



**Study on the conditions of
claims for damages in case of
infringement of EC competition rules**

**ANALYSIS OF ECONOMIC MODELS
FOR THE CALCULATION OF DAMAGES**

Prepared by Emily Clark, Mat Hughes and David Wirth

**Ashurst
Avenue Louise 489
1050 Brussels
tel +32 2 626 1900
fax +32 2 626 1901**

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CONTENTS

EXECUTIVE SUMMARY	4
PART (I): OVERVIEW OF DAMAGES CALCULATION.....	7
1. INTRODUCTION	7
2. PRINCIPLES UNDERPINNING DAMAGES CALCULATIONS.....	10
THE COUNTERFACTUAL	10
DAMAGED PARTIES AND LEGAL STANDING (ELIGIBILITY).....	11
3. CALCULATING DAMAGES IN CARTEL CASES	17
CALCULATING OVERCHARGES.....	17
THE "BEFORE-AND-AFTER" APPROACH	17
THE "YARDSTICK" APPROACH	19
COST-BASED APPROACH	19
PRICE PREDICTION.....	21
THEORETIC MODELLING (SIMULATION).....	24
BENEFITS TO DEFENDANTS FROM OVERCHARGING.....	27
SUMMARY	27
4. PASSING ON.....	30
AN OVERVIEW OF THE DETERMINANTS OF PASS THROUGH.....	31
MEASURING THE IMPACT OF PASSING ON	33
5. CALCULATING LOSS OF PROFIT/LOSS OF GOING CONCERN	35
A FRAMEWORK FOR CALCULATING LOST PROFITS	35
ACCOUNTING MEASURES OF LOST PROFITS.....	37
EARNINGS BASED VALUATIONS.....	37
OTHER APPROACHES.....	38
TYPES OF ANTITRUST CASES WHERE LOST PROFITS PROVIDE A MEASURE OF DAMAGES.....	40
6. CONCLUSIONS.....	42
PART (II): OVERVIEW OF DAMAGES CALCULATION.....	43
1. INTRODUCTION	43
2. COUNTRIES WHERE DAMAGES HAVE BEEN AWARDED	43
FRANCE	43
ITALY	45
UK	47
GERMANY.....	49
3. OTHER RELEVANT CASES	52
SPAIN.....	52
4. COUNTRIES WHERE DAMAGES CASES ARE PENDING.....	54
DENMARK.....	53
LITHUANIA	54
FIGURE 1: STANDARD FORMAT FOR A DAMAGES STUDY	55
ANNEX 1: THEORETICAL OLIGOPOLY MODELS	56
ANNEX 2: AN EXAMPLE OF A THEORETIC (SIMULATION MODEL)	61
APPENDIX A: A COURNOT MODEL	65

ANNEX 3: BIBLIOGRAPHY 67
ANNEX 4: FURTHER READING..... 69

Executive summary: Analysis of economic models for the calculation of damages

- 1.1 This section of the Report provides an overview of the damages cases that have been reported to date and reviews the economic methodology that can be used to calculate damages. Perhaps the most striking point to make is that only a small number of damages cases for breach of competition law have been reported to date. Of those cases, the economic models used to calculate damages appear to have been fairly simplistic (so far as we are aware). Nevertheless, no Member State's law is prescriptive as to the economic model which must be used, and all broadly calculate damages to return the plaintiff to the position but for the infringement. This does therefore seem to introduce a degree of flexibility into the economic models which can be used in practice.
- 1.2 Whilst damages seek to return the plaintiff to the position but for the infringement, the nature of any damages calculation will however depend on the legal framework for a number of reasons. First, the legal framework may indicate who may bring a claim. Secondly, it may have provisions surrounding causation. Thirdly, it may address policy issues such as whether damages suffered by the direct customers of the cartel are reduced by "passing on" the price increases to their customers, and whether those customers purchasing the more expensive finished goods and services (i.e. indirect customers) can bring actions for damages.
- 1.3 The key principle underlying the assessment of damages requires calculations to reconstruct the "state of the world" without the alleged harm. The analysis requires the application of quantitative skills and a good understanding of how markets work. This is therefore generally the preserve of experts with knowledge of the industry and the infringement, and who have the appropriate skills in economic, finance, accounting, valuation and statistical techniques as appropriate.
- 1.4 With regards to standing, there are a number of different categories of persons who might be adversely affected by anti-trust violations, which may be illustrated with reference to a cartel which raised prices:
- (a) the most likely source of a damages claim are actual direct purchasers who paid an inflated price as a result of a price-fixing arrangement;
 - (b) it may be the case that the customers of the direct purchasers (i.e. indirect purchasers¹) are affected if a portion of the overcharge is passed on to them in the form of higher prices for finished goods and services;
 - (c) the firms outside the cartel may also raise prices in line with the firms within the cartel, thereby creating an "Umbrella" effect;
 - (d) claimants may comprise those direct and indirect customers who were willing to pay the competitive price but were forced to buy less desirable products, or forced out of the market because of the higher cartel price;
 - (e) suppliers of goods or services (inputs) to the cartel may suffer lower sales due to a reduction in output of cartel members as a result of the higher prices they charge; and
 - (f) suppliers of complementary goods and services to the market where the cartel behaviour occurs may suffer a fall in sales in response to the higher prices charged by the cartel.

¹ There could be "cascades" of indirect purchasers. For example, a cartel relating to the supply of raw materials could impact on the processors which buy the raw material (the direct purchasers), and then a cascade of indirect purchasers including the manufacturers which buy the processed raw material to use in the manufacture of a product, wholesalers which buy the product, retailers who buy from wholesalers, and the final consumers which buy from retailers.

- 1.5 In order to calculate a hypothetical "but for" scenario, a number of methods have been identified for calculating the prices, profits, costs etc which would have prevailed in the absence of the infringement, which may be illustrated again with reference to a cartel:
- (a) the simplest method is the "before and after" approach which involves a simple comparison of prices during the period of the alleged cartel with the prices in the period before and/or after the infringement, on the assumption that this provides a reasonable approximation of the price levels in the absence of the cartel;
 - (b) the "yardstick" approach involves a comparison of the market where the collusion is alleged to have occurred with a similar market unaffected by the conspiracy. The benchmarked market would ideally have similar competitive characteristics to the allegedly collusive market (i.e. similar cost structures and demand characteristics), thus allowing differences in prices between the two markets to be attributed largely to the effects of the cartel as opposed to other market conditions;
 - (c) the "cost-based" approach involves obtaining information on the average unit cost of production from the cartel members and estimating a competitive price by adding to this cost a profit margin considered to be appropriate under competitive conditions; and
 - (d) the "price prediction" approach involves econometric modelling which seeks to predict prices in a but for scenario on the basis of past determinants of prices in the market or between the market in question and yardstick markets. This approach can be thought of as a more sophisticated version of the "before and after" approach or the "yardstick" approach. Econometric modelling has increasingly been used in antitrust cases in the US. However, the use of econometric modelling is heavily dependent on the quality of the data that is available; and
 - (e) the "theoretical modelling (simulation)" approach involves the use of an oligopolistic model in order to ascertain the effects of cartel behaviour. Econometric modelling may then be used to estimate various of the parameters to feed into a theoretical (simulation) model, and other economic data may be collated as inputs into the model.
- 1.6 All of these methodologies for establishing the counterfactual of what would have happened but for the infringement are complementary in the sense that several may be considered depending on the facts of the case in order to see whether they are yielding similar estimates of the quantum of any damage, and to understand the sensitivities of the damages estimates. Moreover, implicit in all of the methodologies, albeit to varying degrees, is the application of some form of economic model to the facts of the case.
- 1.7 In cases involving intermediate goods, the extent to which a price increase brought about by overcharging has been absorbed by direct purchasers or passed on to other users further downstream (i.e. indirect purchasers) may be an important factor in damages calculations. This is the so-called *passing on* defence, which raises a number of policy questions in relation to *passing on* and *standing*. If the passing on defence is allowed, the analysis of injury must consider whether market conditions in the plaintiff's markets were such that it was able, and acted to, pass on the overcharge. There are various techniques for calculating pass through ranging from a theoretical modelling approach through to more detailed econometric estimations.
- 1.8 Anti-competitive infringements can occur through various other means such as a refusal to supply, predatory pricing, margin squeeze and so on. In these circumstances, damages may be assessed in terms of lost profits from the misconduct where the objective is to value that portion of a business that has been lost as a result of anti-trust infringement. This will involve using accounting, finance and economic methodologies to estimate the

difference between what the plaintiff's profit was, and what it would have been, but for the antitrust infringement. The main accounting methods for valuing businesses and lost profits include:

- (a) an "earnings based" approach which involves discounting sales, costs and cash flows from the income statement in order to provide an estimate of the but for scenario;
- (b) a "markets based" valuation approach which uses financial multiples to value the injured business, such as stock market values or profits of comparable businesses whose shares are publicly traded on stock exchanges; and
- (c) an "assets based" valuation which uses information from the balance sheet to value a business. Measures include the book value of tangible net worth, fair market value of tangible net worth and liquidation value.

1.9 The nature of the damages assessment will therefore depend to a large extent on the legal framework, particularly in relation to the specification of the counterfactual against which the harm is measured, and the question of who is given legal standing to bring a claim. Beyond this it can be seen that there are a variety of quantitative tools and techniques which can be used for the purpose of quantifying damages, which range in complexity from detailed statistical modelling to the use of simple accounting data. The choice of model or technique will usually depend on the specifics of the case and the data which is available. Empirical methods can be highly useful in helping to understand what has happened in the past and for simulating the likely effects of alternative scenarios.

EC study on damages
Part Three: Analysis of economic models for the calculation of damages

Part (i): Overview of damages calculation

1. INTRODUCTION

- 1.1 Little information exists on damages calculations for infringements of EU or individual Member States' competition laws in relation to national court proceedings in Europe (or cases which have resulted in private settlement)², and the information that is available is summarised in Part (ii) below. Accordingly, this section considers the issues relating to damages assessments more generally. In particular, it draws upon the theoretical literature, US antitrust cases where more publicly available information on damages calculations exists, and the approaches to damages assessment in cases outside the area of antitrust. The aim of this part of the Report is to provide a simple introduction and overview to the economics of damages assessment in order to be accessible to lawyers, practitioners and policy-makers alike. It covers the key concepts mentioned in the academic literature and relevant court cases to date, and further information can be obtained from the various references listed in Annexes 3 and 4. Finally, various policy issues are raised as to damages claims, and whilst this chapter outlines these issues, it is not intended to be prescriptive as to the best policy to adopt.
- 1.2 Quantitative techniques have increasingly been used in antitrust cases and the adversarial system more generally, particularly in the US. Antitrust damages cases typically raise questions such as: what was the nature of an alleged violation; what caused the alleged damage; and (particularly relevant for the calculation of damages) what would have occurred "but for" the alleged violation (with this commonly being referred to as "the counterfactual"). The scope of the quantitative exercise may extend to all of these questions where it is necessary to show the link between the alleged violation and the harm to the plaintiff (as well as the quantum of that harm). If a private action is launched in the absence of a competition law infringement decision, the analysis may also extend to whether the violation has in fact occurred.³ The aim of this part, however, is to focus on the techniques which can assist in evaluating the impact of the antitrust infringement, the harm to the plaintiff which ensues, and thus the appropriate level of recoverable damages (i.e. "quantum").
- 1.3 Typically, these questions regarding damages can be framed in terms of alternative hypotheses which can, in many cases, be tested empirically. It should be noted in this regard that the task of framing these hypotheses and the application of quantitative techniques will typically require a broad range of skills ranging from a thorough understanding of the relevant law and the nature of the infringement in question, knowledge of the relevant industry and data availability, familiarity with core economic theory and potential econometric techniques⁴ and accounting and finance skills.

² Whilst there have been more cases involving private claims for damages in various Member States than the cases reported in Part (ii) below, these have typically been settled out of court and therefore little information is available in the public domain.

³ For example, in the case of *Crehan v Inntrepreneur* (HC [2003] EWCH 1510), the UK High Court ruled on both the questions of whether in 1991 and in subsequent years the structure of the beer distribution industry in the UK was such that the beer ties in Inntrepreneur leases infringed Article 81 (i.e. whether a violation had in fact occurred) as well as whether the failure of the plaintiff's business was caused by the beer purchasing ties (i.e. whether there was proximate causation between the violation and the harm to the plaintiff). This was further considered by the Court of Appeal in May 2004 (CA [2004] EWCA Civ 637).

⁴ The use of econometrics (the branch of economics which applies statistical techniques in order to undertake quantitative analysis of economic concepts, also known as "regression analysis") in antitrust cases has grown significantly as courts have increasingly found that reliable statistical evidence can be invaluable in framing questions about the nature of harm and evaluating the associated damages. It is noteworthy in this respect that the US Federal Judicial Centre's *Reference Manual on Scientific Evidence* contains chapters on the use of statistical

Inevitably, this chapter can only provide a broad overview of the issues raised by the application of each of these skills. This part summarises how economic and quantitative techniques can be helpful in shedding light on questions of impact, harm and damages and to mention some of the advantages and potential pitfalls in this regard.

- 1.4 The sections below describe the empirical propositions which have typically arisen in antitrust litigation cases (and specifically the calculation of damages)⁵ and the tools and techniques which have been used to investigate these propositions. For example, regression analysis⁶ has been widely used in the context of US cartel cases to seek to identify the significance of various cost and demand influences on prices, and thus to identify separately the influence of the cartel on prices, with damages typically being measured by the difference between the prices paid by the plaintiff purchasers and the prices they would have paid in the absence of the defendants' conspiracy. In this regard, a key proposition which may also be investigated using quantitative methods is the extent to which damages to direct purchasers may have been mitigated by plaintiffs acting to "pass on" the price increase for an intermediate product to customers further downstream in the form of higher prices for the plaintiffs' finished products.
- 1.5 Where a plaintiff injured by anti-competitive conduct (e.g. due to exclusionary or predatory behaviour) is a rival of the defendant, damages may be assessed in terms of lost profits arising from the misconduct. This analysis tends to require both accounting and economic expertise and is likely to be influenced by the principles which have emerged from the wider application of these calculations in a myriad of commercial litigation cases. Such principles relate to, for example, projections of future earnings, discounting future earnings (since anti-competitive conduct can lead to the loss of a rival's future profits), plaintiffs' potential obligation to mitigate losses and the treatment of tax. As in the case of a cartel, this analysis is likely to involve the specification of a counterfactual involving conduct which would not be anti-competitive. In the extreme, where an enterprise is partially or totally destroyed as a result of an antitrust violation (i.e. where damages are intended to compensate for the loss of a going concern), then techniques for the valuation of a going concern and investment projects may be used.⁷
- 1.6 In summary, the most commonly claimed types of antitrust damages are likely to be overcharges (from, for example, a cartel or excessive pricing by a dominant undertaking), or damages claimed for anti-competitive conduct which has led to lost net profits to a continuing business or even lost going concern value of a terminated business (for example, due to bankruptcy or administration).
- 1.7 The following sections consider these issues in greater detail:
 - (a) section 2 considers the broad principles underpinning damages calculations in the context of antitrust cases – i.e. the specification of an appropriate counterfactual for measuring harm and the question of who is given legal standing to claim damages (which also relates to the question of how the legal system treats the question of "passing on");
 - (b) section 3 focuses on the calculation of damages due to overcharging in the context of cartel cases and outlines some issues surrounding the use of statistical evidence

evidence and multiple regression, as well as a chapter on the estimation of economic losses in damages awards (see www.fjc.gov).

⁵ Clearly there is likely to be some overlap between the analysis used to assess the nature and causation of an antitrust violation and the analysis used to quantify damages.

⁶ See footnote 11 below.

⁷ Again, these techniques have a much wider applicability, for example, business valuations are also performed in the context of potential acquisitions or disposals, valuation for tax purposes, valuations for dispute resolution and valuations to meet certain regulatory requirements (i.e. the requirement for a "fair and reasonable" report when part of a quoted company is disposed of to a related party).

in this context (which is also of more general relevance). It also considers the use of quantitative techniques and economic models, and assesses various options;

- (c) section 4 considers the policy options surrounding passing on and considers ways of measuring the impact of passing on under different market structures; and
- (d) section 5 focuses on loss of profit/enterprise value calculations which have arisen due to anti-competitive behaviour (e.g. exclusionary conduct) and outlines the typical issues which arise in performing this kind of analysis. It concludes by commenting on the use of empirical methods in the context of antitrust cases more generally. In particular, it considers the potential advantages from using what can be powerful empirical tools for understanding what has happened in the past and for simulating the likely effects of alternative scenarios, set against the disadvantages of using what can be at best complex and at worst misleading evidence if used inappropriately.

1.8 Part (ii) of the Report then provides a brief overview of the methodology used in damages cases that have been reported. It includes relevant cases from across Europe where damages have been awarded; damages cases that are pending; and other relevant cases that have considered how damages might be calculated in future cases.

2. PRINCIPLES UNDERPINNING DAMAGES CALCULATIONS

2.1 The nature of any damages calculation will depend on the legal framework in as far as this indicates who may bring a claim, the nature of the injury which must be demonstrated, the provisions surrounding causation, and the policy in relation to passing on.⁸ These issues, and the various policies which exist in the Member States, have been discussed (where applicable) as part of the national reports elsewhere in the Report and are not repeated here. Their broad impact on the way in which a damages assessment is specified and performed, however, is outlined below, in particular:

- (a) there may be a dispute as to the appropriate counterfactual against which damages are assessed, with this resulting in different economic assumptions being made in damages calculations and major differences in estimates; and
- (b) the nature of the injury claim will be different depending on who is given legal standing to bring a claim, and may therefore involve different techniques in evaluating damages.

The counterfactual

2.2 Typically the measure of harm in an antitrust damages case is taken to be the difference between:

- (a) the plaintiff's actual position – i.e. the economic situation of the plaintiff given that an antitrust violation has occurred (for example, the profits/losses made during the period when customers faced inflated prices for a product due to a cartel); and
- (b) the plaintiff's position in the hypothetical scenario where the illegal act has not occurred but conditions are otherwise similar – i.e. its "but for" condition (for example, the profits/losses that would have been made in the absence of the cartel).

2.3 Specification of the appropriate counterfactual in this context raises a number of questions, for example: whether there is dispute as to what would have constituted non-harmful conduct; isolating the role of the defendant's illegal conduct from other factors affecting the plaintiff's performance (e.g. general economic conditions and any management failure by the claimant); and the question of whether and how to address the plaintiff's potential obligations to mitigate losses which might reduce any damages claim.

⁸ For example, under US federal antitrust law (specifically the Clayton Act, Section 4) the law provides that any private person "injured in his business or property by reason of anything forbidden in the antitrust laws...shall recover threefold the damages by him sustained, and the cost of suit, including a reasonable attorney's fee". The ability to recover treble damages can produce very large damages awards and serves to emphasise the deterrence objective underpinning the law relating to private enforcement in the US. For effective deterrence, the overall magnitude of fines, other penalties and damages awards needs to exceed the gains to the defendants in infringing antitrust law for such penalties to be a deterrent against antitrust infringements for all undertakings, given the probability that an antitrust infringement may go undetected. Equally, the punitive element of a triple damage award can be viewed (in part) as simply compensating for aspects of real damage which are difficult to prove. Finally, it should be noted that if interest on damages suffered is allowed by the legal system, this may substantially increase the amount of the damages awarded given that there is often a long delay before the judgement or the settlement for damages. The US system generally does not permit interest payments. See further William H. Page *Proving Antitrust Damages, Legal and Economic Issues* (Antitrust Practice Guide), p. 43 and Professor Barry J. Rodger, *Private Enforcement and the Enterprise Act: An Exemplary System of Awarding Damages*, [2003] ECLR 103, who states that: "One crucial aspect of the US system which actually weakens the impact of treble damages is the lack of pre-judgment interest and this "substantial flaw" ensures that in practice treble damages are equivalent to single damage awards, particularly given the time-lag between violation and judgment. Given the availability of pre-judgment interest in both UK legal systems, the treble damages remedy is less significant than it first appears."

2.4 These issues are discussed in relation to specific antitrust scenarios in the sections below. However, a number of broad points can be made at the outset:

- (a) first, the specification of the counterfactual of the plaintiff's position in the absence of the antitrust infringement may depend greatly on the substantive law governing the injury. Experts assigned to calculate damages will therefore need legal guidance as to the proper legal framework for their calculations. Where there is a dispute as to the interpretation of the law in this regard, however, then there may be major differences in defendants' and plaintiffs' estimates, reflecting the different legal approaches and economic assumptions underpinning the various estimates;⁹
- (b) secondly, the goal of the damages calculation is to isolate the harm caused by the defendant's anti-trust infringement and, in particular to isolate this harm from any that might otherwise flow from legitimate competition or other considerations.¹⁰ One of the advantages attributed to regression analysis¹¹ as a statistical tool is that it can be used to identify separately the impact of the cartel on prices from changes in prices from other variables (for example, changes in the price of substitute products which are not affected by the cartel, new technology, cost changes due to raw material price changes, etc). In others words, it can sometimes be used to isolate the effects of the illegal conduct from other factors affecting market conditions. This type of approach, and its potential pitfalls, is discussed further in section 3 below; and
- (c) lastly, legal policy will affect damages assessment in relation to the question of mitigation – i.e. whether an antitrust plaintiff is expected to have taken reasonable steps to minimise the losses and whether this affects the quantum of the damage (as opposed to the issue of whether the plaintiff was injured in fact). In this case, the relevant counterfactual is still the plaintiff's situation absent the illegal conduct, but the actual position of the plaintiff may need to be evaluated to assess the extent to which there was scope for the plaintiff to reduce its losses by mitigating action.

