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The quantification of damages caused by an infringement of Art. 101 or Art. 102 TFEU: Is arbitration really a short cut?

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ABSTRACT

The quantification of damages for a breach of Article 101 or 102 TFEU is complex, demanding and time consuming. Over the last few years, it has become one of the main issues in policy discussions within the European Union (EU). In particular, the European Commission (EC) investigated and revealed that the procedure for the quantification of damages caused by a breach of EU antitrust laws not only requires expert economic and econometric skills, but varies from Member State to Member State. As a consequence of this disparity, the EC issued new guidelines to render uniform the procedure for the quantification of damages caused by antitrust breaches across Member States and adopted new regulations to encourage private actions for damages. The latter aim at encouraging the use of alternative dispute resolution (ADR) methods, most notably arbitration, to resolve antitrust disputes as they provide a more expedient process and a fairer solution than a national court judgment. Furthermore, arbitration may be compared to a non-cooperative or Bayesian game. Indeed, an antitrust dispute is characterised by asymmetric information. Hence, the parties thereto act strategically in order to push the arbitrator to issue a settlement in their favour. As a result, both parties are incentivized to make extreme offers, the effect of which is to slow down the arbitration proceedings and lead the arbitrator to reach a settlement which does not correctly quantify the damages suffered. Thus, we require a system that has the double effect of encouraging the parties to avoid adopting extreme positions and converge in their offers. The amended final offer arbitration (AFOA) seems to comply with both these requirements. Nevertheless, the fact that it involves a punishment could prove counter-productive by discouraging the parties from actually selecting arbitration as an ADR method to resolve their disputes. Thus, to be an effective private action for damages caused by an infringement of Article 101 or 102 TFEU, arbitration must be structured in a manner that enables the arbitrator to reach a fair settlement, encourages the parties to converge in their offers and incentivises the parties to actually select such arbitration mechanism to resolve their disputes.

5 KEYWORDS

1. Damages

2. Arbitration

3. Game theory

4. First Order Arbitration (FOA)

5. Alternative Dispute Resolution (ADR)

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To Laura for who "I stand upon my desk to remind myself that we must
constantly look at things in a different way."

Dead Poets Society (1989)

Introduction

The European Commission (hereinafter the "EC"), in its White paper on Damages actions for breach of the EC antitrust rules, has clearly stated that "any citizen or business who suffers harm as a result of a breach of EC antitrust rules (Articles 101 and 102 of the EC Treaty) must be able to claim reparation from the party who caused the damage."[1]

More precisely, Article 101 of the Treaty on the Functioning of the European Union (hereinafter "TFEU"[2]) forbids "all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which as their object or effect the prevention, restriction or distortion of competition within the internal market."[3] Moreover, Article 102 of the TFEU prohibits "any abuse by one or more undertakings of a dominant position within the internal market or in a substantial part of it."[4]

However, the quantification of damages caused by an infringement of competition law is problematic because it requires the use of very sophisticated economic and econometric techniques. This has led every member state to adopt its own procedure for the quantification of damages before national courts.

The EC has decided to resolve this issue by adopting regulatory remedies. Indeed, the EC issued new guidelines[5] in 2010 in order to render the procedure of quantifications of damages caused by an infringement of Article 101 or 102 of the TFEU uniform. Moreover, by following the trend of encouraging private action for damages, the EC has emphasised the need to improve the use of alternative dispute resolution (hereinafter ADR) methods in antitrust disputes. In 2011, the EC took action upon this by issuing a new directive and a

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[1] European Commission, White paper on damages actions for breach of the EC antitrust rules, *Commission of the European Communities*, COM(2008) 165, Brussels, 2 April 2008, p. 2 (European Commission 1).
[2] European Union, "Consolidated Versions of the Treaty on the European Union and of the Treaty Establishing the European Community", *Official Journal of the European Union*, C83/47, 30 May 2010.
[3] *Ibid.*, Article 101.
[4] *Ibid.*, Article 102.
[5] European Commission, "Draft Guidance Paper: Quantifying harm in actions for damages based on breaches of Article 101 or 102 of the Treaty on the Functioning of the European Union", *European Commission*, Brussels, June 2011 (European Commission 2).

new regulation on ADR and online dispute resolution for consumer disputes,[6] which both entered into force on May 2013[7].

Arbitration is becoming one of the most used alternative methods for the resolution of antitrust disputes. Nevertheless, it remains unclear whether arbitration is effectively the best method in order to render private actions more accessible to consumers or whether, on the contrary, it might actually contribute to worsen their position in such disputes.

In order to address this issue, our study shall, in a first section, describe the technicalities of the quantification of damages caused by an infringement of Article 101 or 102 TFEU. Then, in second section, we shall demonstrate how two parties in a dispute before a national court may come up with different offers and how it is possible to explain this divergence. For this purpose, we shall analyse the case of abuse of dominant position: *Fastweb S.p.A vs. Telecom Italia S.p.A*.[8]

Finally, in a third section, in order to assess the effectiveness of arbitration, firstly we shall analyse the pros and cons of arbitration in competition. Then, we shall analyse arbitration by using the game theory. Indeed, in any conflict, the parties act strategically in order to maximise their utility.

Therefore, we shall apply the game theory to arbitration disputes. Since there are no game theory models explaining strategic behaviours of the parties in arbitration cases for the quantification of damages caused by the infringement of competition law, we examine game theory models applied to the First Order Arbitration (hereinafter "FOA") methodology, which is the renowned form of arbitration commonly applied in the determination of US baseball player salaries.

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[6] European Commission, "Proposal for a Directive of the European Parliament and of the Council on alternative dispute resolution for consumer disputes and amending Regulation (EC) No 2006/2004 and Directive 2009/22/EC (Directive on consumer ADR), *European Commission*, COM(2011) 793, Brussels, 29 November 2011, and European Commission, "Proposal for a Regulation of the European Parliament and the Council on online dispute resolution for consumer disputes (Regulation on consumer ODR), *European Commission*, COM(2011) 794, Brussels, 29 November 2011.

[7] European Union, "Directive 2013/11/EU of the European Parliament and of the Council of 21 May 2013 on alternative dispute resolution for consumer disputes and amending Regulation (EC) No 2006/2004 and Directive 2009/22/EC (Directive on consumer ADR)", *Official Journal of the European Union*, L168, Brussels, 18 June 2013, and European Union, "Regulation (EU) No 524/2013 of the European Parliament and of the Council of 21 May 2013 on online dispute resolution for consumer disputes and amending Regulation (EC) No 2006/2004 and Directive 2009/22/EC (Regulation on consumer ODR)", *Official Journal of the European Union*, L168, Brussels, 18 June 2013.

[8] The documents are private and so they cannot be quoted. However, we thank the Italian University Luiss Guido Carli to have provided us with these documents.

We chose to examine three different models, which broadly show the evolution of game theory applied to the FOA in the last 26 years. These three models are the Gibbons model "*Learning in equilibrium models of arbitration*" (1988), the Kilgour model "*Final-Offer Arbitration and Risk Aversion in Bargaining*" (2007) and the Deck, Farmer and Zeng model "*Amended Final Offer Arbitration is promising; Evidence from the Laboratory*" (2004).

Finally, we draw our conclusions.

1 The Quantification of damages for infringement of Art. 101 or 102 TFEU: an overview

1.1 Cartel damages and Art. 102 damages

When quantifying damages for infringement of Art. 101 or 102 TFEU, the main question that should be considered is the following: what would have been the situation but for the infringement?

Therefore, in the case of a cartel (i.e. infringement of Art. 101 TFEU), someone should determine the price that would have been set within the market without the anti competitive practice. This is the so-called "but for price" analysis. Whereas, for the infringement of Art. 102, the situation of the market without the exclusionary or exploitative practice should be estimated.

However, in both cases of antitrust infringement, it is not enough to simply estimate the price overcharge or extra costs a consumer may have suffered and the profits that a firm may have not earned. Indeed, other elements must be considered in the quantification of damages.

Bishop and Walker are of the opinion that "in general a proportion of the overcharge will be passed on and there will be an effect of this on the firm's sales and profits. This effect is often incorrectly omitted from damages claims."[9] Indeed, in quantifying damages for competition law infringement, the distinction is usually made between direct and indirect consumers. Direct customers may, for example, be other vertically related firms, such as suppliers which receive primary goods from producers, for instance gas producers sell gas to gas suppliers, or wholesaler which sell finished goods to retailers;[10] while the second category are the final consumers. This distinction is valuable because the direct consumers could, as a result of an antitrust infringement, raise its prices to the detriment of final customers. In this way, the vertically related firm passes the increase of its costs of production to the final consumer. Hence, the direct consumer transfers part or, in extreme

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[9] S. Bishop & M. Walker, *The economics of EC Competition Law*, Sweet & Maxwell, London, 2010, p. 721.
[10] For a better insight into vertical relations, vertical integrations and vertical restraints, see also: D. Carlton and J. Perloff, *Modern Industrial Organization*, Addison-Wesley, 2nd ed., 2005, Chapter 12.

cases, all the harm suffered, onto the indirect consumer – this shift of damages incurred is known as the "passing on defence" tactic.

Moreover, the infringer usually uses this argument in order to reduce the amount of damages claimed by the direct, vertically related consumer. Nevertheless, the "passing on defence" is difficult to implement because it requires a thorough analysis of the market and different elements should be taken into account, such as the elasticity of the demand in the retail market, the costs of production of the wholesaler.[11]

Furthermore, another important element is the timing of the quantification of damages. Indeed, it is often difficult to determine exactly for how long the infringement of Art. 101 or 102 TFEU has lasted. This is an important issue, especially for example, when determining the increase in price caused by a cartel. In this case, the harm suffered by the victim could remarkably vary with the variation of the period of the infringement.

In addition, the quantification of damages should take into account not only damages to assets but also non-patrimonial damages, in particular reputational damages. For example, in August 2013, Telecom Italia, the Italian telecommunications incumbent, was found liable for infringement of Art. 102 TFEU, in the fixed line market, in which Internet and phone services are provided.

In particular, Telecom abused of its dominant position:[12]

(i) by hampering the access to its network to its competitors, from 2009 to 2011. In this way Telecom's competitors have not being able to provide competitive services in the fixed line market; and

(ii) by reducing the margins of its competitors deriving from the business market segment.

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[11] For a better insight into the issue of the passing on defence see: F. Verboven & T. Van Dijk, "Cartel Damages Claims and the Passing-On Defense", *The Journal of Industrial Economics*, Vol. 57, Issue 3, pp. 457-491, September 2009; F. Hoseinian, "Passing-on Damages and Community Antitrust Policy - An Economic Background", *World Competition*, Vol. 28, Issue 1, 2005, pp. 3-23; and J. Stennek & F. Verboven, "Merger Control and Enterprise Competitiveness - Empirical Analysis and Policy Recommendations", *The Research Institute of Industrial Economics,* Working Paper No. 556/2001, 3 May 2001, pp. 45-89.

[12] Italian Competition Authority, Decision A428 - Wind-Fastweb/Condotte Telecom Italia, No. 24339, 9 May 2013.

The Italian Competition Authority imposed a fine on Telecom amounting to Euro 104 Million.[13]

Following the decision of the Italian Competition Authority (also known and hereinafter described as "AGCM"). Vodafone, a primary competitor in the Italian telecommunications market, claimed damages in the amount of Euro 1,029 Billion,[14] which also took into account reputational damages. Reputational damages may be challenging to quantify, thus we use the following example to demonstrate what they may consist in.

A costumer decides to change their fixed line provider, switching from Telecom to Vodafone because the latter has a more attractive offer. Vodafone will have to be granted access to the network owned by Telecom in order to provide the fixed line service to its new customer. This phase is crucial, because it is at this moment that Telecom could abuse of its dominant position. Indeed, as Telecom is the owner of the network, it could adopt anti-competitive behaviours by, for example, delaying Vodafone's access to its network. This delay could have the consequence of discouraging the customer to switch operator. Moreover, it could also have a negative impact on the reputation of Vodafone, which would no longer be perceived as efficient an operator in the Italian telecommunications market as Telecom.

In this situation, the judge presiding over an antitrust would have to be able to assess the link between the abuse of dominant position and the potential reputational damages suffered by Vodafone. The determination of these latter damages is as controversial as estimating damages to assets. This is because the quantification of reputational damages could vary remarkably depending on the degree of communication among customers: in the case of customers communicating rapidly among one-another, Vodafone would have to undertake a massive marketing campaign in order to re-establish a strong reputation.

Bishop and Walker also claim that: "damages estimation should be consistent with the

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[13] *Ibid.*

[14] "Vodafone chiede i danni a Telecom", *Corriere della Sera*, 4 August 2013, retrieved on 5 August 2013, http://archiviostorico.corriere.it/2013/agosto/04/Vodafone_chiede_danni_Telecom_co_0_20130804_026850 1e-fcc8-11e2-89c2-e13baa58a1b2.shtml

known facts of the industry."[15] For example, while assessing the loss of profits suffered by a firm, we should consider whether or not the market is competitive and if there are any barriers to entry. Indeed, it could be contradictory to estimate a high loss of profits in a highly competitive market. This because in a competitive market prices should be equal to marginal costs and firms should not make extra profits.[16]

1.2 Methods and models for the quantification of damages

As we have already stated in our introduction, the economics of the quantification of damages caused by an infringement of Article 101 or 102 TFEU are complicated and demanding. In 2009, the EC asked Oxera Consulting Ltd. to prepare a report on the different methodologies used for the quantification of damages (hereinafter the "Oxera Report"). This report was then used by the EC to draft its guidelines on the quantification of damages for infringement of Article 101 or 102 TFEU.

The Oxera Report presents a classification of the methods and models used for the quantification of damages into three broad groups: (i) the comparator-based approach, (ii) the financial-performance-based approach and (iii) the market-structure-based approach, which we shall each examine in detail here-below.

Chart 1: the different approaches when quantifying damages for infringement of Article 101 or 102 TFEU.

