have covered, for example, petrol/gasoline retailing and various agricultural products.¹⁸⁰ The 100% pass-on is sometimes achieved only after a lag of up to four months—ie, not immediately (which may or may not affect the damages estimate, depending on the length of the period considered—often, the longer the period, the greater the likely extent of pass-on). In addition, some studies have found that the pass-on rate is higher for price increases than for price decreases. (In the standard IO pricing theory, such asymmetry does not exist, but for practical reasons prices may sometimes be ‘sticky’ downwards.)
- One US-based study found that the pass-on rate for an industry-wide cost shock in raw milk was 92–94% in wholesale prices and 85–87% in retail prices.¹⁸¹ The study also tested for firm-specific cost shocks. It found that one supplier with significant market power had a firm-specific pass-on rate of 50–60% (in line with the assumption for the monopoly level), while other suppliers with limited market power had a pass-on rate of 13–19% (in line with the theoretical result where cost changes are firm-specific).
- A US-based study on the cheese market found that pass-on rates were 73–103% where the downstream industry competes according to the Bertrand oligopoly model (similar to the competitive outcome), and 21–31% where the downstream industry engages in collusive pricing (similar to monopoly).¹⁸²
- A study on exchange rate pass-on provides some further support for the assumption regarding high pass-on rates where downstream markets are competitive.¹⁸³ Exchange rate pass-on is conventionally defined as the percentage change in an imported good’s

¹⁷⁸ In the Bertrand model with homogeneous goods, the pass-on rate depends on whether the firm-specific cost increase affects the lowest-cost supplier, the second-lowest-cost supplier or another supplier. In the Bertrand model with differentiated goods, firms behave like monopolists for their own product, so with linear demand and constant marginal cost the pass-on rate for a firm-specific cost increase would be 50%. For more detail on these variants see ten Kate and Niels (2005).

¹⁷⁹ One older study that sought to identify pass-on rates in US cartel cases is Harris and Sullivan (1979). This study did not empirically measure pass-on rates, but rather inferred likely rates based on a review of industry characteristics. Of 48 cartels condemned between 1962 and 1970, the authors estimated that 28 had a high probability of high pass-on in the short run, ten had a medium probability, and ten a low probability. In the longer run, the authors expect pass-on to be high in virtually all cases.

¹⁸⁰ See, for example, Bacon (1991), US General Accounting Office (1993); and Duffy-Deno (1996).

¹⁸¹ Dhar and Cotterill (1999).

¹⁸² Kim and Cotterill (2008).

¹⁸³ Goldberg (1995). It should be noted that the literature on exchange rate pass-on has produced a variety of results.

local-currency price for a given percentage change in the nominal exchange rate. The study focused on the US automobile market, and found that the pass-on rate for Japanese cars was 15–30% when an exchange rate shock occurred, while for German cars it was 65–102%. During that period Japanese car manufacturers competed mainly in the small-car segment, and therefore would be constrained by competitors that were not subject to the exchange rate shock. Their pass-on rate was relatively low. In contrast, German car manufacturers mainly served the luxury-car segment, where there tended to be fewer competitors (and indeed this may constitute a separate market). Their pass-on rate was high.

Legal precedent

In the USA, where case law on antitrust damages is more extensive than in other jurisdictions, relatively few cases have dealt with the issue of pass-on, since this has been ruled out as a defence by the federal courts and only direct purchasers can claim cartel damages.¹⁸⁴ The issue of whether the passing-on defence should be permitted is a separate policy debate that has been addressed at length in the White Paper—the Commission has stated that, in line with the compensation principle, the passing-on defence should be allowed (White Paper, pp. 7–8).

A number of cartel damages cases in Europe have covered the issue of pass-on. The four examples provided below are damages actions that followed on from the Commission decision against vitamin cartels in 2001.¹⁸⁵ The focus in these cases was mainly on whether the pass-on defence was permitted and what its implications would be. However, they also contain some relevant statements on how the pass-on defence is applied in practice.

- A direct purchaser brought a damages action against one of the vitamin cartel members before a French court.¹⁸⁶ In relation to pass-on, the court held that the Commission decision and press release had stated that the cartel affected end-consumers. Therefore, the court inferred, direct purchasers were able to pass on their cost increase. This judgment highlights the importance of pass-on, and that, logically, direct purchasers cannot have been harmed (other than through the volume effect) if it is established that end-consumers have faced 100% of the overcharge—ie, the overcharge harm must not be double-counted. However, in this particular case, whether the Commission’s statement about end-consumers being harmed was not simply a general statement, and whether it referred to 100% of the overcharge (if not 100%, there is still the possibility that direct purchasers have also suffered part of the harm), are open to question.¹⁸⁷
- In a separate damages action, another French court also rejected the claim on the basis that the overcharge on vitamins had been passed on, but for different reasons.¹⁸⁸ The court reasoned that vitamins are a small part of the finished good and a small price increase would be sufficient to offset the overcharge. It also noted that the price of the claimant’s finished good had increased by more than the prices of the vitamins, and that its sales volumes had also grown.

¹⁸⁴ *Illinois Brick Co. v. Illinois*, 431 U.S. 720 (1977); and *Hanover Shoe, Inc. v. United Shoe Machinery Corp.*, 392 U.S. 481 (1968). A number of US states do allow indirect purchasers to claim damages.

¹⁸⁵ Case COMP/E-1/37.512, Vitamins, November 21st 2001. The question of whether defendants should be allowed to invoke the passing-on defence was also discussed in three recent Danish damages cases. See the response by the Danish Ministry for Economic and Business Affairs to the White Paper, October 29th 2008, available on the European Commission website.

¹⁸⁶ Tribunal de Commerce de Nanterre, *Les Laboratoires Akropharma v Roche and Hoffmann La Roche*, May 11th 2006.

¹⁸⁷ One Commission official subsequently described the court’s reasoning in this case as possibly too simplistic an approach. Paulis (2007).

¹⁸⁸ Paris Commercial Court, *Juva v Hoffmann La Roche*, Decision of January 26th 2007.

- Another damages action against the vitamin cartels was the *Devenish* case in the UK.¹⁸⁹ This also addressed the appropriateness of the passing-on defence, and the importance of avoiding double-counting of damages suffered by purchasers along different levels of the supply chain (such double-counting would lead to ‘unjust enrichment’ of the claimants). As regards the pass-on rate itself, one of the claimants, an indirect purchaser of vitamins, argued that its own pass-on rate was close to zero because of the purchasing power of its customers (mainly supermarkets). The courts did not conclude on the level of pass-on.
- A different follow-on claim against vitamin cartel members was made before a German court—see Box 4.1 above. The court in that case held that the defendant bore the burden of proof for any passing-on effects, and that it did not present sufficient evidence for an application of the passing-on defence.¹⁹⁰

Further practical insights related to pass-on

- **Theoretically, there can be no double-counting of overcharge harm at different levels of the supply chain.** If there are claimants at different levels of the supply chain (eg, direct and indirect buyers of the cartel), the above theoretical insights into pass-on still apply, and, from an economic perspective, would have to be consistently considered at each level of the chain. (This is a theoretical insight, and is not meant as commentary on the legal and policy issues of unjust enrichment, or over- and under-compensation of parties).

The theoretical basis for cost pass-on as set out above implies that, in most circumstances (see exceptions below), the sum of harms from the overcharge A suffered at each layer of the supply chain cannot exceed A. For example, if it is found that direct purchasers of the cartel have passed on 75% of A, and their respective customers have passed on 90% of their price increase to end-consumers, the direct purchasers have suffered a harm equal to 25% of A, their customers a harm of 7.5% of A (75% of A – 90% pass-on), and end-consumers 67.5% (90% of 75% of A), such that the total along the supply chain adds up to 100% of A.

- **Dynamic changes in downstream competition.** In some cases the overcharge may have caused significant changes in the dynamics of competition in the downstream market—eg, smaller operators may have been forced to exit. In theory, this may give rise to a pass-on rate greater than 100%, as increased downstream concentration may have led to higher downstream prices (although the term pass-on is not accurate in such a situation, as in reality a chain of events has taken place). Such factors would need to be assessed on a case-by-case basis.
- **Changes in fixed costs.** In the theoretical models of competition, firms set their profit-maximising price with reference to marginal costs. Fixed costs do not directly determine price in the same way as marginal costs, at least in the short run (in the longer run, many fixed costs tend to become variable). Therefore, a change in fixed costs due to an infringement may not be passed on in the same way. For example, if a cartel of copyright owners were to illegally fix an annual licence fee for access to the rights, downstream users of those rights may not pass on the fixed annual fee in the prices to their respective customers as this fee does not represent a marginal cost to them.

¹⁸⁹ The case was heard by the High Court and subsequently appealed to the Court of Appeal. *Devenish Nutrition Limited & Ors v Sanofi Aventis SA & Ors* [2007], EWHC 2394 (Ch); and *Devenish Nutrition Limited v Sanofi Aventis SA & Ors* [2008] EWCA Civ 1086.

¹⁹⁰ The latest amendment to the German Competition Act, in the new Section 33(3) GWB, instead of explicitly excluding the passing-on defence, now merely provides that ‘if a good or service is purchased at an excessive price, a damage shall not be excluded on account of the resale of the good or service.’ German law thereby provides that the burden of proof always falls on the defendant.

However, fixed costs can influence whether a firm can viably operate in the market in the first place—ie, the margins between price and marginal cost need to be at least sufficient to recover fixed costs. An increase in fixed costs may, in the longer term, induce exit and lead the remaining firms to increase price, in which case there is again full pass-on. The effect of changes in fixed costs should therefore be assessed on a case-by-case basis, and the duration of the infringement becomes an important factor to consider.

- **Ratio between input cost and final-product price.** The extent to which a change in the cost of a particular cartelised input affects the total final-product cost and price depends on the relative size of the input cost. For example, if pass-on is 100% and the overcharge is 20%, the final-product price increases by 10% if the input cost represents 50% of the final-product price, but only by 2% if the input cost represents 10% of the final-product price (ie, if the final-product price is €100, the initial input cost is €50 before the cartel and €60 during the cartel, the price increases to €110, which is 10% higher; if the input cost is only €10, the final price increases to €102). This will also have a bearing on the possible lost-volume harm suffered by the purchasers of the cartel (this will be higher the greater the importance of the cartelised input cost).

In addition, the relative importance of the input cost may influence the rate of pass-on. There are a variety of factors that can influence this, and these will typically have to be considered on a case-by-case basis. For example, if the affected input cost makes up only a very small proportion of the final-product price, zero pass-on may occur if the affected business chooses not to reset prices to reflect this (eg, the ‘menu’ costs associated with resetting and communicating the final-product price may outweigh the increase in revenue from the price rise). Alternatively, small changes in the input price may well be fully passed on in some circumstances if their magnitude is sufficiently small to avoid any significant demand reduction. This reasoning was used by the French court in the second vitamins case discussed above under legal precedent.