Damaged parties and legal standing (eligibility)

2.5 There are a number of different categories of persons who might be adversely affected by an antitrust violation, as illustrated in the case of a cartel infringement (see Diagram 1 below):

- (a) first, the most likely source of a damages claim is an actual direct purchaser who has paid an inflated price as a result of the price fixing arrangements;
- (b) secondly, it may be the case that customers of the direct purchasers (also known as indirect purchasers) are affected if a portion of the overcharge is passed on to

⁹ Hall and Lazear (1994), page 291, provide a hypothetical example of this as follows: "*Defendant Copier Service's long-term contracts with customers are found to be unlawful because they create a barrier to entry that maintains Copier Service's monopoly power. Rival's damages study hypothesizes no contracts between Copier Service and its customers, so Rival would face no contractual barrier to bidding those customers away from Copier Service. Copier Service's damages study hypothesizes medium-term contracts with its customers. Under Copier Service's assumptions, Rival would have been much less successful in bidding away Copier Service's customers, and damages are correspondingly lower.*"

¹⁰ Page (1996), page 41, footnote 39 provides details of US antitrust damages cases where this issue is discussed, for example *City of Vernon v. Southern Cal. Edison Co* (1992) where the plaintiff's claim was denied on the basis that the plaintiff's study "*failed to segregate the losses, if any, caused by acts which were not antitrust violations from those that were.*"

¹¹ Regression analysis is concerned with the study of the relationship between one variable called the explained, or dependant, variable and one or more other variables called explanatory variables. The aim is to use regression analysis as a quantitative technique to show how the variable in question (e.g. price) is affected by a number of other variables (e.g. supply and demand factors in the market).

them by these intermediate producers. In the US, for example, no standing is given to indirect buyers in federal courts (although many US state antitrust statutes allow indirect overcharges to be recovered);

- (c) thirdly, even if a cartel does not contain all the producers in an industry, it may be the case that firms outside the cartel raise their prices in line with firms within the cartel, thereby harming direct buyers from non-cartel producers – the so-called “umbrella effect”;
- (d) fourthly, claimants may comprise those customers who were willing to pay the competitive price but not the cartel price and were thus forced to buy less desirable substitute goods, or simply reduce their total purchases. Customers incurring these losses (known in economic terms as “dead-weight loss”¹²) have generally been denied legal standing, for example, in the US on the basis that treble damages is designed to deny conspirators the benefits of their illegal conduct, whereas conspirators do not gain if customers chose to switch to a less desirable product or reduce their purchases¹³;
- (e) fifthly, suppliers of goods or services (e.g. inputs) to the cartel conspirators may lose sales or income due to the artificial output restriction enforced by the cartel. This impact occurs because higher cartel-induced prices will also reduce cartel members’ sales volumes and hence their demand for inputs;
- (f) sixthly, in certain circumstances, competitors outside the cartel may be adversely affected by the actions of the cartel (although they might generally benefit from the higher cartel prices by increasing their own prices and/or sales volumes). For example, a cartel that refuses to supply customers that have previously switched to non-cartel suppliers, could adversely affect the future sales of those non-cartel members. Such behaviour is an attempt to increase customers' switching costs in an attempt to keep customers captive of the cartel. The adverse effect is likely to be particularly severe for new entrants which find their growth path curtailed through a lack of customer switching as a direct consequence of the cartel behaviour, especially where new products have to be trialled and tested by customers to assess performance. An example of this type of behaviour is discussed in paragraph 3.20-3.22 of Part (ii) of the report in relation to a claim for damages in Spain. More generally, competitors may also be adversely affected by other forms of anti-competitive behaviour such as predatory pricing, refusal to supply, bundling and tying etc which is considered in more detail in section 5; and
- (g) the last potential injured group are suppliers of complementary goods and services to the market where the cartel behaviour occurs. The damages may occur as a result of lower demand for the complementary goods or services as a result of the higher prices charged by the cartel. For example, the demand for service contracts provided by other suppliers associated with the purchase of a cartelised product may fall as a result of the price increase of the cartelised products. In turn, a decline in sales in the complementary market could impose harm on the suppliers to that market.

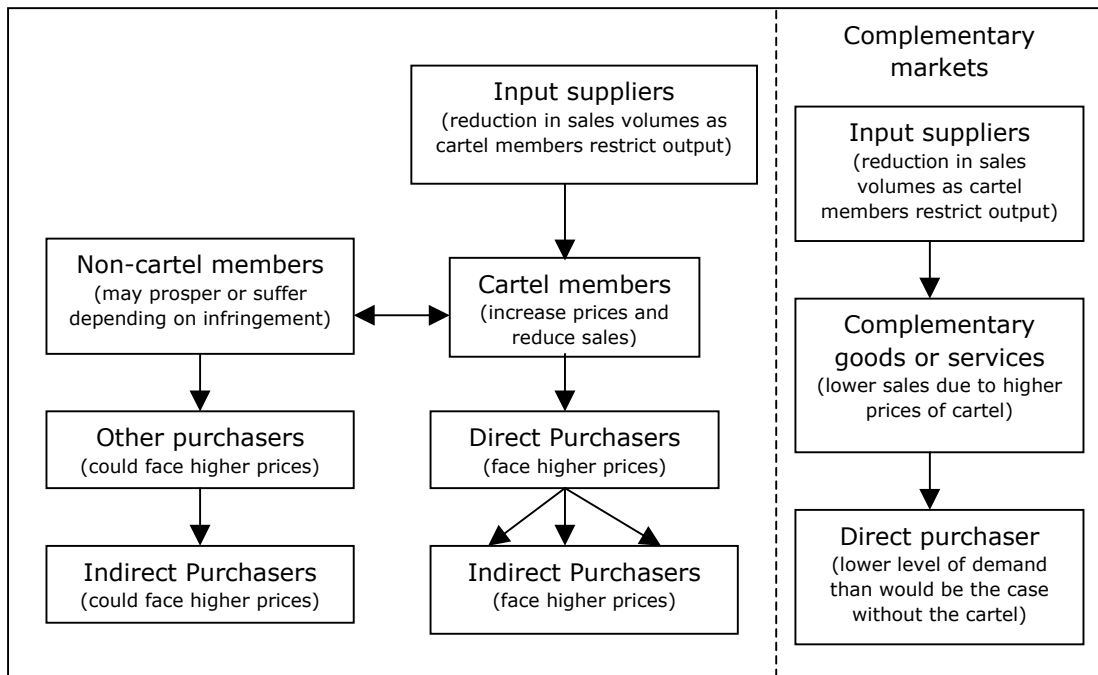
2.6 Diagram 1 below provides a brief overview of the potentially damaged parties due to cartel members increasing prices. Whilst the diagram is simplistic it provides a flavour for

¹² Dead-weight loss is a measure of the welfare loss due to the exercise of market power in raising prices above the competitive level. Consumer surplus is the difference between the maximum price which individual customers are willing to pay and the actual price they pay, with producer surplus being an analogous concept relating to the excess profits that the producers are able to make above the minimum prices at which they would be prepared to supply the product or service. Dead-weight loss is equal to the loss in total surplus (consumer surplus plus producer surplus) when output is below its efficient competitive level.

¹³ Broader policy issues are outside the scope of this Report, but it should be noted that a policy decision could be made that damages awards should have compensatory and deterrence objectives.

the potential repercussions up and down the supply chain, and in neighbouring and complementary markets, as a result of cartel members agreeing to increase prices in an intermediate market.

Diagram 1: Potentially damaged parties due to cartel members increasing prices



2.7 It is not within the scope of this section to discuss exhaustively the legal merits of allowing standing to these various groups. However, in as far as the principles and methodology for calculating damages are affected in these different circumstances, a number of broad points can be made (both from a theoretical and practical perspective).

Direct purchasers

2.8 First, many cases of damages claims which have reached court in the US have been brought by direct purchasers – i.e. they have involved the most straightforward calculation of alleged harm incurred by plaintiffs who purchased a good directly from participants in a cartel. The techniques which have been used to calculate damages in these circumstances are discussed further in section 3 below.

Indirect purchasers

2.9 Secondly, the question of whether indirect purchasers should be given legal standing to claim damages has provoked an extensive debate amongst economists and lawyers. This raises a number of interesting policy questions regarding standing and the *passing on* defence. Much of the literature has considered whether indirect purchasers should be granted standing, and whether there should be a passing on defence available as regards the damages suffered by direct purchasers. However, it is possible to have a policy mix that allows standing to indirect purchasers without allowing a passing on defence against direct purchasers. This is covered in more detail in the 'passing on' section of the report on page 30.

2.10 As noted above, in the US, a Supreme Court ruling in 1977 (*Illinois Brick Co v. Illinois*) held that indirect purchasers could not recover damages for violations of antitrust laws under section 4 of the Clayton Act. This followed on from the earlier ruling in *Hanover Shoe & Co v. United Shoe Machinery Corp* (1968) that it was not possible for a defendant to use a “passing on” defence to a suit by a direct purchaser – i.e. a defendant could not claim that an overcharge was passed on and that the plaintiff’s damages claim should be

reduced accordingly.¹⁴ In short, the decision of the Supreme Court in *Illinois Brick* was based on concerns about the complexity implied by indirect claims and by the belief that restricting standing to direct purchasers and removing any consideration of any “passing on” from direct purchasers’ damages claims would promote deterrence by increasing the potential payoffs to direct purchasers who would thereby have greater incentive to bring private enforcement actions. A more detailed discussion which supports this reasoning may be found in Landes and Posner (1979).¹⁵

- 2.11 Notwithstanding any debate on the merits of giving standing to indirect purchasers, where standing *is* given to indirect purchasers, the damages calculation will logically need to address the question of the proportion of an overcharge passed on to indirect purchasers. This is the case irrespective of whether a passing on defence is allowed or not as regards the damages suffered by direct purchasers. At the outset, it is important to note that this question extends the damages analysis quite considerably in scope and complexity as compared to the relatively simple question of the extent of any overcharge to direct purchasers. This is because the key determinants of pass on are the nature of costs, demand and competition in the output market served by the direct purchaser, and whether the overcharge affects the position of the direct purchaser in its market relative to its competitors.¹⁶ Accordingly, an analysis of these issues requires a consideration of general dynamics in the downstream market and market structure. Some of the techniques which may be used in this regard are considered further in section 4 below.

Umbrella effects

- 2.12 The third issue raised above concerns the extent to which cartel members may be liable to pay damages to direct buyers of output from non-participating sellers on the basis that these firms have raised their prices under the protection of the “price umbrella” created by the cartel. In the US, there is no consensus on whether to allow standing in this case.¹⁷ The first economic question which arises in relation to these cases is whether non-participants in the cartel are also charging the same prices as cartel participants. Estimation of an overcharge on direct purchasers from non-participants may be undertaken using similar techniques to those in the case of direct purchasers from cartel members (as discussed in section 4 below). The task, however, may be complicated by the difficulties of obtaining data from parties who are not parties to the litigation.

¹⁴ Some US states, however, have adopted rules that permit indirect purchasers to recover damages under state antitrust laws. For example, *California v. ARC Corp.*, 490 U.S. 93, 98 n.3 (1989).

¹⁵ William M. Landes & Richard A. Posner, “*Should Indirect Purchasers Have Standing to Sue Under Antitrust Laws? An Economic Analysis of the Rule of Illinois Brick*”, *The University of Chicago Law Review*. 602 (1979). Landes and Posner make a number of further comments on the greater likelihood of direct purchaser suits achieving deterrence objectives. First, they argue that direct purchasers are more efficient enforcers of antitrust laws because of their proximity to the violator and the informational advantage that this provides. Secondly, they suggest that incentives to bring claims may be undermined given the complexity and costs involved in apportioning damages (vertically) between direct and indirect purchasers. Thirdly, they suggest that deterrence may be weakened if the right to sue were divided among more parties such that each claim was relatively small. Landes and Posner also suggest that compensatory objectives may also be met because indirect purchasers may be indirectly compensated if direct purchasers charge their customers less on the basis that their right of action (and potential pay off) is not limited by a passing on defence. It should be noted that this is the subject of significant controversy, not least because indirect customers who suffer damage are not directly compensated (see page 30-31 below) and direct purchasers would be over compensated to the extent that they pass on higher prices to their customers. See further the Antitrust Bulletin of Summer 2003 for a good discussion of the issues involved by Lopatka and Page entitled “Indirect Purchaser Suits and the Consumer Interest”.

¹⁶ The latter point is important since if some firms are affected by the overcharge but others are not then those which are affected not only face higher input prices, but also experience a weaker competitive position relative to their rivals, in which case the rate of pass on may be expected to be lower. Firms facing higher costs which are subject to effective competition from lower cost rivals will have little or no scope to pass-on cost increases without losing market share and profits to their lower cost rivals.

¹⁷ Page (1996), at page 191 outlines some of the reasons put forward by US District Courts for not allowing standing. These include the complexity associated with calculating the relevant overcharge and a reluctance to impose liability on defendants who received no direct benefit from the plaintiff’s purchases. Page (1996) also lists the US cases where standing has been allowed, including *Uranium Antitrust Litig.* (1982) and *Pollock v. Citrus Assocs of the N.Y. Cotton Exch.* (1981).

Dead-weight loss

2.13 As noted above, dead-weight loss comprises the loss to customers who choose not to purchase (or to reduce their purchases) in response to a price increase above the competitive level.¹⁸ Although economic theory can identify parties which have theoretically suffered these losses, establishing them in practice is problematic for the following reasons:

- (a) first, it may be difficult to identify injured parties since potentially anyone could claim that they would have bought the product in question at the competitive price. In the US case *Montreal Trading v. AMAX Inc.* (1981), those who did not purchase a product because of a defendant's action to limit production were denied standing, although the court did comment that damages might be permitted when "*the non-purchaser can show a regular course of dealing with the conspirators*"¹⁹; and
- (b) secondly, the mechanics of the loss calculation are not straightforward. In particular, whilst economic techniques might be used to determine the difference between the actual collusive price and the non-collusive price, it is necessary to know what additional amount would have been purchased at the lower non-collusive price. This volume effect may be difficult to estimate and requires estimates of how demand has changed in response to prices being higher than they otherwise would have been. This is a common issue for all damages methodologies since the damage customers suffer depends on a combination of the higher prices and reduced purchaser volumes. Econometric estimates may be available to assist with this question.

2.14 Parties incurring dead weight losses have generally been denied standing in the US for these reasons.

Suppliers

2.15 Suppliers of inputs to cartel members may also suffer a loss of profits due to the exercise of market power by a cartel as a result of the output reduction brought about by the cartel. As in the case of dead-weight losses relating to customers, there may be difficulties in establishing the injured parties since potentially any supplier could claim that they would have sold to the cartel members but for the illegal conduct. Again, evidence of regular commercial dealings with cartel members might be required to substantiate claims of this nature.²⁰

2.16 As in the case of consumer dead-weight loss, the estimation of damages incurred by upstream suppliers is not without its complications. In this case, damages could be estimated by taking the reduction in input sales²¹ and multiplying this by the profit margin that suppliers would have made on these sales. This profit margin will vary depending on the volume of input produced and therefore it is necessary to estimate the average profit

¹⁸ Customers may choose to purchase other products instead of the cartelised products, but the value they derive from these alternative products will be less than, or equal to, the value associated with the cartelised product, otherwise they would not have chosen to purchase the original product in question in the first place.

¹⁹ This decision was based on the principle that treble damages are designed in part to deny conspirators their illegal gains but there are no direct pecuniary gains to conspirators in relation to sales which are not made. Secondly, these losses are often deemed "remote" and the process of identifying non-buyers potentially speculative.

²⁰ In the US, courts have not generally allowed standing to suppliers because the injuries are viewed as indirect or remote. Workers forced into unemployment (as suppliers of labour), for example have not been permitted to recover damages except in the case of employees who were forced into unemployment because they refused to participate in price-fixing arrangements or became whistle blowers.

²¹ This will require information on the contraction in output and the relationship between inputs and outputs which may be relatively straightforward if inputs are used in fixed proportions (i.e. one tonne of a specific raw material is required to produce one tonne of output) but not so otherwise (e.g. in the case of machinery).

margin which would have been made on the higher sales volume and prices which would have prevailed at these higher volumes (which may not be a simple exercise).²²

Competitors to the cartel

- 2.17 As mentioned above under 'Umbrella effects', it may be the case that where overcharging is concerned, competitors to a cartel will benefit by either increasing prices in line with the cartel, or by increasing their sales volumes if they increase prices by less than the higher-priced cartel. However, cartel behaviour may extend beyond simple price-fixing. A cartel could impose restrictive conditions, such as a refusal to supply customers that have previously switched away from cartel members, in an attempt to discourage such customer switching and reduce the potential future sales of non-cartel members by keeping customers captive of the cartel. For example, a new entrant that is trying to gain market share may have to reduce prices further than would otherwise be the case in a competitive market in order to induce customer switching if there are such restrictions. Alternatively, a new entrant may decide that the prospects of successful entry are significantly less likely than would be the case in a competitive market. Sections 3.20-3.22 of Part (ii) provide a practical example of this happening in Spain, albeit no damages were awarded in that case. Other forms of anti-competitive conduct could affect competitors more directly, such as predatory pricing, refusal to supply, bundling and tying etc. The assessment of such damages to competitors are considered in section 5 below.

Complementary goods and services

- 2.18 Suppliers of complementary goods and services may also suffer a loss of sales and profits as a result of the higher prices of the cartel. Products are complements if an increase in price of one product reduces the demand for the other. Examples of complementary products are computer hardware and software, cars and car insurance, fax machines and phone lines, and so on.
- 2.19 Accordingly, higher prices charged by the cartel will not only squeeze out of the market some consumers that would have purchased that product had the lower non-collusive price been charged, but it also squeezes those consumers out of buying the complementary goods and services as well. For example, the demand for a service contract for a particular piece of equipment will be affected by lower sales volumes of that equipment. This may adversely affect sales of the suppliers to the complementary markets.
- 2.20 This form of interdependency between markets needs to be considered. However, calculating damages in these cases is likely to be a difficult task and will suffer many of the difficulties set out above.

Summary

- 2.21 Using the example of a horizontal cartel, it can be seen that there are a number of potentially harmed parties who might potentially claim damages depending on the nature of the infringement. Clearly, the scope for such claims is a question of legal policy (e.g. who is given legal standing?). It can be seen, however, that different methodologies and techniques for calculating damages are likely to be applicable depending on the answer to this question.
- 2.22 This section provides an overview of all the parties that could potentially suffer damages as a consequence of anti-competitive behaviour. However, whether they are allowed to claim damages for the harm suffered is a question of whether they are given legal standing.

²² Profit margins (i.e. price less average costs) tend to increase as output increases as fixed costs (i.e. those costs which do not vary with volumes) are spread over greater sales volumes. (Average costs are total fixed costs and variable costs divided by output). This is the case until capacity constraints start to apply since additional fixed costs will then need to be incurred. Moreover, reductions in purchases by cartel members might depress their suppliers' prices, as well as leading to a loss in suppliers' volumes.

3. CALCULATING DAMAGES IN CARTEL CASES

Introduction

- 3.1 Focusing on the case of a damages claim brought by direct purchasers in relation to a cartel infringement, the first part of this section considers the techniques which may be used in order to estimate prices that would have resulted "but for" the alleged collusion.²³

Calculating overcharges

- 3.2 A number of methods have been identified for calculating the prices which would have prevailed in the absence of an alleged collusion²⁴:

- (a) the "before-and-after" method;
- (b) the "yardstick" approach;
- (c) the cost based approach;
- (d) price prediction which uses econometric modelling to seek to predict prices on the basis of historical determinants of prices or yardstick comparisons with other markets; and
- (e) theoretic modelling (simulation) of oligopoly, with econometric modelling and other data being used to estimate key model parameters.

- 3.3 All of these alternative methodologies for establishing the counterfactual but for the infringement are complementary in the sense that several may be considered depending on the facts of the case in order to see whether they are yielding similar estimates of the quantum of any damage, and to understand the sensitivities of the damages estimates. Moreover, implicit in all of the methodologies, albeit to varying degrees, is the application of some form of economic model to the facts of the case. To translate these estimates of price increases into the quantum of damages, it is also necessary to form a view as to what volumes the customer would have purchased at the lower prices that would have prevailed but for the infringement, with price increases by the cartel expected to lead to some fall in sales.

The "before-and-after" method

- 3.4 This methodology involves a simple comparison of prices during the period of the alleged cartel with the prices in the period before and/or after, on the assumption that the latter provide a reasonable approximation of price levels in the absence of the cartel. Whilst this approach may be appealing for its simplicity and visual transparency²⁵, it is subject to a number of potentially significant pitfalls. Firstly, a practical consideration – ideally the benchmark period selected for identifying "normal" but for prices should capture long-run equilibrium prices, averaged over a fairly long period. Careful attention, therefore, must be paid to the conditions under which prices have been set before and after the cartel. If prices are un-representative during the selected benchmark period (due to, for example, demand growth, temporary excess or scarce capacity, recent entry or exit of rival

²³ The damage estimate is derived by comparing the but for price with actual transaction prices to get the overcharge estimate and multiplying this estimate by the number of units purchased. Equally, one may calculate the *percentage* increase in price for each time period during the conspiracy, and then multiply these percentages by the *value* purchased in each period.

²⁴ See Connor, "Global Cartels Redux: The Amino Acid Lysine Antitrust Litigation (1996)" in Kwoka & White (2004) for a description of these methodologies in the context of the US investigation of the lysine cartel in the 1990s.

²⁵ The approach can be demonstrated graphically by taking the profile of prices over a period including the cartel and the relevant periods before and after, with a simple line drawn between the two selected points.

suppliers, seasonal factors, or oligopolistic co-ordination which falls short of an antitrust infringement²⁶), then the “but for” prices generated by this approach may be misleading.

