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Settlements and Appeals in the European Commission's Cartel Cases: An Empirical Assessment

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Abstract The introduction of the European Union (EU) Settlement Procedure in 2008 aimed at promoting the speed and efficiency of cartel investigations by the European Commission (EC). We use a data set that consists of 575 firm groups that were convicted by the EC for cartelization from 2000 to 2015 to investigate the impact of the settlement procedure on the probability to file an appeal. Based on the estimation of a model of a firm's decision to appeal in the pre-settlement era, we subsequently run out-of-sample predictions to estimate the number of hypothetical appeals cases in the settlement era absent the settlement procedure. Comparing these estimates with the actual number of appeals, we find a settlement-induced reduction in the number of appeals of about 53%.

Keywords Antitrust policy · Cartels · Settlements · Appeals · Ex-post evaluation · European Union

JEL Classification K21 · L41

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1 Introduction

In the United States, the interplay between settlements and appeals has long been of interest for both lawyers and economists. Guided by the seminal contribution of Priest and Klein (1984), both theoretical and empirical economic research centered around the question when legal cases go to trial and when they settle—with a particular focus on *private* law enforcement.

In such an environment, the relationship between settlements and appeals is straightforward: either a case is settled—thus leaving no basis for an appeal—or the case goes to trial, which offers the possibility to bring an appeal subsequent to an unfavorable court decision. Thus, ceteris paribus, an increase in the relative importance of settlements is expected to translate into a decreasing relevance of the appeals process.

In the European Union, the settlement procedure in cartel cases was introduced in June 2008 as part of *public* cartel enforcement: it enables the EC to close investigations faster by eliminating or reducing several procedural steps that are required under the standard procedure such as (for example): granting full access to file (requiring prior redacting and translation efforts); conducting oral hearings; as well as drafting detailed decisions. Parties that admit liability and waive these procedural rights receive a discount of 10% on the final fine that is imposed; *however, they keep the right subsequently to appeal the Commission's fining decision*.

Although the key aim of the introduction of the settlement procedure was the faster and more efficient handling of cartel investigations by the EC, one potential knock-on effect is of particular interest for both academics and practitioners: the impact of the introduction of the settlement procedure on the number of appeals against Commission's decisions in cartel cases. Although a clearly negative relationship between the number of settled cases and the number of appeals is still expected, the question of the extent of this reduction is interesting from at least three different perspectives.

First, in contrast to the United States, appeals against settled EC decisions are still possible, and an impact assessment therefore allows conclusions about the workability of the settlement procedure. Second, the degree of savings that are reached by avoiding lengthy appeals processes allows insights as to the amount of freed enforcement resources and the related increase in the deterrence effect of competition law. Third, from a practical perspective, insights as to the size of the reduction in the number of appeals cases is important for legal and economic consulting practices as they imply a need for resource reallocations.

In this context, we use a data set that consists of 575 firm groups[1] that were convicted by the EC for cartelization from 2000 to 2015 to investigate the impact of the settlement procedure on the probability to file an appeal. Based on the estimation of a model of a firm's decision to appeal in the pre-settlement era, we subsequently run out-of-sample predictions to estimate the number of hypothetical appeals cases that would have otherwise occurred in the settlement era in the absence of the

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

settlement procedure. Comparing these estimates with the actual number of appeals, we find a settlement-induced reduction in the number of appeals of about 53%.

The remainder of the article is structured as follows: the subsequent Sect. 2 provides a review of theoretical and empirical research with direct links to our research question, followed by a detailed description of the implementation of settlements and appeals in the EU cartel enforcement process in Sect. 3. Section 4 presents our empirical analysis and results, before Sect. 5 concludes the article with a summary of its major insights and a discussion of the main welfare implications.

2 Review of Related Literature

In this section, we provide a review of theoretical and empirical research with direct links to our research question. While Sect. 2.1 gives an overview of the literature on settlements, Sect. 2.2 discusses seminal contributions in the field of appeals.

2.1 Settlements

In many jurisdictions, a significant share of legal disputes are not investigated and decided in court but solved "in the shadow of the law" (Cooter and Ulen 2000, p. 398) through bargaining as part of settlement procedures. Although the expectations of a possible trial outcome are likely to affect the process (and outcome) of a settlement, all parties can often benefit through various cost savings such as legal fees, trial costs, or the opportunity costs of time that are associated with a trial (see, e.g., Landes 1971; or Adelstein 1978).

The relevance of settlement procedures in modern law systems led to a substantial amount of general law and economics research with a particular focus on the determinants of private decisions as to whether or not (and when) to settle (see, e.g., Landes 1971; Posner 1973; Baxter 1980; and particularly Priest and Klein 1984), as well as their social implications in general (see, e.g., Shavell 1982; or Cooter and Rubinfeld 1989) and their (negative) impact on deterrence in particular (see, e.g., Miceli 1996; La Casse and Payne 1999).

With respect to settlements in antitrust cases, Rubinfeld (2015) provides an excellent overview of the theoretical and empirical literature. Differentiating between settlements in private litigation and as part of public enforcement (in the form of plea bargaining), he leaves no doubt that the large majority of existing papers concentrates on the former, with a particular focus on the United States.