- **Pricing practices.** Certain pricing practices may mean that the theoretical pricing behaviour driven by profit maximisation does not apply, at least in the short run. For example, in some industries companies price on a cost-plus basis, while in others there may be explicit contracts through which increases in input costs are agreed to be passed on in full to purchasers. On the other hand, there are industries where prices tend to be changed on an annual (or other periodic) basis, and not continually in response to cost changes. This would have to be assessed for each specific case at hand.
- **Buyer power of downstream customers.** This can influence the ability of downstream suppliers to pass on the overcharge for the upstream input. If strong buyers can credibly switch to alternatives, this may limit the ability to pass on cost increases, in line with the theoretical insights presented above (and also with the argument made by one of the parties in the *Devenish* case, as noted above under legal precedent). However, if buyer power has already been exercised and has meant that prices equal marginal cost, the situation may be similar to that in a competitive market where pass-on is near 100%.¹⁹¹
- **Passing-up of price decreases.** Some cartel cases involve the fixing of upstream purchase prices by competing buyers (as opposed to the more common fixing of downstream sales prices by competing sellers). Equally, abusive practices by a firm with monopsony (dominant buyer) power could lead to artificially low purchase prices. In principle, the effects of such practices mirror those of practices leading to higher sales prices. The analogous question can therefore arise of passing-up of price reductions. The sellers to those infringing firms suffer from lower prices, but to what extent have

¹⁹¹ Again, in this situation, there may also be a volume effect that can give rise to a different type of damage from the overcharge.

they been able to pass this price reduction up—ie, by reducing the price at which they in turn purchase inputs from their suppliers? From an economic perspective, the assessment of pass-up would be similar to that of pass-on.

- **Volume effects.** The insights into pass-on presented here relate to the overcharge harm. As explained in section 2, cartels and other antitrust infringements leading to higher prices will normally cause volume effects as well.¹⁹² For example, an intermediate producer which has passed on all or part of the cartel input price increase may have suffered a loss of sales downstream and hence a reduction in profit. This harm, and the corresponding damages claimed, is different in nature from the overcharge harm.

The Court of Justice of the European Union acknowledged the possibility of such a loss-of-volume harm in the presence of complete pass-on in a 1997 judgment on port fees that were illegally levied in the French territory (this was not an antitrust ruling).¹⁹³

- **Estimating the actual pass-on for a specific damages action.** In principle, it is possible to estimate empirically the actual pass-on rates of relevance to the case at hand (typically, the pass-on rate for the claimants). This would require access to data on actual prices and costs at the relevant layers of the supply chain, and would usually involve the econometrics techniques discussed in sections 3.3–3.5. Obtaining reliable results will not always be possible due to data difficulties.

An alternative approach would be to empirically estimate a ‘typical’ pass-on rate for the industry at hand, similar to the empirical studies on pass-on described above. These ‘typical’ results could then be used as an approximation for pass-on in a specific case.

A ‘hybrid’ approach would be to estimate a number of key structural parameters for the industry (in line with the structural IO approaches discussed in section 3.8) and use these to populate a theoretical pass-on framework and obtain the pass-on rate that way.¹⁹⁴

If, in any specific case, the above empirical approaches are not feasible due to practical reasons, the theoretical insights into pass-on presented in this section may still be useful in approximating likely pass-on effects for that case.

4.5 From the counterfactual stage to a final damage value: further insights

As set out in the conceptual framework in section 2.5, the final step in the analysis is the calculation of the final value of the damage. This involves inputting the results from the counterfactual analysis into a financial valuation model. The two key elements of this are the summation of the losses from the different types of harm claimed (where applicable), and summation and movement of losses over time, including the application of interest.

- **Summation of different losses, if the damages claim involves different types of harm** (eg, an overcharge and a loss of volume harm in a cartel damages case). The summation of the losses is conceptually straightforward, provided that all the input values are consistent. The different losses must be expressed in monetary (cash-flow) terms and must refer to the same time period (eg, cash flows in year X).

¹⁹² This is intuitive since higher prices normally result in lower volumes sold. The economic frameworks developed by Verboven and van Dijk (2009) and by Hellwig (2007) link the price and volume effect together. Legally they are normally separate types of harm that can be claimed, as discussed above.

¹⁹³ Joined Cases C-192/95 to C-218/95, *Société Comateb and others v. Directeur Général des Douanes et Droits Indirects*, January 14th 1997. See, also, Joined Cases C-441/98 and C-441/98 *Kapniki Michailidis v IKA* [2000] ECR I-7145; and Case C-147/01 *Weber’s Wine World Handels-GmbH v Abgabenberufungskommission Wien* [2003] ECR I-11365, para 94.

¹⁹⁴ This structural parameter approach can be undertaken using the relatively straightforward theoretical framework for the percentage pass-on rate as discussed above. Other theoretical frameworks for pass-on—each with their own characteristics and assumptions—that could be populated in this way have been developed by Verboven and van Dijk (2009); Boone and Müller (2008); Basso and Ross (2008); and Hellwig (2007).

- **Summation of losses over time, if the damages claim stretches over multiple years.** An infringement (eg, a cartel) may have lasted many years. The counterfactual analysis may have generated an overcharge estimate in monetary terms for each year, and the yearly cash flows would have to be added up. From an economic perspective, this involves uprating and/or discounting cash flows to take into account the logic of time value of money (see below). Furthermore, part of the harm may be suffered even after the anti-competitive practice has ceased. Depending on the legal rules and the facts of each specific case, those future losses may need to be included in the damages calculation, again using discounting.

From a legal perspective, the uprating of cash flows is closely related to the application of interest to damages estimates. The compensation principle means that antitrust damages awards should also include ‘interest from the time the damage occurred until the capital sum awarded is actually paid’.¹⁹⁵ This requires moving cash flows between time periods in accordance with the legal rules (for example, from the year in which a harm occurred to the year in which the damage is paid), which in essence is a form of uprating. Legal rules and practices regarding the award and calculation of interest vary significantly across jurisdictions and across cases within jurisdictions.

The additional insights presented here relate to whether the interest rate should be applied as ‘simple interest’ or ‘compound interest’, and to the question of how to take appropriate account of corporate taxes when the discount rate is being applied to a firm.

4.5.1 Simple versus compound interest rates

Interest (or discount) rates can be applied as ‘simple interest’ or ‘compound interest’. This insight highlights the difference between the two, and presents selected legal precedent on the choice between them.

Usage: This insight can be of relevance when considering how to apply interest at the final stage of a damages quantification (as set out in the conceptual framework in section 2.5)

Interest (or discount) rates can be applied as ‘simple interest’ or ‘compound interest’. When the interest rate is compounded, the calculation includes interest on accumulated interest from prior periods. For example, 10% is applied to €100 in the first year, giving €110, and in the second year the 10% is applied to that €110 from the first year, giving €121. From an economic perspective, compounding interest is the usual, and conceptually correct, approach to discounting.

However, there may be instances where the legal framework requires the ‘simple’ interest to be applied (ie, interest calculated solely as a percentage of the principal sum). For example, 10% is applied to €100 in the first year, giving €110, and in the second year the 10% is again applied to the €100, giving a total of €120. In this simple example the difference between the two methods is only €1. However, for longer time periods and higher interest rates the differences become substantially greater.

EU case law seems to have used both approaches, depending on the specifics of the case.¹⁹⁶ In *Corus UK Ltd v Commission* (October 10th 2001), the European General Court stated that:

Regarding the rate of interest, it should be pointed out that, according to a principle generally accepted in the domestic law of the Member States, in an action for the recovery of a sum unduly paid based on the principle prohibiting unjust enrichment, the claimant is normally entitled to the lower of the two amounts corresponding to the

¹⁹⁵ European Commission(2008b), p. 57, as based on Joined Cases C–295/04 to C–298/04 *Vincenzo Manfredi and others v. Lloyd Adriatico Assicurazioni SpA and others* [2006] ECR I–6619.

¹⁹⁶ See also the overview of Member States’ practices in Ashurst (2004), p. 87.

enrichment and the loss. Furthermore, where the loss consists of the loss of use of a sum of money over a period of time, the amount recoverable is generally calculated by reference to the statutory or judicial rate of interest, without compounding.¹⁹⁷

However, the General Court also found that in that particular case the actual amount to be calculated would be better reflected by applying a compound interest rate, and therefore applied the latter approach.

A more recent UK House of Lords ruling, in *Sempre Metals*, contains a useful discussion of these points.¹⁹⁸ This was one of the first cases allowing compound interest to be claimed. The case notes some comments made by legal representative bodies that ‘the obvious reason for awarding compound interest is that it reflects economic reality’, and that ‘computation of the time value of the enrichment on the basis of simple interest will inevitably fall short of its true value’, but also that ‘The virtue of simple interest is its simplicity. That cannot be said of compound interest, which can be calculated in different ways leading to different results.’

4.5.2 What tax rate can be used to determine the pre-tax discount rate?

Statutory tax rates could be used in the estimation of pre-tax discount rates.

Usage: Financial models are calculated on a pre-(corporate) or post-tax basis. To do this consistently, the appropriate pre- or post-tax discount rate needs to be used. This assumption can be used to calculate a pre-tax discount rate when sufficient data is unavailable to calculate the effective tax rate.

Theoretical basis

The statutory corporate tax rate is the rate imposed on the taxable income of a company, whereas the effective tax rate reflects the tax paid as a percentage of the economic profit. There is a difference between the two rates when the taxable income is different from the economic profit of the firm; this is often due to deductions and exclusions in the form of tax credits or exemptions. Thus, when the economic profits exceed the taxable income, the effective tax rate is lower than the statutory tax rate, and vice versa.

From a conceptual perspective, it is appropriate to use an effective tax rate based on the claimant’s actual tax position to estimate the pre-tax discount rate, although in practice, it is rarely applied and the statutory tax rate is used instead. In many instances, for simplicity, assumptions are made regarding the tax rate and a statutory tax rate is applied while calculating the pre-tax discount rate. Insofar as the deviation between the effective tax rate and the statutory tax rate is not significant, it may be appropriate to use statutory tax for practical purposes.

Empirical evidence and estimation

Typically, the extent of the difference between the effective tax rate and statutory tax rate depends on the tax incentives provided by the state. Table 4.8 provides a summary of a 1999 study that used data from 1990 to 1996 to compare the effective and statutory tax rates across Europe, and found relatively small differences between the two for countries such as Finland, France, Luxembourg and the Netherlands, whereas, for some of the other countries, such as Austria, Belgium, Denmark and Germany, substantially large differences between the two tax rates were found.

¹⁹⁷ *Corus UK Ltd v Commission*, Case T-171/99, para 60.

¹⁹⁸ *Sempre Metals Ltd v. Revenue & Anor* [2007] UKHL 34, July 18th 2007.

