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An Empirical Assessment**

Kai Hüschelrath and Florian Smuda

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THE APPEALS PROCESS: AN EMPIRICAL ASSESSMENT

Kai Hüschelrath^{*} and Florian Smuda[#]

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Abstract

The appeals process – whereby the losing party of an administrative or judicial decision can seek reconsideration of their arguments before a higher institution – is an important mechanism to correct legal errors and to improve existing laws and regulations. We use data of 467 firm groups that participated in 88 cartels convicted by the European Commission between 2000 and 2012 to study both the characteristics of firm groups filing an appeal and the factors that determine their successfulness in terms of fine reduction. Applying discrete choice models and a two-stage hurdle model, we find that while some characteristics – such as the size and financial condition of the firm group or the clarity of fine guidelines – only affect the probability to file an appeal, other factors such as the size of the fine imposed in connection to characteristics as ringleader, repeat offender or leniency applicant influence both the probability and the success of an appeal. We take our empirical results to derive conclusions for both firms and public policy makers.

Keywords Law and Economics, appeals, antitrust policy, cartels, European Union

JEL Class K21, K41, K42, L41

^{*} Head, Competition and Regulation Research Group, ZEW Centre for European Economic Research, P.O. Box 10 34 43, D-68034 Mannheim, Germany, E-mail: hueschelrath@zew.de; Coordinator, MaCCI Mannheim Centre for Competition and Innovation; Professor, University of Mannheim, L7, 3-5, D-68131 Mannheim, Germany. *Corresponding author.* We are indebted to Cung Truong Hoang for excellent research assistance. The usual disclaimer applies. Funding by the State of Baden-Württemberg as part of the Mannheim Centre for Competition and Innovation (MaCCI) and Strengthening Efficiency and Competitiveness in the European Knowledge Economies (SEEK) grants is gratefully acknowledged.

[#] Researcher, Competition and Regulation Research Group, ZEW Centre for European Economic Research and MaCCI Mannheim Centre for Competition and Innovation, P.O. Box 10 34 43, D-68034 Mannheim, Germany, E-mail: smuda@zew.de.

1. Introduction

The implementation and continuous improvement of a workable and efficient judicial system is of fundamental importance at the constitutional level of any modern society. Independent of the underlying tradition or philosophy – such as the ‘rule of law’ in the ancient Greek or Anglo-Saxon tradition or the ‘state of law’ in the more continental European legal thinking – the judicial system is always viewed as an important constitutional cornerstone focusing on the interpretation and application of the law in the name of the state.

Although the workability and efficiency of the judicial system depends on various factors such as its explicit design or the availability of sufficient financial resources provided by the state, it appears inevitable that even the most efficient judicial system is not immune against the occurrence of erroneous court decisions. As a direct consequence, it is considered a constitutional (or even human) right of the losing party to seek reconsideration of their arguments as part of an appeals process – possibly leading to a diverging decision by an appellate court.

Complementary to this important function as means of error correction, the appeals process also contributes substantially to the improvement of existing laws and regulations: first, because lower court decisions are reviewed by experienced higher courts (thereby contributing to the extension of high-quality case law) and, second, because the frequent occurrence of appeals cases as such provide signals to public policy makers on the (suboptimal) efficiency of existing laws and regulations (thereby initiating, e.g., the publication of guidelines or even the revision of the respective law or regulation). In that sense the appeals process also contributes to the avoidance of erroneous future decisions.

Given this substantial importance of the appeals process for any judicial system, it comes as a surprise that existing empirical research on these processes is rare. This is particularly the case for studies that aim at investigating and evaluating entire appeals processes. In this respect, especially two types of empirical questions are particularly relevant. First, out of the group of convicted parties for a certain infringement or felony, which parties are more likely to file an appeal? Second, out of the sub-sample of parties who decided to file an appeal, what are the characteristics of successful appellants (and how successful are they)? Answers to both types of questions must be considered as valuable information for public policy makers. For example, if it is found that small firms are either less likely to appeal and/or less successful in appealing, public policy makers could closer investigate the reasons for these asymmetries (e.g., the impossibility to bear the respective costs or a restricted access to experienced

lawyers) and (possibly) decide to implement measures to mitigate the problem (e.g., through the provision of low-priced credits or legal consulting services for small firms).

Against this background, we use data of 467 firm groups¹ that participated in 88 cartels convicted by the European Commission between 2000 and 2012 to study both the characteristics of firm groups filing an appeal and the factors that determine their successfulness in terms of fine reduction. Applying discrete choice models and a two-stage hurdle model, we find that while some characteristics – such as the size and financial condition of the firm group or the clarity of fine guidelines – only affect the probability to file an appeal, other factors such as the size of the fine imposed in connection to characteristics as ringleader, repeat offender or leniency applicant influence both the probability and the success of an appeal. We take our empirical results to derive conclusions for both firms and public policy makers.

The remainder of the article is structured as follows. The following second section provides a brief characterization of the appeals process in general and gives an overview of existing theoretical and empirical research. Subsequently, the third section continues with a brief description of the appeals process in European cartel cases followed by the development of an empirical framework to assess this specific appeals process in the fourth section. In the fifth section, we present our empirical analysis. While Section 5.1 characterizes our empirical estimation strategy, the subsequent Section 5.2 describes the construction of the data set and presents the corresponding descriptive statistics. Section 5.3 then follows with a presentation and discussion of our estimation results before Section 5.4 closes the fifth section with the derivation of several implications for both firms and public policy makers. The sixth section concludes the article by summarizing its main results and providing several avenues for future research.

2. The appeals process

It is reasonable to assume that any decision by a court (or public authority) is made under uncertainty with both sides presenting their best cases and the court finally rendering a decision in favor of one side or the other. According to Miceli ((2009), p. 259), the best the court will be able to do is ‘... to assess a probability that each side’s version of the facts is true’. In rendering a decision, the court is typically also committed to interpret existing laws and regulations as these are often – by construction – not deterministic but leave (at least) some discretion to the court.

¹ Firms within one group are linked through ownership and are jointly liable for cartel fines.

The appeals process offers the losing party the possibility to seek reconsideration of their arguments – possibly leading to a diverging decision by an appellate court.² Without denying its important constitutional role or possibly even status as a human right (see, e.g., Nobles and Schiff (2002)), we will assume in the following that the implementation of an appeals process is motivated by two main goals. First, appeals help to refine existing laws and regulations; not only by assessments of experienced appellate courts enriching existing case law (and guiding lower courts in future decisions) but also by providing signals to lawmakers on the efficiency of existing laws and regulations (see, e.g., Cooter and Ulen (2000)). If, for example, the application of a certain law or regulation is frequently followed by an unusually large amount of appeals, a publication of guidelines or even a revision of the respective provision is suggested to increase procedural efficiency.

Second, the implementation of an appeals process aims at reducing the occurrence of legal errors. According to Shavell (1995), the appeals process can be viewed as a tool to correct errors because, first, parties are more likely to file an appeal if the first decision was erroneous (i.e., the act of initiating a (costly) appeal provides additional information on the (increased) likelihood of an erroneous decision). Second, the existence of an appeals process provides incentives to lower court judges to avoid erroneous decisions in the first place; basically because they become aware that errors may be uncovered by the higher court as part of an appeal thereby damaging their reputation and career prospects (see, e.g., Shavell (2006), Levy (2005) or Chopard et al. (2014)).

Given these key motivations for the implementation of an appeals process, its actual design offers various degrees of freedom. In addition to rather general questions such as, first, who should have the right to initiate an appeal (e.g., the litigants themselves and/or the appellate court) and, second, in what time period after the initial court decision may an appeal be initiated, more specific questions include, third, whether the respective appellate court is committed to accept the case for investigation (an appeal ‘as of right’) or whether it can reject it (as part of a ‘discretionary review’; see Cooter and Ulen (2000), p. 418); fourth, whether it

² From a law perspective, it is important to differentiate between the *appeals process* and the *judicial review process* (see, e.g., Schweitzer (2013) for a discussion of the latter with respect to EU competition law). Technically, the appeals process focuses on decisions by lower courts who are reassessed by higher courts on the merits of the decision under appeal while the judicial review process concentrates on assessments of decisions by a public authority (e.g., the European Commission or a national competition authority) by one or two court levels who will focus on the legality of the decision under review only. While important from a legal perspective, the economic implications of a differentiation between both processes must be considered as rather minor thereby justifying our approach to simply use the term ‘appeals process’ in the remainder of this article. In this respect, it is interesting to add that appeals mechanisms are also used in much wider contexts such as religious bodies, commercial trade organizations or professional sports leagues (see Shavell (1995), p. 380) thereby increasing the relevance of our empirical analysis further.

has to make an entirely new judgment on the case ('de novo appeals') or is restricted to a review of the old decision based on either 'facts and law' or 'law only' as part of the appeals process; or, fifth, whether the decision of the first-stage appellate court is final or could be challenged by a second-stage appellate court (the so-called 'finality decision')?

