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Estimating Private Antitrust Damages

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Abstract

In light of the European Commission's recent initiatives to bolster private antitrust enforcement, this paper discusses the general economic framework for damages estimation, reviews common empirical methods used by economic experts and highlights some of the practical challenges for estimating private antitrust damages.

À la lumière des initiatives récentes menées par la Commission européenne pour favoriser le développement des actions privées en dommages et intérêts pour infraction au droit de la concurrence, cet article introduit le cadre économique général pour l'estimation des dommages, expose les méthodes empiriques communément utilisées par les experts économiques et met en évidence une série de questions pratiques pour l'estimation de dommages suite à des violations du droit de la concurrence.

1. The European Commission's 2008 White Paper on private damages actions acknowledged that "although there have recently been some signs of improvement in certain Member States, to date in practice victims of EC antitrust infringements only rarely obtain reparation of the harm suffered".[1] To address the main obstacles to effective compensation, the White Paper considered a series of concrete proposals, including the possibility of providing non-binding guidance to the courts for the quantification of damages in antitrust cases.[2] In order to prepare for the drafting of a paper that would set out this pragmatic guidance, DG Competition commissioned an economic study on damages estimation,[3] and held a workshop in which a number of economic consultants and academics shared their views and experience in estimating damages.[4]

2. This paper sets out some of the key questions for the estimation of antitrust damages within the European context. It starts by stressing that any damages estimation relies on assumptions and that lack of precision cannot serve as an excuse not to estimate damages and to deny compensation to the victims of established antitrust infringements. It then reviews the principal methods of damages estimations, explaining how common econometric techniques for estimating damages can be understood as implementing very simple conceptual approaches. Next, it highlights some of the common challenges that economic experts encounter while estimating damages and argue that the use of qualitative evidence and industry knowledge is often key to selecting a particular estimation methodology. The paper concludes by drawing attention to some of the best practices that are crucial to ensuring that reliable damages estimates are submitted to the courts.

I. Key principle: All damages estimations rely on assumptions

3. Recent experience in Europe has shown that judges sometimes consider that unless claimants are able to establish without any doubt the exact amount of damages that they have incurred, compensation for such damages should not be granted.[5] Yet, as explained below, all damages estimations attempt to measure what a certain variable would have been in the absence of the infringement, which is by definition not observed (the so-called counterfactual).

4. In that respect, it is important to emphasize that damages estimation techniques generate a counterfactual only under a set of specific assumptions.[6] The goal of damages quantification should therefore not be to estimate an exact amount, devoid of any uncertainty, but rather to provide an informed estimate of the damages (given that the infringement has been established).[7]

* The views expressed are my own and do not necessarily reflect those of the European Commission, the Directorate General for Competition or any other EU official.

1 White Paper on damages actions for breach of the EC antitrust rules, COM(2008) 165, 2.4.2008 (hereafter, White Paper), section 1.1.

2 White Paper, section 2.5.

3 Oxera (2009).

4 Workshop on damages quantification chaired by Damien Neven and Carles Esteva Mosso, with the participation of John Beyer, Zoltan Biro, Eric Brouwer, Paolo Buccirossi, Juan Delgado Urdanibia, Hans Friederiszick, Chiara Fumagalli, Mattias Ganslandt, Paul Hofer, Marc Ivaldi, Frédéric Jenny, Russel Lamb, Ioannis Lianos, Andrea Lofaro, Jorge Padilla, Matthias Pflanz, Michele Polo, Luigi Prosperetti, Daniel Rubinfeld, Maarten Pieter Schinkel, Ulrich Schwalbe, David Spector, Eric van Damme, Theon van Dijk, Frank Verboven, Assimakis Komninos, Gunnar Niels, Robin Noble, David Jevons and European Commission staff (DG Competition, 26 January 2010).

5 In the Conduit case in Spain for example, and despite the fact that the infringement was established, the courts did not award damages for lost profits "due to the lack of certain connection, devoid of doubts and insecurities, between the illicit practice and unrealized gains" (Martinez-Granado and Siotis, *forthcoming*)

6 For instance, the cross-section approach described below estimates the effect of the transaction under the assumption that the variable of interest in the absence of the infringement would equal the variable in the comparator market. Similarly, in the before-after approach, the key assumption is that if the infringement had not taken place, the value of the variable of interest would equal the value observed during the reference period (conditional on the development of other variables if a multiple regression analysis is used).