From a theoretical perspective, the general settlement/trial decision literature suggests that settlement decisions depend on a multitude of factors that include: the available savings in litigation costs; the risk aversion of the involved parties; the perceived likelihood of success; or the reputational effects of external benefits that flow from the case (see Rubinfeld 2015). Furthermore, as shown by Perloff and Rubinfeld (1988), the incentives to settle can be influenced by the existing legal rules—and may gain further in complexity in cases that follow-on government suits (see also Briggs et al. 1996).

From an empirical perspective, several contributions—assessing settlement probabilities by applying stochastic models of settlement behavior in private litigation—are particularly worth mentioning (see, e.g., Fournier and Zuehlke 1989; Perloff et al. 1996). In the context of antitrust litigation, Perloff et al. (1996) use a jointly estimated model of settlement and trial outcome to investigate the role of risk aversion in explaining the settlement/trial decision. They find that the likelihood of a plaintiff's success especially depends on: the jurisdiction; the antitrust allegation; firm size; the industry; and whether or not a jury trial occurs. Furthermore, while reputation effects do not play an important role in the decision to settle, risk aversion is found to have such a decisive influence.

Although the main insights of the general (antitrust) literature on the settlement procedure—especially the identified general costs and benefits mentioned above—stay relevant when the perspective is narrowed to settlements in EC cartel cases, Ascione and Motta (2008) correctly point to the following three important legal differences: first, while the general literature typically refers to private contracts that are used to avoid going to court, settlements in cartel cases are used during the EC public enforcement process (and are not an instrument to avoid an official investigation and decision).

Second, while standard settlements typically take place between private actors, in EC cartel cases the settlements refer to the relationship of the EC and the respective companies. Third, standard settlement cases are typically characterized by a large amount of uncertainty (e.g., with respect to the liability of the defendant) while the only uncertainty in EC cartel cases is related to the amount of the fine (as the infringement has already been established). A more detailed overview of the EU Settlement Procedure in cartel cases is provided in Sect. 3.2 below.

2.2 Appeals

As any decision by either a court or a public authority is made under uncertainty, it is considered a constitutional right of the losing party to seek a reconsideration of their arguments as part of an appeals (or judicial review) process. Without aiming at providing a comprehensive survey of the literature, from a theoretical perspective the implementation of an appeals process is motivated by two main goals (see generally Shavell 1995, Shavell 2006, Shavell 2010; Daughety and Reinganum 2000; Levy 2005; or Chopard et al. 2014).

First, the implementation of an appeals process aims at reducing the occurrence of legal errors (e.g., as parties are more likely to file an appeal if the first decision was erroneous or by providing incentives to lower court judges to avoid erroneous decisions). Second, appeals help to refine existing laws and regulations (e.g., by reassessments of experienced appellate courts but also by providing signals to lawmakers on the efficiency of existing laws and regulations).

Compared to the large body of theoretical literature, the number of empirical contributions on the appeals process appears small and particularly focuses on investigations of either appeal rates—in combination with the decision to file an appeal—or the determinants of the success of appeals. In an early contribution, Eisenberg (2004) investigates the appeal rates (and outcomes) of U.S. federal court

cases filed from 1987 to 1996 and finds that about 20% of cases with definitive trial court judgments generate appeals. However, appeal rates show substantial variation across major case categories and by party status as plaintiff or defendant.[2]

Eisenberg and Farber (1997, 2013) are particularly interested in providing answers to the question of why plaintiffs lose appeals: applying statistical models that combine win rates at trial, appeals rates, and success rates on appeal, they find evidence consistent with the hypothesis that the lower plaintiff success rate on appeal is due to plaintiffs' pursuance of lawsuits in which they should win on the merits less than half the time. Interestingly, Eisenberg and Farber (2013) find no evidence that success on appeal is attributable either to trial courts' favoring plaintiffs or to higher rates of appeal by losing plaintiffs.

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 venture 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 larger number of judges are more likely to result in a complete annulment. In addition, Günster et al. (2010) show that the probability of filing an appeal is significantly influenced by the length of the EC decision, the number of accepted complaints, the number of judges, and whether the case is grouped into one case or not.[3]

Most recently, Hüschelrath and Smuda (2016) use the data of 467 firm groups that participated in 88 cartels that were convicted by the EC between 2000 and 2012 to study both the characteristics of firm groups that filed an appeal and the factors that determine their success in terms of fine reduction. Applying a discrete-choice and a two-stage hurdle model, they find that while some characteristics—particularly the reform of the fine guidelines—only affect the probability of filing an appeal, other factors, such as the size of the fine imposed—in connection with characteristics such as ringleader, repeat offender, or leniency applicant—influence both the probability and the success of an appeal.

3 Settlements and Appeals in the EU Cartel Enforcement Process

In this section, we provide a detailed description of the implementation of settlements and appeals as part of the EU cartel enforcement process. While Sect. 3.1 provides the basics in the form of a brief general overview of the EU cartel enforcement process, Sect. 3.2 characterizes the settlement procedure as part of the investigation process of the EC. Section 3.3 closes the third section with a

[2] In a more recent study, Eisenberg and Heise (2015) investigate a similar research question for a large sample of U.S. state court cases that were filed from 2005 to 2009 and find that appellate reversal rates for jury trials and defendant appeals exceed reversal rates for bench trials and plaintiff appeals.