Although it is above the scope of this article to provide a full review of answers given by various theoretical research articles (see generally Shavell (1995, 2010) or more specifically Daughety and Reinganum (2000)), it appears straightforward that an answer to the question of an optimal design of an appeals process depends on a detailed assessment of the (incremental) costs and benefits of various alternative designs.³ In this respect, for example, Shavell (1995) argues that – due to convex costs of avoiding legal errors – it is socially preferable to have a two-stage (less accurate) appeals process rather than a one-stage (more accurate) process. Furthermore, in an older contribution, Martineau (1984) questions the assumption that appeals always follow welfare-enhancing motivations and signal an increased likelihood of an erroneous decision. He argues that appeals may also be initiated for frivolous reasons; i.e., parties file (and/or delay) appeals for tactical reasons and not because they believe that the decision is actually erroneous. Due to the substantial societal costs that are created by such forms of abusive behavior – such as, e.g., delays in decision making at the appellate court level – he suggests to impose sanctions on frivolous appeals in order to '... protect both litigants and the ability of the federal appellate courts to decide cases in an expeditious and fair manner' (Martineau (1984), p. 845).

Compared to the larger theoretical literature, the number of empirical contributions on the appeals process is rather small and fragmented. While a very limited number of studies focus on assessments of the determinants of filing an appeal (see especially Santolino (2010)), several other studies aim at answering the question why plaintiffs lose appeals (see, e.g., Clermont and Eisenberg (2001) and Eisenberg and Farber (2014)). For European competition policy, Günster et al. (2010) provide an empirical analysis of all European Court of Appeal Rulings of horizontal, vertical, abuse of dominance, licensing as well as joint ventures cases between 1957 and 2004. They find, inter alia, that the number of pleas positively (negatively) influences the probability of receiving partial (complete) annulment and that cases with a high number of judges are more likely to result in a complete annulment. In addition, they show that the probability of filing an appeal is significantly influenced by the length of the Commission decision, the number of accepted complaints, the number of judges and whether

³ In the words of Shavell (1995, 386) it is socially desirable to invest further in the accuracy of the appeals process until "... the increase in costs is outweighed by the increase in the expected gain, that is, the increase in the probability of reversal of error multiplied by the social harm from error".

the case is grouped into one case or not. In a related paper, Carree et al. (2010) empirically investigate determinants of appealing EC decisions on case and firm level using a similar dataset. They identify the level of fine, the decision length and the number of parties to which the decision is addressed as significant drivers of the decision to file an appeal.

Against this background, we aim to contribute to this literature by developing an empirical framework for the study of the appeals process and subsequently applying it to European cartel cases. Although any empirical analysis of an appeals process has to take the specificities of the process under investigation into account, our two key research questions – and the corresponding empirical framework – are of general relevance for the study and evaluation of appeals processes: First, how do the characteristics of appellants differ from the characteristics of non-appellants? Second, out of the sub-sample of appellants, what factors drive their success in the appeals process? Answers to both questions are especially important as part of an evaluation of the appeals process and the corresponding identification of improvement potential.

3. The appeals process in European cartel cases

Given the various alternative structures of an appeals process sketched in the previous section, it becomes apparent that any meaningful empirical analysis has to be based on a detailed characterization of the specific appeals process under investigation. Under EU competition law in general and for EC cartel cases in particular, the appellate court proceedings can be either one- or two-stage. At the first stage, a cartel member that believes to have serious concerns with a (fining) decision of the EC can file an appeal with the General Court (GC) of the European Union.⁴ The GC – previously known as the Court of First Instance (CFI) – is composed of at least one judge from each member state. According to Article 254 of the Treaty on the Functioning of the European Union (TFEU), judges are appointed ‘by common accord of the governments of the member states’ for a renewable term of six years. The GC sits in chambers of usually three or five judges. Substantively, four main categories of argument can broadly be distinguished in an appeal against an EC cartel decision: fine levels, procedural aspects, facts/standard of proof aspects, and substantive assessment issues.⁵ In any case, the first-stage appeal must be initiated within two months of the earlier; either the

⁴ See the consolidated version of the Rules of Procedure of the General Court, Official Journal of the European Union, 2010/C 177/02.

⁵ According to Camesasca et al. (2013), appeals against cartel decisions often aim at obtaining a fine reduction rather than an annulment of the fine (basically because it is rather unlikely that a firm was wrongly convicted for its participation in a cartel by the EC).

publication of the Commission's decision or the notification of the firm group (Art. 263 TFEU).

Generally, the GC not only has the power to annul, reduce or increase the fines imposed by the EC; it also has full jurisdiction to review the entire Commission decision (including a repetition of the full assessment process). In practice, however, the GC usually focuses on an assessment of the factors linked to the correct application of the respective law provisions such as cartel duration, the gravity of the infringement or the application of the leniency program (see Geradin and Henry (2005) or Harding and Gibbs (2005)). Typically, the GC does not aim at replacing the Commission's assessment of evidence with its own.

At the second stage of the appeals process in EC cartel cases, judgments of the GC can be appealed before the European Court of Justice (ECJ) by the unsuccessful party, i.e., either the convicted firm, the EC itself or both. The ECJ is the highest European appellate court and also has the power to annul, reduce or increase the fines imposed by the GC. However, in its proceedings, it limits itself to questions of law and has no jurisdiction to (re-)review the facts and analyze the evidence that the GC used to support its findings and decision.

4. An empirical framework to assess the appeals process in European cartel cases

Following a general description of the appeals process and its practical implementation in European cartel cases, in this section, we continue with the development of an empirical framework to assess the appeals process in European cartel cases. The structure of the (more generally applicable) framework is guided by our two main research questions. At the first stage – ‘assessing the characteristics of appellants’ – we will motivate the potential relevance of various determinants of the decision to file an appeal against a cartel decision by the EC or the GC. At the second stage of the framework – ‘assessing the characteristics of successful appellants’ – we will restrict ourselves to the sub-sample of firm groups that decided to file an appeal and aim at isolating key characteristics of successful appellants in connection to the level of success (i.e., the degree of fine reduction reached).

4.1. Stage 1: Assessing the characteristics of appellants

The first stage of our framework focuses on the characteristics of firm groups that decided to file an appeal against a cartel decision by the European Commission. Although on the surface one might argue that the existence of one or more alleged errors in the EC decision is the key (and only) driver of firms to file an appeal, our discussion in Section 2 above has revealed that other purposes such as so-called frivolous appeals (aiming at, e.g., delaying fine payments or

reaching some fine reduction) must be considered as well. In the following, we will subdivide our assessment of potential drivers into three groups of variables: group-related, fine-related and legal environment-related.

Group-related variables

Within the group-related variables, we expect that the characteristic of especially four variables have a significant influence on the probability to appeal: (1) the number of firms in the group, (2) the number of different countries in the group, (3) the number of firm group employees and (4) the financial condition of the firms in the group. First, the larger the number of firms in one group, the more likely it becomes that at least one of the respective firms identifies a reason to file an appeal (be it either alleged errors in the decision or other (tactical) motives). Second, the larger the number of countries in one firm group, the higher the expected heterogeneity among firms (e.g., due to (partly) diverging laws and regulations) and the more likely that at least one firm decides to appeal.

Third, we have included the number of employees as proxy for the size of the respective firm group. *Ceteris paribus*, we expect that the probability to file an appeal increases with group size for basically two reasons. On the one hand, larger firms have better possibilities to file appeals as they have the necessary (financial and) human resources in the form of, e.g., professional and experienced in-house lawyers. On the other hand, larger firms are more likely to have larger incentives to appeal an EC cartel decision, e.g., in order to reduce the negative publicity that is associated to it.

Last but not least, we expect that the probability of filing an appeal is also influenced by the financial condition of the respective firm groups. While a financially healthy firm may decide to pay the fine thereby terminating the respective resource-intensive trial, a financially weak firm may be forced to file an appeal in order to avoid immediate fine payments after the EC decision has become final. We therefore expect that firms in financial trouble have an elevated probability to file an appeal.