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[15] Bishop & Walker, *op.cit.,* p. 721.
[16] Carlton & Perloff, *op.cit.*, p. 43.
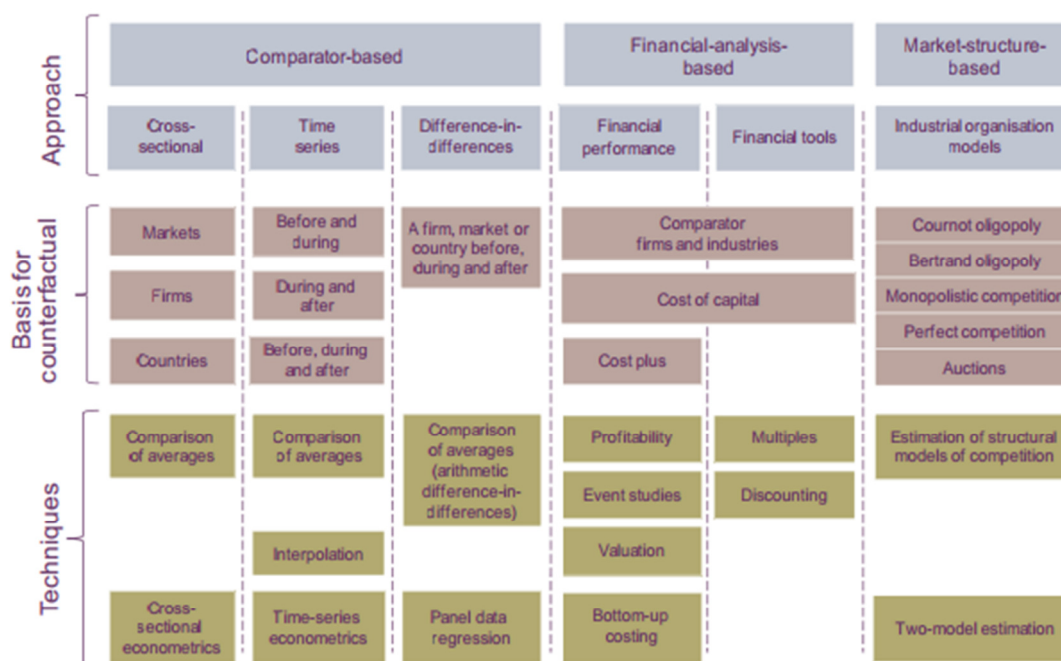
Source: Oxera Report[17]

1.2.1 The comparator-based approach

These models use data such as prices, production costs, and margins of markets which have not been affected by any infringement in order to estimate the counterfactual scenario.

In general, data can be compared in three different ways, through:

i.   Cross sectional models

Oxera explains that "the cross sectional models allow for a comparison across products or geographic markets or overtime or comparisons over both time and cross-sections."[18] For example the comparison of the prices of firms operating in different geographical areas or in different product markets.

Usually, this method either compares means or uses regression techniques. For example, in the first case, the parties could estimate the comparator price by doing an average of the prices of the comparator markets that they have chosen.

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[17] Oxera Consulting Ltd, "Quantifying antitrust damages: Towards non-binding guidance for courts", *Publications Office of the European Union*, Luxembourg, December 2009;
[18] *Ibid.*, p. 46.

The regression techniques measure the impact of the variation of independent variables (x) over dependent variables (y), and can be expressed in the following as below.

$$y_i = \alpha + \beta x_i + \delta D_i + e_i$$

For instance, if any party would like to determine the price (*y*) of a firm, it will consider the impact of the specific characteristics of the market or of the firm such as different costs of production, different quality of products or the size of the firm which are expressed by the independent variable (*x*).

Moreover, as explained in the Oxera Report[19], it is possible to determine the price of the market which has suffered the infringement and the price of the comparator market by simply adding a so called dummy variable (*D*), which assumes the value of 1 if the firm belongs to the market where the infringement took place, and 0 if the firm belongs to the comparator market. (*e*) is a random element that affects the price of firm (*i*).

Therefore, the most important element in this formula is δD_i because it enables one to measure the impact of the infringement on the firm's prices. This is because the effect of specific characteristics of the markets or of the firms is already borne by the independent variable (x_i).

Finally, the cross sectional models are useful because they compare different products or markets without taking into account the period of the infringement. This is an important advantage for the both the two parties involved in the litigation because as we will see in the following section the determination of the infringement period is a crucial step in the quantification of damages. Varying the infringement period of one more year/month or one less year/month could indeed have a remarkable impact on the calculation of the amount of damages.

However, the cross sectional models have the disadvantage that they may rely on biased assumptions. For example, when quantifying damages for an abusive infringement, the

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[19] *Ibid.*, p. 51.

parties may decide to adopt a cross sectional model by comparing their market to another European country market which has the same historical trends and the same market concentration. However, when doing this comparison they are implicitly assuming that the unique difference between their market and the comparator market is due to the anti-competitive behaviour of the two parties.

Therefore, the risk is that the parties may overestimate or underestimate the damages, as we will see in the next section when analysing the Fastweb S.p.A. vs. Telecom Italia S.p.A. case (hereinafter the "Fastweb case") and the AGCM's decision in relation thereto.

ii. Time series models

The time series models allow for a comparison over time of prices of firms operating in the same market but in the pre-infringement period. This method is usually known as the "before and after" method.

It is possible to make three types of comparison by using time series models:

1. Compare the market before the infringement with the market during the infringement;
2. Compare the market during the infringement with the market after the infringement;
3. Compare the market during the infringement with the markets before and after the infringement.

When using time series models, the parties may use different techniques in order to analyse their data. For instance, they can calculate an average price before and after the infringement and compare it with the average price during the infringement period. Otherwise, the parties can do an interpolation between the before and after price data in order to determine what would have been the value of the prices during the period of the infringement.

The positive aspects of adopting the "before and after" approach is that it takes into account the same firms and/or the same markets. Therefore, the problem faced when using the comparator-based approach does not arise, whereby the differences between firm

and/or markets in a non-infringement scenario and firms and/or markets in the infringement scenario could be not just attributed to anticompetitive effects but also to specific features of firm and/or market.

On the contrary, the "before and after" method could cause problems of path dependency because a high value in time (t) could influence the value in time (t+1).

iii.   Difference-in-Difference model

The Difference-in-Difference model (hereinafter "DID") compares over both time and cross-sections in order to "control for differences between the cross-sectional groups and the periods of time."[20]

This last method seems to be the most complete and useful but it is as well the most complicated. The DID estimator enables one "to control what would have happened without the infringement by examining what changed over time for the infringement and non-infringement markets followed by a comparison of those differences."[21]

More precisely, the DID considers two markets, the infringement market and the non-infringement market. It then calculates the average prices for both these two markets in two different periods: the infringement period (the treatment group) and the non-infringement period (the control group).

Therefore, the DID calculates the following average prices:

- The average price of the infringement market during the infringement period (A);
- The average price of the infringement market during the non-infringement period (B);
- The average price of the non-infringement market during the infringement period (C);
- The average price of the non-infringement market during the non-infringement period (D).

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[20] *Ibid.*, p. 46.
[21] *Ibid.*, p. 59.

Furthermore, the DID computes in a first step the difference between the two periods in both markets:
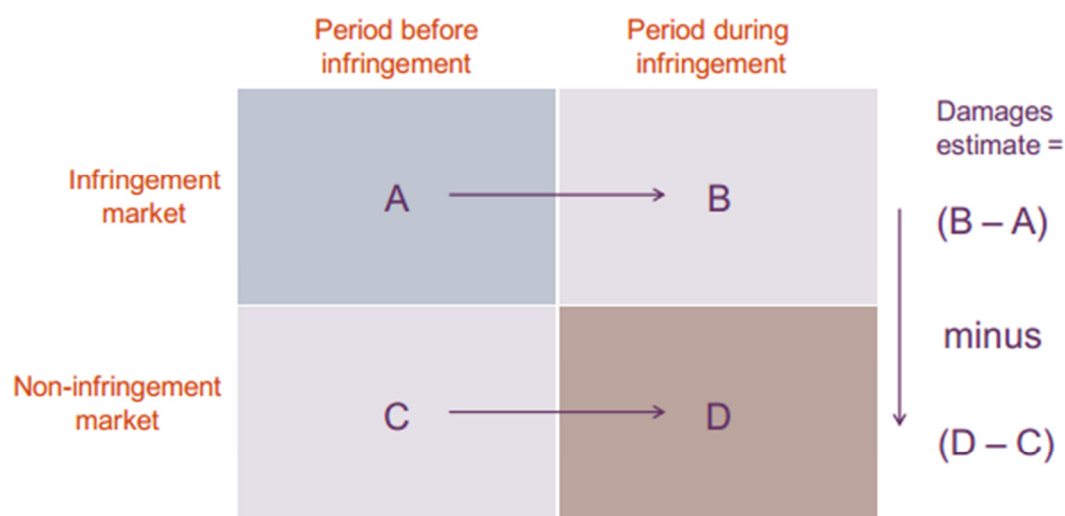
Source: Oxera Report

- (A-B)
- (C-D)

In a second step it calculates the difference between the results of the first step:

$$(A-B)-(C-D)$$

In this way, the DID allows one to eliminate the effects on the prices which are not related to the infringement.

The DID model can be implemented using two different techniques:

(i)   the comparison of averages by for example calculating the differences between the prices in the two markets over time; or

(ii) the Panel data regression, by which average prices are calculated through regressions technique and not by simple averages.

In our Annex attached hereto we illustrate the application of the DID by using the Panel data regression technique. We have applied the DID outside antitrust cases to assess the effect on Irish grocery items prices of the repeal of the Irish Restrictive Practices (Groceries) Order 1987 (hereinafter the "Groceries Order"), which prohibited sales below

invoice price on different grocery items.

More precisely, the aim of the model in this case is to determine whether the Groceries Order was causing an increase in prices for the groceries food in the "before period", prior to this law being repealed. Therefore, the DID analyses whether prices of grocery items decreased or not as a result of the repealing of the Groceries Order.

For this purpose, the model considers two different "markets":

    (i) the Non Grocery Order items (hereinafter "NGO") (the control group); and

    (ii) the Grocery Order items (hereinafter "GO") (the treatment group).

In this way, the DID compares the average prices of both these groups in two different scenarios: under the Groceries Order and without the Groceries Order, which is similar to our infringement and non-infringement scenarios.

The aforementioned second step is represented by a variable which reveals whether the difference between (A-B) and (C-D) is positive or negative and therefore if the GO prices are effectively decreasing or not. The analysis showed that in different time frameworks and also during any specific time period, the Groceries Order caused an increase in prices.

The aim of our application of the DID is also to see which critical issues may generally arise when using such technical tools for the quantification of damages (in and outside antitrust infringement cases).

First of all, the DID requires a wide range of data since 4 scenarios are taken into account. This is a crucial issue because in order to carry out a relevant econometric analysis, a high number of observations are required. For example, our econometric project took into account 768 observations.

Moreover, the implementation of a Panel data regression requires a technical econometric knowledge in order to read the Stata output and to assess the assumptions of the econometric model. For example it is very important to understand which variables are used, whether their coefficients are significant or not and what the time frameworks of the

analysis are.

In particular, from our application of the DID, we have seen that different time frameworks may have a different effect on the results of the model. Indeed, we have seen that considering different time windows have an impact on the significance of the coefficients of the variables of our model. Moreover, we observed that the greater the time period is, the smaller the effect of the repealing of the Groceries Order on prices.

Therefore, from the application of this model we can learn that the more a court judge has technical knowledge of econometrics, the better he shall be equipped to assess the DID results and the sooner he shall be able to issue his settlement judgment.

In addition, if the judge is not an expert of the market, the risk is that the parties may be incentivized to pull the final settlement in their favour by trying to influence the decision of the judge through a complicated and biased analysis.

1.2.2 The Financial-based approach models

It is difficult to talk about real financial-analysis-based models for the quantification of damages, as financial analysis is also required in other models such as the comparator-based models.

For example, in the case of an exclusionary practice,[22] a financial analysis is required to calculate the loss of profits of the claimant. In this case, the integration of comparator-based models with financial-based models is logical. The comparator-based model is required to determine the counterfactual scenario, in other words, the prices and volumes determined in a similar foreign market. Subsequently, the financial-based model is used to calculate the loss of profits by computing the net present value of the cash flows lost by the claimant.

More generally, financial-analysis-based approach models are also concerned with

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[22] Whish explains: "the concern about exclusionary abuses is that a dominant firm is able to behave in a way that forecloses competitors in anti-competitive way from entering the market or prevent existing competitors from growing within it" – in: Whish, Richard & Bailey, David, *Competition Law*, Oxford University Press, 7th Edition, Oxford, 2012, p. 202.

estimating indicators of financial performance, such as profitability or share prices, which can then be quantified as damages[23].

Moreover, these models are useful when, in determining counterfactual prices or margins, an analysis of the cost of capital is required[24]

1.2.3 The Industrial organisation models

The industrial organisation models are used in order to simulate counterfactual scenarios and enable the parties to estimate "but for prices" or loss of profits. Indeed, depending on the market structure, which may be a monopoly, a Cournot or a Bertrand oligopoly, a monopolistic competition or a perfect competition, there may be different relationships between competitors and, therefore, different market prices, outputs and profit margins.[25]

These market-structure-based approaches differ from the comparator-based approaches because they use a combination of theoretical models, assumptions and empirical estimations (rather than comparisons across markets or over time) to assess the counterfactual situation.[26]

1.2.4 Conclusion

As we have stated in our introduction and demonstrated throughout this section, the quantification of damages for infringement of Article 101 or 102 TFEU is very technical and requires strong expertise in the fields of economics and econometrics.

We have not delved into great detail in relation to every single model of estimation of damages, as it would go beyond the scope of our research. However, in the following section we analyse a specific quantification of damages dispute. While it will be interesting to see how some of the above-described methods are applied, it will be even more useful to

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[23] Oxera, *op.cit.*, p. 62.
[24] *Ibid.*
[25] *Ibid.*, p. 76.
[26] *Ibid.*

understand how the parties came up with their analytical reports and why they obtained different results.

2 The Fastweb S.p.A vs. Telecom Italia S.p.A case

2.1 The AGCM's decision: the facts

On 16 April 2004, the AGCM issued the decision[27] that Telecom Italia (hereinafter "TI") infringed Article 102 TFEU during the period from 2001 to November 2004.

More precisely, TI was found in abuse of its dominant position because of its exclusionary practice against its competitors. The operator with significant market power adopted contractual terms with the aim of hampering the entry into the market of other competitors, by introducing matching price clauses or by offering discounts to customers, which were also its employees.

Moreover, TI adopted discriminating behaviours while providing intermediate services to its competitors in the retail market. In particular, the Italian dominant operator provided its competitors services of lower quality with the aim of weakening them.

The relevant markets defined by the AGCM in its decision were:

- First of all the market of intermediate services which includes the submarkets of:
    - fixed network interconnection;
    - wholesale access to local network; and
    - leased lines.

- Secondly, the market for final services which is characterised by the submarkets of:
    - access to the telephone network for business customers;
    - voice services; and
    - data transmission and Internet access services offered to businesses.

This issuance of this AGCM decision led *Fastweb* (hereinafter "FW"), another competitor in the Italian telecommunications market, to consider itself harmed by TI's anti-competitive behaviour and undertake a private action for damages against TI before the

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[27] Italian Competition Authority, Decision A351 – Comportamenti Abusivi di Telecom Italia, No. 13752, 16 November 2004.

courts of Milan.

Consequently, both companies presented their reports, drafted by their own experts, before the courts.