[3] In a related article, Carree et al. (2010) empirically investigate the determinants of appeals of EC decisions on the case and firm levels with the use of a similar data set. 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. Furthermore, Harding and Gibbs (2005) provide a qualitative assessment of EU cartel appeals from 1995 to 2004.

discussion of the impact of the introduction of the settlement procedure on the appeals process as well as some (supporting) descriptive evidence.

3.1 Brief Overview of the EU Cartel Enforcement Process

Article 101 of the Treaty for the Functioning of the European Union (TFEU) prohibits agreements between companies that prevent, restrict, or distort competition in the EU and that may affect trade between Member States. Limiting our overview of the respective EU enforcement process to horizontal (hard-core) cartel agreements, it can broadly be subdivided further into: first, the investigation of and decision on a possible infringement by the EC; and second, the initiation of an (optional) appeals process against the EC cartel decision by the convicted parties.

3.1.1 Investigation and Decision by the European Commission

In general, the cartel enforcement process within the EC can be subdivided further into six subsequent stages (see, e.g., Laina and Laurinen 2013; and Bellis 2014b): (1) initial information gathering; (2) preliminary proceedings; (3) case proceedings; (4) statement of objections; (5) oral hearings; and (6) decision.

As cartel members are typically aware of the fact that cartel agreements are illegal, they keep them in secrecy, and *initial information gathering* therefore becomes the most crucial step in the enforcement activities of the EC. While a complaint by a competitor, a customer, another agency, or a (former) employee used to be the dominant way to initiate cartel investigations in the EU, the leniency program gained tremendously in importance as a case generator for the EC since its introduction in 1996.

Subsequent to the initial gathering of information on an alleged cartel infringement, the EC can decide to open *preliminary proceedings* as part of which it can use certain investigative powers such as, e.g., dawn raids or other information requests to be able to assess whether the rules laid down in Article 101 TFEU have been breached. At the end of the preliminary proceedings, the EC has to make a decision whether the collected material appears sufficient to initiate *case proceedings*—and therefore an in-depth investigation—or alternatively to close the investigation (see EC 2013).

In case an in-depth investigation is commenced and results in the confirmation of the EC's initial concerns, the EC furnishes a *statement of objections* (SO) in which it—based on the collected pieces of evidence—informs the respective firms in writing of the objections that have been raised against them. According to Laina and Laurinen (2013), this time-consuming process regularly leads to SO's with a size of several hundreds of pages (which may additionally have to be translated into different languages).

After the submission of the SO to the accused firms, they have certain rights to defense such as 'access to the file': they are allowed to see all non-confidential pieces of evidence that have been collected by the EC during its investigation, which implies a time-consuming screening process by the EC beforehand to separate confidential from non-confidential pieces of evidence. Subsequently, the parties have the right to reply to the SO in writing and to request an *oral hearing* with an independent hearing officer (see EC 2013).

After reconsidering its own analysis and results in light of the feedback of the accused firms, the EC may decide to abandon part of its initial objections, or even to close the case. If the EC's concerns are not fully dispelled, it drafts a decision that prohibits the respective infringement and sets the respective fines.[4] The draft *decision* is then submitted to the Advisory Committee—composed of representatives of the Member States' competition authorities—for a final check before the decision is adopted by the College of Commissioners.

3.1.2 The Appeals Process Against Decisions by the European Commission

Subsequent to a fining decision by the EC, the respective firms have the right of appeal. 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 has serious concerns with a (fining) decision of the EC can file an appeal[5] with the General Court (GC) of the European Union (see EC 2013).[6] Generally, the GC not only has the power to annul, reduce, or increase the fines that have been imposed by the EC, but it also has full jurisdiction to review the entire EC decision (including a repetition of the full assessment process).

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: either the convicted firm, the EC itself, or both. The ECJ is the highest European appellate court and has the power to annul, reduce, or increase the fines that have been 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.

3.2 Characterization of the EU Settlement Procedure

The EU Settlement Procedure was introduced in late June 2008 with Regulation 622/2008[7] and an EC Notice[8] on the conduct of settlement procedures. It enables the

[4] In the European Union, cartel fines generally aim at punishment and deterrence thereby reflecting both the gravity and the duration of the infringement. The maximum fine level—which is a function of the percentage of a firm's annual sales of the product that is involved in the infringement, the duration of the infringement, as well as aggravating or mitigating circumstances—is capped at 10% of the overall annual turnover of a firm (see EC 2013).

[5] 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.

[6] See the consolidated version of the Rules of Procedure of the Court of Justice, Official Journal of the EU, C 177/01, 2010, 1–36.

[7] EC Regulation (EC) No 622/2008 of 30 June 2008 amending Regulation (EC) No 773/2004, as regards the conduct of settlement procedures in cartel cases, OJ L 171/3, 1.7.2008. EC Regulation (EC) No 773/2004 of 7 April 2004 relating to the conduct of proceedings by the EC pursuant to Articles 81 and 82 of the EC Treaty (OJ L 123/18, 27.4.2004) lays down the rules that concern the participation of the parties that are involved in such proceedings.

[8] EC Notice on the conduct of settlement procedures in view of the adoption of decisions pursuant to Article 7 and Article 23 of Council Regulation (EC) No 1/2003 in cartel cases (2008/C 167/01), OJ C 167/1, 2.7.2008.