Fine-related variables

Turning from group- to fine-related variables, we expect that the characteristic of especially five (groups of) variables significantly influence the probability to appeal: (1) aggravating and mitigating circumstances, (2) the duration of the cartel agreement, (3) the absolute size of the final fine, (4) characteristic as ringleader or repeat offender and (5) the use of a leniency program as either the first reporting firm or a follower. First, the presence of aggravating or

mitigating circumstances⁶ – identified by the EC during their case assessment – is translated into either an increase or a decrease of the respective basic amount of the fine. As the fixing of both types of fine adjustments is rather arbitrary and implemented by the Commission using its discretionary power, it becomes more likely for firm groups to appeal a decision as soon as these adjustments have played a role in an EC decision.

Second, the duration of cartel participation must be considered as a further possible driver of the probability to appeal. The longer the group participated in the cartel, the more complicated it becomes for the EC to collect all necessary information to decide on, e.g., the exact start date of cartel participation thereby increasing the probability that the firm group disagrees with the respective authority finding and decides to appeal. Third, the size of the final fine must be considered as another, rather obvious, driver of the probability to appeal. The larger the fine, the more drastic are the consequences for the respective firms with respect to both share- and stakeholder groups and the larger therefore the desire to at least reduce the fine through a successful appeal.

Fourth, the characteristics as ringleader or repeat offender may also have a presumably negative effect on the probability to appeal, basically because both ringleaders and repeat offenders have a rather difficult standing at the EC and this, *ceteris paribus*, reduces the probability to file an appeal. Last but not least, the application of a leniency program – be it as first reporting firm or follower – may have an influence on the probability to file an appeal. Due to the fact that leniency applicants have to fully cooperate with the EC in order to qualify for a fine reduction or even fine waiver, the EC can base its fining decision on detailed documentation thereby reducing the probability of error. We therefore expect that the characteristic as leniency applicant reduces the probability to file an appeal. As the first self-reporting firm typically receives the largest fine reduction, we expect the negative influence on the probability to file an appeal to be stronger for those firms than for the group of followers (who receive smaller fine reductions).

Legal environment-related variables

We further argue that several legal environment-related variables are likely to influence a firm's probability to appeal an EC cartel decision. The legal environment is taken into account by means of two (groups of) variables capturing (1) the legal basis under which a firm was

⁶ Aggravating circumstances considered by the EC are, e.g., repeat offences, refusal to cooperate with the EC or the role of leader in an infringement. Mitigating circumstances, however, include, e.g., the provision of evidence that the infringement was terminated as soon as the EC intervened or proof that the anti-competitive conduct has been authorized or encouraged by public authorities or by legislation.

fined as well as (2) the state of private enforcement in the jurisdiction in which the firm is located. Precisely, we expect that the publication of a revised EC Leniency Notice in 2002 and revised EC Guidelines on the Method for Setting Fines in 2006 – which specified the granting of leniency discounts and the fine calculation process, respectively – have increased the transparency of EC decisions thereby reducing the probability to file an appeal.

Furthermore, the threat of a strengthened private antitrust enforcement through cartel damage claims by harmed customers of cartel members may cause elevated incentives to file an appeal as the beginning of such (typically follow-on) private suits is postponed. However, as the private enforcement of competition law – at least in terms of cartel damage claims – is a rather recent development in most European countries, we expect that US based firms are more likely to appeal (due to the substantially higher risk of private damage claims). Furthermore, as the UK appears to be the most advanced country in the EU when it comes to damages-related private antitrust enforcement, we will also investigate whether firm groups stemming from the UK have elevated incentives to file an appeal.

4.2. Stage 2: Assessing the characteristics of successful appellants

At the second stage of our empirical framework, we investigate the determinants of successful appeals in connection to the level of success for the sub-sample of those firm groups that decided to file an appeal. The separation into ‘drivers of the probability of success’ and ‘drivers of the level of success’ appears to be especially important as the success spectrum in cartel appeals cases can be very broad reaching from a one percent fine reduction up to a complete fine waiver. Taking this characteristic into account, in a first step, we discuss a set of variables that are believed to influence either only the probability of a successful appeal or both the probability and level of success.⁷ In a second step, we concentrate on variables that are likely to influence the level of success only (but not the probability of success).

Variables affecting the appellant’s success probability in connection to the level of success

Starting off with the first group of variables, we expect that the characteristics of especially six (groups of) variables significantly influence the appellant’s success probability in connection to the level of success: (1) the number of pleas, (2) the number of appellants within one group joining the appeal(s), (3) the number of leniency applicants within one group, (4) the fact whether an appeals decision has been challenged (either by the respective

⁷ We define an appeal as successful if one or more members of a specific firm group received a fine reduction or fine annulment after the GC or the ECJ reviewed the EC decision.

firm group or the EC), (5) the time span between the beginning and the end of an EC investigation and the time span between the cartel breakdown and the beginning of the EC investigation, and (6) the publication of leniency and fine guidelines.

First, we expect that the number of different reasons raised by the group in the appeal(s) is a key determinant of both the success as such and the level of success. The larger the selection of reasons raised, the more likely it becomes that at least one reason is found to have substance. Furthermore, the more reasons are raised, the more likely it becomes that the decision is increasingly erroneous.

Second, the larger the number of appellants within one group that participate in the appeal(s), the more likely it becomes that the decision for at least one firm was erroneous and the appeal therefore is successful. Third, the larger the number of leniency applicants among the firms in one group, the better is the information situation of the EC regarding these firms and the lower the probability that an appeal will be successful. If, however, an alleged error has occurred (e.g., because the respective firms (rightfully) expected a larger reduction of the fine), it is likely that such an error is rather minor thereby leading to smaller reductions in the fine.

Fourth, as some appeals decided by the GC were challenged again either by a firm group or the EC, it is reasonable to assume that the probability of success crucially depends on who lost at the first-stage appellate court. We expect that the probability for an eventually successful appeal increases in case the EC appealed (as this suggests that the GC was in favor of the group) and decreases in case the group challenged the first-round judgment (as this suggests that the GC (at least partly) rejected the appeal). However, it appears unlikely that the level of fine reduction depends on the fact whether a second round is reached or not as both the GC and the ECJ base their decisions (of different scopes) on case-related facts as well as the same legal basis.

Fifth, the duration of investigation and the duration of detection (i.e., the time span between cartel breakdown and beginning of the investigation) both refer to the work environment at the EC and the related probability for erroneous decisions. *Ceteris paribus*, the quicker the decision by the EC, the more likely that facts were either ignored or inaccurately reviewed leading to a higher probability of a successful appeal. Furthermore, the larger the time distance from the end of the cartel agreement to the detection of the cartel, the more likely it becomes that the Commission's case is built on weaker evidence also increasing the probability of a successful appeal.

Sixth, we expect that the publication of a revised EC Leniency Notice in 2002 and revised EC Guidelines on the Method for Setting Fines in 2006 led to increases in the transparency of EC decisions suggesting a reduced probability of a successful appeal and a smaller fine reduction in cases in which the appeal was nevertheless successful.

Variables affecting the appellant's level of success only

Following our discussion of the first set of variables – those that influence either only the probability of a successful appeal or both the probability and level of success – we now turn to variables that are likely to influence the level of success only. In particular, we discuss the following four (groups of) variables: (1) fine annulment, (2) final fine, (3) characteristic as ringleader or repeat offender, and (4) reasons for a successful appeal.

First, we expect that firm groups demanding a complete annulment of the fine are likely to receive greater fine reductions than other firm groups.⁸ A key reason for such a relationship can be seen in the fact that appeals demanding an annulment are likely to have more substance than claims that only demand a reduction in the fine. Second, it is reasonable to expect that the higher the final fine, the larger is the absolute reduction of the fine basically because there is simply more potential for substantial fine reductions.

Third, following our argumentation above we expect that both ringleaders and repeat offenders have a rather difficult standing at both the EC and the appellate courts resulting in comparatively lower reductions when the courts make use of their discretionary power during the evaluation process of the pleas. Fourth, the key drivers of the level of success of an appeal must be seen in the different reasons that either the GC or the ECJ accepts in their decisions as justified. In addition to errors in the substantive analysis, also errors in the application of the leniency program or the fine calculation as such may justify fine reductions. Furthermore, it can also be the case that two or more types of errors are found. Although such a situation may on the surface speak for a higher fine reduction than in cases in which only one type of error was present, a strong case based on a single reason may still lead to a higher fine reduction than a selection of weaker reasons.