- 3.5 Secondly, the approach assumes that the selected benchmark prices would have been constant during the period of the cartel which implicitly assumes that the key determinants of pricing conduct would have remained entirely unchanged during the period of the cartel as compared to the selected benchmark period. This is a strong assumption and may be difficult to justify where the cartel spans a significant time period during which demand and supply conditions are likely to have changed. For example, growth in demand, technological improvements, capacity constraints and entry by competing suppliers are all factors likely to have affected prices in the absence of the cartel, and which may not be adequately captured by looking exclusively at pre or post cartel price levels. Ignoring these factors may mean that the effects of the illegal conduct have not been appropriately isolated from the other factors which might legitimately affect the fortunes of the plaintiff (see paragraph 2.4(b) above).
- 3.6 Thirdly, one of the features of a before and after approach to the assessment of price increases by a cartel is that prices are higher on average than they would otherwise be. However, different customers may well have had very different experiences (e.g. due to different bargaining power, etc.) The calculation of damages therefore also needs to consider a break down of the customer base between specific groups. There is a danger that by considering only the 'average' level of prices could result in inaccurate conclusions. For example, it may be that there is no correlation in price rises between specific groups or that certain groups were not affected by the overcharging. This issue of selective and/or discriminatory overcharging is also a more general complicating factor whatever methodology is applied, since these methodologies all tend to seek to measure average prices but for the infringement, whereas in many markets customers negotiate individually with suppliers and therefore pay quite different prices.
- 3.7 In summary, the methodology has appeal where it is known when the cartel was started and there is reason to believe that there has been no significant change in market conditions “but for” the cartel. This might be the case if, for example, the cartel is short-lived or where a mature industry is involved without significant changes in demand and supply factors such as demand growth, entry, and technological innovation for the duration of the cartel. In such cases, this method has the obvious appeal of simplicity, which can be easily understood by a court. Where this is not the case, however, this technique is more appropriately used as a simple crosscheck of the results of more sophisticated techniques. This is because it has the potential to be misleading where used on its own in circumstances where market conditions are changing irrespective of the effect of the cartel. For example, where prices have been volatile, using different before and after benchmark periods can produce very different results. As stated by Connor (2000):

“...The before-and-after approach is particularly prone to errors of estimation if no additional market information is available to confirm the height of the overcharge and the duration of the conspiracy’s effects.”²⁷

- 3.8 An example of the use of this methodology is set out by Connor, J. in Kwoka and White (2004). It provides an account of the use of the methodology by plaintiffs' experts in

²⁶ The economics literature distinguishes between explicit collusion (i.e. a cartel) and tacit oligopolistic co-ordination (implicit collusion) which does not involve any explicit agreement between the firms involved. As stated by Connor (page 264) in Kwoka & White (2004), for example, the “*post cartel benchmark may be affected by learning during the conspiracy; that is, when a cartel is formed in a competitive industry, its members may learn how to price tacitly after the cartel breaks up. If true, the overcharge would be understated. If prices fall to short-run marginal cost levels during a price war, the overcharge may be overstated.*” The possibility of post-cartel implicit collusion supports the use of pre-cartel price information as the appropriate benchmark.

²⁷ See also Connor, J (2000), page 64, “Archer Daniels Midland: Price-Fixer to the World”, Staff Paper 00-11, Dept. of Agricultural Economics, Purdue University.

relation to the US court proceedings in relation to the lysine cartel in 1996. The analysis was performed in order to evaluate a settlement offered by the defendants to the federal class of lysine direct purchasers. Unusually, this offer was made before the completion of the US Department of Justice's criminal investigations. The paucity of information available in these circumstances forced the plaintiffs to use this simplistic methodology. Defendants challenged the analysis on the basis that the assumed conspiracy period was too long (a matter which would be determined by the relevant regulatory authorities in many cases), prices during the benchmark period were affected by seasonal factors, and the argument that, given market structure for the lysine industry, benchmark prices would have been generated by oligopolistic behaviour as opposed to purely competitive conduct.

The "yardstick" approach

- 3.9 This approach involves the comparison of prices in the market where collusion is alleged to have occurred with a similar market where prices are unaffected by the conspiracy. This could be either a comparison of identical product markets in other geographic areas; different product markets in the same geographic areas; or different product markets in different geographic areas. The benchmark market would ideally have similar competitive characteristics to the allegedly collusive market (i.e. similar cost structures and demand characteristics, thus allowing differences in prices between the two markets to be attributed largely to the effects of the cartel as opposed to other market conditions) yet lie outside the influence of the cartel's activities. The more different the yardstick market is, the more difficult it will be to isolate the effect of the cartel, and the harder it may be to convince a court of the validity of the comparison. Typically this approach is used where the product market is the same but is geographically localised – i.e. where local conditions determine prices and where it may be the case that certain local areas are affected by cartel activities and others are not. In these circumstances, it may be possible to compare prices in areas where collusion is alleged to have occurred with prices in areas where it is accepted that collusion did not operate.²⁸
- 3.10 As in the case of the "before-and-after" approach this technique may be helpful in markets which are localised but demonstrably similar in their demand and supply characteristics, and where, therefore differences in prices between the two markets can be confidently attributed to the effects of the cartel. It may also be used in conjunction with the "before-and-after" approach which would enrich the information available – in essence the "yardstick" markets would be examined over a period of time, creating a panel of time series and cross sectional data (i.e. a set of data both over time and between comparable markets) which could be used to test the effects of the cartel. As in the case of the "before-and-after" approach, however, the technique could be simplistic and prone to error where factors other than the presence or absence of the alleged collusion may be expected to influence prices between the areas. However, obtaining a panel data set could potentially be valuable for conducting econometric modelling to seek to predict prices, and such modelling is discussed in more detail below.

Cost-based approach

- 3.11 An alternative methodology involves obtaining information on the average unit cost of production from the cartel members and estimating a competitive price by adding to this cost a profit margin considered to be appropriate under competitive conditions (also sometimes called the "margin" approach).

²⁸

This might take the form of an international price comparison in the context of national markets for a particular product such that a cartel in one national market could result in a price effect relative to other markets. There are, however, certain difficulties associated with international price comparisons, not least distinguishing exchange rate effects from domestic cost, profit and price factors. For example, appreciation of sterling in the 1990s raised UK prices relative to prices in other countries when converted into sterling which would need to be separated from any cartel effects.

- 3.12 Typically, average costs will be calculated using accounting data or data from internal management reports for the main production costs.²⁹ Average unit costs are calculated by dividing total costs of production by total units of output.³⁰
- 3.13 The more fundamental drawbacks of this approach are, as above, its over-simplification of the factors affecting prices in the absence of the cartel – in essence, this approach assumes that competitive costs and the price-cost margin would be constant for the period of the cartel. More importantly, it also assumes that a competitive price is the appropriate benchmark whereas, as noted above, the non-collusive competitive dynamic may be more accurately captured by a model of oligopolistic competition. It may be possible to estimate the non-collusive prices based on a benchmark period (as in the case of the “before-and-after” approach) but, again, attention must be paid to whether the returns are representative in this period or are affected by un-representative episodes. To put the point another way, it could be assumed that a historical relationship between costs and prices would have prevailed but for the infringement but, as with the before and after and yardstick approaches, other demand and costs changes may have changed the relationship between prices and costs even in the absence of the infringement.
- 3.14 A further difficulty arises in calculating the appropriate profit margin to add to the estimate of costs. In short, assessing competitive prices is very difficult, even if full data on costs is available (which may not be the case).³¹ Ideally, the margin used should reflect the cost of capital for the company which captures the return required by investors to invest in the company’s activities rather than elsewhere and which, thereby, takes account of the level of risk normally associated with the investment.³² In the case of the lysine cartel in the US, a return of 6 per cent of sales was added to ADM’s costs in order to estimate a competitive “but for” price during the cartel period. Connor (2004) comments on this:

“...This is generous because it is ADM’s own rate of return during fiscal 1990 – 1995 when its profits were bloated by several commodity cartels (Connor 2000). It is also well above the average return earned by publicly traded companies in similar industries.”³³

- 3.15 Outside of the regulated sector (i.e. utility industries such as electricity and gas transmission, postal services, airports, etc.) where the calculation of a fair return on assets has a central role within the determination of price controls, the main context for profitability analysis by regulatory authorities has been the assessment of excess prices/profits. It is noteworthy in this regard that there is little EC case law, and the case law that exists provides little practical guidance. A range of accounting and economic measures may be used in order to compare the undertaking’s actual profits with: (i) those of other firms/sectors³⁴; and (ii) the company’s cost of capital. Using the cost of capital as

²⁹ Connor, J. in Kwoka and White (2004) describes the use of this methodology in the US in the context of the lysine cartel. The analysis became possible in 1998 when, as part of the criminal trial of three ADM executives for lysine price fixing, information became available on monthly plant output and data on several costs (labour, energy, dextrose, other chemicals, overheads, transportation, storage, and sales office expenses) over a five year period.

³⁰ In the case of the lysine cartel in the US, the information provided allowed plaintiffs’ experts to plot the costs of manufacturing and distribution against monthly physical plant output using regression analysis. This showed that for levels of production in excess of 10 to 11 million pounds up to the maximum of 18 million pounds, total costs per pound were more or less constant. Given that production always fell within this range for the cartel period, experts estimated that average total accounting costs of manufacturing and sales varied only within the \$0.73 to \$0.78 per pound range and were statistically unrelated to the quantity produced. See Connor, J. in Kwoka and White (2004).

³¹ This is one of the reasons why competition is preferred to economic regulation wherever possible.

³² See the report prepared by OXERA for the UK Office of Fair Trading on “Assessing profitability in competition policy analysis”, Economic Discussion Paper 6, July 2003.

³³ Connor, J. in Kwoka & White (2004), page 270, footnote 29.

³⁴ Comparisons with other firms/sectors can be fraught with difficulty, not least because the approach requires the identification of suitably comparable benchmark firms/sectors which is often difficult due to different market conditions and accounting policies.

a benchmark of the market-based competitive return may be problematic, however, since there are a myriad of reasons why profits may exceed the cost of capital in a competitive industry. For example:

- (a) some firms may be expected to earn more than their cost of capital due to superior efficiency;
- (b) high profits can occur at certain times as a result of the business cycle or where there are capacity constraints in a growing market;
- (c) profits may be high in markets where there is innovation. Firms should be able to earn a fair return on the cost of innovation given the risks of their investment; and
- (d) profits may reflect a successful gamble. Moreover, returns may be generally higher than the cost of capital due to "survivor bias" - i.e. because the firms which earn returns in excess of their cost of capital will tend to be those which survive, then average returns of firms in the industry may be expected to be above the cost of capital.

3.16 In summary, the cost-based approach may not be considered appropriate for measuring the effects of a cartel, since it is not clear that a constructed competitive price is the appropriate benchmark for the non-collusive price, and there are significant difficulties in estimating the appropriate "but for" profits taking into account the business cycle and the need to allow appropriate rewards for innovation, risk-taking, superior efficiency and other factors. Nevertheless, if the hypothesis advanced is that a cartel has inflated prices, then this should in many instances be observable from financial information as to profitability – albeit that other factors will also influence revenues, costs and thus profits (as with the before and after and yardstick approaches).

Price prediction

3.17 In view of the limitations of the before and after and yardstick techniques described above, it is widely recognised³⁵ that a more sophisticated approach may be preferable using regression techniques where data and time permits.³⁶ The "price prediction" approach involves econometric modelling and other data to seek to predict prices in a but for scenario on the basis of past determinants of prices in the market or between the market in question and comparable yardstick markets. This approach can be thought of as a more sophisticated version of the "before and after" approach or the "yardstick" approach. Unlike the theoretic (simulation) model approach which applies data to a theoretical oligopoly model determining but for prices (as considered in the next subsection), this approach seeks to predict but for prices on the basis of historical (and/or cross sectional) relationships between prices and various other variables. It is clearly the case that there is substantial overlap between econometric modelling and the other techniques described above.

3.18 It is not within the scope of this study to describe in detail the nature of regression analysis and its uses and limitations in proving antitrust damages, but it should be noted

³⁵ For example, Lexecon (2003), an economic consultancy, make the following statement in their report on "Quantitative Techniques in Competition Analysis", page 41: "A complete analysis of price-fixing damages, however, will usually require the "but for" prices to be econometrically estimated, as this allows the analyst to control for the main factors that affect prices – for example, changes in cost, demand and customer mix".

³⁶ This is an important qualification since the data required to undertake an econometric analysis is typically extensive and may not be available, depending on factors such as the nature and completeness of the parties' internal records, the potential need for information from non-participants and procedural considerations such as the legal policy in relation to discovery. Bad or inadequate data may render any econometrics futile and meaningless.

that a number of useful sources exist on these topics.³⁷ A few broad points can, however, be made.

- 3.19 The advantage in using regression techniques in order to assess what prices would have been but for the conduct of the conspirators (compared with the before and after and yardstick approaches) is that the analysis can, theoretically, control for certain of the other factors affecting price over the period, thereby isolating the effect of the illegal conduct. This is done by developing a statistical model to examine the relationship between price (the “dependent variable”) and demand and supply factors which affect price (the “explanatory variables”). Typically this relationship is specified using a “reduced form”³⁸ equation – so-called by economists because it seeks to describe price as a function of “exogenous” factors (i.e. factors that are not within the control of suppliers). The model provides an estimate of the average price given specific values for the explanatory variables and their estimated coefficients.³⁹
- 3.20 The reduced form price equation may be specified in a number of ways, particularly⁴⁰:
- (a) *the dummy variable model.* This model uses data on prices and the explanatory variables from *both* the conspiracy and non-conspiracy period. Included within the explanatory variables is a dummy variable (a variable which assumes the value of one for observations during the conspiracy period and zero for observations outside the conspiracy period). The estimated coefficient of the dummy variable provides an estimate of the average overcharge due to the price fixing activity. This model assumes that the conspiracy added a certain Euro or percentage amount to price during the conspiracy period and nothing in the competitive period. In fact, the conspiracy might have affected prices in a more complex and varying manner, and the dummy variable may be picking up other factors that have influenced prices during the conspiracy period but otherwise have been excluded from the equation; and
 - (b) *the residual model.* An alternative approach involves the specification of the relationship between prices and demand and supply factors during the non-conspiracy period only. The estimated relationship is then used to estimate but for prices in the conspiracy period – specifically the estimated coefficients and observed values of the explanatory variables during the non-conspiracy period are used to predict average prices during the conspiracy period. The overcharge is then calculated by comparing the price predicted by the model with actual prices during the conspiracy period.⁴¹ This approach implicitly assumes that there has been no

³⁷ Page (1996), Chapter 5 on “Econometrics and Regression Analysis” provides a detailed overview of the relevant statistical techniques as well as the vulnerability of regression analysis due to potential problems such as specification error and autocorrelation. The US Federal Judicial Centre’s *Reference Manual on Scientific Evidence* also contains a chapter on multiple regression by Daniel L Rubinfeld “Reference Guide on Multiple Regression”. A good account of the use of these techniques in price fixing cases (in the US) may be found in Finkelstein and Levenbach (1983) and Fisher (1980). Lastly, Bishop and Walker (2002) also provide an excellent overview of these econometric techniques.

³⁸ Reduced form equations attempt to calibrate prices based on the intersection of the factors affecting both demand and supply equations. This is the most common technique employed in antitrust litigation in the US. Variables relating to market structure may also appear in the reduced form price equation in an attempt to understand the structural factors affecting the market, though this is by no means straightforward.

³⁹ The coefficient captures the effect on price from a one unit change in the value of the explanatory variable. For example, if the number of bidders for a contract is expected to have an influence on the level of price and the coefficient on the variable representing number of bidders is –0.8 (with price in thousand Euros), then the interpretation is that for each additional bidder, the winning bid price is expected to fall by 800 Euros.

⁴⁰ These analyses may both be performed depending on the availability of data and used as a cross check against each other.

⁴¹ Alternatively a pricing model can be specified using data from the conspiracy period and the resulting equation may then be used to project prices in the competitive period. However, Finkelstein and Levenbach (1983) recommend the following: “It is probably preferable to estimate the model from competitive period data and use it to project competitive prices in the conspiracy period, because this approach leads more directly to an estimate of competitive

structural change between the conspiracy period and the non-conspiracy period in the relationship between price and the supply and demand factors used to estimate price (see further below).⁴²

3.21 This type of econometric analysis raises a number of data and technical issues which should be considered in assessing this technique. As stated by Rubinfeld and Steiner (1983):

"...The econometric approach to measuring damages must overcome certain innate difficulties: (1) the need for a theory to explain which variable or variables should be used; (2) the need to collect the relevant data; and (3) the choice of an appropriate estimation technique and functional form. Once these obstacles have been overcome, an econometric approach can be extremely useful...Econometric techniques, however, can never be applied mindlessly, and on occasion they may provide a good answer to the wrong question."⁴³

3.22 Some of the key issues are as follows:

- (a) *independence of variables*. First, in order for the estimation of prices using an econometric model to be robust, the explanatory variables (i.e. demand and supply factors) must be independent of the cartel activities and vice versa. If these variables are not independent, then the regression analysis might overall provide an explanation of the factors affecting price changes, but it would not accurately isolate the effects of the cartel. An example of this is where the cartel reduces firms' efforts to minimise their costs – if costs are then used in predicting price on the basis that they are independent of the cartel's activities, their inflation due to the conspiracy will result in a downward bias in the damage estimate;⁴⁴
- (b) *structural changes in demand and supply conditions*. Where a model of prices which is developed using data in the non-conspiracy period is used to predict prices in the conspiracy period, this assumes that there has been no significant change in the way in which these factors affect prices (i.e. their coefficients remain constant). For example, if a 10 per cent change in cost in the estimation period was found to result in an 8 per cent change in prices, then the same relationship between cost and price would be assumed in the conspiracy period. As noted above, in the context of a structural change in the nature of such relationships, it will be difficult to isolate the effects of the cartel activity from changes in the way in which demand and supply factors affect price;⁴⁵

prices in the conspiracy period and the usual supply and demand factors included in the equation are more convincingly relevant in a competitive market" (page 156).

⁴² The residuals approach was used in the US *Corrugated Container* litigation (441 F Supp. 921 (S.D. Tex.1977)). In the US *Concrete Pipe* litigation (*New Mexico v. American Pipe and Constr. Co.* Civ No. 7183 (D.N.M. 1970)), plaintiff used a dummy variable model, while defendant used a residuals model). In addition to these models, there are other econometric techniques available depending on the facts of the case.

⁴³ Daniel L. Rubinfeld and Peter O. Steiner (1983), page 126, "Quantitative Methods in Antitrust Litigation", Law and Contemporary Problems, Vol 46, No 4.

⁴⁴ Rubinfeld and Steiner (1983), pages 128-129, provide an example of this problem in the case of the international uranium cartel that operated at least between 1971 and 1975. Rubinfeld and Steiner describe the interdependence between what might otherwise have been regarded as exogenous events (such as the OPEC cartel and the exploding price of oil) with the behaviour of the cartel (which simultaneously imposed a moratorium on commitments to sell uranium) such that the cartel was able to take advantage of demand and supply shifts which occurred outside the activities of the cartel. Accordingly, there was interaction between individual variables such that cartel induced and supply-demand induced impacts on price increases could not be disentangled.

⁴⁵ Lexecon (2003), page 43, provide an example of this in relation to the US polypropylene carpet cartel. In this case, a price model was developed for the conspiracy period and used to predict prices during the non-conspiracy period. The fact of lower actual prices in the non-conspiracy period than those predicted might have been taken as prima facie evidence of the alleged collusion. An alternative explanation, however, was that there was a structural change in the relationship between price changes and costs changes which coincided with the end of the alleged conspiracy

- (c) *variables of interest and data collection*. Econometric modelling typically involves the exercise of judgement in relation to the choice of variable for inclusion in the model. These decisions can be informed by economic theory, knowledge of the relevant industry and a rigorous approach to statistical analysis – the latter, for example, can be used to test for estimation problems due to inter-relationships between variables or misspecification of the model. Problems can arise, however, if there are difficulties in obtaining the preferred variables or if long and consistent data series for these variables are not available. Sometimes, it may be possible to use proxies (e.g. average variable costs instead of marginal costs⁴⁶) but these are necessarily imperfect measures of the true variables and will therefore introduce an element of bias to the estimation; and
- (d) *omitted variable bias*. This arises if some of the key factors (variables) are omitted from the econometric model. If variables are omitted then the parameters will tend to be biased; that is, their average estimated values may not coincide with what the true values should be. This means that estimates may be wrong. No matter how large the sample size is, this bias does not disappear. It is immediately obvious to see that if conclusions were to be made on the basis of a mis-specified model with key factors omitted, the results would be dubious to say the least.

Theoretic modelling (simulation)

3.23 A further approach is the use of an “oligopoly model method”, often referred to as simulation (e.g. as reported by Connor (2004)). To date, simulations have been principally used for merger analysis where they have been growing in importance, particularly in the US.

3.24 Simulations use economic models based on industrial organisation theory to predict the effect of mergers on prices and output in relevant markets. This is achieved by inputting estimates of elasticities of demand (derived from econometric modelling and other sources) and other variables such as marginal costs, prices and quantity, into a simplified economic model of how firms compete with one another and how they respond to their rivals competitive decisions.⁴⁷ An appropriate model in any particular case thus reflects both the significance of individual competitors and the essence of the competitive process in the industry. According to Epstein and Rubinfeld (2001):

"Merger simulation models try to predict post merger prices based on information about a set of pre merger market conditions and certain assumptions about the behaviour of the firms in the relevant market. The simulation models typically assume that the firms behaviour is consistent with the [differentiated] Bertrand model of pricing, both pre- and post-merger. According to this theory, each firm sets the prices of its brands to maximise its profits, while accounting for possible strategic, non-collusive [i.e. non-coordinated] interactions with competitors. An equilibrium results when no firm can increase its profits by unilaterally changing the prices of its brands".

3.25 Simulation models vary in sophistication and complexity. However, in order for estimates of prices (e.g. post merger or in the absence of a cartel) to be made, some assumptions need to be made as to the nature of competition. The standard (basic) assumption in merger simulation models is that firms either compete in a manner consistent with the Bertrand model with differentiated products (rather than homogeneous products), or firms

period such that the price equation attributed to the cartel an effect which was actually explained by non-cartel factors.

⁴⁶ Average costs are the total costs (including both variable and fixed costs) of producing a given volume of output, divided by the volume of output. Marginal costs are the additional (incremental) costs incurred in producing an extra unit output.

⁴⁷ See, for example, Epstein and Rubinfeld (2001), Werden and Froeb (2002), Werden and Froeb (1996).

compete in a manner consistent with Cournot competition (see Annex 1 for a brief overview of these models), with different assumptions as to how firms interact potentially yielding radically different results. In a damages context, simulation models might be used to provide a benchmark for the non-collusive market price. The extent of the overcharge will be a comparison of the cartel prices, with the prices determined under various assumptions in the simulation model.