EC to close investigations faster by eliminating or reducing several (final) procedural steps that are required under the standard procedure that was just described.[9] Parties that admit liability and waive these procedural rights receive a discount of 10% on the final fine that is imposed. Through the introduction of the settlement notice, the EU aims at enabling "… the EC to handle faster and more efficiently cartel cases …"[10] thus freeing up resources for additional cases and strengthening the deterrence effect of cartel enforcement.

3.2.1 Main Steps of the Settlement Procedure

Although it is beyond the scope of this article to present a detailed characterization of the separate steps of the EU Settlement Procedure,[11] it is important for our subsequent empirical analysis to characterize briefly its impact on the EC cartel enforcement process. Based on the standard subdivision of the entire process into the six steps that were discussed in the previous section, the settlement procedure is not expected to have any direct impact on the first two stages of the enforcement process: initial information gathering, and preliminary proceedings.

However, as soon as the case proceedings are commenced, the usual enforcement process can partly be replaced and partly be complemented by the settlement process. In particular, the procedural efficiencies are expected to be realized by eliminating or reducing some of the procedural steps that are required under the standard procedure—such as granting full access to the file (which requires prior redacting[12] and translation efforts), conducting oral hearings, as well as drafting detailed decisions—with the major part scheduled to take place after the SO under the standard procedure.[13] In other words, the settlement procedure should be understood as a 'case closure mechanism' rather than as an investigative tool.

From a procedural perspective, it is important to note that only the EC has the right to initiate the settlement procedure—and the involved firms thus can only decide whether to accept the offer or not. Although the official documents are quiet on the criteria for offering a settlement to the members of a cartel, private statements of EC officials (see, e.g., Laina and Laurinen 2013; Laina and Bogdanov 2014) suggest that the EC generally prefers settlements in cases in which all parties are likely to settle: cases with a comparatively small number of firm groups that already cooperated with the EC as part of the leniency program.[14]

[9] See EC Regulation (EC) No 773/2004, OJ L 123/18.

[10] EC Regulation (EC) No 622/2008, OJ L 171/3, p. 1.

[11] See Schinkel (2011) and Hüschelrath and Laitenberger (2017) for economic assessments and Bay (2010), Bellis (2014a, b), Olsen and Jephcott (2010), or Vascott (2013) for practitioner's perspectives on the functioning of the EU Settlement Procedure.

[12] Granting full access to the file usually demands resource-intensive preparation efforts in the form of screening 'tens of thousands of pages of documents' for confidentiality (see Kroes 2008).

[13] Interestingly, Hüschelrath and Laitenberger (2017) find a statistically significant reduction in the overall duration of EC cartel investigations for settled cases.

[14] Furthermore, it appears likely that the presence of recidivists or aggressive ringleaders in a case is likely to reduce the probability of a settlement offer by the EC.

Technically, in the settlement meetings, the EC presents its assessment to the parties and discloses its evidence that has been used to establish potential objections, liability, and fines. The parties subsequently present their views and arguments to the EC and especially discuss the scope of the infringement (i.e., duration and gravity) as well as the value of affected sales; both are key drivers of the level of the fine. Although the EC does not enter any form of bargaining, in practice, these meetings provide possibilities for the companies to influence the EC's views (see, e.g., Bay 2010).[15]

Eventually, the EC and the respective firms either agree on a settlement—leading to a quick final decision and the promised 10% reduction in fines—or they fail to reach such an agreement, in which case the standard procedure is reactivated. Technically, the EC reaches agreements with each of the respective cartel members separately; i.e., it cannot be ruled out that a settlement agreement turns out to be possible for some cartel members but not for others (so-called 'hybrid cases').

3.2.2 Descriptive Evidence on the Use of the Settlement Procedure

Before we turn to a detailed discussion of a possible impact of the settlement procedure on the probability to file an appeal, it adds value to complement the general discussion of the EU Settlement Procedure with some descriptive empirical evidence. In this respect, Fig. 1 below plots the number and types of all cartel cases decided by the EC from 2000 to 2015 (excluding three readopted cases[16]).

As is generally shown in Fig. 1, the number of decided cases varies quite substantially between the years: 2000 (2 cases) and 2001 (10 cases) delineate the spectrum. With respect to settlements, Fig. 1 shows that, between 2010 and 2015, we observe in sum 18 settled cases out of which five cases[17] were so-called hybrid settlements in which typically one of the companies decided to opt out of the settlement procedure (see generally Laina and Bogdanov (2014) for further information).

Furthermore, the first two cases,[18] which settled in 2010, were special in the sense that they were converted into settlement cases relatively late in the

[15] Interestingly, Schinkel (2011) argues that by fixing the settlement discount at 10%, the EC gave away its only hard bargaining point. As the derivation of the final fine is also subject to comparatively soft facts that are derived from information from/about the cartelists, the setting of individual percentage fine reductions could have maintained a much stronger bargaining position for the EC.

[16] In re-adopted cases, the EC reappraises previous decisions. Re-adoptions are mostly reactions to General Court (GC) rulings: e.g., questioning the liability of a particular cartel member. As such re-adopted cases do not add any additional information of value for our research question, including them would lead to an inappropriate duplication of the respective case information and would therefore bias our results. In our observation period, the following re-adopted cases are thus excluded: Gas Insulated Switchgear (Case COMP/39.966); Steel Beams (Case COMP/38.907); and Manufacture of other Organic Basic Chemicals (Case COMP/39.003).