5. Empirical analysis

In this section, we present our empirical analysis. While Section 5.1 characterizes our empirical estimation strategy, the subsequent Section 5.2 describes the construction of the

⁸ Although most groups demand a fine annulment in their appeal (as also reflected in the descriptive statistics discussed below), they regularly claim a fine reduction in case the fine annulment is rejected by the GC/ECJ.

data set and presents the corresponding descriptive statistics. Section 5.3 then follows with a presentation and discussion of our estimation results before Section 5.4 closes the fifth section with the derivation of several implications for public policy makers.

5.1. Estimation strategy

We estimate two different model specifications in order to investigate, at the first stage, the characteristics of firm groups filing an appeal (‘the characteristics of appellants’) and, at the second stage, the factors that determine their successfulness in terms of fine reduction (‘the characteristics of successful appellants’).

5.1.1. Stage 1: Assessing the characteristics of appellants

With respect to our first research question, the derivation of several hypotheses in Section 4.1 above suggests the specification of the following econometric model:

Stage 1:

$$P(\textit{Appeal} = 1|\mathbf{x}) = F(\beta_0 + \beta_1'\textit{Group} + \beta_2'\textit{Fine} + \beta_3'\textit{Legal})$$

with $P(\textit{Appeal} = 1|\mathbf{x})$ indicating the response probability of a group to appeal the EC decision on the cartel case in which the group was involved, and \mathbf{x} denoting the set of explanatory variables that determine a groups’ decision to appeal (consisting of the three parameter vectors *Group*, *Fine* and *Legal*).

The vector *Group* captures firm group-related variables and consists of the number of firms (*No_firms*) and the number of different countries (*No_countries*) within the underlying firm group. In the standard version of the model the vector merely consists of these two variables as information on them is available for all groups in the sample. In a second, extended version, the vector additionally contains the number of employees (*No_employees*) as well as the liquid ratio (i.e., the ratio of liquid assets to short-term liabilities) of a group in the year of the EC decision (*Liquidratio*) as potential drivers of the decision to file an appeal. This information, however, is only available for 58 percent of the groups resulting in a substantially smaller sample size available for the econometric analysis.⁹

The vector *Fine* contains eight variables referring to specific factors taken into account by the EC during the fine calculation process (for a group). These are binary variables capturing whether aggravating (*Aggrav_circ*) and/or mitigating (*Mitig_circ*) circumstances existed, whether the group took the position as ringleader in the cartel (*Ringleader*) and whether it has

⁹ The ‘number of employees’ / ‘liquid ratio’ of one firm group was calculated as ‘the sum of the number of employees’ / ‘the average liquid ratio’ of all distinct firms in the group. Please note that in some cases observations for particularly smaller firms were not available.

infringed anti-cartel laws before (*Repeat_offender*).¹⁰ In addition, the vector controls for the duration in which the group actively participated in the cartel (*Duration_participation*) as well as the final fine imposed by the EC (*Final_fine*). Last but not least, the binary variables *LP_first* and *LP_follower* are part of the vector in order to take into account whether the group successfully applied for leniency either as the first firm or as a follower.

Finally, the vector *Legal* controls for the legal environment under which a group was convicted and consists of four binary variables capturing whether a group was fined under the 2006 EC Guidelines on the Method for Setting Fines (*Fine_guidelines_06*), under the 2002 Leniency Notice (*Leniency_notice_02*) and whether the group is located in a country with effective private enforcement (*US* and *UK*). The reference groups for the former two binary variables are groups convicted under the 1998 Fine Guidelines or the 1996 Leniency Notice while the reference groups for the latter variables consist of groups not located in the US or the UK, respectively.

Since the dependent variable is binary and equal to one if a group appealed the EC decision, we use Probit and Logit models for binary response. Both discrete choice models are based on Maximum Likelihood estimations and only differ with respect to the underlying functional form $F(\cdot)$. Whereas $F(\cdot)$ represents the standard normal distribution in the Probit model, $F(\cdot)$ follows a logistic function in the Logit model.

5.1.2. Stage 2: Assessing the characteristics of successful appellants

Turning to our second research question – assessing the characteristics of successful appellants – our hypotheses derived in Section 4.2 above suggest the use a two-stage hurdle model suggested by Cragg (1971). This type of model represents an alternative to the classical Tobit model for corner solution outcomes. Our variable of interest is the level of discount granted to firm groups that appealed EC cartel decisions. This variable contains a substantial fraction of zero values in cases in which the GC or the ECJ rejected the pleas initiated by the appellants, however, is continuously distributed if the appeals were successful. As a consequence, the Tobit model appears to be the appropriate choice in explaining the level of fine discounts. A drawback of the Tobit model, however, is that it requires the same set of parameters to influence both the probability of receiving a fine discount (i.e., the probability of a successful appeal) and the level of fine reduction granted in case of a successful appeal. This also implies that, by construction, the sign of an explanatory variable is identical for

¹⁰ Since we explicitly control for both ringleader and repeat offender characteristics of a group, the variable *Aggrav_circ* is equal to one if aggravating circumstances other than those two were taken into account by the EC.

determining the probability of a positive outcome and the actual outcome (given that it is positive) which can be a critical assumption for answering our second research question.

The two-stage hurdle model overcomes both obstacles by using two distinct estimation processes thereby permitting different signs on both stages and allowing different sets of explanatory variables to determine the probability of a positive value of the dependent variable and the actual value given that it is positive (see also Burke, 2009). In our case, this is an important advantage of the hurdle model over the Tobit model as both its assumptions are likely to be inappropriate.¹¹

Econometrically, the hurdle model is implemented by using a Probit model at the first stage and a truncated normal model for all positive values at the second stage. Compared to the estimation of the model at stage 1, the data set is restricted to only those firm groups that appealed the EC decisions. The regression functions on both stages can be specified as follows:

Stage 2a:

$$P(\text{Discount} > 0 | \mathbf{x}_1) = F(\beta_0 + \beta_1 \text{No_pleas} + \beta_2 \text{No_appellants} + \beta_3 \text{Twostage_ec} \\ + \beta_4 \text{Twostage_firmgroup} + \beta_5 \text{No_len_applicants} \\ + \beta_6 \text{Fine_guidelines_06} + \beta_7 \text{Leniency_notice_02} \\ + \beta_8 \text{Duration_investigation} + \beta_9 \text{Duration_detection})$$

Stage 2b:

$$E(\text{Discount} | \text{Discount} > 0, \mathbf{x}_2) = F(\beta_0 + \beta_1 \text{No_pleas} + \beta_2 \text{No_appellants} + \beta_3 \text{Fine_annulment} \\ + \beta_4 \text{No_len_applicants} + \beta_5 \text{Final_fine} + \beta_6 \text{Ringleader} \\ + \beta_7 \text{Repeat_offender} + \beta_8 \text{Fine_guidelines_06} \\ + \beta_9 \text{Leniency_notice_02} + \beta'_{10} \text{Success_reasons})$$

As shown by regression equations (2a) and (2b), we make use of the richer model specification possibilities provided by the hurdle model and use two different sets of parameters (\mathbf{x}_1 and \mathbf{x}_2) on both stages. Precisely, while some variables are included either in the first or the second stage estimation only, others emerge in both estimation equations.

Starting with variables explaining both the success probability of appeals (i.e., the probability of receiving a fine reduction) and the level of discounts (in case of success), we include the number of pleas brought forward (*No_pleas*), the number of appellants within one firm group (*No_appellants*), the number of leniency applicants within one group

¹¹ For example, the requirement of the Tobit model to have the same sets of parameters on both stages of the model is misleading as the levels of fine reductions granted in successful appeals are likely to be strongly influenced by the underlying types of pleas accepted by the court (and these factors are only observable for firm groups whose appeals were successful). Hence, the Tobit model would be insufficiently specified to properly explain the level of fine reductions.

(*No_len_applicants*) as well as two binary variables capturing whether a group was fined under the revised EC Leniency Notice from 2002 (*Leniency_notice_02*) or under the revised EC Fine Guidelines from 2006 (*Fine_guidelines_06*) as explanatory variables.

Turning to variables that are only included in model (2a), we expect both the duration of investigation (*Duration_investigation*) and the duration of cartel detection (*Duration_detection*) to influence the probability of success. In addition, the two binary variables *Twostage_ec* and *Twostage_firmgroup* are included in order to control for the fact that some appeals (decided by the GC as first-stage appellate court) were challenged either by the EC or the respective firm group leading to a second investigation carried out by the ECJ.