2.2 Both parties' reports

2.2.1 FW's report

2.2.1.1 The harm suffered

FW states that the anti-competitive behaviour of TI caused a loss of clients in the business customers market, which is considered the potential market for every other licensed operator (hereinafter "OLO").

This category of customers is divided into:

- large accounts;
- small customers and;
- small office/home office (hereinafter "SOHO")

FW assumed that the small customers and SOHO could be grouped in one unique segment.

The firm explained that from an economic point of view, every loss of client caused the loss of revenues and, therefore, the loss of margins.

Therefore the FW calculates the total loss of profits by quantifying the total lost of margins suffered during the period of the infringement.

In order to have a better understanding of how FW calculated the loss of profits we propose the following chart.
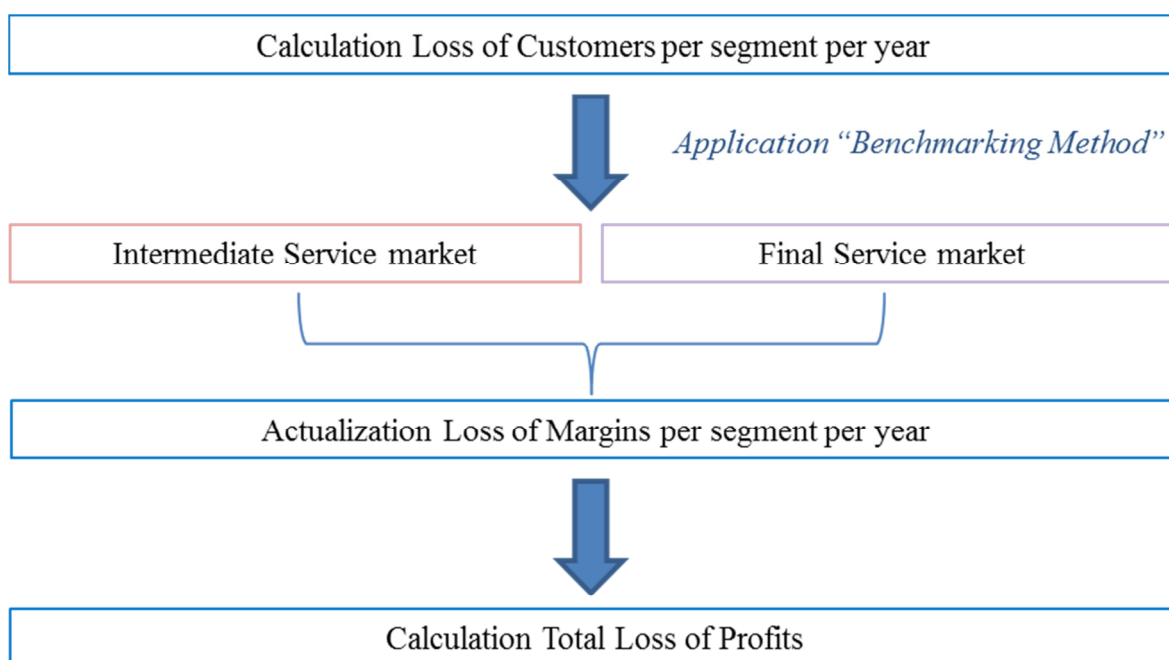
2.2.1.2 The Loss of Profits Calculation

As we have already introduced, every loss of customer equals a loss of margins. FW calculated the total loss of profits summarizing the yearly lost of margins for every type of customers during the time of the infringement. The period of infringement considered by FW ran from 2001 to December 2005.

The methodology used for the quantification of damages suffered by TI's anti-competitive behaviour is the classical formula applied for the actualisation of cash flows:

$$NPV = \sum_{t=2001}^{2005} CF \times (1+K)^{2005-t_0}$$

(1)

Where,

-   NPV is the net present value;
-   CF is the cash flow lost by FW during the period of infringement of TI;
-   K is the rate at which the CF is actualised.

In particular, in order to determine its loss of profits, FW applied the following formula:

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$$\Pi^I = Tot_{customers} \cdot \left[(Q\%OLO_{theoretical} - Q\%OLO_{actual}) \cdot Q\%FW/OLO_{actual} \right] \cdot (ARPU_{FW} - AVC) - (CT - N)$$
(2)

Where:

- Π^I is the loss of profits;
- $Tot_{customers}$ is the total number of customers on the market;
- $Q\%OLO_{theoretical}$ is the percentage of theoretical OLO customer;
- $Q\%OLO_{effective}$ is the percentage of actual OLO customer;
- $Q\%FW/OLO_{actual}$ is the market share of FW on the OLO customer;
- $ARPU_{FW}$ is the theoretical earnings related to the number of customers lost by FW;
- AVC is the average variable cost per customer for FW;
- CT is the cost per customer for the activation of the service for FW;
- N is the total number of customers lost by FW.

2.2.1.3 Determining loss of market shares: benchmarking with the UK market

Following equation (2), in order to determine the market share lost on the potential market, FW followed a two-stage process.

At first, it estimated the whole market share the OLO could have achieved in a non-infringement scenario.

Subsequently, FW's experts calculated the market share of the company on the aggregate potential market share of the OLO. Particularly, in order to estimate OLO's aggregate market share, the experts adopted the so-called benchmarking method. In other words, they used an equivalent European market, which had not been affected by an anticompetitive behaviour. For this purpose, FW's experts selected the UK market.

This choice was motivated by the fact that the UK market did not have any issues of anticompetitive behaviour adopted by British Telecom (hereinafter "BT") and because the

UK telecommunications market had been liberalised more than other markets in the EU. Yet, competition in the UK business and broadband market has become fiercer since 2000, firstly due to access to BT's DSL by UK OLOs and secondly due to unbundling of the local loop.[28]

Furthermore, the potential market share of FW was determined by applying the market share that the company had before the infringement, to the total market share of the OLOs in the UK market.

Consequently, FW calculated the loss of turnover by applying the difference between the potential turnover it could have made without TI's infringement and its actual turnover in the infringed business market.

2.2.1.4 Quantification of the loss of profits

Thus, once FW's experts had all the variables needed to apply equation (2), they were able to quantify FW's loss of profits. In particular, they actualised the loss of profits during the infringement period at a risk free rate, based on the rate of return of the government bonds with a maturity of five years, by applying equation (2).

Using this methodology, FW quantified a total amount of damages during the period from 2001 to 2005 equal to Euro 644 Million.[29] This total amount encompassed the loss of profits that FW might have suffered in the two markets: Large accounts and Small customers/SOHO.

2.2.1.5 Other benchmarking methods

Nevertheless, FW proposed other methodologies for the quantification of damages, which lead to higher total amounts of damages suffered by the infringement.

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[28] The local loop is the wire connection between the local exchange and the customer. Usually, this connection is owned by an incumbent operator. Thus, in order to enhance competition, regulation imposed the unbundled access to the local loop to OLOs.
[29] This amount has been capitalized to the 31 of December 2007.

Indeed, in its report, FW mentioned two other ways of doing benchmarking, besides the method adopted that compared the Italian market to the UK one:

The **first alternative** proposed by FW was to estimate new market shares for FW and the other OLOs, by "adding up" the market shares that these companies might have lost during the infringement period.

More precisely, following FW's argument, we know that TI's market share was strengthened by its anticompetitive behaviour. Therefore, it is reasonable to believe that part of TI's market share could have been reallocated differently within the market and probably to the OLO. For example, if TI had a market share of X% and the OLO of Y%, in 2005, the OLO could have had a higher market share. This additional value of market share could be calculated by the following multiplication: $X\% \cdot Y\%$. In other words, the OLO could have gained part of TI's market share, equal to their market share in 2005.

Using this alternative method of benchmarking, the total amount of damages would have been equal to Euro 845 Million.

The **second different benchmark** proposed by FW was to take the Italian market with adjusted OLO market shares by following the trend before the infringement.

In particular, the FW's experts stated that it was rational to think that TI adopted anticompetitive behaviours in order to hamper the expansion of OLOs within the market, especially because OLOs were having a positive rate of growth before 2005.

Indeed, as specified in the report, TI's market share should have remarkably decreased after 2001 because of the unbundling of the local loop and of the deployment of other networks, besides the ones which it already owned, which would have enabled the OLOs to provide competitive bundles of services (voice and data) to the business market. Furthermore, from a practical point of view, this method requires the carrying out of an interpolation of the past trends in order to find out which would have been the market shares of the OLOs.

As a consequence, the total amount of damages estimated by this different benchmarking amounted to Euro 710 Million.

2.2.1.6 The financial-analysis-based approach

Moreover, FW also used a completely different methodology to quantify the damages suffered as a result of TI's infringement, namely a financial-analysis-based approach. This method considered the damages suffered by FW as the loss in enterprise value caused by the anticompetitive behaviour of TI.

FW's experts used a financial model, which allowed them to determine the enterprise value throughout the sum of all the free cash flows of FW, plus the "terminal value", which is the enterprise value based on an infinite time framework.

Therefore, FW's enterprise unit value for the business market can be expressed as follow:

$$EV_{2000} = \sum_{t=2001}^{2005} \frac{FCF_t}{(1+Wacc)^{t-2000}} + \frac{\dfrac{FCF_{2005} \cdot (1+g)}{Wacc-g}}{(1+Wacc)^5} \quad (3)$$

Where:

- *EV* is the enterprise value;
- *FCF* is the free cash flow;
- *WACC* is the weighted average cost of capital;
- *g* is the *FCF* rate of growth on the infinite time framework, starting from the last year of business plan.

Hence, since the quantification of damages was required for 2007, the total amount following this financial method would be equal to the difference between the enterprise value without the infringement minus the actual enterprise value in the year 2007.

In particular, the *FCF* earned from 2001 to 2005 and the terminal values calculated at the end of 2005 are actualised to the year 2007 at a risk free actualisation rate. While, for the capitalisation of the FCF lost by FW, the WACC is used as the capitalisation rate.

Therefore, FW experts ended up with the following formula:

$$EV_{e,2007} - EV_{actual,2007} = \sum_{t=2001}^{2005} (grossM \arg_{e,t} - grossM \arg_{actual,t} - Inv_{diff,t}) \cdot (1+i_{rf})^{2007-t} + \left[\frac{FCF_{e,2005} - FCF_{actual,2005}}{Wacc} \cdot (1+i_{rf})^2 \right]$$

(4)

Where:

- $EV_{e,2007}$ is the estimated enterprise value in the 2007;

- $EV_{actual,2007}$ is the actual enterprise value in the 2007;

- $grossM \arg_{e,t}$ are the estimated gross margins that FW could have earned without the infringement;

- $Inv_{diff,t}$ are the costs that depend on the number of activated customers and, therefore, from the revenue of the company.

The first term of the equation represents the total net value of the lost margins of FW during the period 2001-2005 in the year 2007. Whereas, the second term expresses the terminal value lost by FW.

Finally, the above equation (4) enabled FW to end up with two different total amounts of damages.

Indeed, the amount of damages estimated varies in respect of whether the loss of profits suffered by FW is determined by:

(i) carrying out a benchmarking exercise with the UK market – in this case, the total amount of damages would be equal to Euro 3.4 Billion; or

(ii) considering a different benchmark such as the Italian market with adjusted OLO market by following the trend before the infringement – in this case, the total amount of damages would amount to Euro 1.8 Billion.

2.2.1.7   The quantification of damages beyond 2005

FW considered that, when losing a costumer, the firm might not only lose profits for the period of the infringement but for the entire period during which the customer would be using FW's services.

Therefore, in order to estimate the average life period of FW's customers, the firm calculated the so-called yearly average churn rate for the period of the infringement from 2001 to 2005, for the SOHO and the small business market segments. The churn rate was the percentage of customers that terminated their contract with FW, compared to active customers who did not.

Once the firm computed the churn rate, it repeated the process of calculation of loss of profits, using the financial actualisation formula (1) considering the average economic life of the customers per sub market. We describe here-below the formula used:

$$NPV_s = \sum_{t=1}^{n} \frac{CF_{t,s}}{(1+k)^t}$$

Where,

- $NPV_{m,s}$ is the Net Present Value for each customer (segment), per month;
- $CF_{t,s}$ is the yearly cash flow per customer per segment, lost by FW during the period of infringement;
- m is the year of loss of the customer caused by the infringement of TI;
- n is the economic life of the customer per market segment in years; and
- K is the rate at which the cash flows are actualized.

Furthermore, as it did in its initial quantification of the loss of profits, FW calculated the yearly margin loss for customer per segment and per economic life of customer.

More precisely, FW multiplied the margin loss for every customer per segment and per economic life by the number of customers actually lost during the period of the infringement.

This can be expressed in the following way:

$$CF/tot_{y,s} = \left(ARPU_{y,s} \times MARPU\%_{y,s} \right) \cdot \left[N_{p,s} \cdot \prod_{p}^{y} \left(1 - c_{y,s} \right) \right]$$

Where,

- $CF/tot_{y,s}$ is the yearly total margin loss of customers per segment;

- $ARPU_{y,s}$ is the yearly average revenues per customer;

- $MARPU\%_{y,s}$ is the yearly margin per user;

- $N_{p,s}$ is the number of customers lost by FW per segment and per year;

- p is the year of loss;

- y is the year under evaluation.

Consequently, FW quantified the total loss of profits (D), in the following way:

$$D = \sum_{t=1}^{y} \frac{CF/tot_{y,s}}{(1+k)^t}$$

FW estimated that taking into account the entire economic life of customers would have increased the loss of profits by approximately Euro 1.020 Million.

2.2.2 TI's report

TI considered that the period of its infringement ran from 2001 to 2004, which was the same time framework identified by the AGCM in its decision.

Furthermore, TI experts used two alternative methodologies in order to quantify the damages suffered by FW.

2.2.2.1   The analytical approach

The first methodology is based on an analytical approach. TI's experts started by assuming that FW was not able to show the existing relation between the infringements of Article 102 by TI and the consequent loss of customers suffered by FW.

Indeed, among the 16 cases presented by FW, TI selected only three cases where this relationship may have existed and where FW may have suffered harms. This is because TI considered, for example, that sending brochures or doing any other form of direct advertising, did not imply that consumers were to be considered as potential costumers.

Therefore, TI estimated the earnings that FW would have made in these three selected cases, in the large accounts market segment, which are equal to a total amount of Euro 2.2 Million.[30] The parameters used to calculate this amount are the gross margin, the costs for activating the service, the elasticity of amortization and the capitalisation of earnings.

Moreover, TI applied the same approach to the whole SOHO market as well as the small business market, in order to determine the maximum loss of profits that FW could have suffered in this aggregate segment market.

Consequently, TI based its assessment on the facts reported in the AGCM's decision. The Italian Competition Authority in fact found out that TI had an anticompetitive behaviour concerning only two categories of offers within the SOHO and small business market, namely (i) business voice and budget and (ii) corporate and business.