[17] The cases are Animal Feed Phosphates (Case COMP/38.866), Yen Interest Rate Derivatives (Case COMP/39.861), Euro Interest Rate Derivatives (Case COMP/39.914), Steel Abrasives (Case COMP/39.792) and Mushrooms (Case COMP/39.965).

[18] The cases are DRAMs (Case COMP/38.511) and Animal Feed Phosphates (Case COMP/38.866). In our empirical analysis below, we therefore exclude these two cases.

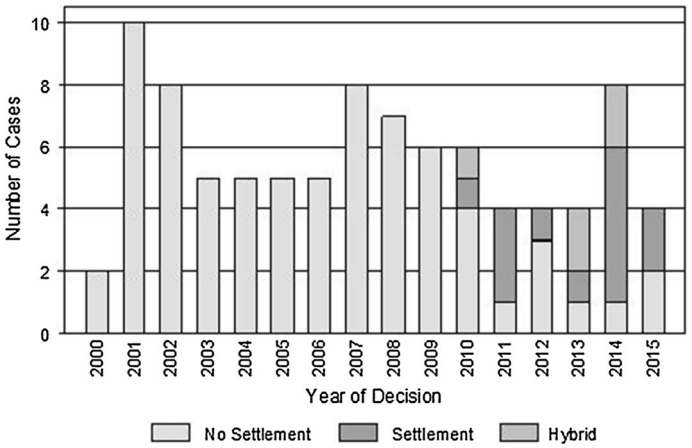

Fig. 1 Number and types of decided EC cartel cases (2000–2015). *Source*: Own figure based on ZEW cartel database

investigation process (see Vascott 2013); this thus raises the question of whether they are suitable cases for an empirical analysis of the settlement procedure. Overall, the fact that 16 out of a total of 24 decided cartel cases since 2011 were (at least partly) settled suggests that the settlement procedure has become an influential cartel enforcement tool.

3.3 The Impact of the Settlement Procedure on the Appeals Process

Although the introduction of the settlement procedure primarily aimed at a faster and more efficient handling of cartel investigations by the EC, both academics and practitioners have identified and discussed several possible indirect impacts of its introduction on various stages of the cartel enforcement process. Examples include: the determination of fines; the operability of the leniency program; the probability and success of appeals; follow-on private enforcement; as well as overall deterrence.

Without wanting to downplay the relevance of any of these potential effects (see Hüschelrath and Laitenberger 2017, for a more detailed discussion), in the following we limit our further assessment to the impact of the settlement procedure on the appeals process. Although not officially stated as an additional aim of the implementation of the EU Settlement Procedure, the EC (at least implicitly) expects a reduced probability and success of appeals against its decisions in the settlement era (see, e.g., Laina and Laurinen 2013).

3.3.1 Initial Descriptive Evidence on the Number and Rate of Appeals

A natural starting point for an investigation of the impact of the settlement procedure on the probability to file an appeal is the provision of some descriptive evidence on the appeals process for cartel cases over time. For example, if no

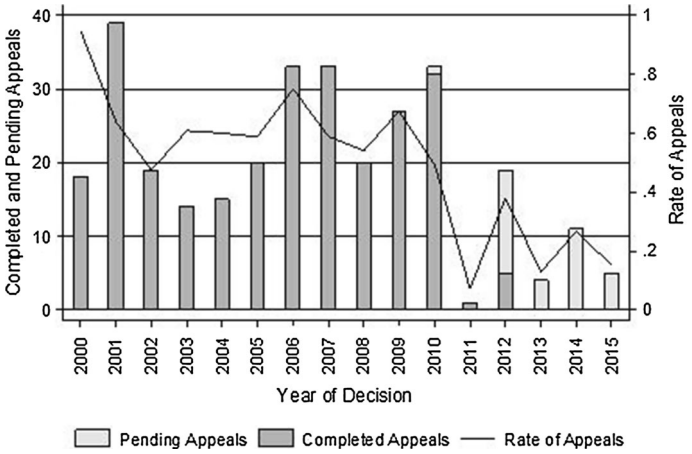

Fig. 2 Number and rate of appeals against EC cartel decisions (2000–2015). *Source*: Own figure based on ZEW cartel database

apparent changes in the number or rate of appeals can be identified in the years after the introduction of the settlement procedure, an isolation of such an effect as part of an econometric approach appears unlikely.

Figure 2 below therefore plots the number and rate of appeals against EC cartel decisions for our observation period from 2000 to 2015.[19] In contrast to Fig. 1 above—which showed how many cases were decided by the EC in the respective years—Fig. 2 plots the number and rate or appeals at the firm group[20] level (as, in each case, different sets of firm groups were involved who later decided—independently of each other—whether to file an appeal or not).

As is revealed by Fig. 2, in the first eleven years of the observation period, the number of appeals vary substantially: 39 appeals (2001) and 14 appeals (2003) delineate the spectrum. However, providing descriptive support for a possible impact of the settlement procedure, the number of appeals recently experienced a substantial drop: while the average number of appeals in the 2000–2010 period is 25, the corresponding average for the 2011–2015 period is found to be substantially lower at only eight appeals (a reduction of about 68%).

In order to take account of the fact that different years show different numbers of decisions (with varying numbers of involved firms) and therefore different general possibilities to file an appeal, Fig. 2 additionally plots the respective shares of firm groups that filed an appeal in the year of the respective EC decision. It is shown that the identified downward trend is confirmed by this alternative measure: while the 2000–2010 period saw an average appeal rate of 63%, the 2011–2015 period witnessed a substantial drop to 20%.