7 The precision of the estimate should be assessed in light of data limitations, taking into account in particular the asymmetry of data availability between the claimant and the defendant.

II. … but to a different extent

5. Damages estimation techniques, such as the cross-section, before-after and difference-in-differences approaches, which are described in detail below, rely on different assumptions. The key question is how strong these assumptions are in a specific case and whether applying a particular technique is likely to bias the estimate.[8] In a given market for example, one may prefer the difference-in-differences analysis to the before-after analysis, as one may doubt that all changes that happened during the infringement were caused by the infringement or could be controlled for in a multiple regression analysis using observable variables.

6. If alternative assumptions are considered, the estimation relying on the least demanding set of assumptions should be carried out if the data allows it. For example, if there is sufficient data variability, a regression analysis allowing for changes in input costs to be controlled for with fixed effects would be preferable to assuming a linear relationship between price and cost. Accordingly, theory-driven analysis should rather be used in the absence of suitable data to carry out more data-driven approaches (or as a complement to these approaches).[9]

7. In that respect, it should also be underlined that seemingly divergent economic evidence presented by the claimant and the defendant relying on different methods of estimation should not be seen as cancelling each other, but rather as an opportunity to isolate the key assumptions, data and methodological choices driving particular results, and hence to better grasp the determinants of the question at hand.[10] For example, if the results of a before-after and a difference-in-differences estimation point to different directions, this could e.g. indicate that the before-after estimation is misleading as it attributes to the infringement the effects of other variables, or that the comparator market used in the difference-in-differences estimation may not be appropriate, e.g. because the comparator market was affected by the infringement.

8 A biased estimate can still be informative if the direction of the biais is known (weighed against, for example, an unbiased, but less precise, estimate).

9 Of course, the delineation mark between the data-driven comparison approaches using multiple regression analysis and the theory-driven approaches relying on stronger assumptions can be somewhat blurry, as multiple regression analysis imposes some structure to be able to recover the parameters of interest while industrial organization models can make use of extensive data.

10 See DG Competition (2010)'s Best Practices for the submission of economic evidence, section 1. As explained in the Best Practices, since any model is by definition a simplification of reality, a successful critique of a model should not only point to its simplifying assumptions or data limitations, but should establish that the results critically depend on these assumptions or limitations.

III. Common empirical methods used by economists to estimate antitrust damages

8. The core question of any damages quantification is to determine what would have happened in the absence of the infringement, also known as the counterfactual scenario or the "but for" world. To better illustrate this point, an analogy could be drawn with medical experiments: if one wants to measure the effect of a drug, one would need to compare patients who take the drug with the exact same patients if they had not taken the drug (or had taken a placebo). Both outcomes can not be simultaneously observed as they constitute different hypothetical states of the world. While medical experiments can be used to randomly assign patients to one or the other option in order to determine what would happen to patients in different states of the world, such experiments are obviously not available to establish the counterfactual in the context of antitrust damages quantification.

1. Primary conceptual approaches for damages quantification

9. From a conceptual point of view, the primary method that economists use to estimate the impact of an infringement is to compare the observed outcome with a proxy for the outcome in the absence of the infringement.

10. For example, in its simplest form, the cross-section (also called yardstick) approach compares the variable of interest (e.g. prices, quantities, margins or financial measures) in the market in which the infringement took place with an otherwise similar market.[11] Similarly, in its simplest form, the before-after approach compares the variable of interest through time within one market (e.g. comparing prices during the infringement period with prices before and/or after the infringement took place).

11. A difference-in-differences estimation combines both the cross-section and before-after approaches. In essence, it attributes to the infringement, not the difference of outcome between two markets or between two time periods, but it considers, in its simplest form, that the effect of the infringement is the difference of outcome between the infringement and non-infringement period in the affected market minus the difference of outcome between these two periods in the non-affected market (or equivalently, the difference of outcome between the two markets during the infringement period minus the difference between the two markets in the non-infringement period).