Table 4.8 Statutory and effective corporate tax rates across Europe

Country	Number of firms studied	Statutory rate (%)	Effective rate (%)
Austria	39	36	18
Belgium	50	40	21
Denmark	101	36	29
Finland	69	34	30
France	289	35	33
Germany	319	50	39
Greece	5	33	21
Ireland	40	22	14
Italy	27	50	35
Luxembourg	5	39	34
Netherlands	123	35	32
Portugal	32	39	17
Spain	84	35	24
Sweden	103	29	27
UK	832	33	29
Average EU	–	36	27

Source: Maastricht Accounting and Auditing Research and Education Center (1999), 'Corporate Effective Tax Rates in the European Union', April.

Legal precedent

In the regulatory context, the statutory tax rate is often used to set the allowed cost of capital for utilities. For example, in Ireland, the Commission for Aviation Regulation used a statutory pre-tax rate while determining Dublin Airport Authority's cost of capital in the 2005 airport charges review.¹⁹⁹ Similarly, in France, the Commission de régulation de l'énergie used a statutory tax rate for setting the allowed rate of return in the gas transmission industry in 2008.²⁰⁰

4.6 Data availability and usage: further insights

In certain instances it may not be possible to obtain the necessary data, such as the price per unit charged by the cartel. This may occur where record-keeping is poor, where records have not been kept beyond a certain time period, or where evidence discovery has not allowed claimants to obtain that data from defendants.

In such cases it may nevertheless be possible to gain some insight into what the missing data was. The three approaches to this outlined below have, by their very nature, an important element of uncertainty. The aim with all these approaches is to provide an unbiased estimate of what the actual data would have been. As such, these insights can aid the use of methods and models by providing more and higher-quality data than might otherwise be available.

¹⁹⁹ Hutson and Kearney (2005).

²⁰⁰ Commission de régulation de l'énergie (2008).

4.6.1 When can industry prices approximate individual firm prices?

Where data on the price charged by an individual cartel member is not available, under certain circumstances the average price in the industry can be used as an approximation.

Usage: For use when applying methods and models when data for individual firms is not available.

In many cases it is desirable to have access to data on prices on a firm-by-firm basis. This is because in the presence of some degree of product differentiation, be it branding, or simply differing geographic location, there are likely to be some price differences. Indeed, only in a highly competitive homogeneous goods market is it expected that the prices charged by all firms are the same.

However, it is not always possible to obtain data on prices at the firm level. This is particularly likely in the early stages in a case where no discovery has been made since many firms do not publish their full price list (and even those that do may actually charge different prices to different clients).

In various sectors, data on industry-wide prices can often be obtained from industry publications or associations. For example, the ICIS Heren and Argus reports in the energy sector provide industry-wide daily average prices for gas and electricity in Europe. Similarly the OECD provides annual data on country-by-country industry prices for agricultural products, while the Food and Agriculture Organization provides similar data on a monthly basis by country.²⁰¹ When such data is available it may be suitable for use as an approximation for firm-specific prices; this data can then be used with various methods and models.

While helpful, this approximation should be used with some care as using the industry-average, or market-average, prices involves several assumptions. First, the assumption is made that the goods or services being traded are relatively homogeneous, such that an industry price is an unbiased estimate of what any firm would have charged. Second, when using this data in the analysis it is indicated that the cartel members all charged the same or a similar level of overcharge. Third, the infringement needs to account for the majority of transactions in the industry. If the cartel makes up only a small proportion of the industry, the industry-average price may not be reflective of that charged by the cartel members.

4.6.2 When can yield approximate price?

The average price (or yield) can be used as an approximation for the actual price paid.

Usage: For use when applying methods and models when actual prices are not available, but when revenue and volume data is.

In some circumstances it is possible to obtain data on volumes and revenues but not the actual price paid. In such cases a market-average or industry-average price (also referred to as yield) may be a suitable approximation.

Yield is derived as follows: first, sum all revenues for the relevant products over the relevant time period. Second, divide this number by the sum of the number of units sold over the relevant time period.

Such an approach may be suitable when one price is required for analysis but many different prices are paid by customers. This is the case, for example, in the airline industry where yield management typically leads to a wide spread of fares for the same route, and in supermarkets where the price per unit of a good is influenced by 'buy one get one free'-type

²⁰¹ See ICIS Heren, 'European Spot Gas Markets'; Argus, 'Power Europe'; OECD (2007); and Food and Agriculture Organization of the United Nations, 'FAOstat'.

offers. For example, in the *Ryanair/Aer Lingus* merger case, the average monthly yield was used.²⁰²

However, this approach will give an unbiased estimate only when the distribution of prices around the average is considered symmetric (ie, prices are evenly distributed around the average) and where there is relatively little volatility. When the distribution of prices paid is skewed (ie, there is a difference between the mean and median prices), issues surrounding the distribution of the damage between claimants may arise because this approach assumes that the average price is representative of the price paid by all customers.

Assuming that the arithmetic mean is used, the total amount to be paid out will be correct when the damage is estimated using a comparator-based or market-structure-based approach since the mean of a series (the market price) multiplied by the number of firms is always equal to the sum of the individual firm's price series. The distribution of the total damage may be affected by use of this approximation, since some claimants will be over-compensated and others under-compensated. This might occur in the following situations.

- Where yield management strategies are in use (such as airlines) to optimise the revenue based on the remaining quantity of a good to be sold. As discussed above, because the average price (or yield) varies considerably, the damage may not be uniformly distributed between all purchasers.
- The volatility of prices is high—for example, in energy markets where changes in temperature can cause price spikes, as the overcharge may not be constant in absolute terms.
- The goods or services sold by the members of the cartel are differentiated in terms of quality, and thus in terms of price.

4.6.3 How can gaps in a data series be filled?

Gaps in a data series can sometimes be filled by using imputation or interpolation.

Usage: Where there are gaps in the available data series.

Where there are gaps in the available data there are techniques available for predicting what those values might be. Data gaps may occur when:

- a firm in the cartel no longer exists;
- a cartel member has refused, or been unable, to complete a data request;
- data for a firm in the cartel is not available;
- a change or failure in a firm's information systems means that data is unavailable or inconsistent.

This approach is useful for completing a data series with short gaps; it is less suitable for longer gaps. For example, it may be appropriate to interpolate between two observations to fill in a single missing value, but if several years of data are missing, it is less likely that interpolation will provide an unbiased estimate.

The first method for filling gaps is imputation, which replaces the missing data with at least one possible response, and can be used to fill in gaps in cross-section and time-series data. The completed dataset can then be used to calculate damages over the cartelised period. Different methods of imputation exist but they all aim to use the existing data to predict what

²⁰² See Case No COMP/M.4439, *Ryanair/Aer Lingus*, Commission Decision of June 27th 2007.

the missing values could have been. The example in Table 4.9 uses a regression technique (in this example this is to impute prices, using volume as the explanatory variable).²⁰³

Table 4.9 Stylised example of data imputation and interpolation

	January	February	March	April	May
Observed price (€)	10.0	Missing value	13.0	12.0	13.0
Observed volume	100	91.0	76.1	81.4	75.3
<i>Imputed series (regression)</i>	10.0	10.9	13.0	12.0	13.0
<i>Interpolated series</i>	10.0	11.5	13.0	12.0	13.0

Source: Oxera.

An alternative to imputation is interpolation. This is used to calculate mathematically what a missing value might have been according to the known points either side of it. Interpolation can be used when the series is quite stable or predictable over time. The functional form of the series has to be identified (ie, is it reasonable to take the average or fit a linear or non-linear trend line through the data to interpolate the missing value?). It is also sometimes important to account for any seasonality in the series when interpolating, such that the imputed value is an unbiased estimate of what the missing value should have been. In the example in Table 4.9, a simple linear interpolation is used with no additional adjustments; this implies that the missing February value is halfway between the January (€10.0) and March (€13.0) values—ie, it is €11.5.

The key difference between imputation and interpolation is that interpolation uses only information on the data series which has the missing value in it (in the example above it uses data only from the price series), while imputation uses other information, such as volumes, to help predict the missing value.

²⁰³ Other approaches include random within-cell hot-deck, nearest neighbour within-cell hot-deck, cell mean, and expectation maximisation algorithms. See Montaquila and Ponikowski (1995).

5 Arriving at a final damages value

This final section of the report draws together the discussion in sections 2–4. It explains how the courts can apply the conceptual framework set out in section 2, and use the methods and models described in section 3, together with the further insights described in section 4, to arrive at a final value of the damages calculation. There are three elements to this.

- How to select the methods and models for estimating damages in the case at hand.
- How to choose a single damages value to be awarded to a claimant. This is to address the issue that, typically, more than one approach can be adopted to estimating the harm suffered by a claimant, with each approach potentially resulting in a different value of the damage.
- How, in practical terms, all the steps and options described in the sections above come together in a damages claim, and how various challenges may be overcome. This is demonstrated with two hypothetical examples: one of a damages action following a price-fixing cartel, and the other of a damages action following an exclusionary abuse.

5.1 Selecting methods, models and insights in a specific damages action

Section 3 describes the range of methods and models that can be used for estimating the various types of possible damage resulting from antitrust infringements. Comparator-based, financial-analysis-based and market-structure-based approaches can all be used. They cannot be ranked in terms of suitability. The choice of approach will depend on the details of each case, and, from an economic perspective, two main factors will influence this:

- the availability and quality of data and information;
- the availability and quality of the basis of the counterfactual used in a particular model.

In addition, these considerations about choice of approach will be dependent on the applicable legal rules; for example, those related to the required levels of evidence and to the burden of proof.

5.1.1 Availability and quality of data and information

All methods and models rely on the data and information that is available to populate and calibrate them. The potential sources for this data and information are discussed in section 2.6.

When more data is available, a wider range of methods and models can in principle be used in any given situation. Several of the more complex methods and models require significant amounts of data in order to be used at all (eg, difference-in-differences panel data regressions, discussed in section 3.5), while many of the simpler approaches can be used with more limited data (eg, difference-in-differences comparisons of averages, also discussed in section 3.5).

In general, the better the quality of the data, the more reliable the estimates that the methods and models produce are likely to be. However, quantity is not a substitute for quality; similarly, more complex techniques will not improve poor-quality data.

5.1.2 Availability and quality of the basis for the counterfactual

All the methods and models discussed in this report have, either directly or indirectly, a basis on which the counterfactual is constructed. For example, in the cross-sectional comparator-based approaches, the basis for the counterfactual is making comparisons across firms,

product markets and/or geographic markets. In the market-structure-based approaches the counterfactual is based on models of competitive interaction such as Bertrand or Cournot oligopoly.

The more of these bases for the counterfactual that are available, the more methods and models there will be to explore and use. As the quality of these bases improves (in terms of their usefulness, comprehensiveness and accuracy), the estimates produced are more likely to be robust and reliable. For example, the quality of a cross-sectional comparator market for use as a basis for a counterfactual price in a cartelised market might be determined by factors such as:

- whether that comparator market has itself been affected by cartel behaviour;
- the similarity of the product in that market;
- the similarity of the market structure (eg, is the degree and type of competition likely to be the same?);
- the similarity of the exogenous shocks (eg, changes in input costs) faced by the cartelised market and comparator market.