[19] Please note that the respective appeal values correspond to the year in which the original EC decision with respect to the cartel was made; i.e., a case that was decided by the EC in 2001 and finally decided by a European appellate court in 2004 is counted as appeal in the year 2001.

[20] Firms within one group are linked through ownership and are jointly liable for cartel fines.

Although other factors, such as changes in the composition of firms and cases, might have influenced this development—which suggests an econometric analysis that is able to control for such other factors—our initial descriptive findings support our claim that the settlement procedure had a measurable impact on the number of appeals that were brought against EC cartel decisions.

3.3.2 Arguments for an Effect of the Settlement Procedure on the Appeals Process

In an investigation in greater detail as to why settlement procedures might affect the number of appeals, it is important to mention that—although technically EU settlement decisions can still be appealed—various requirements for a successful settlement such as particularly the admission of liability and the reduced access to the file are expected to reduce substantially the probability for a successful appeal. Furthermore, even if such an appeal against a settled case turns out to have some merit, it can be expected that the reduction of the final fine on appeal is smaller than for cases that are decided under the standard procedure (which thus reduces the incentives to file an appeal against a settled case in the first place).

In light of some of the key insights of the existing literature on settlements and appeals—reviewed in Sect. 2 above—into account, the decision of companies to either settle or appeal depends on the expected returns that are generated by the two options. In this respect, the outcome of a settlement is fixed at 10% of the final fine with only the exact level of the final fine being uncertain at the beginning of the settlement process.

The outcome of an appeals process, however, faces a substantially greater amount of uncertainty. On the assumption that companies file appeals solely for substantive and not for strategic reasons—such as achieving delays in (public) fine payments or follow-on (private) enforcement—an examination of the statistics of past appeals cases can provide important insights.

In this respect, Hüschelrath and Smuda (2016) recently find that, in the period from 2000 to 2012, about 50% of 467 firm groups that were fined by the EC decided to appeal to the GC. Out of this sub-sample of 234 firm groups, about 47% were eventually successful in the sense of receiving a reduction of the fine originally imposed by the EC. With an average fine imposed by the EC of about €31 million and an average fine reduction on appeal of about €8.4 million, the expected percentage fine reduction on appeal in the past was about 27% of the final fine that was imposed by the EC (and therefore substantially higher than the 10% discount offered for settling).[21] However, taking the probability of winning an appeal into account reduces the unconditional expected reduction to about 12.7%.

In essence, these findings suggest that the promising appeals cases are still brought (and not settled) as the expected percentage fine reductions on appeal are much higher than for settling the case. Cases with a low appeals success probability,

[21] However, it has to be added that the companies on average waited about 49 months from the beginning of the appeals process to the final decision (either by the GC or the ECJ). See Hüschelrath and Smuda (2016) for further information. As this waiting period generates a substantial amount of additional costs, the benefit of an appeals process is reduced.

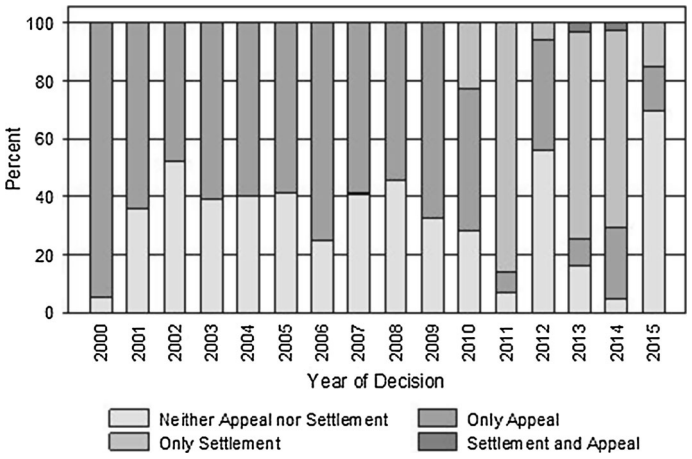

Fig. 3 Shares of settling and appealing firm groups (2000–2015). *Source*: Own figure based on ZEW cartel database

however, can be expected to have a higher probability to be settled simply because the respective companies are better off with the 10% fine discount for settling.

As a consequence, the existence and size of an effect of the introduction of the settlement procedure on the number of appeals will depend: first, on the shares of higher and highest likelihood-of-appeals cases before and after its introduction; and second, more obviously, on the future development of the relative shares of settled cases versus non-settled (or hybrid) cases.

3.3.3 Descriptive Evidence on the Relationship Between Settlements and Appeals

Further descriptive insights on the relationship between settlements and appeals are provided by Fig. 3, which plots the percentage shares of firm groups that for the individual decision years 2000–2015 decided to: (1) neither appeal nor settle; (2) only settle; (3) only appeal; and (4) settle and appeal.

As is shown in Fig. 3, before the introduction of the EU Settlement Procedure in 2010, the share of firm groups that decided to appeal an EC fining decision always exceeded the 50% threshold and reached an average of 63%. However, the picture changes substantially after 2010. With the exceptions of 2012 and 2015, the share of settling (but not appealing) firm groups was much larger than the share of firm groups (fined under the standard procedure) that either decided to appeal or not to do so.