Hence, TI applied its analytical approach only to these two categories of offers and started by calculating the number of clients that TI had gained during the period from 2001 to 2004. Then, it estimated the number of customers lost by FW by applying the market share of the plaintiff firm to the total number of customers gained by TI.

Finally, TI quantified the total loss of profits suffered by FW in the market of SOHO as well as the small business market, which amounted to Euro 4.53 Million.

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[30] Capitalized to the 31 December 2007.

2.2.2.2   The "before and after" method

The second method used by TI is the so-called "before and after" method. This methodology implies the analysis of two different scenarios in order to calculate the loss of profits suffered by FW.

On the one hand, the total amount of earnings expected to be made by FW in the period **before** the infringement of Article 102 TFEU should be estimated. On the other hand, the actual earnings made by FW **after** TI adopted its anticompetitive behaviour should be calculated.

Indeed, in its report, TI calculated the difference between the expected earnings estimated by FW in its business plan for the period 2000-2009 and the actual earnings made since the beginning of its adoption of the anticompetitive behaviour.

The aim of this method is to identify the real impact of TI's infringement had on FW earnings, within the meaning Article 102 TFEU.

The TI experts underlined in their report that the Business Plan expectations of 2000 and FW's actual earnings were influenced, not only by TI's anticompetitive behaviour, but also by exogenous factors created by the Internet bubble at the beginning of the new century.
The experts stated that at the beginning of the year 2000, FW adopted an aggressive strategy of investments with the aim of expanding its business to the entire Italian market and, thus, far beyond only the North of Italy. Consequently, throughout 2001, as a result of the Internet bubble crisis, FW faced problems in financing its expansion and, consequently, remarkably cut down on its investments. Finally, during the year 2002, FW started growing and performed better than other OLOs.

Therefore, in order to estimate the loss of profits suffered by FW in the SOHO and small business market, TI proceeded as follows.

Due to the fact that TI considered the effects of the Internet bubble, its experts adjusted the expectations that FW made in its business plan for these markets by decreasing them by 50%. This adjustment enabled TI to estimate the expected number of clients that FW could

have reached from 2001 to 2009; this is the "before" part of the method. Then, TI proceeded to the "after" part, by identifying the actual number of clients gained by FW during the period of infringement, from 2001 to 2004. Once it had calculated the number of clients that FW would have not reached, TI estimated the loss of profits suffered by FW. The financial formula applied (2), as well as the actualisation and capitalisation rates for this quantification were the same as the ones used by the experts of FW in their report.

Hence, by applying the "before and after" method, TI ended up with a total amount of damages equal to Euro 8 Million.

2.2.3 Comparing the two reports

The two parties ended up with two different total amounts of damages. The difference is remarkable: FW came up with a total loss of profits of **Euro 644 Million**, while TI only came up with a damages estimate of **Euro 8 Million**.

2.2.3.1 Different approaches

However, as we have demonstrated, in the above analysis of both reports, the two firms adopted different methodologies for the quantification of damages. FW used the benchmarking approach while TI initially applied the analytical approach and then the so-called "before and after" methodology.

This first distinction can certainly initially assist us in understanding why the final results were so different.

First of all, the application of different methodologies caused a quantification of the damages in different markets with different rates of growth. Indeed, FW's report focused on benchmarking with the UK market. On the other hand, in TI's report both methodologies were applied in the Italian telecommunication market. This difference should not be underestimated, because the choice of different markets implies different past and future trends, different dimensions and, in turn, different market shares.

Consequently, FW came up with higher and positive market share trends for the OLOs because this is what it found out from the UK market, while TI defined a narrower dimension of the Italian markets as we have already explained in the previous section. Moreover, with the application of the "before and after" method, TI based its analysis on the Italian market.

These differences thus led the two parties to calculate a different total market share of the OLOs and, in turn, different losses of market shares suffered by FW. This then caused a dissimilar quantification of the turnover and of the profits lost by FW.

Nevertheless, FW also applied the benchmarking methodology to the Italian market. Indeed, as we have previously pointed out, the FW experts used the adjusted market shares of the OLO as a benchmark. The latter were modified by considering both the context of the whole market, like the unbundling of the local loop, and by following past trends of the OLOs in the period before the infringement.

On the contrary, TI stated that both benchmarking methods were based on an overly optimistic view of the OLO's economic growth. Indeed, as we have already stated, TI made narrower estimations of the OLOs' market share trends because it took other factors into consideration, such as the Internet bubble.

2.2.3.2   Comparing the benchmarking and "before and after" methods

The above comparison demonstrates that depending on the methodology used, the final results change.

However, it is difficult to say which is the most correct method to apply and, thus, to define a common approach that the parties should apply. In order to attempt to resolve this issue, the expert of the courts of Milan stated that a useful method would be to prove the link between the anticompetitive behaviour and its effects. This method should provide strong evidence of the number of customers and the turnover that FW might have made without the infringement of TI, within the meaning of Article 102 TFEU.

The "before and after" method used by TI seems to comply with this requirement. Indeed, the incumbent made an estimation of what would have been the non-infringement scenario based on a thorough analysis of the Italian telecommunication market.

Nevertheless, the assessments made by the TI experts may not be sufficiently reliable. Indeed, it is not clearly explained how the experts ended up with a reduction of 50% of the expected customers and returns on investments made by FW in its business plan.

Hence, the benchmarking method used by FW seems to be more reliable because it is based on real data, such as those of the UK market. However, as outlined by the expert of the courts of Milan, sometimes this kind of analysis may be unrealistic.

Indeed, it may be unlikely that, from 2000 to 2001, the Italian OLOs increased their total market share by approximately 20 %. This is what happened when the "but for" Italian OLOs' market share was calculated by introducing the UK market benchmark from 2001.

2.2.3.3 Other factors explaining the difference between the offers

Furthermore, the different amounts of damages estimated by the parties can also be explained by other factors.

i. The infringement time period

First of all, if we undertake a more detailed comparison of the two reports, we notice some slight differences, such as the infringement time framework chosen by the two parties. This certainly contributes to explaining the higher loss of profits quantified by FW since its infringement period is one year longer than the one established by TI.

ii. The way of calculating the loss of margins

Secondly, there are differences in the way the margins are calculated. For example, in its estimation, TI also considered the elasticity of amortisation in relation to the turnover of FW per year. Indeed, in order to achieve the level expected in its business plan, FW would have had to bear yearly incremental costs. Therefore, it is correct to remove from the

potential margins, which FW would have earned in a non-infringement scenario, the yearly costs of amortisation.

2.2.4 Conclusion

In conclusion to this section, which has analysed the methods of quantification of damages by both parties to the **Fastweb case**, we have seen how the quantification of damages is complicated, especially in a case of infringement of Article 102 TFEU.

This is because, as we have demonstrated in our case, it is difficult to find the right methodology in order to determine the potential loss of profits suffered by a victim. Moreover, the fact that the analysis is so uncertain could encourage the parties to adopt extreme positions, as was done by TI and FW in their reports submitted to the courts of Milan.

Consequently, the risk is that the judge may be misled and may end up reaching and handing down an unfair settlement. We assume that a fair settlement is the solution to the dispute that leads to a perfect quantification of damages.

Hence, the role of arbitration, in such antitrust disputes could be that of speeding up the negotiations between the parties and thus fostering pre-arbitration settlements. Indeed, as we will demonstrate in the next section, arbitration could encourage the convergence of the offers made by the parties.

3 Arbitration and Game theory

3.1 Arbitration and Competition law: some pros and cons

3.1.1 Definition of Arbitration

The Organisation for Economic Cooperation and Development (hereinafter, "OECD"), in its report entitled "Arbitration and Competition" published in 2010, defines arbitration as "a situation in which a private judge or arbitrator, agreed upon by the parties and under contract, is given the task of settling a dispute through issuing an arbitration decision. Arbitration can be institutional or *ad hoc*."[31]

When the arbitration is institutional, "an arbitral institution conducts the proceeding"[32] and defines the rules of the procedures; whereas an *ad hoc* arbitration requires the parties to enter into an agreement, thus, the parties will directly nominate the arbitrators and the rules of the procedures.

Like all the other ADR methods, arbitration is useful due to the fact that it is efficient in terms of: (i) costs required for the arbitration proceedings; (ii) the possibility for the parties to maintain a confidential position with the arbitrator; as well as (iii) rapidity of process. These arbitration advantages are the reason why arbitration is well accepted, especially among companies, for the resolution of their disputes.

In particular, arbitration is very much appreciated because it enables one not to maintain confidential certain information such as business plans or the settlement of the conflict.

3.1.2 Arbitration in EU Competition law

The adoption of arbitration in competition cases has always been a very confused topic in EU legislation.

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[31] Organisation for European Cooperation and Development, "Arbitration and Competition", *Directorate for Financial and Enterprise Affairs Competition Committee*, DAF/COMP(2010)40, Paris, 13 December 2011, p. 7 (OECD 1).
[32] *Ibid.*

If we start by examining the TFEU, we discover that no clues are provided in relation to the use of arbitration for the resolution of antitrust conflicts. Indeed, the TFEU does not officially allow arbitration clauses in competition law.

Art. 272 TFEU provides that "the Court of Justice of the European Union shall have jurisdiction to give judgement pursuant to an arbitration clause contained in a contract concluded by or on behalf of the Union, whether that contract be governed by a public or private law."[33] Furthermore, Art. 273 TFEU states that "the Court of Justice shall have jurisdiction in any dispute between Member States which relates to the subject matter of the Treaties."[34] These articles do not seem to permit, or to ban, arbitration clauses in antitrust disputes.[35]

However, with the judgement issued by the Court of Justice of the European Union (hereinafter the "CJEU") in the **Eco Swiss vs. Benetton case**,[36] the CJEU also authorised the adoption of arbitration for the resolution of antitrust disputes. In particular, if the arbitrator does not correctly apply EU competition law, the CJEU has the power to annul the arbitration decision or, in any case, the parties have the right to bring the case and the related arbitration decision before a judge.

Moreover, despite this uncertainty, the EC has demonstrated its willingness to encourage the adoption of arbitration in competition cases. For example, in its decision over the **Piaggio vs. Aprilia case**,[37] the EC stated that any counterparty of the plaintiff, Piaggio, which believes that the latter is not complying with its commitments adopted as a result of the decision may activate an arbitration procedure in order to solve the conflict.

Furthermore, arbitration seems to be a common practice in EU national jurisdictions. For example, two different ways of adopting arbitration for the resolution of antitrust disputes exist in Italy:

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[33] European Union, *op.cit.*, Article 272.
[34] *Ibid.*, Article 273.
[35] S.Bastianon, "*Arbitrato commerciale internazionale e diritto antitrust*" in L.Pace, *Dizionario Sistematico del Diritto della Concorrenza*, 2013, Chapter 37, p. 370.
[36] Eco Swiss China Time Ltd v Benetton International NV, Case C-126/97.
[37] European Commission, Case No. COMP/M. 3570 Piaggio/Aprilia, 2004;

> (i) the parties could decide to go before an arbitrator instead of going before the national tribunal; or
>
> (ii) the parties could insert an arbitration clause in their contractual agreements.

The first case is rare. Indeed, when the dispute is raised, the parties prefer to go before the jurisdiction that is most convenient for them. Indeed, the inclusion of arbitration clauses in a contractual agreement is more common. In this case, the parties are forced to go before an arbitrator for any breaches of such contract. Therefore, the parties do not chose to launch an arbitration procedure as a result of an antitrust dispute, but simply because they have no other alternative.

Indeed, as the OECD states "in following the *Eco/Swiss* decision of the European Court of Justice, it would seem the movement is towards a duty on arbitrators to raise legal issues in arbitration proceedings, despite some remaining hostile to any duty to apply competition laws".[38]

Nevertheless, arbitration maintains all of its aforesaid advantages while resolving antitrust cases.

3.1.2.1   Advantages of arbitration

As we have already explained in the first and the second section, the quantification of damages is very complex and requires thorough economic and econometric analyses.

Therefore, arbitration may be very helpful in order to quantify damages because the arbitrator to preside over the antitrust dispute may be chosen among experts in the sector. In this way, the parties to the dispute and the third party arbitrator responsible for settling the case speak the same technical language, which enables them to achieve a more realistic quantification of damages.

An example of unrealistic quantification of damages is the **Courage Ltd vs. Crehan case**.[39] In this case, the judge initially made an unrealistic quantification of damages. Mr Crehan was the owner of a bar and he had a contract of leasing with Inntreprenneur. In

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[38] OECD 1, *op.cit.*, p. 12.
[39] Courage Ltd v Bernard Crehan, C-453/99, 20 September 2001.

1993, Mr Crehan decided to interrupt his contract, blaming Inntreprenneur for applying anti-competitive prices. Hence, he claimed for damages for (i) the higher costs he had to bear until 1993; (ii) the loss of profits he would have suffered from 1993 to 2003; and (iii) the loss of the value of his contract of leasing if he would have continued his activity from 1993 to 2003. As a result of these claims, the judge quantified an amount of damages equal to £ 1.3 million, which was clearly unreasonable.

Furthermore, as we have stated at the beginning of this section, there is a regime of confidentiality between the parties to the dispute and the arbitrator. This is very useful for firms involved in antitrust disputes, especially vertically related direct consumers. Indeed, the non-disclosure of private information helps the parties maintain good relations and encourages them to cooperate in the future.

Moreover, arbitration proceedings are preferred to the classic method of referring a dispute to a national court because they are less expensive and more expedient. Indeed, time is a crucial factor for a firm, which cannot afford to waste financial and/or human resources in proceedings that may drag on and last for decades.

This is true for the defendant but also for the plaintiff, who, in turn, may be even more discouraged by lengthy and expensive litigations to undertake a private action for damages. Take for instance the **Manfredi case**,[40] where many procedural Italian laws slowed down the judicial proceedings. In this case, as Whish and Baily stated: "there were rules that allocated jurisdiction in actions for damages based on competition law to a different court from the one that would deal with 'normal' damages claim, thereby increasing the costs and length of the litigations."[41] By displaying the above advantages, arbitration seems to be a viable and appealing alternative to reduce costs and ensure a more efficient antitrust dispute resolution and quantification of damages process.