- 3.26 Connor (2004) describes the US lysine cartel litigation in which the defendants sought to argue that the “but for” prices should be estimated by applying a standard economic model of oligopolistic market behaviour – the so-called homogenous Cournot model. In essence, the defendants argued that the lysine industry had an oligopoly structure and that its key characteristics (namely high concentration, high barriers to entry, the absence of product differentiation and large number of dispersed buyers) would tend to result in *implicit* price co-ordination that would keep price substantially above the long run competitive price.⁴⁸ On this basis, the defendants identified the Cournot model as the most appropriate framework for analysing prices in the lysine market and using three key factual parameters (the Herfindahl-Hirschman Index of concentration⁴⁹, the own (market) price elasticity of demand⁵⁰, and the marginal cost of production) calculated the profit maximising prices which might be expected in this market in the absence of the cartel (see Annex 2 for a description of this methodology and some of the issues raised).
- 3.27 There are a number of difficulties associated with using theoretic modelling as a basis for predicting actual prices, as outlined below:
- (a) firstly (as pointed out by Connor (2004)), Cournot models are only one type of many plausible oligopoly models – others including the Bertrand model of price competition and various models of price leadership;
 - (b) secondly and most importantly, the Cournot and Bertrand models are static in the sense that they are conceptualised either on the basis that:
 - (i) each firm sets its output/price simultaneously once and for all, and that there is no competitive interaction between firms thereafter; or
 - (ii) that equilibrium is reached on the basis of specific assumptions as to how each firm believes its rivals will respond (or more accurately not respond) to changes in its output or price decisions. The Cournot and Bertrand assumptions about how rivals will respond are exogenously determined, rather than being determined endogenously by the models.⁵¹ In short, competitive responses require a dynamic setting.

The assumptions in these models have been subject to powerful and long standing criticism that static models cannot explain how firms' dynamic competitive

⁴⁸ This argument was developed to rebut the attempt by plaintiffs to calculate “but for” prices on the basis of a competitive benchmark period.

⁴⁹ The Herfindahl-Hirschman Index (“HHI”) is a measure of concentration which is calculated by summing the squares of market shares for each firm in the industry. For example, a market containing five firms with market shares of 40%, 20%, 15%, 15% and 10% respectively has a HHI of 2550 ($40^2+20^2+15^2+15^2+10^2=2550$). The HHI ranges from close to zero (in an atomistic market) to 10000 (in the case of pure monopoly). See European Commission Notice: Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, 28 January 2004, paragraph 16.

⁵⁰ In broad terms, the own price elasticity of demand measures the percentage change in quantity demanded following a small percentage change in price. For example, a one per cent fall in quantity demanded following a one per cent increase in price will result in an elasticity of one.

⁵¹ These models and variants of them are nevertheless still used in a variety of contexts. For example, Willig (1991) presents a simple but more general model which can be used to justify the HHI thresholds in the US.

responses to their rivals' competitive initiatives are determined⁵² (e.g. that their decisions trigger competitive responses from rivals which influence their decisions); and

- (c) lastly, as stated by Connor (2004) "*although possibly allowable as evidence in antitrust cases, the degree of econometric literacy required to comprehend [apply] formal oligopoly models greatly restricts their use in forensic settings*".

3.28 There are a number of important issues raised by the use of simulation models. For example, the Cournot model or differentiated goods Bertrand model conclude that any reduction in the number of competitors automatically leads to higher prices and lower output. It can be strongly argued that such a general conclusion is fundamentally wrong, and results in an exaggerated role for efficiency defences in the merger context (otherwise all mergers between competitors automatically lead to price increases in these models unless efficiencies are realised). In addition, as emphasised by RBB Economics⁵³:

"slavish use of merger simulation models will give rise to policy that is out of line with economic reality, since such models (and those who advocate their use without due regard for their limitations) systematically underestimate the resilience of markets to change".

They go on to say:

"The main ingredient that is missing from the simulation models is market dynamics in the form of active customers and responses by rivals. Simulation models uniformly assume essentially passive customers who, although they switch demand away from brands whose price has increased, take no active steps beyond this to prevent the merger from inflicting harm on them".

3.29 Making simplistic assumptions as to the nature of the competitive process has the merit of being convenient and simple to model, though it is often inconsistent with the way in which competition and markets actually operate. When an element of customer action and reaction, buyer power and/or supply-side responses (e.g. the entry or expansion of new or existing competitors) is added to the mix, the simple predictions from such models may no longer be robust (being heavily reliant on assumptions underlying the oligopoly model). For example, in a merger involving the supply of specific grocery products, supermarket scanner data might provide good information on how consumers respond to increases in prices for specific brands and product ranges. This information could then be used with costs data and a chosen static oligopoly model to simulate what prices would have been in the absence of a cartel or how much prices would rise if a merger occurred.⁵⁴ Unfortunately, it fails to capture supermarkets buyers' responses to such price changes in terms of the ranges of brands/products stocked, where these brands are positioned in

⁵² A further assumption of Willig's non-cooperative oligopoly model is that it "*assumes that firms have the same level of constant marginal cost, thus leaving unexplained why different firms might possess different market shares*" (to quote Willig). This is an implausible assumption as a series of factors will lead to differences in marginal cost, including differences in firms' levels of capacity utilisation, variations in firms' production processes and efficiency.

⁵³ RBB Economics, "The Emperor's New clothes? – the role of merger simulation models", January 2004.

⁵⁴ In this regard, an important point to make is that the oligopoly model chosen should be one that fits the facts of the market. For example, Werden, Froeb, and Scheffman observe that merger simulation has often been applied in the context of US branded consumer good mergers, with the differentiated Bertrand model being applied. However, they caution that: "*Whether the Bertrand model is appropriate in any particular case may depend on many considerations, three of which are of general application: First, the role of non-price competition should be evaluated. Aspects of marketing strategy may interact in important ways with the choice of price or be affected by the merger in ways that would cause the price-increase predictions to be a seriously misleading description of the merger's effects. Second, responses in the recent past to any significant cost changes, new product introductions, or other "shocks" should be evaluated, asking how well the Bertrand model would have predicted them. Finally, the observed price-cost margins for the merging products and close substitutes should be compared to the margins predicted by the Bertrand model.*" (Draft of February 16, 2004, A Daubert Discipline for Merger Simulation, available at www.ftc.gov). More generally, the sensible theme of this article is that its authors "*propose that every modelling choice in a merger simulation apt to matter significantly be accompanied either by some sort of justification or by a sensitivity analysis indicating its impact*".

terms of shelf space, and how retailers' promotion and development of their own label brands would be impacted. Similarly, it fails to capture the fact that supermarkets might respond to price increases by certain suppliers by encouraging the entry and expansion of rivals, and that other suppliers might take the opportunity to launch new brands, or increase the promotion of existing brands.

- 3.30 The above comments should not be interpreted as arguing that merger simulation is always inappropriate and of little value in a mergers context. However, very good and extensive information may be required to yield robust results, and results may be very sensitive to modelling assumptions. To prohibit a merger on the basis of such models is one thing, but to impose damages on the basis of their predictions of what would have happened (under a chosen oligopoly model) but for a cartel seems to the authors to be another matter altogether. This will no doubt be the subject of active debate in cases where such models are applied.

Benefits to defendants from overcharging

- 3.31 The flip side of the coin in assessing damages is that benefits should have accrued to the defendant, and they should, in principal, be reflected in their financial statistics, such as an increase in the gross profit margin, an increase in turnover, or an increase in overall profitability. However, this may not be as straightforward as it first seems. The effect of overcharging may be hidden away in consolidated accounts, so that it is difficult to isolate the effect of the overcharging of the product in question from other factors and products affecting performance. However, if such an approach is feasible, it can provide a useful cross check to the various other approaches used for calculating damages.
- 3.32 Another issue which could be explored is whether any estimates of price increases seem plausible, and the profitability of such price increases. For example, if one of the approaches outlined above were to estimate that prices were increased by 50 per cent during a conspiracy period, cartel members might argue that such a price increase would have been highly loss making. A useful starting point in this regard would be to assess the incentive and motivation for a price rise, and this may be explored using critical loss analysis (CLA). It is based on the assumption that a rational firm will not change price unless it expects, as a result, to increase profits. In simple terms, CLA measures by how much the hypothetical monopolist's sales would have to fall in order to make the hypothesised price increase unprofitable.⁵⁵ The simplicity and ease of the practical application is the reason why CLA has been readily adopted by courts and used frequently by the antitrust agencies in the US.
- 3.33 There are obvious links between CLA and the calculation of damages. For example, if a court is attempting to calculate the overcharge from a cartel, CLA may provide an upper bound on the hypothetical price increase that would be profitable for the cartel. In addition, the critical loss compared to the actual customer behaviour that occurred following a price increase can be used to give an indication of the extra profits that were achieved by operating as a cartel.⁵⁶

Summary

- 3.34 Table 1 below provides a brief summary of the various approaches to estimating damages. In summary, where there is sufficient time and access to detailed information on price and the factors affecting price, the price prediction regression technique described above is likely to be preferred to the simple before and after, yardstick, and

⁵⁵ See, for example, Scheffman and Simons (November 2003), "The State of Critical Loss Analysis: Let's Make Sure We Understand The Whole Story", www.antitrustsource.com.

⁵⁶ These calculations can also be thought of a way of identifying key issues or sensitivities. For example, apparently unprofitable price increases might arise because the methodology adopted has failed to capture a large cost increase during the conspiracy period, or understated marginal costs.

cost approaches for calculating overcharges. The before and after and yardstick approaches may be used as simple cross checks but, as may be seen from the description above, these are simple techniques that may be prone to error if the benchmark period/market selected is not representative of the collusive period/market. The theoretical (simulation) approach may also be possible where good data is available, but it will be important to consider the robustness of any conclusions drawn. Lastly, although the cost base approach has applications in certain circumstances (for example, estimating fair and reasonable access prices in the context of refusal to grant access to an essential facility), it may be less helpful in the context of a cartel where it is not clear that a competitive benchmark price is appropriate or previous relationships between price and cost would have prevailed but for the cartel, and where determining the level and profile of profits in the absence of the cartel may well be very complex.

Table 1: Methods of overcharge calculation

Type of method	Method of calculation	But for price
"before-and-after"	Price comparison before and after the infringement	Prices before infringement
"yardstick"	Price comparison with similar product market	Prices elsewhere
"cost-based" ("margin")	Estimation of competitive price based on past margins	Costs plus margin
Price prediction	Statistical estimation of relationship between prices and demand and supply factors	Calculate (predicted) price based on past relationships
Theoretical modelling (simulation) of oligopoly	Theoretical models to understand effects on prices and output, with econometric and other data being inputs into the model	Theoretical price, based on model's estimates

3.35 However, all the methodologies discussed above can be considered as complementary to each other, and can be used as cross checks where time and data permit. That said, if the aggregate value of the damages claims are small in a specific case, spending a substantial sum on multiple methodologies might not be prudent. At the same time, the strengths and weaknesses of each of the approaches need to be borne in mind as none of the approaches provide the ultimate panacea.

3.36 It is important to emphasise that any analysis must be tested thoroughly and that it is fully supported by qualitative information about the industry. For example, documents and deposition or oral testimony can be used to confirm the specification of the model being used. Sensitivity analysis – i.e. considering how results are impacted by small changes in assumptions – may also be useful for identifying which assumptions are the most important to be verified as fitting the facts and for assessing the robustness of the results. As stated by Baker and Rubinfeld (1999):

"...If key results go away under alternative specifications, they will not be convincing unless those alternative specifications can be shown to be implausible, perhaps because they imply nonsensical things about other variables or because they are inconsistent with the qualitative information available about the industry".⁵⁷

⁵⁷ Baker and Rubinfeld (1999), page 431, "Empirical Methods in Antitrust Litigation: Review and Critique", American Law and Economics Association, Vol 5196.

- 3.37 From the preceding analysis, it should be clear that assessing damages for overcharging cases (e.g. cartels) may be far from straightforward, with the analysis ranging from the relatively simple (i.e. before and after, and yardstick approaches) to the complex (i.e. theoretic simulation models and econometric modelling to predict but for prices). This will inevitably lead to some judgment being required as to which assumptions are the most plausible given the data available, and to understand the key sensitivities behind any damages estimate. This creates an obvious responsibility for those compiling such estimates to make their assumptions explicit, justify their approaches and to reconcile the differences in approach. Otherwise, if competition authorities and Courts cannot appraise the evidence properly, then it is reasonable for them to disregard it.⁵⁸

⁵⁸ A good example of this is provided in CRA Competition Policy Discussion Papers 7 (2003) in relation to the UK Premier League case. Here Justice Ferris concluded that *"The evidence of the econometricians displayed an enormous degree of expertise and diligence, but we have to say that we found it of limited assistance....Unfortunately there was little common ground between them...we do not feel able to prefer the evidence of one of the experts to that of the other"* (para. 227)

4. **PASSING ON**

- 4.1 As noted in paragraphs 2.9 and 2.11 above, an increase in the price of intermediate goods due to over-charging (for example, by a cartel or excessive pricing by a dominant firm) may be borne, to varying degrees, by direct purchasers absorbing the price increase and suffering reduced profit margins, and/or passed to other users further downstream (i.e. indirect purchasers) in the form of higher prices for the goods and services supplied by the direct purchasers. As a result, the degree of passing on may be important if the legal framework allows standing to indirect purchasers and a “passing on” defence to defendants as regards the proportion of the overcharge that is passed on to the direct purchasers' customers.
- 4.2 The debate as to the merits of a passing on defence raises a number of policy related questions. However, the purpose of this section of the Report is not to be prescriptive as to the policy stance which should be adopted, but to identify some of the options.⁵⁹ Essentially, there are five policy options regarding passing on and indirect standing:
- (a) passing on allowed and indirect standing allowed; or
 - (b) passing on allowed, but no indirect standing; or
 - (c) passing on not allowed, but indirect standing allowed; or
 - (d) passing on not allowed and indirect standing not allowed; or
 - (e) passing on not allowed, and indirect purchasers allowed to make claims from direct purchasers.
- 4.3 At first sight, option (a) could be a useful model to compensate both direct and indirect claimants. However, it may not be that simple. Perhaps the first point to note is that the class of indirect purchasers may be very large. For example, suppose there is a cartel between manufacturers of a food stuff which is refined by processors, then included by food manufacturers in various products sold to grocery retailers. In this example, the indirect purchasers would include the food manufacturers which buy the refined product, grocery wholesalers, grocery retailers, and consumers. The further down the supply chain indirect standing goes, the less likely it is that indirect purchasers will bring damages against the defendant (not least because the damages they individually suffer may be comparatively small, remote to the infringement, and possibly hard to prove⁶⁰), and the more fragmented will be the potential number of claimants.⁶¹ If a passing on defence is allowed, this may also create conflicts of interest between the various claimants (e.g. the refiners will wish to argue that they bear all of the damage, and that indirect purchasers further down the supply chain are not adversely affected). The analysis becomes considerably more difficult as pass through must be assessed at each stage of the supply chain.
- 4.4 In the US, part of the rationale for denying standing to indirect purchasers and the related “passing on” defence for defendants is the view that measuring the impact of passing on

⁵⁹ A broader policy analysis would need to consider a variety of issues. In particular, should damages awards have both compensating objectives (i.e. compensating those who have suffered loss) and deterrence objectives (i.e. reducing the gains to infringing conduct), and how should any conflicts in these objectives be resolved. Moreover, deterrence objectives may also be served by other policy instruments (e.g. corporate fines, personal fines, and loss of directorship) and consideration may need to be given as to how damages awards impact on the efficacy of leniency programmes which provide full or partial immunity to government imposed corporate fines and personal sanctions. These broader policy issues are not addressed in this Report, and this section of the report does not address any changes in legal frameworks that may be necessary to implement the various options.

⁶⁰ For example, a coffee bean cartel might have a large impact on the businesses of direct purchasers, but very little impact on individual consumers who might pay a few pence more for a jar of coffee.

⁶¹ See Landes and Posner (1979).

would represent an “insurmountable task”.⁶² This has triggered an extensive debate amongst economists as to the ease or otherwise of calculating pass on rates.⁶³ A pass on defence and need to calculate pass on rates could tilt the balance in favour of the defendants if in practice indirect purchasers are less efficient enforcers of the antitrust laws (e.g. some indirect purchasers do not claim damages), and therefore the defendant may not pay sufficient damages to fully compensate all parties for all the damage caused.⁶⁴ This is an issue both from the perspective of the total compensation awards being inadequate, but it also reduces the deterrence effects of damages claims.

- 4.5 Option (b) is likely to skew the balance even further in the defendant's favour since direct claimants will be able to recover the damages suffered by themselves, but the costs that are passed on to indirect purchasers will not be compensated. In a worst case scenario this could result in no damages being awarded, if the defendant can prove the direct purchasers pass on all the additional costs down the supply chain.
- 4.6 Option (c) may skew the balance in favour of the claimants since direct claimants can recover all the damages suffered irrespective of whether they passed them on or not, whilst indirect purchasers can also recover the damages they have suffered, which must have been passed on from direct purchasers. At the extreme, this could result in multiple damages being awarded, and potentially allows direct claimants to be over-compensated for the actual damage suffered. This approach obviously avoids the need for direct purchasers to measure pass on, but further questions are raised as to whether indirect purchasers must measure pass on. This over recovery of the damages suffered may provide an added deterrent effect on the infringing conduct, though it will not be systematic across all industries (e.g. depending on the actual pass-on rates and the number of levels of indirect purchaser potentially impacted).
- 4.7 Option (d) could result in total compensation exactly equating the total damage suffered, as in option (a), but without any requirement to measure pass through. If the damages are suffered only by direct purchasers, with none of the higher costs passed on to indirect purchasers, then the outcome could maximise economic welfare as the damage suffered is fully compensated. However, the total award of damages will not necessarily be to the parties that suffered the actual damage. For example, direct purchasers will be able to recover the total damages they suffered, and those that were passed on to indirect purchasers down the supply chain. This could, in principal, result in direct purchasers being over compensated for the total damage they suffered, whilst indirect purchasers that may have suffered the actual damage are not compensated.
- 4.8 Option (e) would not lead to over recovery of damages in that the full amount of the damage would be extracted by the direct purchaser, but the direct purchaser would then have an obligation or potential obligation to repay parts of this damage award to indirect purchasers to the extent to which there was pass-on. As set out as regards option (a), this is likely to lead to disputes as to the degree of pass-on, and there may well be cascades of pass-on rates to consider (e.g. from the refiners to food manufacturers, then from the manufacturers to the wholesalers, from the grocery wholesalers to the grocery retailers, and from the grocery retailers to consumers).

An overview of the determinants of pass through

- 4.9 In simple terms, the key determinants of pass on are the nature of competition in the plaintiff's output market, and whether the overcharge affects the position of the plaintiff relative to its competitors.

⁶² *Hanover Shoe v United Shoe Machinery Corporation*, 392 U.S. 481 (1968).

⁶³ See Harris & Sullivan (1979), Landes & Posner (1980), Cirace (1977), Benston (1986), and Hovenkamp (1990)

⁶⁴ See pages 608-615 of Landes and Posner (1979).

Impact of market structure

- 4.10 The economic literature provides insights into the mechanisms that determine cost pass through within the framework of standard models of market behaviour (i.e. perfect competition, monopoly and oligopoly models). A good account of these models may be found in Stennek, J., and Verboven, F. (2001)⁶⁵ (albeit in the context of the pass-on of cost savings as opposed to cost increases) which provides a detailed discussion of the determinants of pass-on, drawing on the theoretical literature on competition and monopoly and adding generalisations to oligopoly market structures.
- 4.11 A number of simple points can be drawn from this literature. First, simple economic intuition would suggest that if all competitors are affected by an overcharge and the downstream market is highly competitive, then passing on is likely to be significant. In a competitive market, prices will tend to reflect variable input costs⁶⁶ and any change in these input costs will be passed on (provided it affects all competitors in the market). Secondly, even a monopolist may be expected to pass on a proportion of a cost increase.⁶⁷ This is because firms with market power charge a mark up over costs, where the size of the mark up depends on the sensitivity of consumer demand to price increases (i.e. own price elasticity of demand). In the most likely case, where consumers are less sensitive to price at lower price levels, then firms will increase mark ups by passing on only a part of the cost reductions and similarly reduce mark ups by passing on only part of cost increases. Stennek and Verboven (2001) state:

*"...it is worth stressing that even in the monopoly case (or the dominant firm case) firms pass-on at least part of the cost savings onto customers. As the number of firms increases, pass-on of industry wide cost savings generally becomes more complete."*⁶⁸

- 4.12 The actual outcome, where competition is "imperfect" will lie somewhere between these two cases. The literature has tended to investigate this by using oligopoly models (such as Cournot and Bertrand) assuming homogenous and differentiated goods. As noted above, however, in paragraphs 3.27(b)-3.30, there are significant drawbacks associated with using these theoretical models.

Impact of plaintiff's competitive position

- 4.13 The position of the plaintiff relative to its competitors is important since if some firms are affected by the overcharge but others are not then those that are affected not only face higher input prices, but also experience a weaker competitive position relative to their rivals, in which case the rate of pass on may be expected to be lower. In other words, in a situation where an overcharge affects companies selectively, those affected may be constrained not to pass on the cost increase in order to avoid losing market share to those companies which are not affected.
- 4.14 Dubow (2003)⁶⁹ describes the circumstances where this may be an issue:

"...It is, however, possible to conceive of circumstances where the abuse does put the plaintiff at a competitive disadvantage. The plaintiff may be the victim of excessive pricing by a vertically integrated competitor which holds a monopoly on

⁶⁵ Stennek, J. and Verboven, F. (2001), "Merger Control and Enterprise Competitiveness – Empirical Analysis and Policy Recommendations", Report for EC Contract III/99/065.

⁶⁶ Variable costs are the costs of production that vary directly with the output level. Fixed costs on the other hand are costs which do not vary with output and which are incurred even when production is zero.