12. The difference-in-differences approach can be illustrated with a very simple numerical example. Suppose that the price of a cartelised product was €130 during the infringement

11 This article refers to comparisons across and within "markets" for ease of exposition; the same exercises can carried out at a more disaggregated level if appropriate data is available, e.g. comparing data of affected and otherwise similar unaffected firms, or of affected firms during the infringement and non-infringement period.

period, while it was €100 during the reference period. Now suppose that in a control market, the price was €90 in the reference period and €100 during the infringement period. The difference-in-differences approach, in its simplest form, would indicate that the infringement increased unit prices by €20 (€30 is the difference between the infringement and non-infringement period in the affected market, to which one subtracts the €10 price difference between these two periods in the non-affected market).[12]

13. An essential consideration for the application of any of these methods is whether the chosen control group (be it another market, time period, or combination of both) is, except for the infringement, similar to the affected market/period. In particular, the control group should be comparable in terms of competitive structure, cost and demand characteristics to the infringement market/period (or more precisely their outcome should represent the outcome in the infringement market/period in the hypothetical situation where the infringement did not take place).

14. In the simple arithmetic form described above, the cross-section and before-after approaches risk attributing to the infringement variations that are driven by other factors than the infringement. Indeed, just comparing average prices between the region where the infringement took place and another region means that all differences between the two regions are assumed to be due to the infringement. If some variation is due to other factors, the estimates based on a simple arithmetic calculation would be misleading as to the amount of damages. Similarly, if prices are compared between an infringement period and a non-infringement period, the simple arithmetic application of the before-after approach leads to biased estimates if some of the changes are due for example to changes in costs or demand shocks.

15. From a conceptual point of view, and to the extent that the control groups are appropriate, the difference-in-differences approach is an improvement over the before-after approach as it isolates changes that happen at the same time as the infringement but are unrelated to it as long as these changes take place in the same way in both markets. It is also an improvement over the cross-section approach as it controls for difference across the affected and control markets, as long as these differences are constant over time.

16. Still, even the difference-in-differences approach, in its simplest numerical form, cannot distinguish between the effect of the infringement and the effect of an unrelated factor that impacts e.g. the affected market but not the control group at the time of the infringement. In the numerical example mentioned above for example, prices in the affected market may have risen by € 20 more than in the control market during the infringement period not only because of the infringement, but maybe also because of a demand or supply shock specific to the infringement market and period.

12 Here, the before-after method, in its simplest form, would indicate that the infringement increased prices by €30, ignoring that prices may have increased in the affected market during the infringement period in part for reasons unrelated to the infringement. Similarly, the cross-section method, in its simplest form, would attribute to the infringement the difference of €30 between the affected and control market during the infringement period, ignoring that prices in these markets also differed by €10 in the non-infringement period.

2. Econometric implementation of these conceptual approaches

17. Fortunately, econometrics comes to the rescue of the expert in charge of disentangling the effect of the infringement from unrelated factors. In particular, multiple regression analysis is a useful tool to take into account differences between the infringement and the control markets/periods. Conceptually, multiple regression analysis can be designed to be a direct application of the cross-section, before-after or difference-in-differences estimation, with the appreciable advantage that it controls for other determinants of the variable of interest.[13]

18. For example, a multiple regression analysis can implement the before-after approach by regressing the variable of interest on a conspiration dummy and a set of control variables using data covering the infringement period and a before and/or after period for the market concerned. This allows controlling for the effect of other observable variables that may affect the variable of interest during the infringement period. For example, if input costs increase during the infringement period due to reasons unrelated to the infringement, the effect on prices of the increased input costs can be isolated from the effect of the infringement.[14]

19. Using regression analysis with the cross-section approach to control for other differences between the infringement and control markets can be more challenging as it requires proper cross-sectional data. This can be done for example with a high number of localized markets or firm-level data from different regions.[15]

20. A regression analysis can implement the difference-in-differences approach by adding to the data used for the before-after approach data from another market over the same time periods.[16] This is particularly interesting as it exploits both cross-sectional and time-series variation as a source of identification. Indeed, the difference-in-differences approach has the advantage that it controls not only for observable variables included in the regression, but also for unobservable changes to the extent that they impact both the affected and control groups in the same manner.[17]

13 Generally, it is essential for the regression analysis to properly account for other variables that are thought to affect the variable of interest, as omitted variables will bias the result if they are correlated with the conspiracy variable. It is also important not overfit the model to the data in the sample, as damages estimates could be driven to zero by including a sufficient number irrelevant variables (see e.g. Rubinfeld (2009)). It is therefore good practice to select the set of control variables on the basis of industry knowledge prior to estimating the model.