Turning to variables only included in model (2b), we argue that the final fine imposed by the EC (*Final_fine*) and the characteristics as ringleader (*Ringleader*) or repeat offender (*Repeat_offender*) are determinants of the fine reduction of successful appeals. Furthermore, while the binary variable *Fine_annulment* captures whether a group demanded an annulment rather than a fine reduction in its appeal, the vector *Success_reasons* contains four binary variables representing different categories of reasons¹² that were accepted by the courts as viable reasons to reduce the fine imposed by the EC or GC.

5.2. Construction of the data set and descriptive statistics

The raw data set used in this article contains information on all cartel and cartel appeals cases decided by the EC, the GC and the ECJ between 2000 and 2012. The data were collected from decisions and press releases published by the EC in the course of its investigations as well as from judgment documents provided by the online platform *CVRIA*.¹³ The data set combines case-related, firm group-related and firm-related information. Firm groups were formed according to the respective EC decisions, i.e., firms within one group are linked through ownership and are jointly liable for cartel fines. For our empirical analysis we use the data on group level rather than on firm level because most variables do not substantially differ between single firms within one group. Using firm level data would therefore result in an unjustified multiplication of the sample size without providing additional information. The data set contains both firm groups that filed an appeal against their EC decisions and firm groups that decided not to appeal; however, the sample is restricted to those appeals for which the final decision of an appellate court was already available at the time of the finalization of

¹² The different categories are (1) substantive reasons; (2) error in the application of leniency notice; (3) error in the fine calculation process after the basic amount of the fine was set; or (4) combinations of separate success reasons ('multiple reasons'). The reference group of the success reason variables is 'errors in the calculation of the basic amount of the fine'.

¹³ See <http://curia.europa.eu> for further information.

the data set in February 2014. In addition to the information provided by the EC and *CVRIA*, we have also created two group-related variables (liquid ratio and number of employees) by adding the respective information from the *Amadeus* database provided by Bureau van Dijk. In total, the data set combines information on 467 firm-groups from 88 cartel cases.¹⁴ Table 1 below shows the descriptive statistics of the data set while Table 4 in the Annex provides a characterization of the variables included in our empirical analysis.

¹⁴ It is worth noting that – for our empirical analysis – we divided some of the decided EC cartel cases into several separate cases, basically because some EC decisions cover several distinct cases within one judgment (e.g., as they either refer to similar product markets or the same product market in different geographical regions). The creation of such distinct cases is important in order to aggregate our group-related variables appropriately. The number of cartel cases included in our empirical analysis is 74 according to the EC statistics (rather than 88 according to our classification).

Table 1: Descriptive statistics

Variable	Mean	Std. dev.	Min	Max	Obs.
<i>Appeals-related variables</i>					
Appeal	0.5011	0.5005	0	1	467
Appeal_success	0.4658	0.4999	0	1	234
No_pleas	5.6	3.1945	1	20	234
No_appellants	1.8632	1.3673	1	12	234
Duration_decision	48.8752	13.7932	5	81	234
Discount	8.3905	28.9366	0	233	234
Fine_annulment	0.9231	0.267	0	1	234
Twostage_ec	0.1068	0.3096	0	1	234
Twostage_firmgroup	0.4103	0.4929	0	1	234
<i>Group-related variables</i>					
No_firms	1.8779	1.3913	1	12	467
No_countries	1.4904	0.9062	1	8	467
No_len_applicants	1.2762	1.4747	0	12	467
No_employees	49.0442	91.1542	0.002	515.063	272
Liquidratio	1.6129	3.8127	0.08	55.6	272
<i>Fine-related variables</i>					
Aggrav_circum	0.0428	0.2027	0	1	467
Mitig_circum	0.1692	0.3753	0	1	467
Duration_participation	83.1606	66.0333	3	419	467
Final_Fine	31.1627	65.912	0	553	467
Ringleader	0.0493	0.2166	0	1	467
Repeat_offender	0.0857	0.2802	0	1	467
LP_first	0.1349	0.342	0	1	467
LP_follower	0.439	0.4968	0	1	467
<i>Legal environment-related variables</i>					
Fine_guidelines_06	0.3704	0.4834	0	1	467
Leniency_notice_02	0.531	0.4996	0	1	467
UK	0.1478	0.3552	0	1	467
US	0.0985	0.2983	0	1	467
<i>Appeal success reasons</i>					
Succ_lp	0.1009	0.3026	0	1	109
Succ_basefine	0.2018	0.4032	0	1	109
Succ_fine_other	0.1835	0.3889	0	1	109
Succ_subst	0.3394	0.4757	0	1	109
Succ_multiple	0.1651	0.373	0	1	109
<i>Other variables</i>					
Duration_investigation	51.4947	20.0356	7	114	467
Duration_detection	6.3897	17.2048	-39	55	467

Although it appears dispensable to provide a detailed interpretation of the descriptive statistics of all variables shown in Table 1, we would like to point to a few key insights within the six categories of variables. First, in terms of *appeals-related variables*, Table 1 reveals that about 50 percent of the 467 firm groups decided to file an appeal. Out of this sub-sample of 234

firm groups, about 47 percent were successful in the sense of receiving a reduction in the fine originally imposed by the EC. In other words, about one quarter of all firm groups convicted by the EC successfully appealed and received a fine reduction. On average, the appellants put forward about 6 pleas (with 1 and 20 delineating the spectrum) and waited about 49 months for a decision on the case. If successful, they received a fine reduction of on average €8.4 million. The large majority of more than 90 percent demanded a fine annulment (and a fine reduction if the fine annulment was refused by the appellate court). Last but not least, the firm groups decided more often to file a second-stage appeal with the ECJ (41 percent of the cases) than the EC itself (11 percent of the cases).

Turning to the *group-specific variables*, we find on average 1.9 firms in one group stemming from 1.5 countries. There are on average 1.3 leniency applicants among them and they have on average about 49,000 employees. Last but not least, the liquid ratio as measure for a firm group's average financial performance is found to lie between 0.08 (worst performance) and 55.6 (best performance) with an average of 1.6.

The descriptive statistics of the *fine-related variables* reveal further insights relevant for the subsequent empirical analysis. It is shown that both aggravating and mitigating circumstances play a minor role in only 4 or 17 percent of all firm groups, respectively. On average, a firm group participated about 83 months in a cartel (with 3 and 419 months delineating the spectrum) and faced an average fine (imposed by the EC) of about €31 million, again within a rather large spectrum from €0 to €553 million. About 5 percent of the firm groups were ringleaders and about 9 percent show the characteristic of a repeat offender. 13 percent of all groups in the data set successfully applied for leniency as first applicant (regularly receiving full leniency) while further 44 percent successfully received leniency as follower (regularly receiving a fine reduction).

With respect to the *legal environment-related variables*, Table 1 reveals that about 37 percent of all firm groups fall under the revised 2006 EC Guidelines for the Method of Setting Fines and about 53 percent under the revised 2002 EC Leniency Notice. About 15 percent of the firm groups are based in the UK (compared to 10 percent in the US).

Turning to the remaining two categories – *appeal success reasons* and *other variables* – it is found that substantive reasons are in about 34 percent of all 109 cases of successful appeals accepted by the courts followed by about 20 percent for errors in the calculation of the fine. Last but not least, the EC needed on average 51 months from the beginning of an investigation to its end with 7 months being the shortest duration and 114 months being the longest. On average, the investigation started about 6 months after the cartel breakdown,

however, with a rather wide spectrum from -39 months (in a case in which the cartel continued to operate after the EC started an investigation) up to 55 months after the cartel breakdown.

5.3. Estimation results

In this section, we present the key results of our empirical analysis. Following our research questions and the structure of the econometric framework, we begin with a discussion of the results for the determinants of appealing against a cartel decision by the EC, followed by a detailed characterization of the second research question after the determinants and the size of success for those firm groups that decided to file an appeal. In a third step, we will make use of the richness of our empirical setting and provide a discussion of our results for those variables that appear to play a key role at all stages of the analysis. We will restrict our discussion to significant variables only.