A judgment needs to be made in each case on factors such as these in order to determine the quality of the comparator being used.

The simpler techniques, such as comparisons of averages, which are straightforward to understand and calculate, are useful when the basis for the counterfactual is of a high quality such that it can be reliably expected to closely represent the counterfactual. When there are important factors that mean that the comparator may not mirror the counterfactual, these simple approaches should be employed with care, since they could over- or underestimate the counterfactual variables.

Factors such as differences in size (eg, different sized firms), macroeconomic conditions (eg, differences in inflation and growth), market characteristics (eg, how mature markets are) and exogenous shocks (eg, changes in regulations) can be controlled for in order to improve the comparability of the basis for the counterfactual and, consequently, the estimate of the damage. In such situations the more complex techniques such as panel data regressions, time-series econometrics, and various of the financial-analysis-based benchmarks for returns, may allow a more precise estimation than the simpler models of what would have happened without the infringement.

5.2 Choosing a single damages value

As this report has made clear, different methods and models are available for calculating a damages value. Indeed, in any given case it may be possible to apply more than one approach, using different models—and different assumptions within those models—and taking advantage of different available information. Furthermore, both claimants and defendants may offer differing estimates, perhaps using different approaches.

However, ultimately, the court needs to decide on the specific amount of damages (if any) to be awarded. Given that, as noted above, methods and models cannot be ranked, the main questions in any particular case would normally relate to whether specific methods or models have been applied reasonably and robustly to the case at hand, not to the use of one type of approach as such.

The economics literature has identified that when presented with multiple estimates of the same variable, two main solutions are available for selecting a single value: identify a

preferred approach (eg, one unique combination of modelling and data), or ‘pool’ a selection of reasonable approaches.²⁰⁴

- **Identify one method or model for the case at hand.** This involves focusing on the method or model that is most appropriate. The output from this model is then used as the best estimate of the harm.

Identifying a single model or single estimate has two potential advantages.

- It can provide more clarity for the court in terms of where each of the parties stands if both choose a single model, since each party is presenting a single construction of what the counterfactual would have been. This clarity means the court has to choose between only two models.
- It may be considered that certain modelling approaches are superior to others. Thus, if these preferable approaches have been applied, greater weight should be attached to them.²⁰⁵

Where models are sub-sets of each other, whether one model is superior can be tested statistically.²⁰⁶ For example, if two models use a similar approach to estimate a variable (eg, volumes), but one model includes an extra explanatory input (eg, the price of alternative goods) while the other model does not, it is possible to test statistically whether the additional explanatory input is improving the robustness of the estimate.

However, the forecasts produced by models can only ever be compared with the actual and not the counterfactual, as in a damages claim the counterfactual is available only through a process of estimation. As such, it is inherently difficult to determine how well any particular model performs against this target, and thus how well it performs relative to others.

- **Pooling model results.** This involves combining the results of each of two or more of the methods and models into a single value. One approach—which, according to the empirical economics literature, has been shown to be robust—is that of simply taking the mean average of the available forecasts.²⁰⁷ For example, if three robust models predict that the damages award should be €10.1m, €11.2m, and €12.0m, the pooled model result, using a simple mean average, would be €11.1m. This combined value can then be used as the best estimate of the actual harm.

It is not always appropriate to use estimates of the damages in such an averaging process, particularly if there are reasons to prefer one group of estimates over another. Indeed, when pooling modelling results, it is standard practice to remove approaches which have certain significant weaknesses (a process sometimes referred to as ‘trimming’), and also to take steps to avoid double-counting of similar approaches.

There are two main potential advantages to the pooling approach.

²⁰⁴ For a summary of the approaches available, see Timmermann (2006).

²⁰⁵ For example, the German Federal Court has indicated that it holds the view that cross-sectional (ie, yardstick) comparisons are superior to other methods, since this is a less abstract approach in which prices are being formed under real market conditions. See Box 3.10.

²⁰⁶ One model is a sub-set of another model if the first model contains all the same features as the second, but the second model contains additional features.

²⁰⁷ See, for example, Hendry and Clements (2004), which notes that ‘the combination of individual forecasts of the same event has often been found to outperform the individual forecasts’ (p. 1). Zarnowitz (1984) makes similar comments, noting that: ‘The group mean forecasts from a series of surveys are on the average over time more accurate than most of the corresponding sets of individual predictions’ (p. 23). Hendry and Clements also note that ‘simple rules for combining forecasts, such as averages (ie, equal weights), often work as well as more elaborate rules.’ Other forms of pooling are also possible, such as using weighted averages, or multi-stage averaging.

- When the models rely on different sub-sets of available data, combining the forecasts means that the final value reflects more of the underlying data (and hence more of the available information) than a single model alone. While it is theoretically possible to conceive of a ‘unified’ model that incorporates all the data sources of the individual models, it is often difficult to implement this in practice. Instead, pooling of different model results does create a form of ‘unified’ model, since it draws on all the approaches undertaken.
- Even when care is taken during the model estimation, there may be biases in the individual models due to the particular assumptions and model structure employed. Pooling the results is likely to help reduce these, as positive and negative biases tend to cancel one another out, at least to some extent.²⁰⁸ Furthermore, the direction and size of the biases may change over time in unpredictable ways, which can make it difficult to identify a single ‘best’ model; pooling the results of multiple models helps mitigate this potential problem.

While pooling has several advantages, it does need to be applied with care. It is most frequently used in cases where a single forecaster is attempting multiple approaches (eg, an expert in a damages action pooling across all estimates), or where multiple forecasters are all attempting to estimate the same value for the same purpose (eg, a group of court-appointed experts). Pooling the results from different experts on opposing sides can also work, but only if their approaches start from similar premises and datasets, and if any approaches with significant weaknesses are excluded from the pooling exercise.

Overall, the conclusion is that a range of methods and models can, in practice, be used for estimating the various types of damage that might result from antitrust infringements. The choice of approach will depend on the details of each case, and, in particular, on the availability and quality of data and information, and the basis of the counterfactual. In any given case, it may well be possible to apply more than one approach. Ultimately, the court needs to decide on the specific amount of damages (if any) to be awarded. The primary focus in any particular case would normally be on whether specific methods or models have been applied reasonably and robustly to the case at hand. The court can then either identify a preferred model for the case, or ‘pool’ a selection of reasonable and robust model results to arrive at a final damages value.

5.3 Hypothetical example: damages from a price-fixing cartel

As discussed in section 2, hardcore cartel agreements in a market can take the form of price fixing, market sharing, customer allocation or bid rigging. The harm caused by a cartel may include the harm from higher prices being charged to the purchaser, lower volume in the market, lower quality of the good or service, and lower levels of innovation in the market. This example focuses on a price-fixing cartel to illustrate the estimation of the damage due to a cartel overcharge.

The illustrative example considered here is that of a follow-on damages claim after a hypothetical decision by a national competition authority that there was a price-fixing cartel in the supply of fresh fish, for which it imposed fines. The decision indicates that the cartel was in operation from December 2006 to February 2009, and included all the members of the South Sea Fisheries and Wholesaler Organisation (SSFWO). The claim was brought by a national chain of seafood restaurants called The Herring (the claimant, ‘Herring’) against all members of the SSFWO that supplied it with fresh fish during the period identified by the competition authority.

²⁰⁸ If the biases are all in the same direction, combining forecasts would not eliminate the bias. However, this will not exacerbate it either. Thus, combining forecasts can be expected to reduce biases in general, since at least some elements of the biases across models are likely to be in different directions.

This example—and that in section 5.4—follows the conceptual framework in section 2 of this report, and illustrates how a combination of comparator-based, financial-analysis-based and market-structure-based approaches (discussed in section 3) can be used to quantify the damage, aided by some of the further insights discussed in section 4. These examples are not specific to any jurisdiction and do not seek to reflect how national legal rules might be applied to the case at hand. The emphasis here is on the quantification of the harm, and not on legal matters such as who bears the burden of proof at each stage of the quantification exercise or the level of proof that needs to be met.

As discussed in the conceptual framework in section 2, the first step of the estimation of damages is to determine the counterfactual scenario. This is informed by an analysis of the type of infringement, potential parties harmed, the characteristics of the market and data availability.

5.3.1 **The counterfactual stage: what type of antitrust infringement is causing what type of harm?**

As outlined in section 2.2, the approach to estimating damages depends on the nature of the infringement. The infringement considered here is a hardcore price-fixing cartel (prohibited under Article 101), the primary effect of which is to raise the price of fresh fish used by the claimant as an input.

The cartel may have had other direct effects such as a lower quality of fish supplied (eg, the wholesaling parts of the businesses may have taken longer to deliver fish, thereby affecting its freshness) and less innovation in the market (eg, less efficient production techniques). The associated harm can also be quantified, albeit not as easily as that from the overcharge. The cartel overcharge may also have had an indirect effect through a reduction in the volume of fish purchased and subsequently sold on by the restaurants, which may have resulted in a further loss to the restaurants.

In this example, Herring has claimed damages under the following two heads.

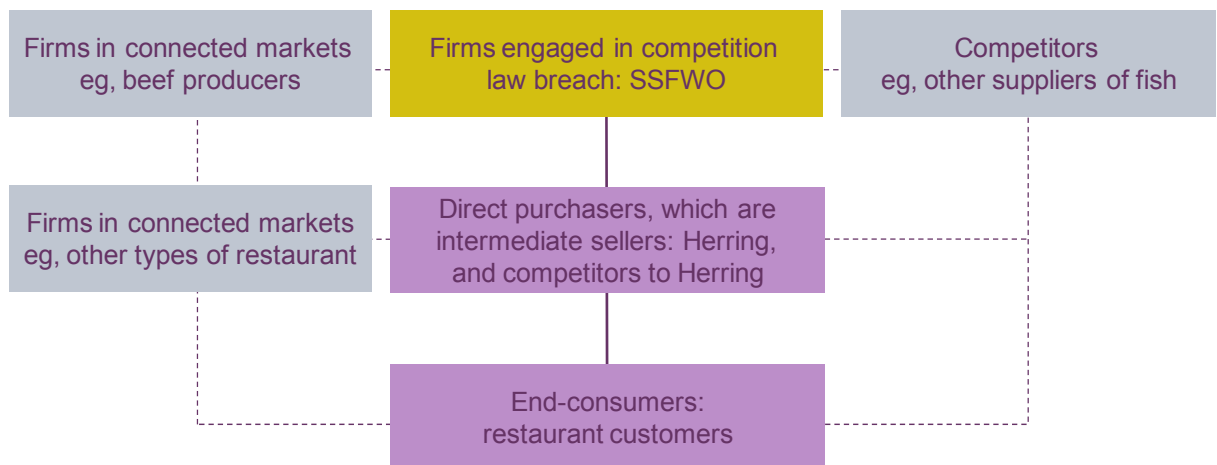
- **Actual loss due to paying the overcharge (*damnum emergens*).** This constitutes the reduction in profits from the volume of fish actually purchased by the claimants due to paying the overcharge.
- **Lost profits due to reduced volumes (*lucrum cessans*).** This constitutes the profits that claimants would have made on the additional meals sold due to the additional volumes of fish purchased had prices been lower.