14 This method was for example used by the Court appointed experts in the German cement cartel (decision of the Higher Regional Court in Düsseldorf of 26 June 2009 on appeal of the administrative procedure, hereafter *German cement cartel*).

15 See Porter and Zona (1999) for a cross-sectional estimation of the effect of the Ohio school milk cartel. The Conduit case in Spain provides another example of application of the cross-sectional approach (Martinez-Granado and Siotis, *forthcoming*), in which the UK was taken as a reference market for Spain. In this case, a regression analysis was carried out with UK data to control for various effects affecting sales levels, such as advertising. Although the regression did use time-series data from the UK, this approach is better classified as cross-sectional, as the source of identification of the infringement effect lies in the cross-country comparison and not in the comparison between an infringement and a non-infringement period.

16 Technically, the effect of the infringement can be estimated with a conspiracy variable defined as the interaction of a dummy variable indicating the market in which the infringement takes place with a dummy variable indicating the infringement period.

17 This approach was for example used by one of the parties in the temporary workers cartel in France in the regulatory context (decision of the French Competition Authority of 2 February 2009), hereafter *French temporary workers cartel*.

3. Theory-driven analysis and cost-based approach

21. Besides the aforementioned data-driven techniques, some more structural techniques may also be used to generate a counterfactual, including simulations of the infringement effects using theoretical (simulation) models and cost-based analysis.[18] One potential criticism of simulations is that they tend to rely on strong assumptions and generally require the use of cost data, which may be difficult to measure in a consistent manner.[19] The cost-based approach, which consists in adding a margin to the observed costs to generate a counterfactual, is less appealing because the observed costs are not independent of the infringement.[20]

IV. A few practical questions for estimating antitrust damages

22. Although the principles of damages estimations explained above are relatively simple, carrying out damages estimations in practice can be quite challenging and requires considerable skills and dedication from the economic experts performing the estimation. This is illustrated below by a few of the common challenges and questions encountered by economic experts.

1. Is the candidate control group affected by the infringement?

23. One key question for choosing the comparator group is not only whether it is comparable to the infringement market,[21] but also whether it was not affected by the infringement. Finding such a market is often difficult in practice, as markets that are very similar may be subject to similar anticompetitive behaviour, and even if they are not, they may be affected by the infringement.[22]

24. For example, in the French temporary workers cartel,[23] damages were estimated (in a regulatory context) by one of the parties using a difference-in-differences estimation, taking local customers as the control group for national customers, which were subject to the infringement. A key question for such an approach is not only whether local customers were not subject to collusive behaviour, but also whether the prices for local customers were indirectly affected by the collusion on national customers. If the control group is affected by the cartel, difference-in-differences approach would tend to underestimate the true effect of the infringement. This illustrates the importance of considering all available evidence, both qualitative and quantitative, to select one particular technique versus another.

2. Which reference period should be considered?

25. Selecting a particular reference period for estimating damages may potentially have a strong impact on the estimated effect of the cartel. For example, one may observe a price war after the breaking up of a cartel. Taking this price level as a benchmark for the competitive price would lead to an overestimation of the effect of the infringement.[24] Another important issue to consider is the endogeneity of the cartel formation decision. For example, Levenstein and Suslow (2006) indicate that a price decline is often observed before cartel creation; if the cartel was formed in response to declining prices, taking the period just before the cartel creation as the counterfactual could overestimate the impact of the infringement. Indeed, the pre-cartel period may in that case not represent the likely outcome in the absence of the infringement (controlling for changes in observable variables).

26. Often, the choice of using a pre- or post-infringement period as a control period will be determined by data availability. In particular, data for the pre-cartel period may not be available, especially for long-lasting cartels. But there are many other important considerations. For example, there may be uncertainty as to the starting date of the cartel (in particular, for older cartels or cartels that have started gradually). In addition, if the infringement was particularly long-lasting, the way prices were determined before the infringement may bear little similarity with the way prices would be determined today in the absence of the infringement, which may lead to additional modeling complication.

27. Although there may be m ore certainty as to when an infringement ended, there are also issues linked to the use of post-infringement data. For example, there may be some time delay before a return to the non-infringement prices[25] and taking into account a reference price before that happens would tend to underestimate the impact of the infringement.[26]

28. Because of all these considerations, there is no general rule on which period to consider as the counterfactual. Rather, it is the task of the economic expert to choose the most appropriate model to address these considerations, which will require not only a thorough knowledge of econometric techniques, but also a good industry understanding and close cooperation with industry experts.