5.3.1. Stage 1: Assessing the characteristics of appellants

The first stage of our empirical analysis focuses on the characteristics of firms who decide to file an appeal against a cartel decision by the EC. Guided by the above description of both our explanatory variables and the empirical model, we receive the following results for the three groups of key variables. Starting with the Probit estimates using the full sample size (first column in Table 2), we find for the group of *fine-related variables*, first, a (weakly) positive relationship between the presence of a mitigating factor and the probability to file an appeal suggesting that firms are more likely to initiate an appeal if they believe that the expected reduction (e.g., due to full cooperation with the EC) was not large enough rather than in the opposite direction in which aggravating circumstances might have led to an ‘exaggerated’ increase in the fine. Second, we find a highly significant impact of the size of the final fine imposed by the EC on the probability to file an appeal confirming our hypothesis that higher fines increase the desire to achieve a reduction in the fine through appealing the EC decision. Third, our estimations reveal that repeat offenders are more inclined to challenge EC decisions than single offenders. The estimated coefficient is highly significant and in contradiction to our hypothesis derived above. One possible explanation for the diverging result could be seen in possible insider knowledge of repeat offenders in the procedures of the EC leading to elevated incentives to initiate an appeal. Alternatively, repeat offenders may be left with the impression that the (elevated) fine imposed by the EC was ‘out of scale’ thereby motivating an appeal. Fourth, we find a significantly lower probability to appeal for firms that

participated in the leniency program. On average, the probability to appeal an EC decision is 58 percent lower for the first applicants and 23 percent lower for the followers (compared to firms that did not apply for leniency) also confirming our hypothesis that the improved information situation on the side of the EC causes a reduction in the probability of error and a therefore a reduced incentive to initiate an appeal.

Turning from the fine-related to the *legal environment-related variables*, we find, first, that firms fined under the revised 2006 EC Guidelines on the Method for Setting Fines have a significantly reduced probability to file an appeal compared to firms that were fined under the preceding guidelines from 1998. As expected, the evidence is consistent with our allegation that the much more detailed fine calculation process defined in the 2006 guidelines increased the transparency of EC decisions thereby lowering the incentives to initiate an appeal. Second, Table 2 reveals significantly lower appeal probabilities for firms that are located in the UK, contradicting our hypothesis that the aim of delaying private enforcement actions may motivate firms to file appeals. One explanation for this unexpected outcome can be seen in the fact that – according to the UK rules on interest and inflation for cartel damages – the damages amount will inevitably increase over time from the occurrence of the loss (i.e., the cartel period) onwards rather than the point in time at which the public case is eventually closed (see generally Bueren et al. (2014) for a detailed assessment). In other words, delaying cartel damage claims in the UK would increase the final damages amount and, as a consequence, only firms in financial trouble may have elevated incentives to postpone the respective fine payments as far into the future as possible through the filing of an appeal.¹⁵

¹⁵ One explanation for the insignificant result of the private enforcement dummy for the US can be seen in the lower prominence of follow-on cases, i.e., potentially damaged customers in the US much more often decide to begin a damages action long before the case was publicly decided (or sometimes even initiated).

Table 2: Estimation results for model stage 1

	Probit (Full sample)		Logit (Full sample)		Probit (Sub-sample)		Logit (Sub-sample)	
<i>Group-related variables</i>								
No_firms	0.0411	(0.98)	0.0419	(0.91)	0.0502	(1.03)	0.0546	(1.01)
No_countries	0.0691	(1.27)	0.0789	(1.35)	0.0298	(0.48)	0.0251	(0.36)
No_employees					-0.00160***	(-2.71)	-0.00179**	(-2.55)
Liquidratio					-0.0141**	(-2.27)	-0.0149**	(-2.27)
<i>Fine-related variables</i>								
Aggrav_circum	-0.159	(-1.05)	-0.167	(-1.09)	-0.224	(-1.13)	-0.225	(-1.13)
Mitig_circum	0.178*	(1.89)	0.188*	(1.87)	-0.00947	(-0.07)	-0.0229	(-0.14)
Duration_participation	-0.000449	(-0.66)	-0.000529	(-0.65)	0.000287	(0.33)	0.000263	(0.26)
Final_fine	0.00248***	(3.65)	0.00273***	(3.13)	0.00303***	(3.61)	0.00332***	(3.53)
Ringleader	-0.0231	(-0.18)	-0.0112	(-0.08)	0.325**	(2.41)	0.327**	(2.20)
Repeat_offender	0.307***	(3.67)	0.326***	(3.81)	0.367***	(3.70)	0.367***	(3.39)
LP_first	-0.584***	(-13.89)	-0.575***	(-12.37)	-0.640***	(-13.29)	-0.650***	(-11.55)
LP_follower	-0.225***	(-2.93)	-0.236***	(-2.82)	-0.366***	(-4.35)	-0.404***	(-4.12)
<i>Legal environment-related variables</i>								
Fine_guidelines_06	-0.539***	(-6.79)	-0.545***	(-6.69)	-0.697***	(-7.71)	-0.719***	(-7.52)
Leniency_notice_02	-0.100	(-0.97)	-0.112	(-0.98)	-0.0919	(-0.59)	-0.0835	(-0.43)
UK	-0.246***	(-4.03)	-0.249***	(-3.92)	-0.268***	(-2.86)	-0.276***	(-2.63)
US	0.0241	(0.26)	0.0236	(0.23)	0.184	(1.35)	0.190	(1.25)
<i>N</i>	467		467		272		272	
<i>Pseudo R²</i>	0.3373		0.3352		0.5114		0.5074	

Marginal effects; *t* statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Turning from the legal environment to *group-related variables*, none of the two variables (*No_firms*, *No_countries*) included in all estimations show a significant impact. However, applying the Probit model to the smaller sample (column 3 in Table 2) of firm groups for which two further variables are available (*No_employees*, *Liquidratio*) reveal that both additional variables significantly influence the probability to file an appeal. Contradictory to our hypothesis derived in Section 3 above, the number of employees is found to have a significantly negative effect on the probability to file an appeal; i.e., larger firms have a reduced incentive to appeal against a cartel decision by the EC. Possible explanations can be seen either in the desire of the respective larger firms to end the case (and with it the negative publicity for the firm as well as the resource-intensive internal investigation period) or the simple fact that larger firms have better possibilities to cope with (even larger) fines. The second key variable – the liquid ratio as measure of a group’s financial performance – however, shows the expected significantly negative effect, confirming our hypothesis that firms in financial trouble have a higher probability to file an appeal – possibly for the tactical reason of delaying fine payments – than firms in better financial condition.

Comparing the remaining variables that are included in both estimations (i.e., full sample and sub-sample), Table 2 reveals that with the exception of one variable (*Mitig_circ*) all significant variables in the full sample estimation turn out to be significant (and have the same direction) in the sub-sample estimation. Furthermore, a comparison of the results of the Probit and Logit estimations also show identical significance and direction characteristics leaving only the size of the coefficients differing marginally. We can therefore conclude that our results are not driven by the underlying functional form of the discrete choice models thereby supporting their robustness.

5.3.2. Stage 2: Assessing the characteristics of successful appellants

The second stage of our empirical analysis focuses on the determinants of successful appeals in connection to the level of success. Guided by the description of both our explanatory variables and the empirical model above, we receive the following results for the two groups of key variables (referring to the results of the superior two-stage hurdle model only). Starting with the *variables affecting the appellant’s success probability in connection to the level of success*, we find that, first, the number of different reasons raised by a group in an appeal has – as expected – a highly significant positive effect on the probability of a successful appeal; however, the number of reasons raised does not influence the size of the fine reduction granted. Second, we find that an increasing number of leniency applicants significantly reduce

the probability of a successful appeal thereby confirming our hypothesis derived above. Interestingly, however, if the appeal is found to be nevertheless successful, the number of leniency applicants has a positive effect on the level of fine reduction granted (suggesting that if an error occurs it is of severer nature thereby justifying larger fine reductions). Third, in terms of second-stage appeals, the respective coefficients reported in Table 3 reveal that the probability for a successful appeal increases substantially if the EC appealed against the first-stage appellate court decision while the corresponding probability decreases if the firm appealed the GC decision thereby supporting our hypothesis derived above.

Fourth, with respect to the time span between cartel breakdown and beginning of investigation our results show that the probability of a successful appeal is reduced with an increase in the period until detection. This result stands in contradiction to our hypothesis derived above arguing that such older cases are more difficult to handle by the EC and consequently leave more room for a successful appeal.