5.3.2 **The counterfactual stage: who has been harmed?**

The claim was brought by a direct purchaser, Herring, but the competition authority decision identified the supply chain and the parties potentially affected by the cartel (see section 2.3). Figure 5.1 presents the supply chain in this example.

The most immediate harm from the price fixing by the SSFWO is that of the overcharge. Herring, one of the direct purchasers of the cartelised product, claimed that it had to pay a higher price for a product that is an essential input into its business. As noted above, Herring has claimed damages resulting from this under two heads: the actual loss from paying the higher price, and the lost profits due to reduced volumes.

Figure 5.1 The value chain in the relevant and related markets



Source: Oxera.

Other parties may also have been harmed due to the cartel. For example, restaurant customers may have suffered if part of the cost increase has been passed on to them in the form of higher restaurant prices. In this example the customers have not yet brought a claim. However, the issue of pass-on is relevant since it potentially affects the harm suffered by Herring.

Conceptually, parties that may have been harmed by (or benefited from) the infringement include participants in related markets—eg, in markets for potential substitute products such as meat. In this example, this would seem unlikely to be the case since the products are not close substitutes; however, this may have to be assessed empirically.

5.3.3 The counterfactual stage: what is the market and industry context?

As discussed in section 2.4, the amount of harm to the relevant parties will often depend on the specific features of the market such as the type of product (homogeneous or heterogeneous), number of competitors, and cost structures in the market. In this case, the market for the supply of fresh fish has the following characteristics.

- **The relevant product is a perishable intermediate good and is subject to unpredictable price and volume shocks.** The cartelised product purchased by the claimant is a perishable intermediate good in a relatively localised market. The suppliers supply a similar set of products to each restaurant according to their demand several times per week. The market is also potentially subject to industry-wide shocks such as an infection in stocks of particular species or an unexpected reduction in the population due to climatic conditions. It is important to consider any such shocks that may have occurred before or during the infringement period since the price charged by the defendants may have been higher for a certain period due to the limited supply and not due to the cartel agreement.
- **The market is primarily affected by local factors.** The market for the supply of fresh fish includes only five major suppliers in the country, all of which belong to the SSFWO and have been involved in the cartel. The five defendants are also active in packaging and exporting specific types of fish to neighbouring countries and further afield. However, most of the catch is sold locally through their respective sales units. Furthermore, analysis indicates that other potential competing suppliers of fish that are not members of the SSFWO generally find it prohibitively costly to import fresh fish since they are located long distances away.
- **Pricing behaviour of defendants is uniform across sales to all restaurants.** The prices charged by the defendants are typically uniform across sales to restaurants, and

the overcharge by the cartel is therefore likely to be similar for the claimant and its direct competitors.

- **There is limited scope for substitution to alternatives.** The market also supports some small independent suppliers in the area but their scale of operations is not sufficient to supply large quantities on a regular basis. Thus the scope of substituting the cartelised product by purchasing from these smaller suppliers is limited. Furthermore, the claimant is a chain of specialised seafood restaurants and the possibility of changing the menu to focus more on alternatives such as meat is therefore not viable.
- **The market is characterised by quotas imposed by the Common Fisheries Policy.** Any relevant regulation is also important to consider in the analysis of the harm to the parties. The fishing industry is regulated by the Common Fisheries Policy (CFC), which sets a quota for each country for each type of fish for each year. Consequently, each supplier of fish is also constrained by a quota, which it cannot exceed. These quotas are regularly revised through a review of the CFC by the European Commission. The presence of such a quota may affect the analysis since a price increase in a particular year can be due to a lower supply following restrictions of a lower quota for that particular year. If the relevant quota is not taken into account in the analysis, this price increase may be incorrectly attributed to the cartel and thus the estimated damage may be too high.

5.3.4 Variables and data sources for the damages estimation

The variables that are of interest when estimating the value of the damage relate to the specific steps in the quantification. These steps are outlined below.

- **Estimating the level of overcharge.** This requires data on the value of the factual prices charged by the defendants from December 2006 to February 2009, as well as an estimate of the value for the counterfactual price.
- **Translating the overcharge to a value of actual loss for the claimants.** Information is also required on the actual volumes of fish bought by Herring during the relevant period.
- **If invoked by the defendant, considering the level of pass-on.** Information on the prices charged by Herring to restaurant patrons over the relevant period would be required for such an analysis. Alternatively, or in addition, theoretical insights on pass-on, as presented in section 4.4, can be used.
- **Herring claiming for the harm from lost volumes.** To estimate this, additional information is required on counterfactual volumes that would have been purchased by Herring, and the profit margin per unit that Herring would have earned on its own sales.
- Taking into account other variables such as typical costs of the defendants and claimants, together with information on the market structure.

As set out in section 2.6, the possible sources of such data can be broad. Data on prices, volumes and costs of the five defendants and Herring can be obtained from the management accounts, invoices and sales databases; data on the typical market price, demand and other industry-level data can be sourced from fish industry studies, independently produced market reports, government publications and websites of other fish suppliers.

5.3.5 Methods, models, and insights

As discussed in section 3, three categories of methods and models can be used to estimate the counterfactual variables:

- **Comparator-based.** These models use data from sources that are external to the infringement to estimate the counterfactual. In this case, two data sources can be used:

- a time-series comparator in the form of prices charged by the defendants before (pre-December 2006) and after (post-February 2009) the infringement;
 - a cross-sectional comparator in the form of prices charged by similar but non-cartelised fish producers in another country. Prices in another product category such as frozen fish may not be appropriate in this case since freshness is a key driver of demand in the relevant market and the possibility of storage and remote supply of frozen fish might undermine the comparability of the two markets.
- **Financial-analysis-based.** These models have been developed in finance theory and applied in practice. They use financial information on comparator firms and industries, benchmarks for rates of return, and cost information from defendants and claimants to estimate the counterfactual. In this case, information on the costs and profit margins of the defendants could be compared with that of comparable suppliers in the fishing industry to assess whether the defendants made excessive profits. This estimate of illicit gain can then be used to estimate the harm to Herring.
 - **Market-structure-based.** These models are based on IO theory and use a combination of theoretical models, assumptions and empirical estimation to arrive at an assessment of the counterfactual situation. A homogeneous goods Cournot model provides some relevant insight into the counterfactual for this example since the product is reasonably homogeneous; and the market is characterised by quotas for each vessel according to the CFC, which imposes a maximum capacity of supply. The information on the defendants' costs can then be used to calibrate the model and estimate the counterfactual price.

The methods and models that can be used to estimate the price that Herring would have paid and the precision of the estimate depends crucially on the availability of the relevant data. This example focuses primarily on the choice and use of comparator-based approaches, which has the advantage of not requiring detailed data from defendants on costs, margins and profits.

In some damages cases the availability of detailed data may be limited because of the problems of disclosure or absence of complete records for either party. For the purpose of this example, two hypothetical scenarios with different levels of data availability and quality are considered.

- **High information availability.** This includes detailed data on weekly prices from December 2002 to May 2009 charged by the defendants; data on average monthly prices charged by similar suppliers in another country during the same period; and other information such as the costs of production for fish suppliers as well as restaurants, weekly quantities bought by the claimant, prices charged by the claimant to restaurant patrons, the size of the countries in terms of population, the number of seafood restaurants, and market shocks over the same period.
- **Low information availability.** This includes data on the defendants' weekly prices and costs from November 2006 to May 2009; data on weekly quantities of fish bought by the claimant; data on the claimant's prices to end-consumers; and high-level information of the average weekly prices in the various other countries, as well as market shocks during the period obtained from public domain sources (such as industry-specific websites providing information on prices, regulations, and industry reports).

Steps in the estimation of the harm

For each level of data availability, the set of feasible methods and the precision of the estimates vary. However, the steps required for the calculation of the damage, outlined below, are broadly similar.

In this case the steps for quantifying the overcharge paid by the claimant are as follows:

- a. estimate the overcharge (€);
- b. calculate the total volume of fish purchased by the claimant;
- c. (if the pass-on defence is invoked by the defendant) estimate the amount of pass-on for the claimant (€);
- d. (if the pass-on defence is invoked by the defendant) subtract c from a to calculate the net overcharge—ie, the part of the overcharge absorbed by the claimant and not passed on;
- e. multiply d and b to calculate the actual overcharge paid by the claimant.

The quantification of harm arising from lost volumes can be undertaken as follows:

- a. estimate the claimant's counterfactual sales;
- b. subtract a from actual sales to calculate the lost volumes;
- c. estimate the counterfactual profit per unit of sales of the claimant;
- d. multiply b and c to arrive at a value for lost volume.

The final step in the quantification of the harm to Herring is to aggregate the two types of harm along with any interest that might be due. The particular methods and insights that can be applied in each of these steps for the high and low information scenarios are discussed below.

High information availability scenario

When detailed data covering the pre-infringement period as well as another geographic market (eg, another country) is available, difference-in-differences and panel data regression (see section 3.5) can be used to estimate the counterfactual price. This approach can control for any difference in the quality of fish (or other unobserved characteristics) between suppliers in the two countries that might exist before and during the cartel period. This is important because a higher price for the defendant's product may be due to higher quality. Panel data regression could be used to estimate the increase in the difference in prices after December 2006, and could therefore estimate the overcharge caused by the cartel agreement. Other factors such as the size of suppliers, applicable quota restrictions, costs of production, number of restaurants in the country, and industry-wide supply shocks are useful to include as control factors in the regression since they may affect the level of prices, irrespective of the cartel agreement. This way the analysis can also help inform the assessment of causation.

Given the availability of comparisons over time and across unaffected firms, panel data regressions would be likely to lead to economically more robust results than simpler approaches since the estimates can control for more exogenous factors, which improves the quality of the comparator markets as a comparison.

One practical issue to consider is that the defendants' prices are available weekly, while those of other suppliers are available for each month. It is therefore necessary to transform the data to either weekly or monthly series. The weekly prices of defendants can be used to calculate average monthly prices and the panel regression would then involve monthly prices.²⁰⁹ The other more complex alternative is to use data-imputation techniques to transform all data to a weekly level.²¹⁰ In this case, all variables are transformed to monthly data since this is straightforward and there are sufficient observations.

In this example a panel data regression was used to estimate the overcharge. It used monthly data covering the period both during (ie, December 2006 to February 2009) and after the infringement (ie, the remainder of 2009), and included data on the country under analysis plus data on four comparator countries. The regression included controls for all the variables mentioned above (eg, size of suppliers, applicable quota restrictions, costs of

²⁰⁹ The other weekly or daily variables can similarly be transformed into monthly data.