⁶⁷ In the case where a monopolist faces a linear, downward-sloping demand curve, marginal costs are constant and where it maximises profits by setting price where marginal cost equals marginal revenue, it can be shown that it will pass on exactly one-half of any increases in marginal costs.

⁶⁸ Stennek, J. and Verboven, F. (2001), Page 61.

⁶⁹ Ben Dubow (2003), "The Passing on Defence: An Economist's Perspective", European Competition Law Review.

the input required by both firms. Alternatively, the input may not be tradable while the plaintiff's output may be. Hence the plaintiff may be forced to obtain the input at a high abusive price in a local market for the input good and then be put at a disadvantage against competitors in the wide geographic market for the output good. Finally, the plaintiff may not have been able to switch to a supplier offering lower unit input prices due to high fixed costs of doing so, for example, the costs of retooling, retraining or establishing new supply arrangements."

Measuring the impact of passing on

- 4.15 If the passing on defence is allowed, the analysis of injury must consider whether market conditions in the plaintiff's markets were such that it was able, and acted to, pass on the overcharge. Techniques include a "theoretical approach" which would start from a theoretical model of the plaintiff's market and the structural determinants of pass-on (with empirical evidence used to support the assumptions underlying the model), to an approach which directly estimates the extent of pass-on using a statistical study of the historical relationship between the plaintiff's prices and the determinants of these prices.
- 4.16 The theoretical modelling approach has been described in the context of calculating overcharges in paragraphs 3.23 and 3.27 above, and an example is given in Annex 2. In the context of passing on, a similar approach may be used – i.e. typically, a model of oligopolistic competition is selected to characterise the competitive interactions in the industry and key inputs (for example, the number of competing firms, market shares and the number of companies affected by the cost increase) are derived from industry information. The approach, however, is subject to the same pitfalls as described above.
- 4.17 An alternative approach uses statistical techniques to examine how marginal cost changes in the past (whether this is due to increases in the price of the raw material which is subject to the cartel or other inputs) have actually affected product prices (this avoids imposing an economic model as to how pass on is determined). There are examples from the economic academic literature on how this analysis may be performed, in particular, a number of academic papers have explored how the price of a single consumer good responds to the movements in the price of a single intermediate good. Some examples of academic papers include the following:
- (a) Bettendorf and Verboven (2000)⁷⁰ consider the price transmission for coffee beans into consumer prices for roasted coffee using a model of oligopolistic interaction;
 - (b) Borenstein, Cameron and Gilbert (1997)⁷¹ assess the effect of fluctuations in crude oil price on gasoline prices; and
 - (c) Cramon-Taubadel (1997) considers the pass through of changes in the producer prices for pork into wholesale prices in Northern Germany.
- 4.18 Typically these studies have examined pass through by means of a statistical analysis (specifically, an econometric regression) which relates the prices of the final consumer good to the price of the intermediate input in question and other variables which may explain variation in the level of the final consumer good. For example, work by Frank Verboven on the European coffee market involved the estimation of a regression relating the price of roasted coffee to the price of its main input, coffee. This analysis required time series data on the prices of the final consumer good and the intermediate goods, as well as data on the other variables which affected prices.

⁷⁰ Bettendorf, L. and Verboven, F. (2000), "Incomplete transmission of coffee bean prices: evidence from the Netherlands", *European Journal of Agricultural Economics*, 27, 1-16.

⁷¹ Borenstein, S.A., Cameron, C., and Gilbert, R. (1997) "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?", *Quarterly Journal of Economics*, 305-339.

- 4.19 Baker and Rubinfeld (1999) cite a further example of a pass through estimation undertaken by the Federal Trade Commission's (FTC) economic expert in the litigation arising from the FTC's challenge to Staples's proposed acquisition of Office Depot (1997)⁷². This example obviously relates to a merger but the methodology could be applied to assessing the passing on of prices for an intermediate good. The defendants projected that two-thirds of their cost savings would flow to consumers in the form of lower prices. The FTC's economic expert estimated the historical pass-through rate with data that included monthly measures of price and average variable cost for 30 products at approximately 500 Staples stores over two years. The data also included a measure of the average Office Depot cost (averaged over the stores) for each product in each month. The conclusion was that only 15 per cent of firm specific cost reductions had historically been passed through and the court accepted this figure rather than the defendant's figure.
- 4.20 Some of the key methodological issues in performing an analysis of this kind are as follows:
- (a) *estimating pass on of marginal cost increases*. A movement in the price of an intermediate good may only affect some fraction of the total marginal cost of a finished good. Therefore, it is necessary to adjust the estimated pass-on elasticity on costs as a whole by the cost share of the intermediate good. For example, Bettendorf and Verboven (2000) examine the possible explanations for different degrees of pass through, and find that the weak relationship between coffee bean and consumer prices follows largely from the fact that the price of coffee beans is only a small fraction of total marginal supply costs; and
 - (b) *dealing with delayed effects*. Marginal cost increases may not be passed on immediately, but may affect final prices over a period of time (e.g. contract prices may be fixed for the duration of the contract so a general increase in price will not take effect until the contract is renewed). It may therefore be necessary to specify the regression equation to include lagged variables to capture the long run response to changes in the price of intermediate goods.
- 4.21 Although the latter econometric estimation approach is recommended on the basis that it provides an empirically tested estimate of the pass-on rate, as opposed to an estimate derived from a theoretical construction of market dynamics, it is important that the statistical analysis is tested thoroughly and that it is fully supported by qualitative information about the industry. Moreover, as stated in the relation to the use of econometrics for the purpose of calculating overcharges, the presentation of information and analytical procedures should be as clear as possible. In this regard, Rubinfeld (1994) recommends certain guidelines which can be helpful in resolving disputes over statistical studies.⁷³

⁷² In 1996 the two largest office superstore chains in the US, Office Depot and Staples announced their agreement to merge. In 1997 the FTC opposed the merger on the grounds that it was likely to harm competition and lead to higher prices. The merging parties chose to contest the FTC's actions in court, but the District Court agreed with the FTC.

⁷³ Daniel L Rubinfeld (1994), "Reference Guide on Multiple Regression", in Reference Manual on Scientific Evidence, Washington D.C.: Federal Judicial Center. This includes clear definitions of variables, a discussion of any missing data and reporting on procedures used to minimise sampling errors.

5. CALCULATING LOSS OF PROFIT/LOSS OF GOING CONCERN

Introduction

- 5.1 The section above has described various techniques for calculating damages in the context of cartel cases where the claimant is a direct (or indirect) purchaser facing an over charge (e.g. due to a cartel or excessive pricing by a dominant firm). This section focuses on cases where a claimant is a rival of the defendant and is injured by anti-competitive conduct such as, for example, single firm or concerted refusal to deal, tying or bundling arrangements and predation/margin squeeze. In these circumstances, damages may be assessed in terms of lost profits arising from the misconduct and may be regarded as a type of business valuation where the object is to value that portion of a business that has been lost as a result of an antitrust infringement. In the extreme, if an undertaking is forced out of business completely by the antitrust infringement, then the damage estimate represents the value of that business in its entirety (otherwise described as a loss in going concern value) which may be estimated by assessing the stream of profits which would have been generated over the life of the business, taking into account the effects of risk and time on that stream of profits.⁷⁴
- 5.2 The estimation of economic losses for the purposes of damages calculation has a wide application in the context of commercial litigation and arbitration cases involving commercial matters such as breach of contract or torts, intellectual property disputes (for example, patent infringement claims and copyright disputes), post acquisition disputes (for example, claims for breaches of warranties), professional negligence claims and personal lost earnings. Many of the issues which are summarised below, including the projection of future earnings and losses, the treatment of taxes and prejudgment interest and mitigation are of relevance and have precedents in these wider areas of dispute. At the outset, therefore, this section describes the standard format for a damages study which seeks to evaluate lost profits and some of the generic issues raised by such an exercise. It then goes on to describe the main accounting measures of lost profits with emphasis on the most commonly used methodology – the discounted cash flow approach.

A framework for calculating lost profits

- 5.3 Hall and Lazear (1994) succinctly describe the main elements of a loss of profits calculation in their "Reference Guide on Estimation of Economic Losses in Damages Awards" for the Federal Judicial Center:

"...The essential features of a study of losses are the quantification of the reduction in earnings, the calculation of interest on past losses, and the application of financial discounting to future losses. The losses are measured as the difference between the earnings the plaintiff would have received if the harmful event had not occurred and the earnings the plaintiff has or will receive, given the harmful event. The plaintiff may be entitled to interest for losses occurring before the trial. Losses occurring after trial will normally be discounted. The majority of damages studies fit this format."⁷⁵

- 5.4 The reference guide also includes a graphical illustration of these components of a standard loss of profits damages study (see Figure 1 on page 50 of this Report).

⁷⁴ A further aspect of damages in this context is the opportunity costs associated with the loss of profits (i.e. the alternatives forgone through lost re-investment income due to lower profitability). The difficulty with this approach is the need to speculate as to the nature of the "alternatives foregone" and their financial effects.

⁷⁵ Robert E. Hall and Victoria A Lazear (1994), page 280, "Reference Guide on Estimation of Economic Losses in Damages Awards", in Reference Manual on Scientific Evidence, Washington D.C.: Federal Judicial Center.

5.5 As noted above, a number of generic issues are raised in loss of profits calculations which would apply to antitrust cases as well as in other contexts. These are considered briefly below:

- (a) *timing of injury*. A damage model will need to establish the period of time over which the earnings and opportunities of the plaintiff were affected by the antitrust infringement. This may not be straightforward. For example, the commencement of damage may not be co-incident with the infringing act if the consequences of the infringement takes some time to occur. Equally, damage may be shown to extend beyond the termination of the infringement since it may take some time for a business to return to where it would have been. In these circumstances, damages may also be measured for a recovery period and may include investments in the restoration of goodwill;
- (b) *discounting future losses*. The value today of a stream of cashflows that will be received at various times in the future is the "present value" of that cashflow stream. A discount rate is applied to future cashflow streams in order to calculate the "present value" – i.e. when calculating how much 1 Euro to be received some time in the future is worth today. The discount rate is an estimation of the cost of capital (as mentioned in paragraph 3.14 above) which captures the return required by investors to invest in such activities (rather than elsewhere) and which, thereby, takes into account of the level of risk associated with the investment. The calculation of the cost of capital may not, however, be straightforward, depending, as it does, on methods of measuring risk such as the "Capital Asset Pricing Model" (a well known technique which is covered extensively in most financial textbooks)⁷⁶;
- (c) *mitigation*. In circumstances where plaintiffs have a duty to mitigate any losses, the appropriate benchmark against which to measure "but for" earnings would be the earnings that the plaintiff should have achieved under proper mitigation, as opposed to actual earnings. An example might be if the plaintiff believes that the infringement destroyed a business, the defendant may argue that the business could have been revived and earned a profit (possibly in a different line of business) or that losses could have been reduced by redundancies or asset disposals. The defendant will then treat a failure to take mitigating action as an offset to damages;
- (d) *effect of taxes*. The key issue in relation to tax is whether taxes would have been payable in relation to the amount claimed in respect of the loss if the amounts in question had been in the hands of the claimant. Assume, for example, that Company X is forced out of business due to a predatory pricing scheme and that the measure of damages is the lost profit which Company X would have earned but for the antitrust infringement. If taxes would have been payable by Company X in the course of its business, then it should receive post-tax profits as the proper damage award (i.e. the damage award should be reduced to take account of the tax that the claimant would normally have paid)⁷⁷. If the damage award is taxable, then the pre-tax profits must be awarded in order to provide sufficient funds for Company X to pay the taxes with enough remaining to replace the post tax profits it lost due to the predation;
- (e) *prejudgment interest*. The law may specify how to calculate interest for past losses (prejudgment interest). Options include the exclusion of prejudgment interest

⁷⁶ In simple terms, the capital asset pricing model ("CAPM") is a tool for measuring the particular level of risk associated with a company in relation to the average level of risk associated with the stock market as a whole. It should be noted that even a risk free investment requires a minimum return equivalent to that of other risk free investments.

⁷⁷ This is because the claimant would never have had the use of those funds that would have been paid as tax.

entirely, a simple uncompounded interest rate (e.g. x per cent over the total period) or a compounded interest allowance (e.g. x per cent payable per annum, with interest effectively being paid on the interest paid in earlier years⁷⁸). If a rate is not specified by the law, there may be a dispute between the parties over the appropriate interest rate to use – the borrowing rate of the defendant or the lending rate of the plaintiff, or some other rate. There may also be disagreements about adjustments for risk.⁷⁹

Accounting measures of lost profit

- 5.6 Where a measure of lost profits is considered appropriate as a measure of the damages suffered by a claimant, calculating damages will involve using accounting, finance and economic methodologies to estimate the difference between what the plaintiff's profit was, and what it would have been, but for the antitrust infringement.
- 5.7 The main accounting methods for valuing businesses or a portion of a business are as follows:
- (a) earnings-based methods (or discounted cash flows);
 - (b) market-based valuations; and
 - (c) asset based valuations.

Earnings based valuations

- 5.8 The discounted cash flow approach takes accounting profits as indicated in the income statement (or profit and loss account) and adjusts these profits to reflect the actual cash flows generated (e.g. adjusting for accounting items such as depreciation charges which do not affect cash flows). These cash flows are then discounted as described above to give their present value. This is estimated for the "but for" scenario in which the antitrust infringement did not occur and the difference between the actual and "but for" discounted cash flows is taken as the measure of damages.
- 5.9 Calculating accounting profit and the associated cash flows in the "but for" scenario requires an estimate of what sales and costs would have been but for the antitrust infringement. This typically involves a forensic exercise taking into account, for example, historical trading results, internal information such as budgets and forecasts, marketing reports and strategies, financial and production reports and correspondence with customers. Historical information cannot, however, be relied upon if there is reason to believe that the future would have diverged from the past even in the absence of the antitrust infringement. Actual sales of similar (but not competing) product lines unaffected by the infringement may be a good indication of the "but for" sales of the product line affected by the antitrust infringement.⁸⁰ In addition, an analysis of the performance of the relevant market sector during the infringement period is likely to be necessary in order to identify the key factors which would have affected the damaged business in that period, regardless of the incident at the heart of the claim. Page (1996) discusses the use of regression techniques in analysing the factors that affect or determine sales and states:

⁷⁸ For example, 8 per cent per annum for an infringement lasting 10 years will accrue simple interest of 80 per cent (10 x 8 per cent) whereas the total compound interest payment will be 215 per cent (1.08¹⁰).

⁷⁹ See James M Patell et al., "Accumulating damages in Litigation: The Roles of Uncertainty and Interest Rates", 11 J Legal Studies 341 (1982).

⁸⁰ For example, if an infringement is limited to one Member State, then sales growth and profits in other Member States might provide a measure of the but for scenario.

"...Isolating and estimating the importance of the determinants of sales makes it possible to predict the amount of sales that would have occurred but for an antitrust violation."⁸¹

- 5.10 Identifying the costs which would have been incurred by the plaintiff in the absence of the antitrust infringement can be equally complex since it requires a consideration of which costs are fixed (i.e. will be incurred regardless of the incident which has occurred) and which are variable (i.e. will be avoided as a result of the incident). The difficulty in this categorisation is that costs that are fixed in the short run usually become variable in the longer run.⁸² Care must be taken in categorising costs on the basis of their relationship to revenues in the past. For example, computer expenditure may have increased over time over the same period as a revenue increase, but the increase in computer expenditure may be due to an upgrade of systems that would have occurred even if revenues had declined. Again, regression analysis can be a useful tool for examining the nature of the relationship between revenues, output volumes and costs. The results of such an analysis can be used to measure the costs avoided by the decline in sales volume caused by the antitrust infringement.
- 5.11 The adjustment to measures of accounting profit to reflect the actual cash flows associated with these profits is described in any standard accounting textbook and also (in the context of calculating antitrust damages) by Page (1996)⁸³. In short, cash flows are calculated from net income adding back expenses that did not require any current outlay of cash (such as depreciation). In addition, transactions that do result in the current use (receipt) of cash including changes in working capital and capital expenditures are subtracted from (added to) net income to arrive at a measure of the total amount of cash generated (used) in the normal course of business.
- 5.12 As noted above, the calculation of lost profits using this approach will typically require the involvement of an expert accountant and may involve input from economists (in relation to, for example, the projection of sales and the analysis of the relationship between costs and revenues). The techniques, however, have been widely applied in relation to general commercial litigation cases and therefore extensive expertise exists in this area.

Other approaches

- 5.13 A "market-based" valuation approach uses financial multiples such as "market values/profits" of comparable businesses whose shares are publicly traded (i.e. quoted or listed) on stock exchanges to value the injured business.⁸⁴
- 5.14 For example, suppose company 'Z' has suffered damages, and a comparable non-competing publicly-traded company 'Y' unaffected by the infringement has been identified with a market value of 1 million and sales of 500,000. Company Y's market value to sales multiple is 2 (1/0.5). If company Z's sales before and after the injury were 400,000 and 200,000 respectively, then the measure of the damages would be $(400,000 - 200,000) \times 2 = 400,000$. The approach is simple and can be summarised as illustrated in the box below.

⁸¹ William H. Page (1996), chapter 5, page 145, "Proving Antitrust Damages: Legal and Economic Issues", American Bar Association.

⁸² For example, salaries of permanent employees may not be avoided (i.e. they are fixed costs) as a result of a decline in sales. However, this will depend on the time period in question and the materiality of the claimed lost business compared to the company's normal production. It may be that some permanent staff were laid off as a result of the incident, in which case, the costs of employing those staff, including employer's national insurance and the cost of providing benefits, should be deducted from the claim.

⁸³ William H. Page (1996), page 123 to 128.

⁸⁴ This method and a worked example is explained in William H. Page (1996), page 132 to 135.

<p>Value of injured business</p> <p style="text-align: center;">=</p> <p>Stock market valuation as a multiple of sales for a similar quoted company</p> <p style="text-align: center;">X</p> <p>(Sales of injured company before – sales on injured company after the injury)</p>

- 5.15 In short, the approach involves taking the multiple of sales implicit in the value at which a similar quoted company's shares are priced and applying that multiple to the sales of the injured business. Equally well some measure of profits could be used instead of sales. These multiples can be applied both before and after the injury, with the difference being the measure of damages.
- 5.16 There are a number of measures which can be used but it is important to be consistent in the multiples examined as explained below:
- (a) profit multiples based on the value owned by the equity shareholders (i.e. market capitalisation) should be based on earnings after interest charges⁸⁵, since this represents the return to the equity shareholders; and
 - (b) profit multiples based on the value owned by providers of debt and equity finance (i.e. the enterprise value), should be multiples based on earnings before interest charge (such as EBIT or EBITDA⁸⁶) since this reflects the combined earnings to debt and equity providers.
- 5.17 Clearly, this method depends on the appropriate identification of other listed companies as market proxies for the injured business. Indeed, it is critical that the company(s) identified is (are) truly comparable to the injured business (before the injury) in relation to key factors such as capital structure (i.e. extent to which financed by debt and equity), product mix, size, market shares, accounting policies and (most importantly) future earnings potential (with expectations as to future profits affecting stock market valuations of shares). Statistical techniques can be used to test whether it is reasonable to assume that the injured firm would have tracked the performance of the comparator company/group by measuring the correlation between the injured firm's performance and that of individual comparator companies or the whole comparator group before the date of the damage.
- 5.18 Asset based methods use information from the balance sheet to value a business. Measures include the book value of tangible net worth, fair market value of tangible net worth and liquidation value.⁸⁷ The approach is simple – the value of the company after it has been damaged is subtracted from the value of the company before it was damaged. Whilst being simple and relatively easy to calculate, these measures of damage are subject to a number of limitations. Firstly, the balance sheet provides historical data on the value of assets and liabilities and is therefore unlikely to provide a reliable estimate of

⁸⁵ With interest being the return to providers of debt finance.

⁸⁶ EBIT is "earnings before interest and tax". EBITDA is "earnings before interest and tax, depreciation and amortisation".

⁸⁷ Tangible net worth is the sum of all tangible assets less intangible assets (e.g. patents, goodwill etc) and total liabilities. The book value is the value of the assets carried on the balance sheet minus accumulated depreciation. The fair market value is the current market value of the assets minus liabilities (e.g. the stock market capitalisation). The liquidation value is the value of the assets less liabilities if the business goes into liquidation. An explanation of the various asset-based values may be found in William H. Page (1996), page 135 to 136.

how the value of the injured business has been impaired. Secondly, the method is only appropriate if the antitrust infringement conduct has a direct and measurable effect on the value of the assets and liabilities of the plaintiff. Lastly, the approach may be difficult to apply if only a small proportion of a company has been harmed, because any allocation of assets to the component parts of the business may involve a certain amount of subjective judgment.

Types of antitrust case where lost profits provide a measure of damages

5.19 As noted above, the antitrust cases involving anti-competitive conduct which cause harm to a rival are considered the most likely candidates for a loss of profits calculation. The following outlines in more detail the nature of the calculation in relation to specific anti-competitive practices:

- (a) refusal to deal. Where a competitor claimant challenges the defendant's denial of access to an input that the claimant needs in order to compete, the principal component of the claimant's damages consist of lost profits from income foregone due to the defendant's exclusionary conduct and possible loss of goodwill as a result of the damage to the claimant's reputation. A key aspect of the damages calculation in this case will be the establishment of a non-infringing "but for" price that the defendant would have charged for access to the input. If the case involves excessive pricing/profits for the input, this is likely to be an area where a cost-based approach may be appropriate – there are, for example, many cases of fair, cost-based charges being determined for access to an essential facility.⁸⁸ On the other hand, the case may involve non-discriminatory access to the input where the objective is to ensure a level playing field in the downstream market which uses the input, rather than to address the level of prices of the input per se. In such circumstances, other market indicators may also be used, for example, if there is a history of previous transactions between the parties then this can be used as a benchmark (assuming, of course, that these prices would not themselves be infringing prices). Equally, prices to other customers may be examined and prices charged in other markets;
- (b) tying and bundling. Anti-competitive tying or bundling can result in damages to a competing supplier of the tied good which would typically be measured as the lost profits on sales of the tied good that the plaintiff would have made in the absence of the tie (allowing for any price reductions the plaintiff made in seeking to minimise the sales loss). It may be possible to estimate this loss of profit by examining the sales of firms which sold the tied good without the tie (taking into account any difference in market conditions which might explain the level of sales in these circumstances other than the absence of the tie, such as cost of inputs and number of sellers); and
- (c) predatory pricing/margin squeeze. The main component of damages in such pricing cases are the plaintiff's lost profits, which may arise from a combination of lower sales, lower prices (if the plaintiff cuts its price in an effort to reduce the decline in sales), and any resulting loss of goodwill. The same applies in the case of margin squeeze, where damages would reflect the lost profits on sales that the plaintiff was unable to make because of a key input being priced excessively by an integrated rival. The key question in both cases is what price the plaintiff would have faced, and thus what sales and profit margins it would have achieved, in the absence of the defendant's infringing conduct. Typically, this will involve a determination of the defendant's costs in order to determine what would have constituted a fair and competitive price in the absence of the infringement.