Turning to the *variables affecting the appellant's level of success only*, Table 3 reveals that, first, firm groups that demand a fine annulment receive larger fine discounts than firm groups that only appeal for a fine reduction supporting our hypothesis that the former case type is likely to have more substance. Second, our estimation results also provide strong support for our hypothesis that the higher the final fine, the larger the absolute fine reduction as part of an appeals process. Third, we also find strong support for both ringleaders and repeat offenders receiving larger fine reductions than firms without those two characteristics. This finding contradicts with our hypothesis derived above, however, may be explained – at least for repeat offenders – by the presence of insider knowledge that allows the realization of larger fine reductions.¹⁶ Alternatively, the EC may have decided to impose very large fines for both ringleaders and repeat offenders (for deterrence purposes) which were later found to be incompatible with EC competition law by the appellate court (and consistently reduced substantially). Last but not least, the different appeal success reasons show partly diverging results. While all coefficients are found to be significant, only the presence of ‘substantive reasons’ is found to result in a higher level of the fine reduction (relative to the reference group ‘error in the calculation of the basic amount of the fine’) while the remaining three reasons (error in the application of leniency notice, error in the fine calculation process, or multiple reasons) result in (comparably small but) lower fine reductions compared to the reference group.

¹⁶ Please note that a higher final fine for both ringleaders and repeat offenders (due to the presence of aggravating factors) cannot explain the size and significance of the two coefficients as we separately control for the size of the final fine.

Table 3: Estimation results for models stages 2a and 2b

	Hurdle model (stage 2a)		Hurdle model (stage 2b)		Tobit model		Tobit model	
	$\partial P(\text{Discount} > 0 \mathbf{x}_1) / \partial x_j$		$\partial E(\text{Discount} \text{Discount} > 0, \mathbf{x}_2) / \partial x_j$		$\partial P(\text{Discount} > 0 \mathbf{x}) / \partial x_j$		$\partial E(\text{Discount} \text{Discount} > 0, \mathbf{x}) / \partial x_j$	
No_pleas	0.0399***	(3.38)	-0.0177	(-0.10)	0.0249**	(2.06)	0.5297*	(1.95)
No_appellants	0.0666	(1.45)	-0.2750	(-0.51)	-0.0028	(-0.08)	-0.0598	(-0.08)
No_leniency_applicants	-0.0656*	(-1.76)	0.993**	(2.29)	-0.0232	(-0.49)	-0.4925	(-0.5)
Twostages_ec	0.546***	(10.18)			0.071	(0.47)	1.5525	(0.46)
Twostages_firmgroup	-0.133*	(-1.72)			-0.1663***	(-2.6)	-3.5295**	(-2.43)
Duration_investigation	0.00192	(1.02)			0.002	(1.26)	0.0425	(1.2)
Duration_detection	-0.00413*	(-1.68)			-0.0066***	(-2.88)	-0.1396***	(-2.85)
Fine_guidelines_06	-0.0969	(-0.77)	1.8370	(0.75)	0.1335	(0.91)	2.9831	(0.82)
Leniency_notice_02	-0.145	(-1.57)	0.8760	(0.52)	-0.1067	(-1.29)	-2.2578	(-1.28)
Fine_anulment			4.945***	(3.59)	0.1048	(0.89)	2.1648	(0.91)
Final_fine			0.0627***	(4.89)	0.005***	(5.13)	0.1057***	(5.92)
Ringleader			6.269**	(2.16)	-0.0342	(-0.3)	-0.7189	(-0.3)
Repeat_offender			4.533**	(2.04)	0.0031	(0.03)	0.0650	(0.03)
Succ_subst			8.621*	(1.83)				
Succ_lp			-2.459*	(-1.80)				
Succ_fineother			-3.924***	(-3.19)				
Succ_multiple			-2.646*	(-1.75)				
<i>N</i>	234		109		234		234	

Marginal effects; *z* statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Before we turn to a discussion of several implications of our entire empirical analysis and results for public policy makers, it is important from a *methodological perspective* to point to especially two advantages of the two-stage hurdle model compared to the Tobit model. First, as shown by the ‘number of leniency applicants’ variable, the hurdle model allows for differences in the sign of coefficients between both stages while the simple Tobit model is unable to take these important differences into account. Second, a direct comparison of the results of the hurdle model with the Tobit model reveals substantial differences in the sign, the size and the significance of the coefficients. Last but not least, Green (2003) proposes to test the hurdle model against the Tobit model by using the log-likelihood values of the Tobit, the Probit and the truncated regressions. Applying this test to our data clearly prefers the hurdle model over the Tobit model.

5.4. Implications for firms and public policy makers

Based on the description of our empirical results in the preceding section, we will now turn to a discussion of implications for both firms and public policy makers. Instead of providing a full assessment addressing all (significant) variables on the two stages of the empirical model, we will rather concentrate on a more detailed discussion of several important topical areas.

Assuming that a firm as rational decision maker decides to file an appeal as long as the net present value of the investment is positive, the question is posed how our empirical results help in conducting the necessary assessment of both the probability of success and the level of success (i.e., the level of fine reduction granted). With respect to the former, we find that firms can positively influence the probability of success by increasing the number of reasons for appeal raised (and substantiated) in the official documents. Furthermore, our empirical results also help in identifying situations in which the probability of a successful appeal is significantly reduced. This is especially the case with an increasing number of leniency applicants (within a certain cartel case) and after the EC has won the first-stage appellate court trial with the GC.

In terms of drivers of the level of success of an appeal, our results suggest that, first, the level of success depends on the type(s) of reason(s) accepted by the court to justify the appeal. In particular, we find that ‘substantive reasons’ and ‘errors in the calculation of the basic amount of the fine’ lead to the largest fine reductions while all other reasons and especially the assertion of multiple reasons are less successful. Second, our results suggest that both ringleaders and repeat offenders are encouraged to initiate appeals as they can expect – if successful – larger fine reductions. Third, when filing an appeal, firms are well advised to

demand a fine annulment as this characteristic is likely to increase the level of fine reduction later on. Last but not least, our empirical results also suggest that the level of success increases with the size of the final fine imposed by the EC or GC (making an appeal increasingly attractive).

Turning to the implications of our results for public policy makers, we can, first, say that our finding of a significantly reduced probability to file an appeal after the introduction of the EC Guidelines on the Method of Setting Fines in 2006 is consistent with the hypothesis that this clarification of the respective rules and regulations increased the transparency of EC fining decisions and correspondingly reduced the desire of firms to initiate (eventually unjustified and costly) appeals. As a consequence, it appears likely that further increases in transparency have the potential to further improve the efficiency of the appeals process. This may especially be the case for a clarification of the role of mitigating circumstances (as our empirical analysis revealed that firms decide to file an appeal with a higher probability as soon as mitigating circumstances play a role).

Second, our result that firms that decided to participate in the EC leniency program had a significantly lower probability to file an appeal suggests that such forms of cooperation between the authority and the respective firms increase the mutual understanding of the positions of both sides and therefore leads to a significant reduction in the number of (unnecessary and therefore inefficient) appeals. As the effect is found to be much stronger for the first reporting firm compared to the runner-up reporting firms – basically because only the first reporting firm is likely to receive a fine waiver – possible reforms could think about ways to further increase the number of firms that participate in the EC leniency program thereby reducing the number of unnecessary appeals further. However, it is important in this respect to remind that large fines for breaches of the anti-cartel laws are important for the creation of a (sufficiently large) deterrence effect. In other words, while larger fine reductions for (more) runner-up firms are likely to reduce the number of appeals further, the societal costs created by the corresponding weakening of the deterrence effect (due to the lower expected fine payments) may be substantial (possibly overcompensating the savings in the appeals process).

Third, our finding that firms in financial trouble are more likely to file an appeal suggests that tactical reasons – rather than the true belief that the respective EC decision was erroneous – may motivate the filing of appeals. Although such cases are likely to reduce efficiency, the apparent difficulty to clearly differentiate (*ex-ante*) between legitimate claims and frivolous claims suggests that it may be in the interest of society to accept a certain amount of (inefficient) frivolous claims rather than to take the risk of discouraging firms with legitimate

reasons to file an appeal. However, if it is found – e.g., after the establishment of private antitrust enforcement in Europe in the coming years – that the number of appeals is increasing substantially, additional measures to reduce the number of potentially frivolous appeals may become desirable. In this respect, it would not even be necessary to implement changes in the appeals process as such but rather to change the incentives of firms to file an appeal for tactical reasons only. In particular, if interest has to be paid from the time of the occurrence of the loss (as currently the case, e.g., in the UK and Germany) rather than the final decision in the public investigation of the cartel case (as currently the case, e.g., in France), the incentives to file appeals only for the sake of postponing damages payments would be reduced substantially.