²¹⁰ Put simply, this involves filling in the gaps in the prices of other suppliers to estimate weekly prices (see section 4.6).

production). These controls allowed the use of all four of the comparator countries; as discussed below, when controls are not available the number of useful comparators may be reduced.

The regression identifies the price effect of three factors:

- the price effect of trading in the cartel market at any point in time;
- the price effect of trading during the infringement period both in the cartel market and the non-cartel market;
- the joint price effect of trading in the cartel market in the infringement period.

It is this joint price effect that gives a direct estimate of the overcharge. The results from the regression estimate the cartel overcharge to be €1.3/kg, which is equivalent to 17% of the average cartelised price of €7.8/kg.

Low information availability scenario

When data for the pre-infringement period is not available or is limited, time-series or panel data techniques often cannot be used. In such cases, cross-sectional comparisons, such as comparing average prices of defendants during the infringement with the average prices in other countries, may be useful. However, it is important to select only those countries that are sufficiently similar to the relevant country in terms of characteristics such as population and number of seafood restaurants (which would affect the ultimate demand for the cartelised product), location (which might affect costs of production and transport costs), and number of suppliers (which would affect competition). These differences in characteristics between countries could be controlled for if panel data regression had been used, but not in this comparison of averages. In this example, two of the four comparator countries used in the high information scenario fit these criteria. The other two are insufficiently similar.

Even within these two comparable countries, only the prices of suppliers that are reasonably similar in factors such as scale, costs and individual fishing quotas are likely to be useful. This is because a simple average cannot control for the differences across markets and a high similarity ensures greater precision of the counterfactual.

Using the above approach, if the average price in the country during the infringement was €7.8/kg, and the average prices of comparable suppliers in two comparable countries are €6.2/kg and €6.4/kg, the overcharge can be calculated as $€7.8 - \frac{€(6.2+6.4)}{2}$ —ie, €1.5/kg or 19% of the cartelised price.

Estimation of pass-on

In this example, the defendants successfully invoked the pass-on defence. They argued initially that 100% of the overcharge was passed on to end-consumers. In particular, they reasoned that since the cost of fish is a reasonably small proportion of the total cost of the food sold by claimants (once costs such as wages are taken into account), the overcharge has led to only a small increase in menu prices, and the claimant has been able to pass on the overcharge. To support the plausibility of their argument, the defendants also referred to empirical economic studies that show that pass-on in markets such as petrol and agricultural products tends to be around 100%.

The degree of competition in Herring's market, and the degree of uniformity of the price rise faced by Herring and its direct competitors are important considerations in estimating the pass-on rate (see section 4.4).

- **Competition in the claimant's market.** This is somewhat limited in this example, since there are a small number of seafood restaurants in the country and each has a strong brand.
- **Uniformity of the cost shock.** The defendants charge uniform prices to all restaurants for the supply of fresh fish and hence all seafood restaurant chains have been subject to

the same overcharge. The claimant does face some competition from other non-specialised restaurants since customers could switch to restaurants serving mainly meat dishes if prices of seafood dishes are too high; these rivals have not faced the cartel overcharge. However, available empirical evidence suggests that such competition is likely to be limited.

- The uniformity of the cost shock and the limited degree of competition between fish restaurants was used by the claimant to argue that the pass-on rate is likely to be closer to 50% than 100% (see section 4.4).
- To further counter the defendant's arguments on pass-on, the claimant undertook an empirical analysis. This was based on its own historical menu prices—comparing prices before and during the infringement—and data on fish input prices, indicating a pass-on of at most €1.0/kg (ie, a pass-on rate of between 67% and 77%).
- The court chose to accept the €1.0/kg estimate. This was used to adjust downward the net overcharge to the claimant. The net overcharges in the high and low information scenarios were therefore accepted as €0.3/kg and €0.5/kg respectively.

Calculating the harm from the overcharge

The next step in the estimation of the harm is to calculate the total overcharge harm. The amounts purchased by the claimant from the cartellists can be multiplied by the net overcharge estimate to calculate the actual loss for the claimant. This can be done for each month or week depending on the level of disaggregation of the data. In this case, weekly quantities bought by the claimants can be used to calculate the actual loss. The total volume bought by Herring during the period was 300,000kg. The actual losses, using the overcharge of the high and low information scenarios, are then equal to $€0.3 \times 300,000 = €90,000$ and $€0.5 \times 300,000 = €150,000$ respectively.

Estimation of lost volume

The first step of calculating the lost-volume harm is to estimate the lost volumes. The part of the overcharge passed on to consumers was €1.0/kg. This translates to around €0.25 per dish sold (each dish requires on average of around 0.25kg of raw fish). The average price of seafood dishes at The Herring during the cartel was calculated to be €12 (therefore, €0.25 of the €12, or 2.1%, represents the overcharge passed on to the restaurant price). To estimate the lost volume, a recent academic study of consumer willingness to pay for seafood was used to derive consumer sensitivity to price changes (price elasticities).

The study estimated a price elasticity of -0.7 (meaning that a 10% price increase would lead to a 7% fall in demand). The Herring can be expected to bear all of this lost volume as it does not serve non-seafood dishes, thus its diners could not switch to non-seafood options, thus implying that the restaurant price increase of €0.25 resulted in a decrease in volume of 1.5% ($2.1\% \times -0.7$).

The 1.5% volume loss, along with the number of customers during the infringement, could be used to identify how many more customers The Herring would have had if the infringement had not taken place. Herring estimates that it had 1m customers during the infringement period. This suggests that it could have served an extra 14,583 customers.

Calculating the harm from lost volume

To convert the total lost volume of the claimant, as estimated above, to a reduction in profits, information on the profit per unit of the claimant can be used. It is important that counterfactual profit per unit is used since profitability may have been affected by the cartel (eg, due to the less-than 100% pass-on), which would mean that the factual profit would be lower than the counterfactual profit in this case.

The claimant argues that its profit per unit/profit margin prior to the infringement was a good comparator, and could therefore be used to estimate the counterfactual profitability. To assist

in its analysis, the claimant drew on the economic insight (set out in section 4.3 of this report) on what profit margin to use when conducting a damages estimation. As the cartel affected only the direct costs of the business, the claimant argued that the gross profit margin was the appropriate measure to use. This analysis indicated that the counterfactual gross profit per unit was €5 per seafood dish in the pre-infringement period. Thus, if the total lost volume of a claimant is estimated to be 14,583 customers over the infringement period, the effect on the claimant's profit would be €72,917 (14,583 multiplied by €5; the result does not match exactly due to rounding).

5.3.6 From the counterfactual stage to a final damages value

The next step in the assessment, as discussed in section 2.5, is to arrive at a final value of damages. The losses quantified need to be aggregated using the appropriate adjustment to different types of harm or the same harm at different points in time.

There are two elements to this final step.

- **Summation of different losses, if the damages claim involves different types of harm.** In this case, the harm claimed is for loss from paying the overcharge and for lost volume resulting from the overcharge. Both types of harm have been quantified in monetary terms over the same period and the total harm is €72,917 + €90,000 = €162,917, and €72,917 + €150,000 = €222,917 in the high and low scenarios respectively.
- **Summation of losses over time, if the damages claim stretches over multiple years and the calculation of interest due, if there is a time lag between the occurrence, award and/or payment of the damage.** In this jurisdiction the claimant is entitled to claim for statutory interest, compounded monthly from the date of the harm occurring to the date on which damages are due to be paid—ie, in September 2009. The statutory annual compound interest rate is 10%, equivalent to a monthly rate of 0.83%. The total harm of €162,917 (high scenario) and €222,917 (low scenario) is equally distributed over the 27 months of the infringement—ie, December 2006 to February 2009. The monthly damage of €6,034 (€162,917 divided by 27 for the high information scenario) is uprated to the end of the infringement period—ie, February 2009—according to the relevant discount factor for each month, starting December 2006. The sum of the value of the damages for each of the 27 months as at February 2008 is €183,371 (high information scenario) and €250,904 (low information scenario). This estimate is further uprated at the same rate to obtain the final value of the damage as at September 2009.

The total monetary harm calculated using each method for each data scenario can then be aggregated to the final value using the interest rate as described above. In this example, only one method has been applied for each of the two levels of data availability. Thus the issue of choosing which final value to use (see section 5.2) does not arise.

Table 5.1 summarises the calculations used in this price-fixing cartel example, including the calculation of the damages estimate using the high information scenario.

Table 5.1 Calculations in the price-fixing cartel example

Description	Values
Overcharge	
Average price paid by Herring for raw fish during the infringement (€/kg)	7.8
Estimated overcharge in high information scenario—difference-in-differences panel regression: (€/kg)	1.3
Estimated overcharge in low information scenario—cross-sectional comparison of averages (€/kg)	1.5
Pass-on	
Empirically estimated pass-on rate (€/kg)	1.0
Percentage pass-on rate: high–low information (€ pass-on rate / average price paid) (%)	67 (high) 77 (low)
Overcharge not passed on: high–low information (average price paid – € pass-on rate) (€/kg)	0.3 (high) 0.5 (low)
Calculating the harm from the overcharge	
Factual volumes sold (kg)	300,000
Harm from overcharge: overcharge in high–low information scenarios (overcharge not passed on × factual volumes) (€)	90,000 (high) 150,000 (low)
Lost volume	
Empirically estimated pass on rate (€/kg)	1.0
Pass-on rate on a per-dish basis (each dish contains 0.25kg of raw fish) (€/dish)	0.25
Average price per dish of seafood in factual (€)	12.00
Increase in price per dish (pass-on rate per dish / factual price per dish) (%)	2.08
Price elasticity of demand	–0.7
Volume loss (increase in price per dish × price elasticity) (%)	1.46
Factual volume of customer dishes	1,000,000
Counterfactual volume of customer dishes	1,014,583
Lost volume of customer dishes (counterfactual volume – factual volume)	14,583
Calculating the harm from the lost volume	
Margin per dish not sold (€/dish)	5.0
Lost profits: harm from volume loss in high information scenario (lost volume of customer dishes × margin per dish not sold) (€)	72,917
From the counterfactual stage to a final damages value	
Total harm, not including interest, high–low information (overcharge harm + volume loss harm) (€)	162,917 (high) 222,917 (low)
Statutory annual compound interest rate	10%
Total harm, including interest at February 2009, high–low information (€) ¹	183,371 (high) 250,904 (low)
Total harm, including interest at September 2009, high–low information (€) ¹	194,339 (high) 265,911 (low)

Note: ¹ These assume that the harm occurs equally for each month of the infringement—ie, the € 162,917 is equivalent to €6,034 for each of the 27 months of the infringement.
Source: Oxera.