Most interestingly, however, we find that—since the introduction of the EU Settlement Procedure—only two firm groups that decided to settle made the subsequent decision to appeal the respective EC decision.[22] In this respect, we find

[22] In the Euro Interest Rate Derivatives case (Case COMP/39.914), Société Générale became the first settling party to appeal an EU Settlement decision: The bank alleged an error in the assessment of the fine (Case T-98/14, Société Générale versus EC, case brought on 14 February 2014). Subsequently, in the Envelopes case (Case COMP/39.780), Printeos became the second settling firm group that decided to file

clear qualitative evidence for a substantial reduction of the number of appeals for the sub-group of firm groups that decided to settle.

4 Empirical Analysis

In this section, we present our empirical analysis, subdivided further into: a detailed description of the construction of our data set in Sect. 4.1; the development of our empirical strategy in Sect. 4.2; and the presentation and discussion of our estimation results in Sect. 4.3.

4.1 Construction of the Data Set and Descriptive Statistics

The data set that is used in this article contains detailed information on all cartel and cartel appeals cases that were decided by the EC, the GC, and the ECJ between 2000 and 2015. The data on EC cartel cases were collected from decisions and press releases that were published on the EC's online platform[23] in the course of the investigations, while information on the corresponding appeals cases was retrieved from judgment documents that were available at the online platform *CVRIA*.[24]

The data set generally combines case-related, cartel-related, firm group-related, and firm-related information. For our empirical analysis, we use the data at the firm group level—defined as firms within one group that are linked through ownership and are jointly liable for cartel fines—rather than at the firm level, as most variables do not differ between single firms within one group.[25]

As unfortunately not all types of information were available for all firm groups, our sample consists of information on 575 firm groups that participated in 108 cartels (which were dealt with in 85 separate cases by the EC). Table 1 below provides a detailed overview of the names, types, and descriptions of the variables that are used in our analysis; these data are sub-divided further into: legal environment-related variables; firm group-related variables; and cartel-related variables. Subsequently, Table 2 presents the descriptive statistics of our data set.

In addition to the respective descriptive statistics for the entire population of cartel cases that were decided between 2000 and 2015 ('all'), Table 2 provides the corresponding information for two specific subsamples: first, all cases in which the settlement procedure factually could not be applied (the 'pre-settlement era') and all

Footnote 22 continued
an appeal: Printeos alleged that the EC neglected the duty to state reasons (related to an adjustment of the basic amount of the fine) and the principles of equal treatment as well as proportionality and non-discrimination (both related to the determination of the amount of the fine, see Case T-95/15, brought on 20 February 2015).

[23] See http://ec.europa.eu/competition/antitrust/cases/index.html (last accessed on 15 January 2017).

[24] See http://curia.europa.eu (last accessed on 15 January 2017).

[25] Using firm-level data would therefore result in an unjustified multiplication of the sample size, without providing additional information.

Table 1 Variables in the data set. *Sources*: Data on EC decisions obtained from EC case database; data on GC/ECJ decisions obtained from CVRIA database; data on firm size obtained from BvD's Amadeus database and desk research; nominal fines were deflated using the Consumer Price Index for Europe taken from the OECD Main Economic Indicators (MEI) database

Variable	Type	Description
Legal environment-related variables		
settle_notice	Binary	=1 if the EU Settlement Notice was applied
fine_glines_06	Binary	=1 if the EC Guidelines on the Method for Setting Fines (2006) were applied
len_notice	Binary	=1 if the EC Leniency Notice (2002 or 2006) was applied
Firm group-related variables		
g_appeal	Binary	=1 if firm group brought an appeal against the EC decision before the GC
g_settlement	Binary	=1 if firm group settled
g_no_firms	Integer	Number of firms within group (min: 1, max: 13)
g_mitigating	Binary	=1 if mitigating circumstances were taken into account in the EC decision
g_aggravating	Binary	=1 if aggravating circumstances were taken into account in the EC decision
g_dur	Integer	Duration of cartel participation by the firm group, in months (min: 0, max: 347)[a]
g_def_fine_final	Integer	Final fine imposed by the EC, in million €, deflated (base year: 2010), (min: 0, max: 865.6)
g_rep_off	Binary	=1 if firm group is a repeat offender
g_lfirst	Binary	=1 if firm group successfully applied for leniency and was the first applicant
g_lfollower	Binary	=1 if firm group successfully applied for leniency and was not the first applicant
g_sme	Binary	=1 if firm group consists of firms with either an operating revenue of less than €1 million, total assets worth less than €2 million, or less than 15 employees
Cartel-related variables		
c_detect	Binary	=1 if cartel was detected before its end
c_worldwide	Binary	=1 if cartel market is worldwide
c_no_firms	Integer	Number of firms involved in the cartel (min: 2, max: 62)[b]
c_manufacturing	Binary	=1 if cartel was active in the manufacturing sector
c_endusers	Binary	=1 if cartel product was located at the end of the value chain

[a] The low minimum value refers to the French beer cartel (Case COMP/37.750), in which the cartelists aimed at entering into an 'armistice agreement', but never actually implemented it

[b] The high maximum value refers to the Bathroom fittings & fixtures cartel (Case COMP/39.092) which consisted of 62 legal entities that belonged to 17 firm groups