18 See e.g. Röller and Friederiszick (2008).

19 This is the case in particular for multiple-product firms, in which common costs are often attributed arbitrarily.

20 For example, the infringement may lead to cost inefficiencies.

21 One way to gauge whether the two control groups are sufficiently close substitutes is to compare how they fare in the non-infringement period.

22 This suggests that very localised markets may be good candidates for this method. The same difficulty would apply if one were to choose different products within the same geographic market. To constitute a suitable control group, the chosen reference product should be on the one hand very similar to the affected product, but on the other end, it should not be impacted by the infringement, which may be unlikely if the products are very close substitutes.

23 See footnote 17.

24 Still, in practice, it may be very difficult to determine what exact time period to consider. For example, in the *German cement cartel*, the court-appointed experts excluded from the reference periods not only price wars but also adjustments periods.

25 For example, the knowledge gained on how to tacitly cooperate may persist after the infringement ended.

26 In addition, the impact that fines and damages may have on post-infringement behavior should not be ignored. For example, Harrington argues that the infringing firms have an incentive to maintain higher prices post-infringement to limit their exposure to fines and compensation.

3. Does the infringement affect control variables or their relationship with the variable of interest?

29. If the infringement affects some of the control variables, e.g. if it increases input costs, not taking this effect into account will lead to biased estimates of the infringement impact. Such endogeneity of control variables may be addressed with specific econometric techniques, such as instrumental variables. Similarly, if there are reasons to believe that the infringement affects the relationship between control variables and the variable of interest (e.g. the extent to which input cost affects prices), such a possibility must be taken into account by the estimated model.[27]

30. Another way to deal with these issues, if sufficient data is available, is the so-called fill-in-the-gap approach, where the estimation is carried out only on the non-infringement period while the counterfactual is forecasted out-of-sample. The effect of the infringement is then given by the difference between the observed outcome during the infringement period and the forecasted outcome for the same period (on the basis of appropriate covariate values). This out-of-sample forecast assumes that the regression in the non-infringement period sufficiently captures the determinants of the variable of interest in the infringement period (except for the effect of the infringement).

31. These are just examples of the practical questions and difficulties that the economic expert may encounter while estimating damages, but there are many others. For example, another key question for estimating damages for indirect purchases relates to the degree to which price overcharges were passed on through the supply chain from intermediate purchasers to end-consumers.[28]

V. Conclusion

32. A recurring theme of this paper is that any quality antitrust damages estimation must rely on substantive qualitative evidence, as industry understanding is key to a proper choice of estimation techniques and econometric specifications. The paper also makes it clear that damages cannot be estimated exactly, but rely on assumptions, and that lack of precision cannot serve as an excuse not to estimate damages and deny compensation to the victims of established antitrust infringements.

33. To ensure that economic evidence is given proper weight by the courts in private antitrust proceedings, it is the responsibility of economic experts to ensure that their work reflects the highest professional standards. Given the importance of modeling choices and data limitations inherent to any antitrust damages estimation,[29] economic experts should be particularly careful to highlight the assumptions on which their work relies and the uncertainties associated with their estimates. Economic experts should also conduct a thorough robustness analysis of their damages estimates and provide the data and computer codes necessary to easily replicate and test the sensitivity of their results.[30] The Best Practices on the submission of economic evidence that DG Competition has just published should also provide a useful guide in this context. ■

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27 See e.g. Rubinfeld (2009) for a simple adaptation of the standard conspiracy dummy regression to address this issue.

28 The White Paper suggests that defendants be able to invoke a passing-on defense, but also that indirect purchasers be able to rely on a rebuttable presumption that the illegal overcharge was passed-on to them (White Paper, section 2.6).

29 Data limitations may be a particular concern in the absence of extensive discovery rules. The White paper proposes minimum levels of disclosure under strict control of the judge to avoid abuses (White Paper, section 2.2).

30 In case confidential data is concerned, access could be granted to economic experts working for opposite parties subject to strict confidentiality conditions and secure procedures as in the data-room access that takes place at the European Commission. Court appointed experts may also play a role with this respect (see e.g. Baker and Morse (2006) for a balanced discussion and further references on the use of court-appointed experts in antitrust proceedings).

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