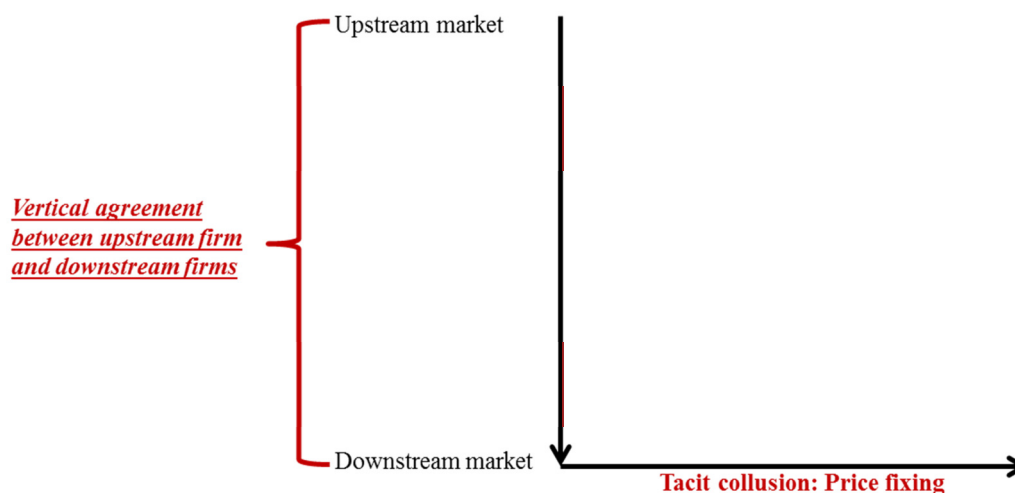### 3.1.2.2   Disadvantages of arbitration

Despite its benefits, arbitration may also have a negative impact on the resolution of

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[40] Vincenzo Manfredi and Others vs. Lloyd Adriatico Assicurazioni S.p.A. and Others, Joined Cases C-295/04 to C-298/04, 13 July 2006.
[41] Bailey & Whish, *op.cit.*, p. 299.

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disputes in competition cases.

Indeed, the fact that the documents provided by the parties to the arbitrator and that the final settlement decision are not disclosed or published raises a series of anticompetitive issues. For example, the fact that the parties exchange sensible information during the pre-arbitration meetings may lead them to draw up a tacit collusion. In other words, if the upstream firm has a dominant position in the upstream market it could enter into an illicit vertical agreement with the downstream firms by fixing the downstream market price.[42]

Upstream market

Vertical agreement between upstream firm and downstream firms

Downstream market

Tacit collusion: Price fixing

Furthermore, another related disadvantage of arbitration, deriving from its "lack of transparency, could be the lack of precedents"[43] which have yet to be established by arbitral tribunals to create grounded case law. Indeed, this lack of case law may hamper arbitrators from, as is done in a classical judicial proceeding, comparing their decisions with a previous similar case and basing their judgment on such case.

For example, when comparing two scenarios in the quantification of damages as a result of an antitrust breach, as we have seen in the **Fastweb case**, it is important to see the evolution of a similar or the same market in the past. In particular, it is helpful to know price and earning trends in that market, the effects of the competitive behaviour and the approaches and methods used by the parties to resolve the dispute. This is all information, as we have seen in section 2, crucial for the settlement of a dispute.

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[42] For more information see: Frignani & Pardolesi, *La Concorrenza*, Vol. 7, G. Giappichelli, Turin, p. 105.
[43] OECD 1, *op.cit*, p. 8.

Moreover, a disadvantage of arbitration compared to a court judgment is that the arbitrator does not "have powers of investigation"[44] as does the national tribunal. This may be problematic if the arbitrator wishes to verify the information provided to him by the parties in their reports.

More specifically, it is difficult for an arbitrator to control the reliability of the data provided by the parties in their report, especially information relating to costs of production. In addition, the parties may omit important information from their reports with the aim of misleading the arbitrator in adopting its decision.

As a result of his lack of investigative powers, the arbitrator will either try to obtain the extra information required, which will have the effect of slowing down the arbitration proceeding, or he will adopt a decision on the basis of the more limited information available to him.

In both of these scenarios, the settlement would be unsatisfactory to the parties to the arbitration. Indeed, in the first case, drawn out proceedings could have a significant detrimental impact on the parties in terms of financial and human resources. In the second case, the arbitrator may end up adopting a decision, based on limited information, which is not efficient, as it does not fairly allocate the damages among the parties.

Finally, as we have stated at the end of section 2, on both sides, the parties may be encouraged to take advantage of this inherent weakness of asymmetric information so that the arbitrator adopts a decision which is more in their favour. Therefore, seeing as arbitration may imply strategic behaviours being adopted by the parties as a result of their ability to keep information undisclosed, we shall analyse this ADR method together with game theory. In fact, as we will see in the next section, arbitration could be compared to non-cooperative or Bayesian games.

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[44] *Ibid.*

3.2   Arbitration and Game theory

3.2.1 Game theory: a definition

Cabral stated "a game is a stylized model that depicts situations of strategic behaviour, where the payoff for one agent depends on its own actions as well as on the actions of other agents."[45] Moreover, Schelling defined a strategic move as "a move that induces the other player to choose in one's favour. It constrains the other player's choice by affecting his expectations."[46]

However, many different games exist in game theory that could express and analyse strategic behaviours of players. For the purpose of our analysis of arbitration, we shall focus more on the non-cooperative and Bayesian games.

Indeed, arbitration may be viewed as a non-cooperative game because the parties consider each other, in the arbitration proceeding, as rivals. So, they are encouraged to omit information and to not cooperate, since they have the same aim, namely to obtain the most positive settlement in their favour.

Similarly to arbitration, a Bayesian game is characterised by the fact that there is incomplete information between the parties. In other words, the parties do not know the other's features. Therefore, arbitration may be analysed through this game because, as we have seen in the **Fastweb case**, the parties to the arbitration do not know each other perfectly. For example, in the **Fastweb case**, TI did not avail of sufficient information on the business strategy of FW as well as the length of the infringement period.

No game theory models have yet been applied to arbitration in competition disputes. Therefore, in order to give us an idea as to how such a model may be utilised, we have analysed some game theory models applied to baseball arbitration conflicts in the United States (hereinafter "USA").

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[45] L. Cabral, *Introduction to Industrial Organization*, The MIT Press, 2nd Edition, Cambridge, 2000, p. 49.
[46] T. Schelling, *The Strategy of Conflicts*, Harvard University Press, Cambridge, USA, 1980, p. 122.

Indeed, game theory models for baseball arbitrations arising from disputes as to the wages of baseball players are useful to understand the strategic behaviours of two parties in the calculation of damages stemming from an antitrust infringement.

More specifically, when analysing these game theory models, we focus on a particular crucial aspect in the adoption of arbitration to resolve conflicts arising from infringements of Article 101 or 102 TFEU. This aspect is the ability of the parties to converge to a same proposal before the arbitrator, in order to speed up the entire arbitration proceedings.

In this section on arbitration and game theory, we have chosen to examine Gibbon's model as a basic starting point model. It is a Bayesian game, which gives us a clear insight into how the First Order Arbitration (hereinafter "FOA"), described below, especially used in US Major League Baseball, works from a game theory point of view. The Gibbons model can be considered as a starting point model because, as we shall see below, its simple assumptions shall be modified, by other scholars over time.

Kilgour's model shall then be useful in order to point out some flaws of the FOA.

Finally, the Amended Final Offer Arbitration model developed by Zeng in 2003 will cast light on a potential new version of the FOA system.

3.2.2 The conventional arbitration and the FOA methods

Since the 1970s, arbitration has been widely used in US Major League Baseball, in order to solve wage disputes between players and clubs.[47] The use of arbitration in Major League Baseball has sharply increased due to the development of the FOA model, which, from the early 1970s, quickly replaced the conventional arbitration model. These two different types of arbitration are described here below.

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[47] J. Chetwynd, Play Ball? An Analysis of Final-Offer Arbitration, Its Use in Major League Baseball and Its Potential Applicability to European Football Wage and Transfer Disputes, Marquette Sports Law review, Volume 20, Issue 1 Fall, Article 6, Arizona, 2009, p. 112.

i. The Conventional arbitration method

The Conventional arbitration method is characterised by the fact that the arbitrator bases his decision on the facts of the event that occurred and on the propositions submitted by the parties.

Nevertheless, in order to adopt a decision that he considers fair, the arbitrator will usually take the average between the two parties' propositions. As a result of this, the parties, which adopt a strategic behaviour, could be encouraged to make an offer more favourable to them. This is commonly known as the "chilling effect". In turn, the arbitrator, once he realises that the parties have made unfair and unrealistic offers, will base his decision only on the facts that concretely occurred. Such a technique of arbitration is inefficient because the facts are insufficient in order to estimate a fair amount of damages and thus the final result of such arbitration is biased.

ii. The FOA method

The FOA was developed exactly with the purpose of eliminating the biasing effect deriving from the conventional arbitration. Indeed, the aim of FOA was to create a system where the decisions were more based on the parties' propositions and which was characterised by a higher risk for the parties if a less favourable decision was handed down in their favour. The purpose of this latter characteristic was to encourage the parties to make reasonable offers. In particular, such a method of dispute resolution "forces an arbitrator, or panel of arbitrators, to pick either one party's offer or the other's. In theory, like in the game of baseball itself, there is one winner and one looser."[48] This was made possible by imposing the rule in FOA that "an arbitrate settlement is imposed if no agreement is reached by a specified date."[49]

More precisely, the FOA is characterised by two steps. As the first step, the parties submit their offers, which help the arbitrator come to the decision that he considers to be most fair, which is usually achieved by taking the average of the two parties' proposals.

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[48] *Ibid.*, p. 109.
[49] E. Hanany, M. Kilgour & Y. Gerchak, "Final-Offer Arbitration and Risk Aversion in Bargaining", *Management Science,* Vol. 53, No. 11, 2007, p. 1785.

However, the outcome of this first step does not constitute the final settlement. The arbitrator only delivers his final settlement once he, in a second step, receives the parties' modified offers integrated of supplementary information and further analyses. At this second stage the arbitrator chooses the revised offer which is closest to the fairest solution he identified in the previous step.

We are now able to analyse the FOA under the game theory by examining three different game theory models.

3.2.3 Gibbons' model: "Learning in equilibrium models of arbitration" (1988)

Gibbons analysed "the strategic behaviours that the parties could undertake in conventional and final offer arbitration."[50] He based his model on the negotiations between an employer and a union for the determination of the salary. The parties decided to go before an arbitrator to find a solution to their dispute.

More specifically, Gibbons decided to study this situation at first by introducing the FOA and by simulating the adoption of a conventional arbitration. However, for the purposes of our analysis, we shall only consider the part of his model relating to the FOA.

In this model, the arbitrator has a most preferred settlement, (z). In other words he thinks that this settlement is the ideal one and, therefore, he wants to achieve the closest final settlement to (z).[51]

As we have already explained in the previous section, the arbitrator will have to choose between the proposals of both parties. Let (y_e) be the employer's proposal and (y_u) the

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[50] R. Gibbons, "Learning in Equilibrium Models of Arbitration", *The American Economic Review,* Vol. 78, No.5, 1988, p. 896.

[51] In the Gibbons' model it is said that the arbitrator has a utility function which he wants to maximize. This utility function is defined as the difference between the arbitrator's most preferred settlement (z) and the final settlement, (y).

union's proposal.

For instance, the arbitrator will choose (y_e), only if $z < \bar{y}$ where $\bar{y} = \dfrac{(y_e - y_u)}{2}$, that is the average between the proposals made by the two parties.

Hence, the arbitrator will choose the employer's proposal because it is the proposal closest to his preferred settlement. For example, if $y_e = 100$ and $y_u = 300$, then $\bar{y} = 200$. Since $z < \bar{y}$, (y_e) is closer to (z). Therefore, the arbitrator will choose (y_e).

Consequently, the parties will have the incentive to make their offers the closest possible to the arbitrator's most preferred settlement. However, the parties do not know (z), but they can assume that it varies among a range of possible values.[52]

In addition, as the two parties want to maximise their utility, they shall reach a so-called Nash equilibrium.[53] So, the employer wants to minimise (y_e) and the union wants to maximise (y_u).

Nevertheless, both of them have to face a trade-off issue: "in equilibrium, each party considers making a more aggressive offer but must balance the gain from having such an offer accepted against the reduced probability that it will be accepted."[54].

Thus, the parties shall assume that (z) varies among a range of possible values. In particular, the model assumes that the two parties believe this range has an average value (M)[55].

Therefore, since the parties have to consider the above cited trade-off issue, by simplifying the model, the employer's offer will be equalled to $M - X_e$, that is the mean of the

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[52] In reality, the model describes this uncertainty by a probability distribution function $F(z)$. This function has a continuous and positive density $f(z)$. See: Gibbons, *op.cit*. p. 7.

[53] In a non-cooperative game the parties behave strategically. More precisely, each party knows the other's strategy and behaves accordingly. Therefore, a Nash equilibrium can be defined as an equilibrium where the parties have no further benefit in changing their strategy while their opponent's remain unchanged.

[54] Gibbons, *op.cit*., p.8.

[55] The model assumes that z is normally distributed with mean M and precision H.

arbitrator's ideal settlement minus an (X_e) amount which meets the employer's utility to minimise (y_e). Hence, the union's offer will be $M + X_u$, that is the mean of the arbitrator's ideal settlement plus an (X_u) amount, which meets the union's utility to maximise (y_u).

In other words, Gibbons specified "that the equilibrium offers are centred about the mean of the parties' belief about the arbitrator's ideal settlement, and that the distance between the equilibrium offers decreases as this belief becomes more precise."[56]

Furthermore, the model makes the important assumption that the arbitrator can learn from the parties' proposals. In other words, the arbitrator can make himself an idea about the environment, in this case for example the level of salaries among employees, thanks to the propositions submitted by the employer and the union. In addition, the parties are not influenced by the state of the environment and are risk-neutral.

More specifically, both parties and the arbitrator will have certain knowledge of the state of the environment represented by a noisy signal. Let be (s_a) the signal monitored by the arbitrator and (s_p), the parties' signal.

As Gibbons stated in his paper, the arbitrator can draw inferences from the parties' private information on the state of the environment (s_p) from their proposals and, then, it can use this information and its own signal (s_a) to define the state of the environment (s) and, then choose, as a final settlement, the proposal that maximises its expected utility.[57] Moreover, the parties know that the arbitrator can infer (s_p) and, therefore, could try to influence that estimation by misleading the arbitrator. However, the parties will find it optimal not to do so.[58]

Considering all these elements, the model will reach the following distinct equilibrium: the two parties' offer strategies and the arbitrator's decision strategy based on the ideal settlement and the inference rule related to the state of the environment.

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[56] Gibbons, *op.cit.*, p.9.
[57] *Ibid.*, p.12.
[58] *Ibid.*

More precisely, "the model is characterised by three steps."[59] As a first step, the parties shall monitor (s_a) and the arbitrator (s_p). Then, the parties shall submit y_e and y_u at the same time. In turn, the arbitrator shall define the state of the environment. As a result, the arbitrator shall adopt the decision that maximizes its expected utility.