Last but not least, our results also reveal that both repeat offenders and ringleaders not only have elevated incentives to initiate an appeal but also receive larger fine discounts if their appeal turns out to be successful. Given the fact that both characteristics are clearly negative and the EC consequently has announced (and implemented) a very strict enforcement policy against such firms, on the surface, it appears questionable why the appellate courts subsequently reduce the fines imposed substantially (thereby weakening the deterrence effect). However, given that the appellate courts are committed to review the case with respect to the correct application of existing laws and regulations, it appears likely that the large (and further elevated) fines imposed by the EC for both ringleaders and repeat offenders were incompatible with EC competition law and therefore had to be reduced by the appellate court(s). As a consequence, our results suggest a revision of the definition and role of aggravating factors (including especially ringleaders and repeat offenders) as part of the fine calculation process in order to allow a severer punishment of firms with those characteristics thereby strengthening both the efficiency of the appeals process and the deterrence effect of anti-cartel law enforcement.

6. Conclusion

The appeals process is an important mechanism to correct erroneous decisions and to improve existing laws and regulations. Although the law and economics literature often relates appeals processes to decisions by lower courts reassessed by higher courts, the mechanism as such plays a much wider role as indispensable part of decision making processes in various types of organizations such religious bodies, commercial trade organizations or professional sports leagues. In fact, the long-lasting existence of all these organizations is closely tied to convincing answers to the question how disputes are handled and resolved – with workable

appeals processes regularly representing an important cornerstone in the overarching organizational and governance structures.

Although a suitable design of appeals processes is an important precondition for achieving their intended goals, the consistent implementation of the respective concepts into practice is of at least equal importance. Even the most advanced theoretical ideas and concepts on the design of appeals processes remain meaningless ‘paper tigers’ if they are not implemented (or implementable) in an effective and efficient fashion considering, e.g., the availability of sufficient financial resources in general or the appointment of experienced and reputable officials who are entrusted with the power to act as decision makers in particular. As a consequence, an overarching and sustainable design and implementation of appeals processes is committed to combine elaborate theoretical thinking with empirical studies that aim at investigating, e.g., key characteristics of (successful) appellants resulting not only in conclusions on the workability and efficiency of certain implemented appeals processes but also allowing to develop options for further improvement.

Against this background, we use data of 467 firm groups that participated in 88 cartels convicted by the European Commission between 2000 and 2012 to study both the characteristics of firm groups filing an appeal and the factors that determine their successfulness in terms of fine reduction. Applying discrete choice models and a two-stage hurdle model, we find that while some characteristics – such as the size and financial condition of the firm group or the clarity of fine guidelines – only affect the probability to file an appeal, other factors such as the size of the fine imposed in connection to characteristics as ringleader, repeat offender or leniency applicant influence both the probability and the success of an appeal.

Based on our empirical results, we are able to derive several important conclusions for both firms and public policy makers. From a firm perspective, our results not only suggest that firms can positively influence the probability of success by increasing the number of reasons for appeal but also allowed the conclusion that the probability of success is reduced with an increasing number of leniency applicants and after the EC has won the first-stage appellate court trial. Furthermore, the level of success is found to be influenced by, e.g., the type(s) of reason(s) accepted by the courts to justify the appeal or the characteristic as either ringleader or repeat offender. Generally, the consideration of all these different drivers supports firms in an overarching assessment of the expected gains and losses of filing an appeal and therefore facilitate a rational decision whether to invest into such a project or not.

From a public policy perspective, our results suggest that an increase in the transparency of administrative or judicial decisions – through a publication of clear guidelines – can reduce the number of unnecessary and inefficient appeals substantially. A similar effect can be expected if certain forms of cooperation between a public authority and the respective firms are implemented (e.g., through a leniency program) that promote the mutual understanding of the position of the other side (and include some commitment to reduce the imminent fine). Furthermore, although we only find limited support for the current existence of frivolous appeals, i.e., appeals that are filed for tactical purposes only, the rising importance of private enforcement in Europe demands regular reassessments of the situation in order to avoid possible decreases in the efficiency of the appeals process through an increased proportion of inefficient tactical appeals (to, e.g., postpone damages payment into the distant future). Last but not least, a consequent implementation of the deterrence approach in European competition law demands that both ringleaders and repeat offenders are punished more severely than other cartel members or first-time offenders. In this respect, our finding that European appellate courts had to grant higher fine reductions to both groups appears counterproductive and suggests a revision of the definition and role of aggravating factors (including especially ringleaders and repeat offenders) as part of the fine calculation process.

Our empirical results together with the derived policy implications suggest several avenues for future research. One interesting area in this respect is field studies within both appellate courts and firms. While the aim of the former type of field study would be to learn more about the practical side of the appeals process with its various challenges and constraints, field studies within firms would especially allow to acquire a deeper understanding of the true motivations behind the decision to file an appeal (reaching from the true belief that the decision of the EC was erroneous via an attempt to receive some degree of fine reduction up to the filing of frivolous appeals). Both types of studies are likely to subsequently allow the inclusion of further variables (possibly) reaching an even better explanatory value of an empirical analysis.

Another fruitful area of future research is international comparisons of differently structured – but topic-wise similar – appeals processes. Although it is obvious that legislative (and related) differences across countries will complicate such an endeavor, benchmarking exercises would still enable efficiency comparisons and would therefore allow basing policy conclusions on more robust foundations. A third and last promising area of future research is to complement our study of one specific appeals process with comparable studies focusing on different appeals processes in other areas of law (or within organizations). Given the fact that

the theoretical literature has identified an ample number of different options to structure appeals processes (all with specific advantages and disadvantages), further empirical studies would certainly help to understand their corresponding effects after being implemented in practice – and would subsequently facilitate constant improvements of the workability and efficiency of existing appeals processes thereby creating substantial additional benefits for society.

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Annex

Table 4: Variables in the data set

Variable	Description
<i>Appeals-related variables</i>	
Appeal	=1 if group brought an appeal against the EC decision before the GC
Appeal_success	=1 if group received a fine reduction due to appeal
No_pleas	Number of pleas put forward in the appeal
No_appellants	Number of appellants within group
Duration_decision	Duration of appeal decision, in months
Discount	Discount granted due to appeal
Fine_annulment	=1 if group strived for an annulment of the fine rather than for a fine reduction
Twostage_ec	=1 if the appeal decision is challenged by the EC before the ECJ
Twostage_firmgroup	=1 if the appeal decision is challenged by the group before the ECJ
<i>Group-related variables</i>	
No_firms	Number of firms within group
No_countries	Number of different countries within group
No_len_applicants	Number of leniency applicants within group
No_employees	Number of employees of group, in thousands
Liquidratio	Liquid ratio (=liquid assets/short-term liabilities) in the year of the EC decision
<i>Fine-related variables</i>	
Aggrav_circum	=1 if aggravating circumstances were taken into account in the EC decision
Mitig_circum	=1 if mitigating circumstances were taken into account in the EC decision
Duration_participation	Duration of cartel participation by the group, in months
Final_Fine	Final fine imposed by the EC
Ringleader	=1 if group was ringleader in the cartel
Repeat_offender	=1 if group is a repeat offender
LP_first	=1 if group successfully applied for leniency and was the first applicant
LP_follower	=1 if group successfully applied for leniency and was not the first applicant
<i>Legal environment-related variables</i>	
Fine_guidelines_06	=1 if the EC Guidelines on the Method for Setting Fines from 2006 were applied
Leniency_notice_02	=1 if the EC Leniency Notice from 2002 was applied
UK	=1 if group is located in the UK
US	=1 if group is located in the US
<i>Appeal success reasons</i>	
Succ_lp	=1 if GC/ECJ accepted appeal due to an error in the application of the leniency notice
Succ_basefine	=1 if GC/ECJ accepted appeal due to an error in the calculation of the basic amount of the fine
Succ_fine_other	=1 if GC/ECJ accepted appeal due to an error in the fine calculation process after basic amount of the fine was set
Succ_subst	=1 if GC/ECJ accepted appeal due to substantive reasons
Succ_multiple	=1 if GC/ECJ accepted appeal due to several reasons
<i>Other variables</i>	
Duration_investigation	Time span between begin and end of investigation by the EC, in months
Duration_detection	Time span between cartel breakdown and begin of investigation, in months