⁸⁸

For example, the determination of charges for use of airport services by airlines.

Finally, in all of the cases cited above, it is important to separate out the effect of the infringement from other factors which may have affected prices and costs (and thereby profits which would otherwise have been earned). For example, entry may have affected prices irrespective of the infringement, resulting in lower profits.

6. CONCLUSIONS

- 6.1 This section has provided an overview of the quantitative methods and techniques that economic and financial experts typically use in formulating theories of harm and quantifying them in the context of various antitrust violations. Examples have been drawn from the theoretical literature, US antitrust cases where more publicly available information on damages calculations exists, and the approaches to damages assessment in cases outside the area of antitrust.
- 6.2 The key principle underlying the assessment of damages is the identification of a “but for” scenario which would have occurred in the absence of the defendant’s actions, and a quantification of the resulting harm to the plaintiff. In other words, damage calculations involve the reconstruction of a state of the world without the alleged harm. The analysis requires the application of quantitative skills and a good understanding of how markets work and therefore is generally the preserve of experts (with knowledge of the industry and the infringement and the appropriate skills in economics, finance, accounting, valuation and statistical techniques as appropriate).
- 6.3 As may be seen from the sections above, the nature of the damages assessment will depend to a large extent on the legal framework, particularly in relation to the specification of the counterfactual against which the harm is measured, and the question of who is given legal standing to bring a claim. Beyond this, it can be seen that there are a variety of quantitative methods and techniques which can be used for the purpose of quantifying damages and which range in complexity from detailed statistical modelling to the use of simple accounting data or comparisons.⁸⁹ The choice of model or techniques will usually depend on the specifics of the case and the data which is available. The recommendations made above, however, have tended towards the more sophisticated statistical methodologies and the earnings based method for calculating lost profit where there is sufficient time and access to detailed information to support these techniques. The other methodologies can, however, be usefully deployed as cross checks where time and data permit, not least because it may reveal some of the sensitivities in the estimates derived by different methodologies.
- 6.4 In short, empirical methods can be highly useful in helping to understand what has happened in the past and for estimating the likely outcomes of alternative scenarios. They can, therefore, provide valuable information to courts in the evaluation of anti-competitive harm suffered by customers and producers and the estimation of antitrust damages. It is important, however, that these techniques are not applied in a vacuum and that they are rooted in a sound understanding of the market in question and thoroughly tested against the qualitative information which is available. It is also important that they are presented in a comprehensible manner and that guidelines on the presentation of statistical evidence such as that developed by Rubinfeld (and referred to in paragraph 4.21 above) are followed.

⁸⁹ The use of comparable companies to indicate the likely trends in performance of the claimant’s business but for the alleged harm are often used to provide additional or alternative market data.

Part (ii): Overview of damages calculation

1. INTRODUCTION

- 1.1 A review of the Member States reports reveals a number of points. First, perhaps the most striking point to be made is that damages for competition law infringements have been awarded by courts in only a few Member States (namely France, Germany, Italy, and most recently, the UK), although there are pending cases in several other Member States and a small number of other judgments have hinted at the methodology that can be used for calculating damages in future cases. Secondly, no Member State's law is prescriptive as to the economic model which must be used, and all broadly calculate damages with the aim of returning the plaintiff to the position but for the infringing conduct. Finally, the other striking point is that the economic models used in reported EU damages cases have been very simplistic to date with no reliance on econometrics (so far as we are aware).
- 1.2 There have been no reported damages cases for breach of competition law in Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Holland, Poland, Portugal, Slovakia, Slovenia, Spain or Sweden. As a result, the first section focuses on those countries where damages cases have arisen in practice, those countries where cases are pending, and relevant cases that have considered the calculation of damages. Section 2 focuses specifically on those cases where damages have been awarded by a court, and section 3 considers other relevant cases by country. This Part includes a brief overview of the cases and provides some commentary on the economic methodology used. However, many of the models and assessments made by the experts to calculate damages are not published with the judgment, so this section is based purely on the limited published information available.

2. COUNTRIES WHERE DAMAGES HAVE BEEN AWARDED

FRANCE

- 2.1 Generally, there is no single method used by courts or the experts, though it is possible to identify two different methods which have been used in practice:
- (a) comparisons between the price, costs, margins usually encountered in the relevant market, and the price, costs, and margins encountered at the time of the anti-competitive practices (i.e. the before and after approach); and
 - (b) assessing the profits that would have been made in the potential markets, based on an hypothetical "but for" price by estimating a reasonable profit margin to be added to the unit costs (i.e. the cost based approach and accounting measures of lost profit).

Mors / Labinal case

- 2.2 In a Judgment of 19 May 1993, the Paris Court of Appeal found that a company (Labinal) carried out practices contrary to Article 81(1)/82 EC which caused harm to its competitor (Mors).
- 2.3 The background to the case is that British Aerospace had issued an invitation to tender for the fitting of Airbus A-330/340 planes with a Tyre Pressure Indication System (TPIS). Westland and Mors entered into a joint venture agreement for the purpose of the tender and were chosen as the first supplier, with Labinal being accepted as a secondary and optional supplier. Labinal is specialised in TPIS and enjoyed a *de facto* monopoly on the supply of TPIS for other planes (except the A-330/340 planes).

- 2.4 The Court found that Westland and Labinal had entered into an agreement contrary to Article 81(1) whereby Westland would submit confidential information to Labinal, enabling it to be retained as a secondary supplier; and Labinal carried out illegal pricing practices contrary to Article 82 having the sole purpose of eliminating the only competitor (Mors) from the fitting of TPIS to the A-330/340 planes.
- 2.5 The Court ruled on the damages in a judgment of 30 September 1998. The loss was assessed with regard to:
- (a) the market for the tender. The Court's appointed expert assessed the potential number of Airbus A-330/340 fittings which Mors could have supplied but for Labinal's infringements. The expert calculated a margin on the TPIS turnover and assessed the production costs of supplying TPIS equipment. This was done with reference to factors including current orders, Airbus's projections, new Airbus versions expected, penetration rate of TPIS, the expected life time of Airbus 330/340 etc. The expert also concluded that Mors' market share would have been at least 50%, but could have been up to 70% as it was the first supplier; and
 - (b) supply of TPIS to other planes in neighbouring markets, not just those where Labinal carried out the illegal practices. The Court's reasoning was that the illegal practices prevented Mors from the opportunity to have its technology accepted and therefore from gaining potential market shares in these neighbouring markets. However, the expert acknowledged that absent the infringement, Mors' reputation for fitting Airbus A-330/340 would have increased the number of tender invitations received by Mors for other planes, though it could not be implied with sufficient certainty that Mors would have won those tenders. Furthermore, Mors did not submit evidence as to the development of technological improvements or special tariff conditions which could have given them a specific advantage in TPIS tenders for other planes. The Court therefore rejected Mors claim for damages in neighbouring markets.
- 2.6 The calculation of the damages was carried out exclusively by the expert appointed by the Court. The Court confined itself to appraise whether his conclusions were reasonable, and not contradicted by statements or documents supplied by the parties. In this case, the Court accepted all the conclusions reached by the expert, and therefore granted FF 34.2M damages to Mors for the "loss of markets" caused by Labinal's infringement, but did not include any damages for "loss of neighbouring markets".

Ecosystem / Peugeot case

- 2.7 In a Judgment of 22 October 1996, the Paris Commercial Tribunal (the "Tribunal") awarded damages to Ecosystem following the European Commission's decision that Peugeot had infringed Article 81(1) and caused harm to Ecosystem.
- 2.8 Ecosystem was active in the sale of new cars to individuals, which it purchased on their behalf from Peugeot car dealers established across the EU. Peugeot used a number of different means to prevent Ecosystem from acquiring the vehicles. In particular, Peugeot sent a circular to all the Peugeot car dealers throughout the EU, prohibiting them from supplying Ecosystem. In 1985 Ecosystem complained to the Commission about Peugeot's behaviour. The Commission imposed interim measures and concluded on 4 December 1991 that Peugeot's behaviour constituted an infringement of Article 81. Notably, the Commission requested the withdrawal of the circular.
- 2.9 The Tribunal found that Peugeot's infringement and the subsequent failure to observe the recommendations from the Commission provided a legal basis for claiming compensation for damages. Ecosystem alleged losses occurred on two counts: (a) a loss of operating income, which Ecosystem evaluated at FF 37,846,513; and (b) a loss of goodwill

evaluated at FF 61,112,100. However, the Tribunal questioned the methodology employed by Ecosystem for calculating the losses.

2.10 The Tribunal went on to calculate damages using the following methodology:

- (a) lost operating income: Accounting data indicated that the operating profit for 1988/1989 (pre infringement) amounted to FF 776,788 whereas in 1989/1990, following Peugeot's circular, Ecosystem incurred an operating loss of FF 792,675. The Tribunal refused to consider any further losses in 1990/1991 after the withdrawal of the circular. The Tribunal therefore estimated the harm suffered by Ecosystem between 9 May 1989 and 11 June 1990 to be the difference between the loss suffered in 1989/1990 and the profits made the previous year (FF 792,675 + FF 776,778) = FF 1,569,463. The Tribunal arbitrarily rounded this up to FF 1.6M.
- (b) depreciation of goodwill: The Tribunal rejected the evaluation of lost goodwill submitted by Ecosystem. They referred to a transaction in 1988 in which goodwill accounted for only 10% of the capital. The Tribunal also noted that the claim for damages made by Ecosystem related to the loss of goodwill in its entirety (FF 61,112,100), whereas the value of the goodwill in 1988 was estimated at FF 4,270,483, which included turnover generated from all of Ecosystem's business, not just from the sale of Peugeot vehicles. The Tribunal therefore concluded that the extent of the lost goodwill could not be determined sufficiently precisely on the basis of the evidence submitted by the parties, and therefore decided not to award any damages for loss of goodwill.

2.11 Accordingly, the Tribunal granted Ecosystem FF 1.6M in damages for lost operating income. This compared to the FF 98,958,613 requested by Ecosystem. This reflected the fact that the Tribunal reduced the period within which Peugeot's behaviour could be considered as causing damage, and because the claimant could not justify with sufficient certainty the scope of the loss relating to goodwill.

ITALY

2.12 There are three reported cases in which Italian courts have awarded damages for breach of national competition rules. Both the Corte d'Appello of Milan and the Corte d'Appello of Rome applied the "before and after approach" in each case.

Telsystem v. SIP case

2.13 In October 1994, Telsystem sued SIP (the former telecommunication monopolist⁹⁰) before the Corte d'Appello of Milano alleging that it had abused its dominant position within the vocal telephony services market for a closed group of users.⁹¹ In parallel with the civil action, Telsystem also made a complaint to the Italian Competition Authority against SIP on identical grounds. The service involves a network infrastructure, made up of a line rented by the claimant, which is then used to connect to certain locations of the closed group of customers. SIP maintained a position of absolute dominance in the Italian market. Telsystem requested a line to be rented from SIP, and access to urban direct circuits in order to connect the clients' offices onto a closed network.

2.14 Telsystem filed a complaint that SIP had abused its dominant position by delaying the execution of contracts relating to the installation of the direct circuits, refusing to fulfil the contracts already executed for the installation of urban direct circuits, attempting to dissuade Telsystem's current and potential clients from using Telsystem's services, and

⁹⁰ SIP is now called Telecom Italia.

⁹¹ A telephone network system for a closed group of users consists of those that utilise the service to communicate with their own offices or with subjects linked by established legal and economical relationships.

making demands for the payment of the line rental even though the contracts had not been fulfilled.

- 2.15 The case was decided by the Corte d'Appello of Milano in two judgments dated 18 July 1995 and 24 December 1996 respectively. The judgment of 18 July 1995 recognised Telsystem's right to damages. It appointed a pool of experts with the task of answering the following queries:
- (a) what expenses had been incurred by the plaintiff since the beginning of the infringement? This query was answered by the experts upon examination of Telsystem's accounts;
 - (b) what profits could the plaintiff have made if it had obtained in a timely fashion from the defendant all the necessary direct local connections with its own clients?; and
 - (c) whether, due to the one year delay caused by the dispute with SIP, Telsystem has suffered damages by not being able to be the first active undertaking on the Italian market of vocal telephonic services (i.e. a lost opportunity).
- 2.16 The analysis of the panel of experts sought to identify the economic performance of Telsystem "but for" the obstacles introduced by SIP, including the impact from delaying Telsystem's entry into the vocal telephonic services market. The model used to calculate the but for scenario is not published in the judgment, though it is believed to have been based on a 'before-and-after' approach. The most controversial point was in relation to the lost opportunity for Telsystem from being the first to provide the new vocal telephonic service, since it could be affected by a number of factors, such as advertising and promotional activity, speed of marketing, and organisational capacity.
- 2.17 The Court followed the conclusions reached by the panel of experts and awarded damages to Telsystem of Euro 1,871,552. However, no damages were awarded for lost opportunity for entry into the new market because the court considered that *"after the obstacles have been overcome and Telsystem has reacquired full operational capacity, there is no reason to believe that the planned activity could no longer be put into effect. The market's potential was not modified; no other competitor has entered the market; the same SIP has not implemented particular market penetration policies; the attractiveness of Telsystem's proposal has not faded"*. The damages calculation was therefore concentrated on the plaintiff's lost business and profits foregone as a direct result of the infringements.

Albacom v. Telecom

- 2.18 The case related to an abuse of a dominant position by Telecom Italia by foreclosing access to the market for services of data transmission through digital subscriber line (DSL) and other technologies. The market had been liberalised and the incumbent with market power (Telecom) was required to allow access to the network upon request to potential competitors. However, Telecom had denied access to the network for data transmission to competitors, and thereby abused its dominant position. The case was decided by the Corte d'Appello of Rome on 20 January 2003.
- 2.19 Based on findings of the Italian competition authority which had previously fined Telecom for the same behaviour, the Court found Telecom guilty of the alleged abuse and proceeded to rule on the question of damages. The Court stated that damages could be calculated only on the loss of income suffered by the plaintiff arising from its exclusion from the market. The Court's assessment of damages was based on the market share held by the plaintiff in the year before the infringement (15 per cent), multiplied by the turnover earned by Telecom in the market for data transmission for the period of the infringement (ITL 169.5 billion). The Court then used a 10 per cent profit margin (the Court reduced the 12 per cent profit margin identified by the Italian telecommunication authority for Telecom, because Albacom was considered an innovator in the market and was therefore subject to higher costs) to calculate the total damage. One point to note is that there does not appear to have been an adjustment for the fact that profit margins

might have fallen if Telecom had permitted access as Telecom might well have cut prices its prices in response to the competition from new rivals.

Bluvacanze

- 2.20 In August 2001 Bluvacanze (a retailer of travel package holidays) sued some of the principal Italian tour operators for their refusal to allow it access to their on-line reservation system so that Bluvacanze could not sell the travel packages of the tour operators. Bluvacanze provided evidence that the tour operators had formed a cartel and jointly agreed to withdraw access codes from Bluvacanze because of its aggressive low retail pricing in the market.
- 2.21 The Court awarded damages to Bluvacanze on the basis of accounting documentation provided by it on the profits that it could have made but-for the exclusion from the market. The Court explained that the profit lost could be quantified "*by forecasting the earnings that could have been made in the absence of the unlawful behaviour and by projecting the data noted in the past and that could have reasonably been noted in the subsequent period*". The Court also assigned an amount of money to compensate for the injury to the commercial reputation caused by the defendants. The Court awarded Euro 185,000 for loss of profits and Euro 50,000 for damage to the commercial reputation.

UK

- 2.22 There has been one case in the UK to date (*Crehan v Innentrepreneur*) where damages have been awarded, which provides an insight into how damages will be calculated in future cases. There are two other pending cases that were both lodged on 26 February 2004.⁹²

Crehan v Innentrepreneur

- 2.23 The case concerned an action for damages by Mr Crehan against the Innentrepreneur Pub Company CPC ("Innentrepreneur") caused by the alleged infringement of Article 81(1) of the EC Treaty of Innentrepreneur's pub leases.⁹³ Mr Crehan's claim was that the beer tie restrictions in relation to the two pubs he leased from Innentrepreneur between mid-1991 and mid-1993 were anti-competitive. The ties forced him to buy beer from Innentrepreneur (or its nominees) at too high a price (higher than the prices charged for the same beer to non-tied pubs) and this caused him to make losses on the operation of the two pubs and, ultimately, to surrender the leases. The ties meant that Mr Crehan had to charge more than his competitors for the same beer because he was paying a higher wholesale price than his competitors for the same beer. This relatively high price also affected the amount of beer he sold. The High Court did not find that the beer ties infringed Article 81(1), however, the Court of Appeal (which gave its judgment on 21 May 2004), held, considering the relevant decisions of the European Commission and judgments of the European Court of Justice, that the beer ties infringed Article 81(1) and caused the damage suffered by Mr Crehan.

⁹² Case No: 1028/5/7/04: (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*; and Case No: 1029/5/7/04: *Deans Foods Limited v (1) Roche Products Limited (2) F Hoffman-La Roche AG (3) Aventis SA*

⁹³ The case has a long history (dating back to the early 1990s) which is, in the main, outside the scope of the current document. One important part of this history, however, is that it included a reference to the European Court of Justice on the preliminary point of whether a party to an agreement was entitled to claim damages for an infringement of Article 81(1) resulting from that agreement. The European Court of Justice's answer to that question was, essentially, that a party to an agreement that infringed Article 81(1) could claim damages resulting from that infringement of the EC Treaty if that party was in a markedly weaker position than the other party, such as seriously to compromise or even eliminate his freedom to negotiate the terms of the contract and his capacity to avoid the loss or reduce its extent, in particular by availing himself in good time of all the legal remedies available to him – Case C-453/99 *Courage v Crehan* [2001] 5 CMLR 28, paragraph 33.

- 2.24 The calculation of the damages to be paid to Mr Crehan as a result of the infringement of Article 81(1) was considered first by the High Court and then, on appeal, by the Court of Appeal.⁹⁴
- 2.25 The Court of Appeal held that damages should be awarded to Mr Crehan under two heads: (i) direct losses suffered as a result of paying too much for beer sold in the two pubs he leased from Intreprenneur; and (ii) as a result of this, losses suffered from giving up the two loss-making leases.
- 2.26 Under the first head, the Court of Appeal accepted the High Court's approach that the damages awarded should be the difference between the amount lost by Mr Crehan and the amount he would have made had he been charged reasonable price for the beer he bought under the ties. The High Court assumed, inter alia, that in the absence of the tie Mr Crehan would have charged lower prices to customers and consequently increased the amount of beer he sold. According to Mr Crehan's expert accountant, the actual losses he suffered on this basis during the period he held the leases were £45,487. In addition, Mr Crehan would have made £11,634 in profits at the two pubs over the same period on this basis. Therefore, the High Court would have awarded damages under this head of £57,121 (£45,487+£11,634). This was the sum awarded under this head by the Court of Appeal, which did not criticise the High Court's approach under this head.
- 2.27 The Court of Appeal held that the quantum of damages under the second head should be determined by the sale value of the leases (had they been profitable – i.e. without the infringing beer tie) at the time that they were given up. On the basis of the views of the valuation experts, profitable leases of the two pubs could have been sold by Mr Crehan for approximately 2.5 times the latest estimated annual profit figures without the restrictive tie before the leases were given up (estimated at a combined total of £25,186) plus a further £4,500 for selling the two pubs together (the "*marriage value*" - due to the cost savings which could be achieved, including the ability to buy greater volumes of beer and therefore benefit from higher volume discounts). Accordingly, total damages awarded under this head amounted to £74,206 (2.5x(£25,186+£4,500)).
- 2.28 It is important to note that the Court of Appeal adopted a different approach to the second head of damages to the High Court. The High Court had (exceptionally) calculated damages on the basis that, had it not been for the infringing beer ties in the two leases, Mr Crehan would have continued operating the pubs profitably to the date of the judgment. However, the Court of Appeal, adopting the standard approach for assessing damages under English law (that they should be assessed at the date of loss rather than the date of judgment), ruled that the correct basis for assessing such damages was at the date at which the leases had been given up on the basis that any other approach would have been unduly speculative – being based on "*a hypothesis upon a hypothesis: the hypothetical profits of a hypothetical business*"⁹⁵. Furthermore, the Court of Appeal appears to have been of the view that the sale values at the date at which the leases were given up, would represent a more reasonable valuation of the likely profitability of the pubs going forwards than the arbitrary 15 per cent markdown on projected profits due to unidentified contingencies that had been applied by the High Court.
- 2.29 In addition, it should be mentioned that the total amount awarded by the Court of Appeal was subject to interest being added (and the relevant tax being deducted – if any).

In conclusion, the Court of Appeal awarded damages of £131,336 plus interest. This compared to the £1,311,500 that would have been awarded by the High Court.

⁹⁴ The High Court (which gave its judgment on 26 June 2003) had previously held that the beer ties did not infringe Article 81(1), but had nevertheless considered what damages it would have awarded had it held that the ties did infringe Article 81(1).

⁹⁵ Paragraph 179.