Finally, what we can learn from Gibbons' model is that the offers of the parties do not perfectly converge. Indeed, as we have seen from section 2, one of the central issues of a dispute, which requires the quantification of damages caused by the infringement of Article 101 or 102 TFEU is that the parties have the incentive to make extreme proposals. As a result, the judge may be misled and the final settlement shall not be optimal.

Thus, Gibbon's model shows that the parties will never have the incentive to perfectly converge their offers, even when they know that the arbitrator will base his decision on the average of their proposals. This is because the model leads to a separate equilibrium, which implies that the parties' strategic behaviour will vary in function of the position that the parties' proposals assume in the range of preferred settlements of the arbitrator.

Therefore, the parties are likely to fail in their negotiations and the arbitrator shall adopt a decision that he considers optimal and this settlement will belong to a range of possible decisions the arbitrator prefers.

As a result, the FOA may not be more expedient and effective than the Conventional arbitrator method or even the traditional route of bringing the dispute before a national court.

We shall now demonstrate how the FOA system could be even worse at encouraging the parties to converge their offers with the following model.

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[59] *Ibid.*

3.2.4 Kilgour's model: "Game-Theoretic Properties of Final-Offer Arbitration (1994)

Kilgour's model is characterised, as well, by two individuals A and B, which are in a conflict that could be settled by FOA. The player, A, wants the arbitrator's decision to be the most in its favour as possible and vice versa for player B. Let (a) be the offer of A and (b) the offer of B. Furthermore, Kilgour specified that the offers can be normal, when $a \leq b$, and crisscross if $a > b$. Moreover, the arbitrator has a solution, x, which he considers to be the optimal settlement. Hence, like in Gibbons' model, the arbitrator will choose the offer closer to x, if the offers are normal and, also, when they are crisscross.[60]

Therefore, the expected resolution, r, can be expressed in the following way:[61]

- $r = r_x(a, b) = a$, If $a \leq b$ and $x < \dfrac{(a+b)}{2}$

- $r = r_x(a, b) = b$, If $a \leq b$ and $x > \dfrac{(a+b)}{2}$

- $r = r_x(a, b) = \dfrac{(a+b)}{2}$, If $a > b$ or $x = \dfrac{(a+b)}{2}$

Kilgour started by applying to this model the theorem of Chatterjee. In other words, when the parties have perfect information about the distribution of the preferences of the arbitrator, then their offers will converge to the settlement the arbitrator considers to be the optimal one, which is, as in Gibbons' model, the average point of this distribution. Let (M) be our average point.

As a result, there will be a Nash equilibrium (a_0, b_0). Like in the previous model, by simplifying the model, agent A's offer shall be equal to $M - X_a$, that is the mean of the arbitrator's ideal settlement minus an amount (X_a) which meets the agent A's utility to minimise (a_0). On the other hand, agent B's offer shall be equal to $M + X_b$, that is the mean of the arbitrator's ideal settlement plus an (X_b) amount, which meets the agent B's

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[60] M. Kilgour, "Game-theoretic properties of Final-Offer Arbitration", *Group Decision and Negotiation*, Vol. 3, Issue 3, September 1994, p. 286-287.
[61] *Ibid.*, p. 287.

utility to maximise (b_0).

However, Kilgour stated that this equilibrium is unrealistic and that it could be achieved only if two conditions are fulfilled:[62]

(i) the distribution of the arbitrator's preferences should be continuous. In other words, the arbitrator should be able to adopt whatever settlement he wants in the range of his preferred possible settlements (hereinafter, "Condition (i)");

(ii) the two players, A and B, should be risk-neutral. For example, as we will see below, risk-adverse parties tend to be more aggressive with their proposals during the arbitration proceeding (hereinafter, "Condition (ii)").

Therefore, if these two conditions are not respected the parties may not converge their offers. We shall now demonstrate the impact on the equilibrium if one of the above Conditions (i) and (ii) is not present.

i. **Assessing the case when the Condition (i) is removed**

Kilgour suggested that the best way to remove the first assumption would be to simply assume a two-point distribution. In other words, the arbitrator will probably equally choose only between two possible settlements, one that is in favour of A and the other one in favour of B. Therefore, the parties will make their offer taking strategically into account this distribution of the arbitrator's preferred settlements.

As Kilgour explained, under the hypothesis that the parties are free to make whatever offer they want, the model would no longer be able to reach an equilibrium where the parties have just one possible settlement that maximises their utility. Indeed, there would be a multiple range of possible settlements the parties could propose to the arbitrator. In turn, this would encourage the parties to be more aggressive and to make extreme offers with the aim of making the settlement as favourable as possible for themselves.

As a result of this flaw, Kilgour concluded that: "FOA seems to encourage behaviour that

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[62] *Ibid.*, p. 289.

may well appear disparate and even erratic despite the underlying symmetry of the situation."[63] Hence, the convergence of the parties' offers seems more likely when the arbitrator's optimal settlement approaches the median, as we have seen in the basic model described at the beginning of Kilgour's model. On the other hand, in the case whereby the arbitrator makes extreme choices, we see the opposite effect.[64]

ii.   Assessing the case when the Condition (ii) is removed

Kilgour made the assumption that the parties are risk adverse. Thus, the parties make their choices in respect of their attitude to the risk. In order to represent these different behaviours against the risk, Kilgour transferred the preferences of the parties on two utility functions. Therefore, the settlement shall now generate a different utility for the two players.[65]

Consequently, the parties shall make their strategic offer by maximising their utility. Hence, as in Gibbons' model, a Nash equilibrium shall be reached by optimizing the two parties' expected utility.

However, Kilgour discovered from this equilibrium that the more a party is risk-adverse the more he will increase his probability to win. Moreover, the author showed that in his model the risk-adverse party is the one who is more aggressive and tends to make more extreme offers. For example the risk-adverse party could make a proposal, the only aim of which is to increase its probability to be accepted by the arbitrator. This would slow down and bias the whole arbitration proceedings, since the arbitrator would receive a proposal, which could be misleading for the determination of the state of the environment. This is because, as in Gibbons' model, the arbitrator defines the state of the environment on the basis of the parties' initial proposals.

Thus, also in this case, the FOA seems unable to encourage the parties to converge their offers, which would speed up the entire arbitration proceedings.

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[63] *Ibid.*, p. 293.
[64] *Ibid.*
[65] *Ibid.*

3.2.5 The amended final offer arbitration

As we have seen from the previous models, the FOA seems not to achieve its aim of encouraging the parties to converge their offers. Indeed, in Gibbon's model, this convergence is not perfect because there is always a margin of discretion by which the parties could strategically try to pull the settlement to their side. Moreover, in Kilgour's model, it was sufficient to modify one of the two assumptions made in the basic FOA model to demonstrate that the parties tend to make extreme offers instead of converging.

It is for this reason, that Zeng, in 2003, proposed a new model of FOA, called the Amended Final Offer Arbitration (hereinafter "AFOA"). The authors Deck, Farmer and Zeng proposed a study of the model in 2004 entitled: "Amended Final Offer Arbitration is Promising: Evidence from the Laboratory."[66]

In this paper, they defined the AFOA as a system where "the individual's bid affects the probability that he or she wins, but the award amount is determined by the deviation of the opponent's bid from the arbitrator's value."[67]

Therefore, as the authors observe, in this way the parties are less encouraged to make extreme offers. This is because, besides being less likely to win, they could be penalized. In other words, the party who loses will have to pay the winning party an amount equal to the difference between his proposal and the arbitrator's settlement sum. On this basis, the more the parties' offers differ from the arbitrator's optimal settlement, the higher will be the final payoff of the winning counterpart.[68]

Hence, the AFOA system seems to also overcome the problems highlighted by Kilgour in his model. For example, dropping the hypothesis of the continuous distribution of the preferences of the arbitrator could cause extreme divergence of the parties' proposals. More specifically, "when the arbitrator's distribution is binary, no pure strategy equilibrium exists. However, AFOA is theoretically robust to such changes."

As in the previous models, in AFOA, there are two parties, X and Y, which are negotiating

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[66] C. Deck, A. Farmer & D. Zeng, "Amended Final Offer Arbitration is promising: Evidence from the Laboratory", *EES 2004: Experiments in Economic Sciences – New Approaches to Solving Real-world Problems*; 29 October 2004.
[67] *Ibid.*, p. 840.
[68] *Ibid.*, p. 839.

how to share a certain sum, Π. The two parties make their respective offers x and y. Moreover, the arbitrator thinks that the fair share for X is a certain amount z, and for Y, $\Pi - z$. Like in the other models, the parties do not know the arbitrator's optimal settlement but they know the distribution of his preferences.[69]

The authors then described the possible scenarios and payoff of the parties and found out that, following the identical arbitrator's choosing rule in Kilgour's and Gibbons' models:[70]

- If agent X's offer is more similar to the arbitrator's belief, $z > \dfrac{(x+y)}{2}$, than X obtains $z + |z - y| = 2z + y$ and Y gains $\Pi - 2z - y$;

- If agent Y's offer is more similar to the arbitrator's belief, $z < \dfrac{(x+y)}{2}$, than Y obtains $z - (x - z) = 2z - x$ and X gains $\Pi - 2z - x$;

- If the two offers are equally distant from the optimal settlement of the arbitrator, than this last one will choose one of the two offers with a probability equal to $\dfrac{1}{2}$.

Furthermore, the authors conducted an experiment in order to see whether AFOA is a more effective system than FOA for the resolution of disputes. The experiment is characterised by 1280 individual allocation decisions under FOA and AFOA systems. Moreover, the authors constantly changed the distribution of preferences of the arbitrator, alternating continuous and discrete distributions. In this way, they were able to observe the results in two dimensions: AFOA vs. FOA and continuous vs. discrete / binary.[71]

As a result, the authors found out from the experiment that, under the AFOA system, the parties tend to converge their offers to the average point of the preferred distribution of settlements of the arbitrator. On the other hand, in the FOA system, the parties seem not to comply with what the theory says. Indeed, the experiment demonstrates that the parties, on average, do not make extreme offers. Their proposals are scattered along the distribution of offers.

Moreover, another result of the experiment was that AFOA seems "to generate greater pre-

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[69] *Ibid.*, p. 841, 843.
[70] *Ibid.*, p. 843.
[71] *Ibid.*, p. 844.

arbitration settlement than does FOA."[72]

3.2.6 Conclusions on the game theory models analysed

The models that we have analysed have contributed to give us a better insight on the issue of the convergence of the offers of the parties in a dispute.

Gibbons' model is valuable because it takes into account the fact that the arbitrator, through his own research, makes himself an idea of the market environment where the dispute is raised, and gathers information from the parties' proposals. This model is realistic because the arbitrator's settlement is fair,[73] as it is based not only on information provided by the parties, but is also consistent with the market environment of which the arbitrator has made his own idea. In contrast, the settlement reached by the court in the **Crehan case** analysed above was unrealistic because the quantification of damages was not appropriate for the size and the market share of Mr. Crehan's business.

However, in Gibbons' model, the parties face a trade-off: they must strike a balance between making an offer which is as close as possible to the preferred settlement of the arbitrator and an offer which meets their needs of maximising their utility.

Since the two parties have opposite aims, they will have different strategies in order to maximise their utility. This could represent a constraint for the arbitration proceeding, because it implicitly means that the parties do not perfectly converge their offers. Therefore, the arbitrator could face more difficulties in defining the state of the environment, which, in turn, could slow down the arbitration proceedings.

Moreover, Kilgour's model demonstrates that by dropping two hypotheses of the classical basic FOA model, the result of the arbitration could be even more flawed. More specifically, by replacing the assumptions of the continuous distribution of the preferences of the arbitrator with a dual point distribution, the parties will be incentivized to make extreme offers.

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[72] Ibid., p. 850.

[73] As we have done at the end of section 2, we assume that a fair settlement is the solution to the dispute that leads to a perfect quantification of the damages.

In other words, when removing Condition (i) of the FOA model, namely the assumption that the arbitrator is able to choose whatever possible settlement in the range, known by the parties, of his preferred settlements, this range of choices of the arbitrator will, most likely, decrease to a mere two proposals. More precisely, the range of the arbitrator's choices shall be narrowed down to the proposals of both parties. Thus, the parties will have the incentive to make aggressive proposals and will never converge their offers.

Likewise, if we remove Condition (ii) of FOA, namely the assumption that the parties are risk neutral, and we rather assume that they are risk-adverse, the party which is the most risk-adverse is the one who has the higher chance of winning the dispute and it is also the most aggressive; in other words the party who tends to make extreme offers. Indeed, risk-adverse parties do not only not converge in their offers but also seem willing to assume extreme positions.

Thus, from Kilgour's model, we learn that a system is required, which limits the parties' tendency to make extreme offers, and which, at the same time, encourages the players to converge in their proposals.

The AFOA system seems to comply with these two requirements. Indeed, by introducing the risk of punishment if a party deviates from the arbitrator's optimal settlement, the parties are much more encouraged to converge in their proposals. Consequently, as the experiment conducted in the third model demonstrates, the AFOA system may even foster pre-arbitration settlements.

Therefore, the AFOA system seems to be the best model to apply when adopting arbitration for the quantification of damages caused by an infringement of Article 101 or 102 TFEU. This is because it encourages the parties to converge in their offers and thus enables the arbitrator to reach a fair settlement. Moreover, it speeds up the entire arbitration proceedings and, in some cases, may even lead to pre-arbitration settlements.

In the **Fastweb case** analysed in detail above, the parties could have started by applying the AFOA model for the quantification of damages. Indeed, as we have outlined in section 2, a good model proves the link between the anti-competitive behaviour and its effects. In

our case, AFOA should provide strong evidence on the number of customers and the total amount of turnover that FW may have lost. As the expert of the national court of Milan stated, this method should have been the one used by TI: the "before and after" method.

However, it seemed that TI did not use this method properly because its experts made unreliable estimations. Indeed, TI did not have enough information on the business plan of FW and on FW's data accounting. Moreover, FW decided to adopt the benchmarking method, which was considered to be misleading as well. Therefore, the AFOA system could encourage the parties to both use the "before and after" method.

In particular, since the AFOA method implies a punishment for the party who deviates the most from the arbitrator's optimal settlement, they will be encouraged to use the best method for the quantification of damages. Yet, we are also assuming that the arbitrator, as in Gibbon's model, has the possibility to gather information on the state of the environment which would lead him to figure out which is the optimal settlement.

Furthermore, FW would have the advantage in using the "before and after" method because it has perfect information on its business plan and on its data accountings. In turn, TI would have the incentive to make more reasonable estimations, in order to avoid AFOA's punishment.

As a result, both parties could also be more open to negotiate, which may increase their chances of reaching a pre-arbitration settlement.