5.4 Hypothetical example: damages from an exclusionary abuse

This example concerns a hypothetical exclusionary abuse under Article 102 that resulted in foreclosure. As discussed in section 2.2, exclusionary abuses can take many forms including exclusive dealing, tying and bundling, predation, refusal to supply and margin squeeze. The following is a case in which loyalty-inducing contracts between a dominant airline, Charlemagne Air, and travel agencies led to the partial foreclosure to competitors of the market for domestic scheduled airline services. In this example, a private stand-alone action was brought by the sole competitor airline operating in the market, Bonaparte Air, concerning

these loyalty schemes, which were in force from March 2003 to December 2007. Bonaparte was the first airline to enter the market in competition with Charlemagne, shortly after the airline market was fully liberalised in 2002 after the country's accession to the EU. Prior to this there were no significant rivals offering domestic scheduled services. Bonaparte was growing rapidly, and had a target to achieve a 50% market share by 2004. No other airlines entered the market until 2008.

While the proceedings in private damages litigation vary depending on the Member State in question, it is assumed for simplicity that the claimant has proved that the infringement has taken place. This has demonstrated that Charlemagne Air is dominant and has engaged in an exclusionary abuse under Article 102. Such loyalty-inducing contracts are not always anti-competitive. However, the court, taking an effects-based approach, found that the loyalty payments led to substantial harm to competition because there were no other significant routes to access the market for competitors. The court therefore ruled that these contracts were illegal and that damages must be awarded to the claimant. This example illustrates the quantification of these damages.

The first step would be to estimate the counterfactual scenario by considering the type of infringement, the parties being harmed, market structure and the availability of data.

5.4.1 The counterfactual stage: what type of antitrust infringement is causing what type of harm?

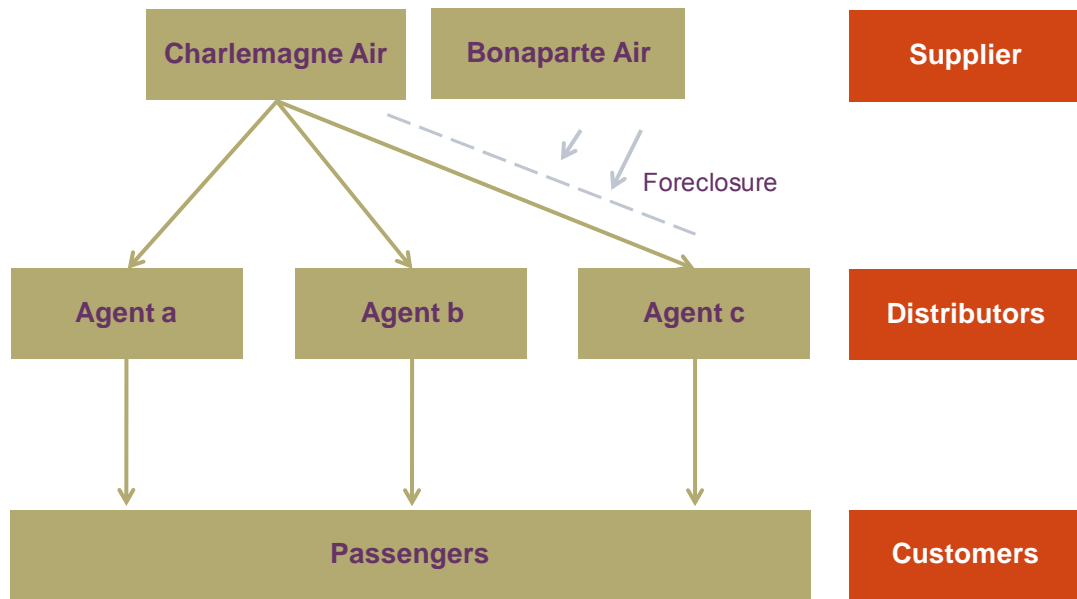
In this example, the competition law infringement is an exclusionary abuse of dominance. Charlemagne Air foreclosed the market to its competitor Bonaparte Air (and also to other potential rivals) by entering into loyalty-inducing agreements with downstream intermediaries—ie, travel agencies. In particular, Charlemagne Air's agreements offered loyalty-inducing incentive payments, which provided higher commissions to travel agents on all sales if the agent substantially increased sales of Charlemagne Air flights compared with the previous year and in relation to rival airlines.

As discussed in section 2.2, the primary harm to a competitor arising from an exclusionary conduct is usually a fall in profits. In this case, it is claimed that Charlemagne Air's agreements with the travel agencies reduced the market share of Bonaparte Air over the period of the infringement, which in turn resulted in a reduction in its profits.

5.4.2 The counterfactual stage: who has been harmed?

The next step in the analysis is to consider who has been harmed (see section 2.3). In this case the only claimant is Bonaparte Air, which has been harmed due to the partial foreclosure of the market by its competitor, Charlemagne Air. It has faced restricted access to the downstream market owing to the strong incentive schemes provided by Charlemagne Air. Figure 5.2 illustrates the structure of the market.

Figure 5.2 Harm arising from the exclusionary conduct



Source: Oxera.

In addition to Bonaparte Air, end-consumers (passengers) could also have been harmed due to restricted choice and greater effort by agencies to promote Charlemagne Air’s tickets over Bonaparte’s. The most immediate impact is that they may have been denied the choice of Bonaparte’s flights. The potential longer-term impact is that the exclusionary behaviour reduces the competitive pressure on Charlemagne, which could result in higher prices for flying with Charlemagne (and also potentially lower quality). Furthermore, as the loyalty-inducing incentives provided by Charlemagne Air were retained by the travel agents and not passed on to the consumers in this case, there is no offsetting reduction in price. Finally, potential entrants are also likely to have been foreclosed from the market by Charlemagne’s incentive schemes. These potential claims have not been brought to court in this example and are therefore not discussed further.

5.4.3 The counterfactual stage: what is the market and industry context?

As discussed in section 2.4, the amount of harm suffered from an infringement depends on particular features of the market such as the type of product, cost structures of the parties and the pricing behaviour. It is, therefore, important to consider the features of the air travel market in this example.

- **There were only two players in the market.** During the period of infringement, there were only two players in the market. In December 2008, a third operator, Alexander Jet entered the market; Alexander Jet is primarily a low-cost carrier and is branded as such.
- **There were entry barriers during the infringement period.** Barriers to entry and exit are an important consideration in the overall economic analysis of the market. Capacity constraints (eg, limited runway and terminal capacity) at several strategic airports in the country in question, combined with rules that existing airport landing slots are to be retained by the incumbent airline, mean that there were various barriers to entry during the period in question (in addition to the foreclosing effect of the Charlemagne Air contracts themselves). These capacity constraints were substantially eased towards the end of the infringement period. Not including these other constraints in the analysis of the counterfactual might result in overestimation of the counterfactual volumes for the claimant, since it would have faced these constraints even in the absence of the infringement.

- **Differences in cost structures.** In this case, Bonaparte Air and Charlemagne Air are reasonably similar in terms of fixed and operating costs—eg, both own the majority of their aircraft (they lease the remaining aircraft), they pay the same regulated airport charges, and the staff costs are relatively similar. However, despite these similarities, overall, Bonaparte is somewhat less efficient than Charlemagne, in part because of its lower scale and shorter experience in the market. This is relevant for the application of the market-structure-based models, as illustrated below.

5.4.4 Variables and data sources for the damages estimation

As outlined in section 2.6, the next step is to consider variables and data sources for the calculation of the harm to Bonaparte. Information on prices, volumes and costs of the claimant can be obtained from a range of sources such as management accounts, invoices and sales databases. In this case, while quarterly and annual financial reports are published and are easily available for the company, invoices and prices of individual tickets sold are not readily available for Bonaparte Air. Table 5.2 provides a brief summary of the relevant variables for estimating the damages and the sources that could be used in this case (this is based on Table 2.2).

Table 5.2 Variables of main relevance to estimating damages from exclusionary conduct

Variable representing the harm	Other relevant variables when claimant is competitor	Available sources in this case
Fall in profits	Factual and counterfactual volumes sold by the competitor	Quarterly financial reports and market-structure-based models
	Factual and counterfactual prices charged by the competitor	Quarterly financial reports
	Avoided costs if volumes are reduced	Quarterly financial reports
	Discount rate	Cost of capital calculated by economic consultants using publicly available data (including stock market information, interest rates)

Note: The sources for variables suggested above are for illustrative purposes only and can vary on a case-by-case basis.

Source: Oxera.

5.4.5 Methods, models, and insights

As discussed in section 3, three categories of methods can be used to estimate the counterfactual price, market share, profit margins and avoided costs:

- **Comparator-based**—these models use data from sources that are external to the infringement to estimate the counterfactual. In this case, two comparators can be used to determine the counterfactual market share, which in turn will inform counterfactual volumes: i) market share of the claimant before March 2003; and ii) market share of similar entrants in another country.
- **Financial-analysis-based**—these models use financial information on comparator firms and industries, benchmarks for rates of return, and cost information on defendants and claimants, to estimate the counterfactual. In this case, information on the revenues, costs and profit margins can be used to determine the counterfactual revenues.
- **Market-structure-based**—these models are based on IO theory and use a combination of theoretical models, assumptions and empirical estimation to arrive at an assessment of the counterfactual situation. In this example, the features of the airline industry in this country during the infringement period indicate that competitive dynamics in the absence of the foreclosure would have been driven by airlines choosing capacity in advance of

the scheduling season (which lasts around six months), and then competing on price in the season. This suggests that a Cournot model may provide some insight to this case (as discussed in section 3.8).

The application of the above-mentioned methods and models depends on the availability of data. Since the data on invoices and prices of each ticket sold is available only from January 2008—due to the introduction of new (hypothetical) regulations in the airline industry, which require more transparent and detailed book keeping of sales and costs—it is relatively difficult to apply the before-and-after approach to determine the counterfactual.

This example therefore focuses on the use of financial-analysis-based and market-structure-based approaches to estimate the harm to Bonaparte Air. The detailed steps in the quantification are described below.

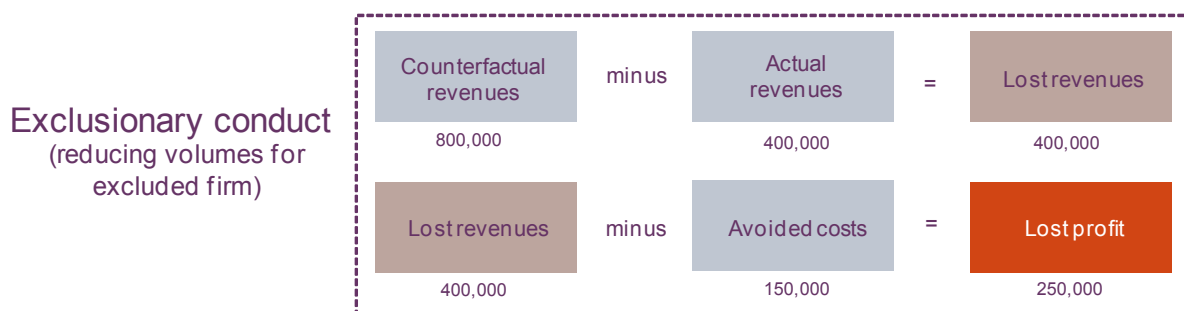
Steps in the estimation of the harm from exclusion

To estimate the harm in this case, the following steps are followed:

- estimate the counterfactual revenue per unit, namely revenue that Bonaparte Air would have earned per ticket in the absence of Charlemagne’s exclusionary behaviour during the period;
- estimate the counterfactual market share of Bonaparte Air to calculate counterfactual volumes;
- multiply a and b to calculate the estimate for counterfactual revenues;
- subtract actual revenues from the counterfactual revenues to calculate the estimate of lost revenues;
- estimate avoided costs associated with the reduced level of revenue actually earned by Bonaparte Air;
- subtract e from d to calculate the reduction in profit suffered by Bonaparte Air.