Germany

- 2.30 The key principle for the calculation of damages in Germany is for the claimant to be put into the position he would have been in, but for the damaging event. This is evaluated by comparing the actual situation with the hypothetical development of market conditions without the infringement. In many cases, a comparison with other product markets, or identical markets in other geographic areas, or different markets in different geographic areas (i.e. the yardstick approach) is used as a basis for estimating the development of the relevant market but for the infringement. Comparisons may also be made with other time periods (i.e. the before-and-after approach).
- 2.31 In making comparisons with other markets and other geographic areas, case law suggests that the less similar the comparable market is to the relevant market, the more closely the courts will scrutinise the differences between the markets, and the more difficult it is to calculate damages accurately. The first case referred to is a recent judgment in which damages were awarded. The remaining cases consider the methodology that could be used for awarding damages, though there were no damages awarded in those cases. Damages have been awarded in other cases but those judgments do not go into any detail as to how the damages were calculated.⁹⁶

Vitamins

- 2.32 This case concerns a judgment by the Landgericht Dortmund of 1 April 2004 relating to damages awarded to a direct customer of a vitamins producer. The names of the parties were excised and it is not clear exactly how the amount of damages was calculated.
- 2.33 The defendant (company "X") is a worldwide producer of synthetic vitamins. The complainant is a subsidiary of a group of companies (company "Y") active in the production of confectionery. Company X supplied company Y with vitamins between September 1989 and February 1999 with a total sales value of DM10,174,301.
- 2.34 Following the cartel investigations by the US, Swiss and European authorities into price-fixing agreements and market sharing agreements prevalent in the vitamins market on a national and international basis in Europe, Asia, and North and South America, company Y was filing for damages against company X. On 1 April 2004, the Landgericht Dortmund decided in favour of the complainant and EUR 1,596,977 were awarded to company Y.
- 2.35 The Court decided that the complaint was justified and that company Y had legal standing on the basis of German competition law together with Article 81. The Court held that it was sufficient that the complainant was directly and objectively affected, because the cartel was organised and aimed at price increases on the downstream market, where a producer of foods products was considered a direct customer. The Court also decided that company X had infringed the cartel prohibition in relation to a number of vitamins.
- 2.36 The damages were calculated on the basis of the percentage decline in prices following the ending of the cartel in relation to the relevant vitamins B1, B2, C and E and the vitamin mixes containing vitamin B2 and vitamin E. The percentage price reductions which were listed in the European Commission's decision were used by the Court to assess the increase in price during the total duration of the cartel agreement. The Court held that tables on price development over time showed that, in general, higher cartel prices prevailed and did not change. Prior to the cartel agreement, prices were subject to a clear downwards trend, which had slowed at the beginning of the cartel agreement. On this basis, the Court assumed that, in the absence of the price-fixing agreements, the price declines prevalent prior to the agreement would have quickly led to prices falling to the level observed following the termination of the cartel agreement.

⁹⁶

e.g. OLG Bremen, *Nachfragerkartell*, OLG Frankfurt, *Bieterabkommen*.

The Valium Judgment

- 2.37 The case related to an abuse of a dominant market position by Roche SAPAC in relation to allegedly excessive prices for Valium and Librium in Germany. The prices of both products in the UK, Italy and France were generally lower than they were in Germany. Roche SAPAC's prices had stayed constant in Germany since the products' launch and were substantially above those in other countries.
- 2.38 The Higher Regional Court of Berlin used prices of a Dutch pharmaceuticals company, Centrafarm, as a basis to determine the but for price for Valium. The Court added on a 25 per cent premium ("own costs") for the different cost structures present in the Netherlands and Germany, a further 25 per cent (on basis of the German competitive price) for the research costs, and a further 10 per cent for "general service costs" and "goodwill" of Roche. As a result of the comparative price calculated it was concluded that Roche's prices were on average 28.25 per cent higher than Centrafarm's adjusted prices. The Court then estimated the non-abusive price at 72 per cent of the then-current value of Roche's prices, and requested price cuts to or below this level. As a further comparator, the Court compared the resulting comparative price to an equivalent price of a product produced by Berk in the UK (whose prices were below those of Centrafarm). In addition, the Court checked the effects of the comparative result against the profits and competitiveness of Roche and concluded that there were no concerns in relation to the necessary price cuts.
- 2.39 The Federal Court of Justice overruled the Higher Regional Court because it thought it inappropriate to ignore the distinction between a research-engaging company (Roche) and one that draws competitive advantages (Centrafarm) from infringing patents. It further questioned the rationale for the 10 per cent increment added for general service costs and "goodwill" of Roche. Here, the Court rejected these adjustments because it regarded that Roche, unlike Centrafarm, offered additional services (confidentiality protection of clients, information and advice to doctors) which should not be accounted for in the price comparison.
- 2.40 Although damages were not awarded in this case, the methodology adopted provided a useful insight into how the Court would calculate damages in future cases, and highlighted the difficulties in making price comparisons with yardstick markets due to the adjustments that have to be made.

The Strom Tarif Judgment

- 2.41 The case related to an abuse of a dominant market position in the supply of electricity at excessive prices. OBAG was a regional supplier of electricity in Germany. In 1963 OBAG signed a contract with a small electricity company which was given exclusive rights to supply electricity within a small area of OBAG's region. The small electricity company had its own infrastructure in that area, and sourced about two thirds of its energy from a generation plant owned by OBAG. When the size of OBAG's generation plant was increased, the small supplier contributed financially to the project.
- 2.42 The Bundeskartellamt found the tariffs charged by the small electricity player to its customers were higher than the tariffs charged by OBAG to its customers in the rest of the region. The Bundeskartellamt also stated that if OBAG and the smaller player had not entered into the exclusive supply contract then there would have been competition between them, so prices in the exclusive region would have been lower. The competition authority therefore concluded that the small electricity supplier's prices were abusive in the area in which it had the exclusivity agreement, since such abusive tariffs could not prevail without the agreement.

- 2.43 On appeal, the Federal Court of Justice said that there was no real competition for electricity in Germany so the overcharge had to be calculated on the basis of fictitious competition.⁹⁷ The Court said that it might not be possible to compare the small electricity company's prices with those charged by OBAG because of structural differences in the regional electricity market such as density of population, number of miles of grid network, density of tariff purchasers per square kilometre, etc. The Court therefore questioned the methodology for applying adjustments, ruling that regional abnormalities and market characteristics, such as special geographical conditions or anomalies in the infrastructure of a regional market need to be taken into account. The Court ruled that it was not possible to have a comparator for electricity supply in Germany since there was never any 'real' competition.
- 2.44 The Federal Court of Justice upheld the cartel authority's conclusions regarding the lack of competition, but did not decide on the abusiveness of prices. This case highlights the difficulty in using yardstick markets for damages calculations. The Court determined the facts which had to be examined in more detail in order to be able to calculate the overcharge on the basis of a 'but for' scenario.

The Flugpreisspaltung decision

- 2.45 The case relates to "price splitting" on comparable German flight routes by Lufthansa. The Bundeskartellamt concluded that Lufthansa charged in excess of its estimate of the cost difference of DM10 on comparable single flights between Berlin and Frankfurt than on the Berlin to Munich route (see further below). This was prohibited by the Bundeskartellamt, but was successfully appealed by Lufthansa at the Higher Regional Court. The Bundeskartellamt then appealed the Higher Regional Court's decision.
- 2.46 At the time of the Bundeskartellamt's decision, Lufthansa was the only supplier on the Berlin-Frankfurt route. On the Berlin-Munich route, Lufthansa had been in competition with Deutsche BA (DBA) whose prices were below those of Lufthansa as its parent company (British Airways) absorbed some of DBA's costs.
- 2.47 The Bundeskartellamt had concluded that prior to new entry on the Berlin-Frankfurt route, Lufthansa was abusing its dominant position as the sole supplier of flights. The Bundeskartellamt reasoned that Lufthansa was charging much lower prices on the comparable Berlin-Munich route due to the fierce competition with DBA, even though the number of seats sold on the Berlin-Munich route was much higher than on the Frankfurt route. The average turnover per single ticket on the Berlin-Frankfurt route where Lufthansa was the only airline operating amounted to DM200 compared to only DM169 on the Munich route. According to the Bundeskartellamt, the cost difference between the single flights on both routes should only amount to DM10 on the basis of higher landing and baggage handling fees on the Berlin-Frankfurt route compared to the Berlin-Munich route. Lufthansa argued that the Berlin-Munich route could not serve as a comparative market due to the fierce "below cost" competition by DBA, which forced Lufthansa to accept lower fares and losses on that route if it did not want to exit the market.
- 2.48 The Federal Court of Justice held that the Frankfurt to Berlin and Munich to Berlin routes were two separate but comparable markets. Both markets are comparable in distance, both airports are international airports with significant transfer business, and utilisation ratios are similar. The Court ruled that price splitting is normally viewed as a means by which the dominant company uses its market power to the disadvantage of its competitors. However, the Court was critical of the fact that the Bundeskartellamt ignored the fact that Lufthansa was not covering its costs on the Berlin-Munich route due to the fierce competition provided by DBA. Instead, the Bundeskartellamt had assumed that because Lufthansa was a dominant company on the Frankfurt route, then it would

⁹⁷ The Court calculated the overcharge only in order to state an abuse of a dominant market position. There was no reference to damages in the judgment.

use this market power to try to force out a rival on the Munich route. The Court held that this view was not justified because even though Lufthansa was dominant, it could not cover costs on the Munich route because of the competition.

- 2.49 No damages were awarded in this case. The issue only surrounded the abusive conduct, and the purpose of including this case is to illustrate further the difficulties that would have arisen in establishing but for non-infringing prices for the purpose of calculating damages.

The Arbeitsgemeinschaft Rheinausbau case

- 2.50 The case relates to a price fixing cartel in the bidding for contracts awarded by the Government for the development of waterways in Germany. The cartel involved a number of competing companies that agreed to fix prices and award contracts within the cartel prior to the public tender. For members which did not win the bids, a complex structure of compensation payments had been agreed in case various other cartel members won the bid.
- 2.51 The cartel was successful in winning the bid, so they paid out Euro 1.6 million in compensation payments. When the German authorities found out the winning parties had fixed prices, they demanded damages compensation. In its assessment the Court took into account the opportunity to obtain a better (cheaper) bid in a free and competitive market. However, the Court acknowledged that products and services supplied on a free market do not have a fixed and unitary value, and that the price of these services will vary with regard to time, place, type, contents, matter of the transaction in question, and the position within the supply chain. Therefore, the market price of the aggregate total tender could not have been known, and the market price was not comparable to any other products and services offered on the market. The outcome of the Court's decision was that the calculation of the market price was possible, though not by comparison with other markets.
- 2.52 The case was settled out of Court so there is no published information on the level of damages awarded.

3. OTHER RELEVANT COMPETITION CASES

Spain

- 3.1 There have been no reports of private damages being awarded in Spain for breach of competition law to date.⁹⁸

Resolution of the Court of Appeal of Burgos of 26 June 2002 (action for damages based on infringement of the Competition Defence Act)

- 3.2 The damage in this case was allegedly caused by certain restrictive agreements adopted by a regional association of lift companies, which consisted of sharing the lift maintenance and repair market within the province of Burgos between the members of the association. The members imposed long duration maintenance contracts (generally five years), and also agreed not to provide maintenance services to customers that had switched suppliers previously. The effect was to force customers to renew their maintenance contract with their existing service provider, which was to the detriment of a lift maintenance company that was not part of the agreement (the claimant). The civil judge asked the Competition Court for a report on the quantification of damages.

⁹⁸ In Spain, the Competition Defence Act (CDA) is aligned with Article 81 and 82 of EU law. The Unfair Competition Act (UCA) is different. Therefore, an infringement of the UCA is not considered a competition law infringement in the sense used in this report. Most of the infringements can be *prosecuted* under the UCA, but not under the CDA, since the latter requires more strict requirements. For example, the CDA is an order, aimed at protecting the market in general, and not only individual parties' interests.

- 3.3 The Competition Court recommended that damages be calculated by multiplying the market share lost from the infringement (i.e. potential market share minus actual market share) by the total market turnover, and then applying the average profit margin of the claimant for the period of the infringement to the lost turnover calculation. However, it is possible that this methodology understates the total damages incurred by the claimant. The profit margin charged by the claimant during the infringement may be lower than it otherwise would be since the claimant might have had to cut prices to a greater extent in order to gain any new contracts.
- 3.4 The First Instance judge and the Court of Appeal dismissed the action for damages due to the lack of evidence of the damage caused; a point that the Competition Court also raised in its report. In particular, there was an absence of data regarding the average market share and profits of the claimant. The Court of Appeal gave some guidelines on the evidence which the claimant should have submitted in order to substantiate the loss of profits suffered as a result of the restrictive agreements. These included the number of lifts which the claimant had maintenance contracts for in each of the years affected; the number of lifts for which the claimant was authorised to provide such services; the number of qualified employees of the claimant, etc. However, the claimant had not submitted an expert's report setting out the damages suffered, which seems to have been to the claimant's detriment.

Canal Satélite Digital ("CSD") case (action for damages against the State Administration)

- 3.5 In a recent decision of the Supreme Court dated 12 June 2003 the Government was ordered to pay CSD more than Euro 26,445,280.37 for loss of profits as a result of certain provisions contained in a Royal Decree which were contrary to EU law regarding the direct-to-home platform for television broadcasting.
- 3.6 The damages were calculated based on the loss of subscribers (both temporary and permanent) suffered by CSD as a result of the infringement, based on the figures of new subscribers obtained by the other direct-to-home platform provider during the same period. This number was then multiplied by the average monthly subscription fee (calculated by averaging out across the range of subscriber packages available), for the duration of the infringement. The Court then made various adjustments for seasonal variations in subscription rates, a general decline in subscription fees, better programming, market penetration of the product based on length of time available to consumers and distribution networks. These calculations led to a total award for damages of Euro 26,445,280.37.

Ruling of the Court of Appeal of Barcelona of 25 May 1999 (action for damages based on infringement of the Unfair Competition Act)

- 3.7 In a case involving unfair competition, the Court of Appeal of Barcelona had to calculate the loss of profits suffered by a pharmacist in a small village as a result of unfair conduct carried out by a doctor during 1994. The claimant argued that the conduct gave rise to a loss of profits due to the fact that the patients bought medicines directly from the doctor instead of buying them in the pharmacy.
- 3.8 The Court of Appeal accepted the action for damages and calculated the loss of profits on the basis of the difference in the claimant's turnover in 1993, 1995 and 1996 (before-and-after the infringement), compared to 1994 when the infringement occurred. This showed that the claimant's turnover was 8.4 per cent lower during the year of the infringement, which gave a loss of turnover of Euro 32,736.74. The Court then applied the average profit margin of 14.97 per cent to the lost turnover figure to calculate the net loss to the claimant from the infringement. Again, the possibility of the doctor cutting prices in response to the competition, which might have reduced the pharmacy's profit margins, did not appear to be considered.

4. **COUNTRIES WHERE DAMAGES CASES ARE PENDING**

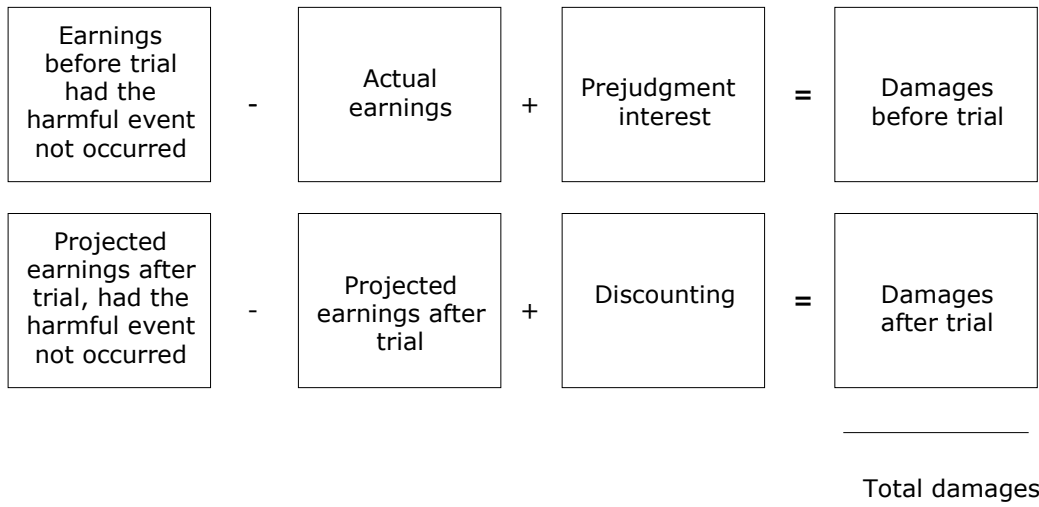
DENMARK

- 4.1 To date there have been a limited number of reported damages cases based on breach of competition law and no damages have yet been awarded. However, there is a pending case.
- 4.2 The pending case involves damages claimed by local municipalities (i.e. local authorities) against the participants in the pre-insulated pipes cartel that the European Commission found to breach Article 81 in their decision of 21 October 1998. The cartel started in Denmark and then extended throughout the European Union. The competition restrictions involved price fixing, market sharing and bid rigging. The European Commission imposed fines of 92.21 million on the ten companies involved.
- 4.3 The plaintiffs claim that prices were significantly lower in 1999 (after the cartel ended) than during the cartel period. The plaintiffs have compared the "cartel" and "post-cartel" prices, adjusted for estimated weighted changes in raw material costs and wage costs (i.e. the 'before-and-after' method, though not focussing on the 'before' part of the equation). They have calculated damages based on a calculation of 1999 prices after the cartel period, and compared them to the prices applied during the cartel period (taking into account relevant inflation and index adjustments), in order to derive a damages calculation based on the over-charge.
- 4.4 The defendants' claim that the plaintiffs have passed on all the costs through higher prices to their customers and therefore have not suffered a loss (this passing-on defence is covered in more detail in section 4 of part (i) of the report). The defendants have argued that prices during the cartel period were affected by a large number of factors unrelated to the cartel, so that no specific market price is applicable. They have also argued that the comparison solely with post cartel prices in 1999 is misleading as the market position was considerably different compared to years prior to the cartel. This highlights some of the problems associated with the before-and-after approach as mentioned in section 3.3 to 3.6 of part (i) of the report.
- 4.5 The defendants have also made alternative damages calculations based on "the cost-based approach" involving a calculation of the size of any supranormal profits obtained by the defendants (based on an assessment of prices obtained by using actual unit costs and allowing for a normal return on capital).
- 4.6 An oral hearing is scheduled for 2005.

LITHUANIA

- 4.7 There are no reported cases to date, but there are two pending cases relating to claims of damages incurred due to infringements of competition law. Both of these cases concern abuse of a dominant position by setting discriminatory prices and other trade terms and conditions. In both cases the plaintiff is trying to show the income (profit) that they would have received but for the discriminative prices and other infringements set by the defendant. In both cases the Court has assigned an economic expert since there is sufficient doubt about the quality and validity of the economic calculations provided by the plaintiff. However, there is limited information available at this stage to assess the methodologies used by the plaintiff and the defendant.

Figure 1: Standard Format for a Damages Study



Source: Robert E. Hall and Victoria A Lazear (1994) "Reference Guide on Estimation of Economic Losses in Damages Awards", in Reference Manual on Scientific Evidence, Washington D.C.: Federal Judicial Center

ANNEX 1: THEORETICAL OLIGOPOLY MODELS

1. INTRODUCTION

- 1.1 Many real world markets can be characterised as 'oligopolies' – that is, markets with more than one firm (monopolies) but where there are too few firms for the 'perfect competition' model to apply, in particular, because each firm knows that the profitability of its competitive decisions (for example, as regards prices and quantities) depend on the reactions of rivals to these competitive decisions. Firms in an oligopolistic market are therefore strategically interdependent.
- 1.2 A number of theoretical oligopoly models have been developed by various academic economists over the years to study such markets. The first were the classical 19th century static⁹⁹ models of Cournot and Bertrand, which have been the subjects of numerous developments over the years¹⁰⁰. More recently, a 'game theoretic' approach has been adopted to model the dynamic behaviour of firms in oligopolistic markets¹⁰¹. This Annex describes the key features of some of the more important theoretical non-cooperative oligopoly models, but these models can only serve as a guide to some of the possible patterns of behaviour of firms in an oligopolistic market, and many different behavioural patterns can be observed in the real world¹⁰².

2. TRADITIONAL MODELS

- 2.1 Traditional oligopoly models, such as those developed by Cournot and Bertrand, focus on determining firm and industry equilibrium outputs and prices. They are based on firms' 'reaction functions'. A 'reaction function' specifies how much output one firm would produce (or what price one firm would charge) given the different possible outputs (or prices charged) by the other firm(s) in the market¹⁰³. The market equilibrium is the intersection of those reaction functions.

The Cournot model

- 2.2 In the standard Cournot model, each firm is assumed to produce a single homogenous product at constant marginal cost, with each firm being able to supply the entire market, and each firm having a clear knowledge of market demand. There is no possibility of entry by other firms. This model may be conceptualised either on the basis that:

⁹⁹ That is, the lack of a time dimension to the problem, where action on the part of one firm can be followed by reaction on the part of another firm, etc. As opposed to a 'dynamic' analysis approach, such as that used in many of the relevant game theoretic models, where actions over time can be taken into account.

¹⁰⁰ This Annex does not cover a third class of models which describe competition in a spatial manner, such as Hotelling's famous linear city model. See further, e.g. Tirole (1988), *The Theory of Industrial Organisation*, Cambridge, MA, page 279.

¹⁰¹ 'Game Theory' is the study of how people and firms behave in strategic situations. That is, situations in which each person or firm, in deciding what to do, must consider how others might respond to that action.

¹⁰² This Annex can only serve as a very simple introductory summary to an area that has received a great amount of academic interest. Another helpful summary is contained in the European Commission (2001) *Assessment criteria for distinguishing between competitive and dominant oligopolies in merger control*, Enterprise Papers, No.6 – 2001, Europe Economics. Further detail can be found in a number of basic microeconomics and industrial organisation texts, e.g.: Pindyck, R.S., & Rubinfeld, D.R. (1989), *Microeconomics*, 4th edn., New Jersey; Varian, H.R. (1987), *Intermediate Microeconomics – a modern approach*, 4th edn., New York; Carlton, D.W. & Perloff J.M. (1999), *Modern Industrial Organization*, 3rd edn., New York; and Waldman, D.E. & Jensen, E.J. (2001), *Industrial Organisation – theory and practice*, 2nd edn., New York. Other, more technical, discussions can be found, e.g. in: Martin, S. (1993), *Advanced Industrial Economics*, Cambridge, MA; Church, J. & Ware, R. (2000), *Industrial Organisation – A Strategic Approach*, Singapore; and Tirole, J. (1988).