However, as we have seen in this section, the parties tend to assume strategic behaviours in any conflict and especially in disputes involving the quantification of damages. Thus, entering into a kind of game, which would not enable them to undertake such behaviours, could represent a barrier to their behaviours. More specifically, the parties would not be incentivised to adopt the AFOA system simply because they would not feel free to act strategically. As a result, the parties may choose not to opt for arbitration as an alternative method for the quantification of damages deriving from the infringement of Article 101 or 102 TFEU.

We shall now provide an example, which serves to explain how an agent (hereinafter

"Agent 1") who has infringed antitrust law would not be incentivised to adopt arbitration for the quantification of damages in a simplified case of infringement of Article 101 TFEU.

If we assume that Agent 1 has infringed competition law by entering in a cartel, that the market is composed by two agents: Agent 1 and Agent 2, then the anticompetitive effects could be represented as in the following chart:
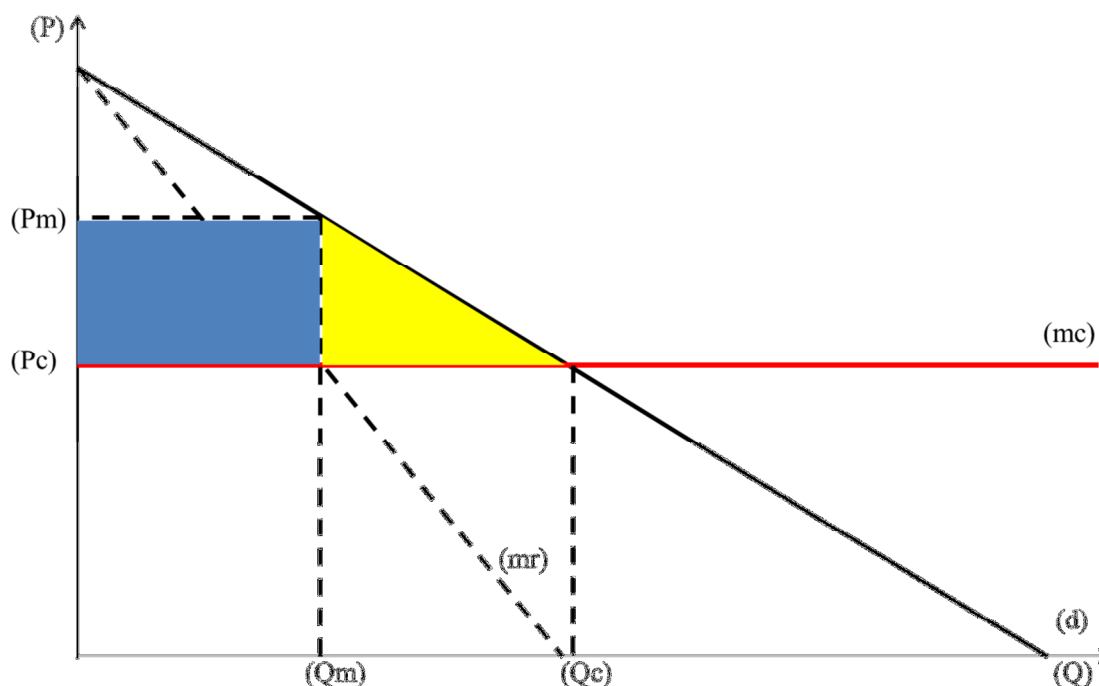
As we can see from the chart, by entering into the cartel, Agent 1 behaves as a monopolist: it faces a decreasing demand curve (of Agent 2) and maximises its profits when mr=mc. This causes a reduction of the quantity produced (Qm) and an increase in price (Pm). Indeed, comparing this situation with a "but for" scenario, we find out that, without the cartel, there would have been a regime of competition which would have provided a higher quantity produced (Qc) and a lower price (Pc).

Furthermore, by assuming that there has been a perfect pass through, the harms suffered by Agent 2 can be identified as the following:

- The blue rectangle, which represents the harm of paying the quantity Qm at a higher price, Pm.
- The yellow triangle, the so-called "deadweight loss", which represents the harm of

not consuming the quantity equalled to (Qc-Qm).

Therefore, Agent 1 can claim two different damages that, for simplicity, we will identify as A (the blue rectangle) and B (the yellow triangle). Hence, we are also considering, for simplicity, only damages to assets and not non-patrimonial damages, such as reputational damages.

Yet, we assume that the parties go before an arbitrator and that there is an AFOA proceeding. Moreover, we assume that the arbitrator and the parties know that the fair quantification of the damages is D=A+B. Thus, the parties will have to make a proposal, which is as close as possible to D, if they want to win the settlement and not be subject to a punishment. Thus, we assume that Agent 1's proposal will be equal to $z = X \cdot (A + B)$, where (X) is a percentage of the fair total damages, D.

Thanks to these assumptions, we can figure out what will be the pay-off of Agent 1:

- With a probability of (α), if he wins the settlement, it will be –D.
- With a probability of $(1-\alpha)$, if he loses the settlement, it will be $-D - \gamma$, where (γ) is the difference between D and (z).

Whereas, in the case whereby the parties adopt a FOA regime and assuming that the parties have the same probability to win and lose as in the AFOA regime, the pay-off of Agent 1 would be:

- With a probability of (α), if he wins the settlement, it will be - $z = X \cdot (A + B)$.
- With a probability of $(1-\alpha)$, if he loses the settlement, it will be –D.

Agent 1 wants to minimise the damages that he will have to pay. Hence, if he is a rational agent, he will not have the incentive to adopt the AFOA method, seeing as, with the FOA system, he has the same probabilities, whether he loses or wins, to pay lesser damages.

From these three game theory models, we can learn that a successful arbitration system for the quantification of damages caused by an infringement of Article 101 or 102 TFEU should be characterised by the three following features:

A. it enable the arbitrator to choose a fair settlement;

B. it encourages the parties to converge in their offers, and last but not least;

C. it incentivises the parties to select arbitration in order to resolve their disputes.

The FOA system can be considered a successful method to comply with these three conditions, especially considering that it may be difficult to find solid incentives to encourage the parties to select arbitration for the resolution of their conflicts.

In particular, the FOA system, despite its flaws, has shown to be an effective way to assist the arbitrator in adopting a fair settlement. Indeed, the arbitrator has the possibility to make himself an idea of the state of the environment. Moreover, this system encourages the parties to converge to the arbitrator's preferred settlement, even if this convergence is not perfect or even, according to Kilgour, impossible.

Thus, it is better to have a system that barely complies with the above three conditions, than a system like the AFOA that enables parties to perfectly converge but may not encourage them to actually select arbitration as an alternative method to resolve their disputes. This would also be counterproductive for and in contradiction with EU policy, which is strongly encouraging the adoption of ADR for the resolution of conflicts, including those involving the quantification of damages.

Moreover, as the US Major League Baseball reports on its website, "since 1974, and including 2012, arbitrators have ruled on behalf of the players 214 times and clubs 286 times. Although the number of players filing for salary arbitration varies per year, the majority of cases are settled before the arbitration hearing date. Approximately 90 per cent of the players filing for arbitration typically reach new agreements before a hearing." [74]

Therefore, the FOA system seems to continue to be a successful alternative dispute resolution method in Baseball salary disputes and it appears that it also enables parties to find a pre-arbitration settlement, as the AFOA system seems to do too.

Furthermore, what would make an arbitration system more appealing, and thus encourage the parties to adopt it, is the manner in which it is structured and its capability to deliver a settlement more efficiently.

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[74] Major League Baseball Players Association website, retrieved on 29 August 2013, http://mlb.mlb.com/pa/info/faq.jsp#record.

In particular, the arbitration system should focus on the elements that we have already described in the previous sections, namely: enforceability, flexibility, neutrality, confidentiality, cost-effectiveness and expediency.

4 Conclusion

We are now able to answer the question that we posed at the beginning of this paper as to whether or not arbitration is a more effective private action for the quantification of damages caused by the infringement of Article 101 or 102 TFEU.

Arbitration could be a very useful way for the parties to solve their conflicts because, as we have seen, it is flexible, fast, cost-effective and confidential. However, this type of ADR is also characterised by some flaws.

Indeed, as we have highlighted at the beginning of section 3, arbitration lacks precedents of established case law, the arbitrator does not have powers of investigation and arbitration could raise some anticompetitive issues because its proceedings are not publicly disclosed.

In particular, by analysing the game theory models applied to FOA, one of the leading systems used in arbitration proceedings, we have discovered that one of the central issues to arbitration seems to be whether or not it is capable of helping the parties converge in their proposals, hence speeding up the delivery process of the judgement. Convergence in the parties' proposals could have the positive effect of increasing the number of pre-arbitration settlements and/or speeding up the decision-making process of the arbitrator and making his decision fairer and less biased.

Nevertheless, the parties tend to adopt strategic behaviours and could make proposals which do not converge and which, sometimes, could also be extreme. Hence, arbitration, especially the FOA system, seems not to work well for solving this problem and not to be much more expedient than traditional proceedings before a national court.

However, as we have seen from the analysis of the three models of game theory, types of arbitration, such as AFOA, which have a dual effect on parties, do exist. Indeed, the AFOA system could deter the parties from making extreme offers, by introducing the risk that they may be subject to a punishment, and, at the same time, encourage the parties to converge in their proposals. Thus, by using such new mechanisms, arbitration could overcome the problem of asymmetric information.

However, introducing such mechanisms could act as a deterrent to selecting arbitration as a ADR method for the quantification of damages. Indeed, as we have seen in the AFOA system, by introducing the punishment, which places limits on extreme behaviours, the parties are no longer be able to adopt strategic behaviours. Therefore, by using systems such as the AFOA, we may face a trade-off: greater convergence in offers against a decreased appeal of arbitration as an ADR method for the quantification of damages.

Consequently, we are able to draw conclusions as to what could be the best arbitration system for the quantification of damages caused by an infringement of Article 101 or 102 TFEU. An arbitration mechanism is required which:

A. enables the arbitrator to reach a fair settlement;

B. encourages the parties to converge in their offers, and;

C. incentivises the parties to adopt such arbitration mechanism to resolve their disputes.

The FOA system, despite its flaws which we have explored above, seems to be a sufficiently effective method of arbitration which complies with the above three requirements. Moreover, what could strengthen the FOA method, in particular in relation to the third requirement, is making the system more appealing than national courts for the parties, by focusing on the enforceability, procedural flexibility, party-control, neutrality, privacy and confidentiality, cost-effectiveness and speed of the entire arbitration proceedings.

In conclusion, arbitration could be considered, for the purpose of our paper, as an effective way for consumers to undertake private actions for damages and the quantification of damages caused by an infringement of Article 101 or 102 TFEU.

Annex

The Difference in Differences method, an example:
The Irish Groceries Order Case

*We thank the Centre for the European Policies Studies
for having provided the dataset.*

Contents

I.   Introduction

The proposed project has the aim to test the Difference-in-Differences (hereinafter "DID") estimator. For this purpose, we have chosen to use the DID estimator to explain the effects on prices caused by the repeal, in 2006, of the Irish Restrictive Practices (Groceries) Order 1987 (hereinafter the "Groceries Order"), which prohibited sales below invoice price on different grocery items. In particular, we try to assess the extent to which the DID estimator is able to estimate the impact of an exogenous change, in our case the change in law, on the Irish grocery market. In this way, we are adopting the same method of proceeding for the quantification of damages: the comparison between a non-infringement scenario and an infringement scenario, which, in our case, becomes the comparison between the periods before and after the repeal of the Groceries Order.

Hence, it will be interesting to assess whether or not the prices of the items covered by the Groceries Order were artificially raised. In order to answer this question, we shall adopt a comparator-based scenario by applying the DID method. Following a short review of the theoretical literature on which the model is based and an analysis of the data employed in the panel, the study will report the result of the estimation and try to draw some conclusions on the relation between the change in law and the potential drop in prices in the Irish grocery market.

II.   Theory

As we have already introduced, we want to assess the effects before and after a specific event, in our case the repeal of the Groceries Order, in place in Ireland since 1987, on 20 March 2006.

A related methodology of event studies is the one used on financial economics in order to assess the impact of a certain event on stock prices. More precisely, in finance, event studies measure the mean and the cumulative mean abnormal return on a security around the time of an event, such an announcement.[75] However, there are other different event studies that do not focus only on the effect on mean stock prices but also on return variances or on trading volume. Moreover, event studies in finance have also been useful in order to assess the efficiency of the markets.

The study carried out by the Irish competition authority (hereinafter the "Authority") used the same natural experiment but without using the DID estimator. The Authority examined the effects of the repeal of the Groceries Order on retail prices. In particular, the Authority divided the groceries items into two groups: those that were not covered by the Groceries Order (NGO) and those that were covered by such order (GO)[76]. This is because their economic models predicted that, on average, the Groceries Order caused an increase in prices. The study found that before the Groceries Order was repealed; GO prices raised more rapidly than NGO prices. Conversely, GO prices tended to fall slower than NGO prices.

Subsequently, the Authority examined the trends of prices for these two groups during the nine-month period after the change in law and beyond such period. They observed that, immediately after the repeal of the Groceries Order and, thus, within the time framework of 9 months, the GO prices fell by 1.5% and the NGO price raised by 2.4%[77]. On the contrary, more than 9 months after the repeal, the price trends of both the two groups were

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[75] S.P. Kothari and J.B. Warner, "Econometrics of Event Studies", *B. Espen Eckbo Elsevier North-Holland*, 2007, Chapter 1.
[76] Irish Competition Authority "Price Trends in the Irish Retail Grocery Sector: A Description of the Evolution of Retail Grocery Prices Between 2001 and 2007", *Irish Competition Authority Grocery Monitor Report No. 2.*, Dublin, 2008.
[77] *Ibid.,* point 3.4.

similar. The difference between the two periods was justified by the fact that, after the repeal of the Groceries Order, there was a period of adjustment, especially for GO prices that were no longer bound by the Groceries Order.

The study of the Irish competition Authority represents the basis of our project. However, the principal difference is that we use the DID method. We believe that the DID is a better method to assess the impact of a change in law on a population which has an impact on a specific group, the GO items, and where we can observe the population before and after the event. Indeed, we find that the analysis of the Authority could be biased by other changes in the environment related to the two groups of items that may change the trends of the prices and bias the real effect of the repeal of the Groceries Order on prices.

 In the DID method, we have two groups: a control group and a treatment group. In our case, the control group are the NGO items and the treatment group are the GO items. Using the DID, we can introduce two dummy variables. As Wooldridge says, one of them "captures possible differences between the treatment and control groups prior to the policy change and a time period dummy that captures aggregate factors that would cause changes in prices even in the absence of a policy change." [78] In so doing, we overcome the issues connected with a simple comparator-based model such as the one used by the Authority.

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[78] J.M. Wooldridge "Econometric Analysis of Cross Section and Panel Data", *The MIT Press, Cambridge Second Edition*, London, 2010, p. 148.