Figure 5.3 illustrates the framework for calculations used by the claimant and accepted by the court in this case.

Figure 5.3 Framework for calculations in this case



Note: This figure is as per Figure 2.3, but with calculations added reflecting the details of this case.
Source: Oxera.

To estimate the counterfactual revenue and avoided costs, financial-analysis-based approaches have been used with financial data on costs of various inputs, revenues and profits of Bonaparte taken from its detailed financial accounts. To estimate the counterfactual market share, market-structure-based approaches have been used in this example.

Use of factual data: counterfactual revenue per unit

Bonaparte Air argued that its counterfactual revenue per unit would have been higher in the absence of the infringement, since it would have had better access to the market and not had to discount tickets to such an extent in order to attract customers. However, this argument was not accepted by the court as Bonaparte Air was not able to provide any evidence. Instead, the court accepted a more conservative assumption that the average revenue per

unit would not have been affected by the infringement. Thus, the factual revenue per unit charged was used to approximate the counterfactual revenue per unit.

The average revenue per unit for the infringement period was obtained from the financial accounts of the company. Revenue data is divided by the total number of tickets sold to obtain the average revenue per tickets sold. This indicated that the average revenue per ticket was €200. The calculation of the profit margin requires this revenue per unit.

Use of market-structure-based models: counterfactual market share and volumes

IO theory has developed a range of models of competitive interactions and firm behaviour that predict a variety of outcomes. The structure and assumptions behind each model should be compared with the market type and features of the affected market while choosing a model.

As discussed in this section, the Cournot model provides a useful representation of a market which is characterised by capacity setting followed by price competition. Importantly, the cost structures of Bonaparte Air and Charlemagne Air are somewhat different. Given these characteristics of the market, the claimant argued that competition in the counterfactual would be best represented as a Cournot model with homogeneous goods and asymmetric costs.

Cournot competition with two firms and an asymmetric cost structure, with Charlemagne being more efficient than Bonaparte, provides an estimate of the market shares (certain other assumptions also need to be made—eg, regarding the shape of the demand curve). In this case the cost differences mean that the model predicts a 40% market share for Bonaparte and a 60% market share for Charlemagne. (The intuition of this is that the greater the cost disadvantage faced by the Bonaparte, the smaller the market share it will achieve).

Charlemagne argued that this assumption was likely to overestimate Bonaparte's counterfactual market share, since other airlines may also have entered in the absence of the foreclosure. However, the court rejected Charlemagne argument, noting that it was inconsistent with submissions it had made when defending the liability portion of this stand-alone action; in these, Charlemagne had argued that there would have been no new entrants even in the absence of its loyalty-inducing contracts. The court also rejected arguments by Charlemagne that other factors might have caused Bonaparte's low market share, such as its less developed management structure, and adverse macroeconomic events.

The court therefore concluded that Bonaparte Air would have had around a 40% counterfactual market share. This is substantially more than the company's actual market share: Bonaparte Air had an average of a 20% market share during the infringement period. The average lost volumes per month are determined by multiplying the lost market share (ie, 20%) by the total passengers that travelled on average per month. This information was available from financial reports for both Bonaparte Air and Charlemagne Air. Charlemagne Air had sales of 8,000 tickets per month on average. The total market volume was 10,000 (8,000 tickets sold by Charlemagne Air + 2,000 tickets sold by Bonaparte Air). Thus, the lost volume per month for Bonaparte Air is 2,000, which is 20% of the total volume sold in the market.

Counterfactual, factual, and lost revenue

The lost volume derived above can be used to calculate the lost revenue directly by taking the average revenue per ticket of €200. Bonaparte justified the use of this assumption based on the economic insight (presented in section 4.6) that average yield can be used to approximate price. The approach was argued to be appropriate in this instance because one price is required for this analysis (in order to calculate revenues), even though passengers pay many different prices. Using the €200 value results in a lost revenue of €400,000 per month.

It is also useful to derive the counterfactual and factual revenues to link this back to the individual steps set out in Figure 5.3 above. The counterfactual revenue is calculated by combining the previous two steps: the counterfactual volume of 4,000 per month is multiplied by the average revenue per ticket of €200. This gives a counterfactual revenue of €800,000 per month. The factual revenue was €400,000 per month on average. The difference between these two is equal to the estimated lost revenue of €400,000 per month.

Use of financial-analysis-based approaches: avoided costs

The next step is to identify the avoided costs—ie, the relevant costs not incurred as a result of Bonaparte Air carrying fewer passengers due to Charlemagne Air's conduct. The claimant accepted the point made by the defendant that such avoided costs should be accounted for in the quantification. These costs could include costs of extra ticketing, catering and higher fuel costs. The claimant used a bottom-up costing approach which involved analysing the cost structures to determine the avoided costs that would have been incurred in the counterfactual scenario.

There are three ways in which Bonaparte Air could have carried the additional passengers in the counterfactual:

- utilising empty seats on existing flights;
- using existing planes to make additional flights;
- leasing (or buying) additional planes to make additional flights.

Each has distinct avoided costs associated with it: carrying additional passengers in otherwise empty seats clearly corresponds to the lowest avoided costs, since Bonaparte Air would have simply flown without these passengers on board. If, in order to carry these additional passengers, additional planes needed to be leased, this would have implied the highest level of avoided costs.

The claimant provided estimates of the factual capacity used with the existing volumes sold during the period of the infringement and demonstrated that, on average, only 40% of the seats on the Bonaparte Air flights were occupied. In contrast, Charlemagne consistently achieved 80% occupancy. The analysis on lost volume (see above) indicates that existing Bonaparte flights were capable of carrying all extra passengers while not exceeding an 80% occupancy on average.²¹¹ Thus Bonaparte argued that avoided costs could be calculated by estimating the marginal cost of flying passengers on existing planes.

The information in the financial reports provides a detailed breakdown of operating costs. These were used to calculate the average avoided costs of €75 per passenger (eg, the costs of ticketing, in-flight meals, additional baggage handling, airport fees and additional newspapers).

This can be converted into a total avoided costs estimate by multiplying it by the lost volumes (ie, 2,000 per month). This gives a total value of avoided costs of €150,000 per month on average.

Reduction in profit due to lost volumes

The reduction in profit is calculated by subtracting the avoided costs (€150,000) from the lost revenue (€400,000). This gives a reduction in profit per month of €250,000 on average. The exclusionary conduct occurred for 58 months, so the total harm equals €14.5m (€250,000 × 58).

²¹¹ The lost-volume analysis suggests a doubling in passenger volumes, which would double Bonaparte's occupancy to 80%.

5.4.6 From the counterfactual stage to a final damages value

Summation of different losses, if the damages claim involves different types of harm

The harm, in this case, is from lost market share only and different types of harm do not need to be summed.

Summation of losses over time and calculation of interest

As discussed in section 2.5, from an economic perspective, the summation or movement of cash flows over time needs to take account of inflation and the opportunity cost of the reduction in profit. This then also covers the legal requirement of applying interest.

In this jurisdiction it is standard practice to account for these factors by allowing damages claims to be uprated to the end of the infringement period using the claimant's cost of capital. Bonaparte commissioned economic consultants to calculate its cost of capital using publicly available sources, including stock market data (both on itself, as it is a publicly traded company, and on other comparator companies), interest rates, and details about Bonaparte's debt levels. The analysis used a statutory corporate tax rate to calculate the cost of capital given the complexities associated with estimating Bonaparte's effective tax rate (see the economic insight presented in section 4.5). The report concluded that the firm's average annual cost of capital was equal to 12.5% pre-tax for the relevant period. The court accepted this value. The harm (€14.5m) was therefore uprated on a monthly basis at this rate to the last date of the damages period (ie, 58 months between March 2003 and December 2007), which gives a damage value of €20.0m (rounded).

In this jurisdiction, the value of the damage as at the end of the infringement period is further uprated to the date of payment at a statutory interest rate of 6.5% per annum compounded annually. This would result in a damages award of €21.6m or €23.0m if the defendant makes payment in March 2009 or March 2010 respectively. Table 5.3 summarises these calculations.

Table 5.3 Calculation of the damage in the exclusionary conduct example

Description	Estimates
Use of factual data: counterfactual revenue per unit for Bonaparte	
Factual revenue per unit (average price per ticket), used as estimate for counterfactual revenue per unit (€/ticket)	200
Use of market-structure-based models: counterfactual market share and volumes	
Total market volume (on average per month)	10,000
Bonaparte Air's factual market volume (on average per month)	2,000
Bonaparte Air's factual market share (on average per month) (%)	20
Bonaparte Air's counterfactual market share, estimated by the asymmetric costs Cournot model (on average per month) (%)	40
Bonaparte Air's lost market share (counterfactual market share – factual market share) (%)	20
Bonaparte Air's lost volume (lost market share × total market volume)	2,000
Bonaparte Air's counterfactual volume (counterfactual market share × total market volume)	4,000
Counterfactual, factual, and lost revenue	
Bonaparte's counterfactual revenue (counterfactual volume × counterfactual revenue per ticket) (€)	800,000
Bonaparte's factual revenue(€)	400,000
Bonaparte's lost revenue (counterfactual revenue – factual revenue) (€)	400,000
Use of financial-analysis-based approaches: avoided costs	
Bonaparte's avoided costs per passenger (€/ticket)	75
Bonaparte's total avoided costs (avoided costs per passenger × lost volumes) (€)	150,000
Reduction in profit due to lost volumes	
Reduction in profit, on average per month (lost revenue – avoided costs) (€)	250,000
Reduction in profit, total not uprated (average harm per month × 58 months) (€)	14,500,000
From the counterfactual stage to a final damages value	
Pre-tax cost of capital: annual (%)	12.5
Value of damage uprated by cost of capital as at December 2007	19,982,432
Statutory interest rate: annual (%)	6.5
Value of damage for the first quarter as at March 2009	21,628,987
Value of damage for the first quarter as at March 2010	23,034,871

Source: Oxera.

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All legal cases referred to in this report are listed below. This is not meant to be a comprehensive list of damages actions that have been brought in courts in Europe or elsewhere.

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