¹⁰³ For this reason, these models have also been referred to as 'conjectural variation' models. The 'conjecture' is the firm's estimate as to how its rival(s) may behave as a result of its different actions ('variations'). See, e.g., Carlton & Perloff (1999), page 156, footnote 3.

- (a) each firm sets its output/price simultaneously once and for all, and that there is no competitive interaction between firms thereafter; or
 - (b) equilibrium is reached on the basis of specific assumptions as to how each firm believes its rivals will respond to its output decisions, with the belief or conjecture being that each firm believes that its rivals will not respond to changes in its output.
- 2.3 As indicated in paragraph 2.1, equilibrium output levels (and therefore prices according to market demand) are determined by each firm on the basis of its beliefs as to the output decisions of other firms and therefore the 'residual demand' it will face given those other firms' output decisions. The 'residual demand' being the remainder of the market demand given the supply by other firms.
- 2.4 In the standard model, this generates output and prices somewhere between those predicted by the perfect competition model and the monopoly model. A general result of the model is also that the fewer (greater) the number of firms, the lower (higher) the output and the higher (lower) the prices. This means that prices are always above the competitive level (marginal cost), a decrease in the number of firms in the market produces lower output and higher prices, and total industry profits are never maximised where there is more than one firm in the market.¹⁰⁴
- 2.5 Dynamic models of oligopoly are considered further below. However, one of the most famous variations on Cournot's model is the limited dynamic version developed by von Stackelberg. In his variation, von Stackelberg allowed one firm to set its output before the other firm in the market and allowed the second firm to set its output taking into account the output decision of the first firm. In this model, the firm setting output first has an advantage since it can independently determine the residual demand faced by the second firm. This leads to the first firm producing more output than the second firm and making higher profits.

The Bertrand Model

- 2.6 Bertrand's model was similar to that of Cournot, except that he proposed that firms set prices rather than levels of output. In this model, it is assumed that goods are homogenous, and each firm is able to supply the entire market. As a result, market price is equal to marginal cost since one firm can capture the entire market if it sets a lower price than its other firms in the market.
- 2.7 One of the limitations of this model is that in practice firms are often capacity constrained, and so are unable to supply the whole market. Accordingly, capacity constraints may lead to higher prices (and lower output) than predicted by the simple Bertrand model.¹⁰⁵
- 2.8 Also, where the goods produced are differentiated (but still substitutes), and, therefore, demand for each of them is not identical (although it may be similar and related), it is possible to observe that a price-setting approach can yield similar results to that produced by the original Cournot model. Although, depending on the demand systems for the products, prices are generally lower and output is generally higher than under quantity-setting models.¹⁰⁶ One interesting difference however, is that in a homogenous goods Bertrand model allowing one firm to set prices first does not lead to different results than

¹⁰⁴ See, e.g., Office of Fair Trading (1999), "Merger appraisal in oligopolistic markets", Research Paper 19 (OFT 267), pages 23-24.

¹⁰⁵ See, e.g., Church & Ware (1999), pages 264 to 270.

¹⁰⁶ See, e.g., OFT (1999), page 25.

the simple Bertrand model (i.e. that price equals marginal costs). However, if goods are differentiated then the second firm is generally in the stronger position.¹⁰⁷

General comments on the classical static models

- 2.9 The appeal of these models lies in the relatively simple way in which complex oligopoly situations may be modelled. However, this simplicity is also the main criticism. In particular, the static nature has been identified as a serious shortcoming in representing real world situations which need to be characterised in a dynamic fashion where firms in oligopolistic markets repeatedly interact.
- 2.10 In addition, a further problem with these types of models is that they do not allow for explicit or tacit coordination between firms (this could be in the form of cartel-type behaviour prohibited by Article 81 of the EC Treaty or tacit coordination without any express collusion).

3. GAME THEORETIC APPROACHES

- 3.1 The majority of contemporary work on oligopoly theory has concentrated on game theoretic approaches. That is, considering what strategic actions firms may take to optimise their profits in the face of the actions of other firms. Such models generally specify precisely the range of opportunities each firm has to react to the actions of another firm and the precise sequence in which such reactions may take place. Unlike the traditional static models described above, the focus is not generally on finding a (single) market equilibrium price and output level, but on identifying the kinds of equilibria that it may be reasonable to suspect may exist over time and the assumptions required to support such equilibria.
- 3.2 One of the key concepts of game theory is the 'Nash equilibrium'. In this context, a Nash equilibrium is where each firm adopts a strategy that gives it the highest possible profit, given the actions of its competitors. This leads to another important concept – the 'dominant' strategy. That is a strategy that is the best for a firm regardless of the strategies of the other firms in the market.
- 3.3 As indicated above, the difficult issue faced by oligopolists is that they would like to produce less output and sell it for a higher price, and could do so if all others in the industry would also do the same, but they are not able to do so because if they raised prices or reduced quantities others would not follow them and they would lose market share and profits.
- 3.4 Possibly the most illuminating hypothetical situation in game theory, the 'prisoners' dilemma', is directly relevant to the problem faced by firms in an oligopolistic market. The key elements of the prisoners' dilemma are generally set out in the following manner:

"Two prisoners have been accused of collaborating in a crime. They are in separate jail cells and cannot communicate with each other. Each has been asked to confess to the crime. If both prisoners confess, each will receive a prison term of five years. If neither confesses, the prosecution's case will be difficult to make, so the prisoners can expect to plea bargain and receive a term of two years. On the other hand, if one prisoner confesses and the other does not, the one who confesses will receive a term of only one year, while the other will go to prison for ten years."¹⁰⁸

- 3.5 The dominant strategy for each prisoner, and Nash equilibrium, is to confess, even though the aggregate time spent in jail would be shorter if neither confessed.

¹⁰⁷ See, e.g., Pindyck & Rubinfeld (1989), pages 451 to 452.

¹⁰⁸ Taken from Pindyck & Rubinfeld (1989), page 455.

- 3.6 This dilemma is directly relevant to the pricing decisions of oligopolists. Firms in oligopolistic markets must decide whether to lower their prices in an attempt to capture market share at the expense of the other firms in the market and risk the same reaction from the other firms in the market (equivalent to 'confess'), or to keep prices high and trust that the other firms in the market will do the same (equivalent to 'not confessing'). While the former is the 'dominant strategy', it leads to lower profits for all firms involved, whereas, the latter is less stable but leads to higher profits all round provided no firms cut prices. This dilemma provides the intuition for the incentive for firms in cartels to 'cheat' (i.e. charge lower prices) in order to capture greater market share for themselves.
- 3.7 While the above analysis is interesting, its static approach fails to take into account the repeated nature of most interactions between firms in oligopolistic markets where a dynamic approach is required. There are two ways such repeated interaction can sensibly be modelled: first, as a game with an infinite number of iterations; and second, as a game where each iteration has a certain probability of being the last.¹⁰⁹
- 3.8 The problem with such repeated games models is that they generally do not result in single possible equilibria. This is known as the 'folk theorem' which states broadly that any price/output level can be an equilibrium provided that profits are at least as much as could be earned in a single period game. That is any result between 'confessing' in all rounds and 'not confessing' in any round is a possible equilibrium. This, naturally, is not a particularly helpful result in attempting to predict the behaviour of firms in oligopolistic markets and/or industry prices and outputs.
- 3.9 A number of variations can be made to such models to attempt to bring them closer to real world situations, such as removing the assumption that firms have perfect information as regards each others actions or introducing demand uncertainty. However, such relaxations of the model assumptions often have ambiguous results in general terms and may make 'confessing'/'cheating' either more or less likely depending on the precise market circumstances – and, in any event, a very broad range of equilibria may be sustainable.
- 3.10 It is also possible to introduce sequential (rather than simultaneous) move games. However, as seen with the sequential versions of the Cournot and Bertrand models, these generally have ambiguous results, and depend on market factors.
- 3.11 A number of other strategic actions related to the functioning of the market that firms may take have also been considered in a game theoretic context. These include price signalling and price leadership, and raising barriers to entry by investment in research and development, advertising or even excess capacity. However, while these can be useful for explaining observed behaviour they do not generally assist in predicting in which markets such behaviour may arise or quantifying the exact effects of such behaviour.

4. **CONCLUSIONS**

- 4.1 Simple static models do not fit very many (if any) real world scenarios since many of the assumptions (such as perfect knowledge of industry demand, no capacity constraints, no threat of new entry, etc.) are unrealistic. However, such models may be useful once assumptions are relaxed and tailored to the particular circumstances of the case being analysed.
- 4.2 Dynamic approaches appear more promising, however, they too are of limited practical use, especially due to the effect of the 'folk theorem'. Accordingly, while a number of

¹⁰⁹ It should be noted that finitely repeated versions of the game may give the same results as single rounds. This is because, if firms know which period, is the last period they will 'confess'/'cheat' in that period. If all firms know that they will 'confess'/'cheat' in the last period, then they will all realise that the only sensible thing to do is to 'confess'/'cheat' in the previous period, etc. Therefore, by a process of 'backwards induction' firms will realise that the dominant strategy and Nash equilibrium is for all firms to 'confess'/'cheat' in all periods.

theoretical oligopoly models exist, none of them do more than outline the kinds of equilibria (in terms of prices and outputs) that may be sustainable in particular circumstances. In particular, they may not enable any precise calculation of a particular equilibrium given a specific set of market circumstances.

ANNEX 2: AN EXAMPLE OF A THEORETIC (SIMULATION) MODEL

1. INTRODUCTION

1.1 For the sake of illustration this Annex assumes that all of the available evidence indicates that, prior to the operation of a cartel, the market behaved as if it was a homogenous goods Cournot market. This Annex illustrates how the "but for" prices may be estimated in such circumstances with the difference between these prices and actual cartel prices indicating how much prices have been elevated by the cartel. The first stage for any simulation model is to identify a particular oligopoly model that fits the factual setting of the industry and the behaviour of firms within it. If a simple model based on Cournot or Bertrand assumptions fails to fit the facts of the market, in the sense that prior to the cartel the oligopoly model does not have a high degree of predictive power, then it should not be used. Evaluating fit draws on the full array of quantitative and qualitative evidence developed in each particular case.

1.2 This Annex sets out:

- (a) a brief description of the Cournot model, and the three key inputs required in order to estimate non-cartel prices;
- (b) the basic results of the Cournot model in a particular case;
- (c) some observations as to the Cournot model's predictions;
- (d) the application of the Cournot model in the US Amino Acid Lysine case; and
- (e) some brief general comments about the use of simulation approaches.

2. EXAMPLE: THE COURNOT MODEL

2.1 In the Cournot model (set out in Annex 1), each firm is assumed to produce a single homogenous product at constant marginal cost, with each firm being able to supply the entire market, and each firm having a clear knowledge of market demand. This Cournot model is a simple static game in which the strategies of firms are based on the following set of assumptions:

- products are homogenous;
- firms choose how much output to produce;
- firms compete with each other just once and they make their production decisions simultaneously, or equilibrium is reached on the basis of an assumption that firms believe that rivals would not respond to changes in their output; and
- there is no entry by other producers.

2.2 In order to use the Cournot model to calculate counterfactual non-cartel prices the model requires only three pieces of information to be collected/calculated:

- (a) the Herfindahl-Hirschman Index ("HHI")¹¹⁰;
- (b) the market price elasticity of demand¹¹¹; and

¹¹⁰ The HHI is a measure of concentration which is calculated by summing the squares of market shares for each firm in the industry. For example, a market containing five firms with market shares of 40%, 20%, 15%, 15% and 10% respectively has a HHI of 2550 ($40^2+20^2+15^2+15^2+10^2=2550$). The HHI ranges from close to zero (in an atomistic market) to 10000 (in the case of pure monopoly).

(c) the weighted-average marginal cost of production¹¹².

3. RESULTS OF THE COURNOT MODEL

Oligopoly

3.1 In equilibrium all firms are profit maximising given the output of the other firms, i.e. all firms play a best response to each other. The particular Cournot model set out in Appendix A derives a profit margin for each firm based on the following formula (the derivation of this formula is set out in Appendix A to this Annex¹¹³):

$$\frac{\text{Price} - \text{Marginal cost}}{\text{Price}} = \frac{\text{Herfindahl-Hirschman Index}}{\text{price elasticity of market demand}}$$

3.2 The formula can be re-arranged in order to calculate prices based on the same three pieces of information:

$$\text{Price} = \frac{(\text{Marginal cost} \times \text{price elasticity of market demand})}{(\text{price elasticity of market demand} - \text{Herfindahl-Hirschman Index})}$$

3.3 For example:

Marginal costs = \$0.70; elasticity = -0.5¹¹⁴; HHI = 3500 (or 0.35)¹¹⁵

$$\text{Price} = \$2.33$$

4. OBSERVATIONS

4.1 This Cournot model leads to the following observations:

- the Cournot oligopolists can and does exercise market power in the sense that price exceeds marginal cost. The market power is limited by the market elasticity of demand (i.e. the price sensitivity of customers) and the number of competing firms in the market;
- Cournot markups are less than monopoly markups, since the market share of each oligopoly firm is less than 100 per cent;
- for a given market price elasticity of demand, the market price and each firm's profit margin decreases with the number of firms. Furthermore, because the market price decreases with number of firms, so does the aggregate profit. When the number of firms becomes very large, the market price approaches the competitive price;
- the greater the HHI (with a given market price elasticity of demand), the higher the average markup of price above marginal cost; and
- there is an endogenous relationship between marginal cost and market share. More efficient firms with lower marginal costs will have larger market shares.

¹¹¹ In broad terms, the own price elasticity of demand measures the percentage change in quantity demanded following a small percentage change in price. For example, a one per cent fall in quantity demanded following a one per cent increase in price will result in an elasticity of one.

¹¹² The marginal cost of production is the change in total costs due to the production of one or more unit of output. The weighted average marginal cost is simply the market average marginal costs for all firms, weighted by their individual market shares.

¹¹³ It should be noted that this simple result does not generally apply to other oligopoly models.

¹¹⁴ In the Cournot formula, the negative sign on the elasticity is ignored.

¹¹⁵ In the Cournot formula, the HHI is inputted between 0 and 1. For example, a HHI of 5000 would be inputted as 0.5.

5. THE AMINO ACID LYSINE CASE¹¹⁶

- 5.1 In the Amino Acid Lysine case in the US, the defendants provided a rebuttal of the plaintiff's before-and-after analysis that they used to calculate the counterfactual non-cartel prices. The defendants asserted that the relevant counterfactual was one based on a non-cooperative oligopoly model, namely the homogenous goods Cournot model (as described above). The defendants chose the Cournot model apparently arbitrarily "*because of its longstanding acceptance and analytical use in economics*".¹¹⁷
- 5.2 As set out above in paragraph 2.2, the Cournot model (described in Appendix A) requires estimates of three structural parameters in order to calculate prices. In this case, there was no disagreement regarding the calculation of the HHI, which for the three domestic manufacturers and two importers during the cartel was about 3500. The other parameters were based on the plaintiffs' own opinion, namely that the marginal cost was \$0.70 (or close to it) and that the elasticity of demand was between 0.5 and 1 during the cartel period. (Clearly, all these parameters need to be properly estimated). These values could then be simply inserted into the Cournot model to give an estimation of predicted prices for the counterfactual (as done above).

Results of the model

- 5.3 Over certain ranges, Connor observes that the Cournot model predicted equilibrium market prices that fell within the range of actual market prices observed during the cartel period. That is the model predicted that the cartel had failed to raise prices above the (legal) non-cooperative Cournot oligopoly level that would have allegedly prevailed in the absence of the cartel. Thus, according to the defendants, the extent of overcharge during the cartel period was negligible compared to the prices that would be charged had the cartel not operated.
- 5.4 However, Connor makes a number of observations. Firstly, the problem with the Cournot model is that the formula can, under some assumptions, predict impossible prices. Connor emphasises that, in layman's terms, the model can "blow up". For example, if the demand for Lysine was highly inelastic (less than 0.35), then the Cournot oligopolists would be predicted to set negative prices, no matter what the cost of production: an impossible result (see further the Appendix to this Annex). Secondly, another problem with the Cournot model is that it is only one of many plausible oligopoly models; its popularity often rests more with its mathematical tractability and simplicity than its consistency with real markets (i.e. it is used for the wrong reasons).

6. BROADER ISSUES TO THE USE OF SIMULATION MODELS

- 6.1 There is a substantial literature on the application of merger simulation models, but it is helpful to emphasise a number of points which have been made in a recent article by Werden, Froeb and Scheffman (2004).¹¹⁸
- 6.2 The first point to make (as is clear from Annex 1 which compares and contrasts the results from the Cournot model and the undifferentiated Bertrand model with no capacity constraints) is that any theoretical model should not be chosen arbitrarily, but with reference to the facts of the case. For example, Werden, Froeb and Scheffman observe that the differentiated Bertrand model is commonly used in branded consumer good mergers, but caution that:

¹¹⁶ See further Connor, J. in Kwoka and White (2004).

¹¹⁷ See Connor, J. in Kwoka and White (2004), page 268.

¹¹⁸ Werden, Gregory J., Froeb, Luke M., Scheffman, David T. (2004), "A Daubert Discipline for Merger Simulation". A Draft of February 16 2004.

"Whether the Bertrand model is appropriate in any particular case may depend on many considerations, three of which are of general application: First, the role of non-price competition should be evaluated. Aspects of marketing strategy may interact in important ways with the choice of price or be affected by the merger in ways that would cause the price-increase predictions to be a seriously misleading description of the merger's effects. Second, responses in the recent past to any significant cost changes, new product introductions, or other "shocks" should be evaluated, asking how well the Bertrand model would have predicted them. Finally, the observed price-cost margins for the merging products and close substitutes should be compared to the margins predicted by the Bertrand model."

- 6.3 The second point is that applying the differentiated Bertrand model may be information intense as it requires a wide range of information, including data on the price elasticities of demand between various brands (which may or may not be available); actual prices and sales; marginal costs; how elasticities of demand vary with price (for example, with a linear demand curve the price elasticity of demand increases as prices rise); and how retailers vary their prices in response to changes in manufacturers prices. This leads to Werden, Froeb and Scheffman to advise that:

"Any model used to predict the effects of a merger must fit the facts of the industry in the sense that the model explains past market outcomes reasonably well. Many critical modelling choices can be justified or rejected by evidence gathered in the normal course of merger investigation. The modelling exercise indicates kinds of evidence useful to gather and how to interpret it, while the evidence indicates whether any given model is appropriate. When the evidence cannot justify or reject an important choice, a sensitivity analysis should be done. A range of estimates should be reported that reflect the uncertainty in the model's predictions."

APPENDIX A: A COURNOT MODEL

A general Cournot model is set out below with this example being taken from Scherer and Ross (1990).¹¹⁹ This model makes no assumption about industry demand and allows for differences in firms' costs. Firm *i*'s profit is given by:

$$(1) \quad \pi_i = P(Q)q_i - c_i(q_i)$$

Where price $P(Q)$ is a function of industry output Q , q_i denotes firm *i*'s output and $c_i(q_i)$ is its total costs.

In equilibrium all firms are maximising profit, given the output of the other firms. That is, they choose a best response to each others quantity choice. Mathematically this implies firm *i* differentiating (1) with respect to q_i to obtain the first order condition for profit maximisation (i.e. output is increased until the additional output generates no further increase in profits).

$$(2) \quad d\pi / dq_i = P + (dP / dQ)q_i - MC_i = 0$$

where firm *i*'s marginal cost (MC_i) is (dc_i/dq_i) , $P + (dP/dQ)q_i$ is firm *i*'s marginal revenue. This expression for marginal revenue can be manipulated into:

$$P[1 + (dP / dQ)(Q / P)(q_i / Q)] = P - (P / e)s_i$$

where e is the market price elasticity of demand (which is assumed to be negative); $(dP/dQ)(Q/P) = 1/e$; and s_i is firm *i*'s market share (q_i/Q) and the expression $P - (P/e)s_i$ is equal to firm *i*'s marginal cost MC_i .

Substituting this last expression into (2) and rearranging terms, equation (3) is derived relating firm *i*'s market share in equilibrium (s_i) to its marginal cost (MC_i):

$$(3) \quad s_i = e(P - MC_i) / P$$

Alternatively, (3) can be written as an equation relating the firm *i*'s price-cost margin to its market share:

$$(4) \quad \frac{(P - MC_i)}{P} = \frac{s_i}{e}$$

Multiplying each side of (4) by the market share s_i and summing over the n firms in the market, an expression may be obtained relating the weighted average industry price-cost margin to a measure of market concentration, the Herfindahl-Hirschman Index (HHI or H in equation below):¹²⁰

$$(5) \quad \frac{(P \sum s_i - \sum MC_i s_i)}{P} = \frac{\sum s_i^2}{e} \rightarrow \frac{(P - \overline{MC})}{P} = \frac{H}{e}$$

(5) can be arranged to yield:

$$P = \frac{(e)}{(e - H)} \overline{MC}$$

¹¹⁹ Scherer, F. M, and Ross, D (1990), "Industrial Market Structures and Economic Performance - third edition", Houghton Mifflin Company.

Returning to the Lysine case, if $H = 0.35$, then e must exceed 0.35 or $e - H$ will be negative and predicted prices will thus be negative, which is obviously an unreasonable result.

¹²⁰ Note that $\sum s_i = 1$. I.e. the sum of the market shares of the firms in the market adds up to 1 or 100%. Also HHI lies between 0 and 1, rather than the usual 0 and 10,000 ($100^2 = 10,000$ for a monopolist).

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Annex 4: Further reading

1. Statistical methods (econometrics/multiple regression)

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2. Accounting models of damage

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