III. The Data

The Centre for European policies studies (hereinafter "CEPS") has provided the data, which came from the Authority. As reported by the Authority*:*

"The analysis undertaken in this Report is based on two types of prices data published by the Central Statistics Office:

- Monthly price index information for the period 2001 to November 2007;and
- Bi-annual average price information for the period May 2004 to November 2007.

For the purposes of this Report, the principal monthly index is the Consumer Price Index (CPI)."[79]

However, for the purpose of our project, as the CEPS has done, we will consider only CPIs for the period running from December 2001 to November 2007. Moreover, we will only take into account the CPIs of four (4) products categories: meat, fish, fruits and vegetables, which, in turn, are subdivided in GO and NGO. Therefore, we have a total number of observations of 768.

All the relevant statistics concerning the variables of our model can be found in the attached appendix (hereinafter the "Appendix"), together with a detailed analysis of CPIs.

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[79] Irish Competition Authority, *op.cit.*, p. 6

IV.   The Statistical Model

In this section, we shall introduce our econometric model, which has the aim to explain the effect of the repeal of the Groceries Order on prices. Furthermore, we will justify the choice of our model and describe how it has been applied and how our analysis has been conducted.

The equation of our econometric model is the following:

$$\ln CPI_{it} = \alpha + \beta_1 G_i + \beta_2 T_t + \tau_{did} W_{it} + \varepsilon_{it}$$

Where (G_i) is the treatment group and it is a dummy variable which assumes the value 1 if the item was previously under the Groceries Order and 0 if it was not. (T_t) is as well a dummy variable that equals 1 in the post-treatment period (in our case after March 2006) and 0 if not. (α) is a constant, (β_1) is a group-specific time-invariant component, (β_2) is the time trend common to both groups, and (ε_{it}) is a random unobserved error.

The dependent variable is the log of CPI for both GO and NGO items. We use the log in order to express the effect of the changing in law in percentage terms. This effect is formally represented within the equation by (W_{it}), the so-called treatment indicator, which is equal to the interaction of the group and the time indicators, $W_{it} = T_t * G_i$.

Moreover, the coefficient τ_{did} expresses the difference between the population average difference over time in the control group with the population average difference over time in the treatment group. In this way, we can remove effects on prices which are not related to the change in law and which biases our estimation.

This equation model allows us to assess the effect of a natural experiment on the groceries market, more precisely on prices. Indeed, by writing our equation in this way, we are able to: (i) express the effect of the event, namely the change in law, on prices; (ii) capture

potential differences between the two groups; and (iii) remove potential effects closely related to the two groups' products that may bias our analysis.

Furthermore, we make a panel data estimation. It is important to underline that we shall not consider fixed effects because of a problem of collinearity. Indeed, if we introduce a product specific dummy variable into the model, in order to control effects related to the different characteristics of the goods, this variable will be equal to 1 if the product is processed and 0 if the product is not.

However, the Authority specified in its report 2 that processed items are usually GO products and likewise non processed products are generally NGO items. Hence, adding this new dummy variable will cause collinearity with the already existing G_i variable.

Moreover, in order to check the robustness of our treatment indicator, we have decided to apply the model at three different event windows. The first window runs from January 2006 to June 2006; the second from January 2006 to September 2006; and the third from January 2006 to December 2006. We shall see that, even if the magnitude of the effect of the event is different through the three different time periods, the sign remains the same, which demonstrates that the time period does not affect the direction of the effect.

Finally, we have not considered the possibility of applying the model individually to all four (4) goods of our analysis because the number of observations would not have been enough to predict any relationship between the prices and the event.

V.   The Estimation and Interpretation of the results

1) Panel data regression with random effects

We first estimate our equation without considering any specific time event window.

```
. xtreg lncpii groupgi timeti wi


Random-effects GLS regression                Number of obs     =        768
Group variable: period                       Number of groups  =         96

R-sq:  within  = 0.1556                       Obs per group: min =         8
       between = 0.5390                                      avg =       8.0
       overall = 0.2806                                      max =         8

Random effects u_i ~ Gaussian                Wald chi2(3)      =     233.32
corr(u_i, X)        = 0 (assumed)            Prob > chi2       =     0.0000

──────────────┬────────────────────────────────────────────────────────────
      lncpii  │      Coef.   Std. Err.       z    P>|z|     [95% Conf. Interval]
──────────────┼────────────────────────────────────────────────────────────
     groupgi  │   .0362253   .0038341     9.45   0.000     .0287106    .0437399
      timeti  │    .046475   .0047551     9.77   0.000      .037155    .0557949
          wi  │  -.0123706      .0056    -2.21   0.027    -.0233464   -.0013948
       _cons  │   4.561017   .0032556  1400.96   0.000     4.554636    4.567398
──────────────┼────────────────────────────────────────────────────────────
     sigma_u  │  .01287262
     sigma_e  │  .03872209
         rho  │  .09951594   (fraction of variance due to u_i)
──────────────┴────────────────────────────────────────────────────────────
```

We can see from the above regression that all the coefficients of our independent variables are significant. The p-values of the three coefficients of our three independent variables are inferior to 0.05, so the null hypothesis of non-significance of the coefficient can be rejected at 5% significance level. In addition, for the coefficients of the variables (G_i) and (T_t) we can reject the null hypothesis also at 1% significance level, because their p-values are inferior to 0.01.

First of all, the coefficient of our treatment indicator (τ_{did}) is negative: -0.0123; this means that prices of GO items increased less of NGO prices. If we compare this result with the results found by the Authority within the time period which goes from December 2001 to

March 2006, we shall that while GO items CPIs were increasing, NGO items CPIs were decreasing[80]. Therefore, the change in law has had an effect on the groceries prices.

Moreover, from the regression, we find out that the coefficient of the variable group is positive: 0,036. This means that the CPIs of GO items are 3.6% higher than CPI of NGO items. This is consistent with the Authority's economic model, which states that the Groceries Order caused, on average, an increase in prices.

Finally, from the regression, we have also found that the coefficient of the variable time is positive as well: 0.046. Thus, the CPI of the post-treatment period is 4.6% higher than the CPI of the pre-treatment period. The Authority's economic model can also explain this effect. Indeed, during the period before the event, the Authority found that GO prices were on average higher than NGO prices.

Furthermore, during the period after the removal of the Groceries Order, GO prices started to decrease and NGO began to increase. However, after 9 months from the event, the trends of the two groups of items were similar. Therefore, we may draw the conclusion that, on average, prices in the whole groceries market were higher in the post-treatment period.

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[80] *Ibid.*, p. 19.

2) <u>Panel data regression considering different time event windows</u>

a) Period 1:

```
. xtreg lncpii groupgi timeti wi if period>=37 & period<=45

Random-effects GLS regression              Number of obs     =        72
Group variable: period                     Number of groups  =         9

R-sq:  within  = 0.1578                     Obs per group: min =         8
       between = 0.5460                                    avg =       8.0
       overall = 0.3007                                    max =         8

Random effects u_i ~ Gaussian              Wald chi2(3)      =     19.85
corr(u_i, X)       = 0 (assumed)           Prob > chi2       =    0.0002
```

lncpii	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
groupgi	.036361	.0113957	3.19	0.001	.0140258	.0586961
timeti	.0520739	.0165219	3.15	0.002	.0196916	.0844562
wi	-.0221016	.0170935	-1.29	0.196	-.0556043	.0114011
_cons	4.561284	.0110146	414.11	0.000	4.539695	4.582872
sigma_u	.01679143					
sigma_e	.03603633					
rho	.17838646	(fraction of variance due to u_i)				

We can see from the above regression that the coefficients of all our independent variables are significant, except the coefficient of our treatment indicator (τ_{did}). The p-values of the two coefficients of the two variables (G_i) and (T_t) are inferior to 0.05, so the null hypothesis of non-significance of the coefficient can be rejected at 5% significance level.

Conversely, (τ_{did}) is greater than 0.05, so we accept the null hypothesis of non-significance of the coefficient at 5% significance level.

Furthermore, for the coefficients of the variables (G_i) and (T_t) we can reject the null hypothesis also at 1% significance level, because their p-values are inferior to 0.01.

Although the coefficient of our treatment indicator is not significant, we find out that like in the previous regression, without any time event window, it is negative: -0.022. This means that prices of GO items increased less of NGO prices and, as we have already

explained previously, comparing it to the results of the Authority, within the time period which runs from December 2001 to March 2006, it is clear that the change in law has had an effect on groceries prices.

Moreover, from the regression, we find out that the coefficient of the variable group is positive and very close to the one obtained before: 0,036. This means that the CPIs of GO items are 3.6% higher than CPI of NGO items.

Finally, from the regression, we have also found that the coefficient of the variable time is positive as well: 0.052. Thus, the CPI of the post-treatment period is 5.2% higher than the CPI of the pre-treatment period.

b) Period 2:

```
. xtreg lncpii groupgi timeti wi if period>=37 & period<=93

Random-effects GLS regression              Number of obs     =        456
Group variable: period                     Number of groups  =         57

R-sq:  within  = 0.1772                     Obs per group: min =          8
       between = 0.5422                                    avg =        8.0
       overall = 0.2995                                    max =          8

Random effects u_i ~ Gaussian              Wald chi2(3)      =     150.60
corr(u_i, X)       = 0 (assumed)            Prob > chi2       =     0.0000
```

lncpii	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
groupgi	.0393831	.0048649	8.10	0.000	.029848	.0489181
timeti	.048833	.0061471	7.94	0.000	.0367849	.060881
wi	-.0164863	.0070685	-2.33	0.020	-.0303404	-.0026323
_cons	4.559498	.0042307	1077.72	0.000	4.551206	4.567791
sigma_u	.01348921					
sigma_e	.03768331					
rho	.11358288	(fraction of variance due to u_i)				

We can see from the above regression that the coefficients of all our independent variables are significant. The p-values of the three coefficients of our three independent variables are inferior to 0.05, so the null hypothesis of non-significance of the coefficient can be rejected at 5% significance level. In addition, as in the previous regression, for the coefficients of

the variables (G_i) and (T_t) we can reject the null hypothesis also at 1% significance level, because their p-values are inferior to 0.01.

First of all, the coefficient of our treatment indicator (τ_{did}) is negative: -0.0164; this means that prices of GO items increased less of NGO prices, and that, as in the Period 1 regression, the change in law had an effect on the groceries prices.

Moreover, from the regression we find out that the coefficient of the variable group is positive: 0,039. This means that the CPIs of GO items are 3.9% higher than CPI of NGO items.

Finally, from the regression, we have also found that the coefficient of the variable time is positive as well: 0.048. So, the CPI of the post-treatment period is 4.8% higher than the CPI of the pre-treatment period.

c) Period 3:

```
. xtreg lncpii groupgi timeti wi if period>=21 & period<=37
```

```
Random-effects GLS regression              Number of obs     =        136
Group variable: period                     Number of groups  =         17

R-sq:  within  = 0.1248                     Obs per group: min =          8
       between = 0.5333                                    avg =        8.0
       overall = 0.2661                                    max =          8

Random effects u_i ~ Gaussian              Wald chi2(3)      =      33.83
corr(u_i, X)       = 0 (assumed)           Prob > chi2       =     0.0000
```

lncpii	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
groupgi	.0314275	.0089628	3.51	0.000	.0138607	.0489944
timeti	.0473583	.0124902	3.79	0.000	.022878	.0718386
wi	-.0089772	.0139676	-0.64	0.520	-.0363531	.0183988
_cons	4.561701	.0080148	569.16	0.000	4.545992	4.57741
sigma_u	.01551481					
sigma_e	.04008305					
rho	.13029908	(fraction of variance due to u_i)				

We can see from the above regression, like the regression in Period 1, that the coefficients of all our independent variables are significant, except the coefficient of our treatment indicator (τ_{did}). The p-values of the two coefficients of the two variables (G_i) and (T_t) are inferior to 0.05, so the null hypothesis of non-significance of the coefficient can be rejected at 5% significance level. Conversely, (τ_{did}) is greater than 0.05, so we accept the null hypothesis of non-significance of the coefficient at 5% significance level. Furthermore, as in the previous regression, for the coefficients of the variables (G_i) and (T_t) we can reject the null hypothesis also at 1% significance level, because their p-values are inferior to 0.01.

Yet, like in the regression of Period 1, although the coefficient of our treatment indicator is not significant, we find out that like in the previous regression, without any time event window, it is negative: -0.0089. This means that prices of GO items increased less of NGO prices and, as we have already explained, comparing it to the results of the Authority, within the time period which goes from December 2001 to March 2006, it is clear that the change in law had an effect on the groceries prices.

Moreover, from the regression, we find out that the coefficient of the variable group is positive: 0,031. This means that the CPIs of GO items are 3.1% higher than CPI of NGO items.

Finally, from the regression, we have also found that the coefficient of the variable time is positive as well: 0.047. So, the CPI of the post-treatment period is 4.7% higher than the CPI of the pre-treatment period.

VI. Conclusion

We are now able to answer our introductory question as to whether the prices of the items covered by the Groceries Order had been artificially raised or not. Our analysis confirms that the prices could be artificially raised. In fact, all the regressions carried out, with or without time event periods, have produced a negative coefficient of our treatment indicator. These results, as already explained, show that after the removal of the Groceries Order the GO prices increased less than NGO prices.

However, it is worth highlighting the magnitude of the impact of the event on prices. Although not all the coefficients of (W_{it}) were significant in our regressions with different event time windows, we can observe that the greater the time period is, the smaller the effect of the removal of the Groceries Order on CPIs.

This means that the effects of the event are stronger the more they are close to the date of the change in law. Indeed, this is also consistent with the results of the Authority's analysis. The Authority found that more than 9 months after the removal of the Groceries Order, the price trends of the two groups were similar.

Appendix

A1) Statistics concerning all the variables

```
. summarize
```

Variable	Obs	Mean	Std. Dev.	Min	Max
goodsi	0				
periodt	0				
cpii	768	99.39987	4.681867	83.5	109.9
groupgi	768	.5	.5003258	0	1
timeti	768	.46875	.4993477	0	1
wi	768	.234375	.4238836	0	1
good	768	4.5	2.292781	1	8
period	768	48.5	27.72937	1	96
lncpii	768	4.598016	.0479796	4.424847	4.699571

A2) Detailed Statistics on the independent variable: lncpii

```
. summarize lncpii, detail
```

		lncpii		
	Percentiles	Smallest		
1%	4.467057	4.424847		
5%	4.492002	4.435567		
10%	4.529368	4.443827	Obs	768
25%	4.575741	4.447346	Sum of Wgt.	768
50%	4.60617		Mean	4.598016
		Largest	Std. Dev.	.0479796
75%	4.625953	4.694097		
90%	4.652054	4.694097	Variance	.002302
95%	4.667206	4.697749	Skewness	-.8009995
99%	4.691348	4.699571	Kurtosis	3.768563

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