Table 2 Descriptive Statistics—all cases from 2000 to 2015

Variable	All		Pre-settlement era		Pre-settlements era: appellants		Settlement era		Settlement era: settling firms	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Legal environment-related variables										
settle_notice	0.26	(0.44)	0.00	(0.00)	0.00	(0.00)	1.00	(0.00)	1.00	(0.00)
fine_glines_06	0.48	(0.50)	0.30	(0.46)	0.28	(0.45)	1.00	(0.00)	1.00	(0.00)
len_notice_02	0.35	(0.48)	0.47	(0.50)	0.46	(0.50)	0.01	(0.12)	0.00	(0.00)
len_notice_06	0.27	(0.44)	0.01	(0.12)	0.01	(0.11)	0.99	(0.12)	1.00	(0.00)
Firm group-related variables										
g_appeal	0.53	(0.50)	0.63	(0.48)	1.00	(0.00)	0.26	(0.44)	0.02	(0.13)
g_settlement	0.11	(0.31)	0.00	(0.00)	0.00	(0.00)	0.42	(0.49)	1.00	(0.00)
g_no_firms	1.99	(1.44)	1.88	(1.36)	1.98	(1.45)	2.32	(1.61)	2.55	(2.14)
g_dur	77.43	(61.35)	87.62	(64.82)	84.86	(62.84)	48.33	(37.18)	50.53	(36.50)
g_mitigating	0.17	(0.37)	0.18	(0.38)	0.23	(0.42)	0.13	(0.34)	0.13	(0.34)
g_aggravating	0.15	(0.35)	0.19	(0.40)	0.22	(0.41)	0.01	(0.08)	0.00	(0.00)
g_rep_off	0.08	(0.27)	0.11	(0.31)	0.12	(0.32)	0.01	(0.08)	0.00	(0.00)
g_def_fine_final	32.12	(80.43)	32.50	(77.86)	45.20	(92.46)	31.01	(87.64)	36.93	(77.25)
g_lfirst	0.16	(0.37)	0.14	(0.35)	0.03	(0.18)	0.22	(0.42)	0.29	(0.46)
g_lfollower	0.51	(0.50)	0.54	(0.50)	0.59	(0.49)	0.42	(0.49)	0.48	(0.50)
g_sme	0.17	(0.38)	0.14	(0.35)	0.12	(0.32)	0.26	(0.44)	0.08	(0.27)
Cartel-related variables										
c_detect	0.53	(0.50)	0.61	(0.49)	0.65	(0.48)	0.30	(0.46)	0.29	(0.46)
c_worldwide	0.12	(0.33)	0.04	(0.20)	0.04	(0.19)	0.34	(0.48)	0.03	(0.18)

Table 2 continued

Variable	All		Pre-settlement era		Pre-settlements era: appellants		Settlement era		Settlement era: settling firms	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
c_no_firms	14.46	(11.66)	15.23	(12.90)	15.96	(12.77)	12.26	(6.51)	9.50	(6.75)
c_manufacturing	0.79	(0.41)	0.84	(0.36)	0.79	(0.41)	0.64	(0.48)	0.71	(0.46)
c_endusers	0.14	(0.35)	0.16	(0.37)	0.17	(0.37)	0.09	(0.29)	0.13	(0.34)
Observations	575		426		269		149		62	

Means are reported with standard deviations in parentheses. The sample consists of all cartel and cartel appeals cases finally decided by the EC, the General Court and the European Court of Justice between 2000 and 2015. Data is used on the firm group level, i.e., firms that are linked through ownership and are jointly liable for fines are grouped together

cases in which this was factually possible (the 'settlement era').[26] Second, we also report the respective descriptive statistics for all appellants (in the pre-settlement era) and all settling firm groups (in the settlement era).

Starting with the descriptive statistics (that are shown in Table 2) for the *legal environment-related* variables, we find that for 26% of all firm groups in the sample the settlement procedure was factually applicable. The corresponding results for the other two major reforms in EC cartel enforcement—the fine guidelines and the leniency program—however, look quite different.

While the 2006 EC Guidelines for the Method of Setting Fines ('Fine Guidelines') were applied in 48% of all firm groups in the sample, the two most recent leniency programs were applied for 35 or 27% of all firm groups, respectively. However, as further revealed by Table 2, the timing of the respective reforms factually determine that all (or virtually all, respectively) convicted firm groups in the settlement era fall under the 2006 Fine Guidelines or the 2006 Leniency Notice, respectively.

Turning to the *firm group-related* variables, we find that about 53% of all 575 firm groups in our data set decided to file an appeal. However, comparing the respective values for the pre-settlement era and the settlement era reveals that the appeals rate experienced a substantial reduction from about 63% to 26%. Furthermore, only 2% of all settling firm groups[27] later decided to file an appeal, which thereby confirms the observations in Sect. 3 that the large majority of appeals were filed by non-settling firm groups.

Furthermore, we find that for 11% of all firm groups in our sample the settlement procedure was actually applied. Conditioning on the subsample of firm groups for which the settlement procedure was factually available, 42% of them decided to settle with the EC. Taking into account that overall 26% of convicted firms later appealed, one can conclude that the appeal rate for non-settling firms is roughly 42%: about 20% points lower than in the pre-settlement era (63%).

Besides these important structural differences in the appeals and settlement variables between the different sub-periods, the remaining group-related variables mostly show less substantial differences. While the number of firms within a firm group increases from about 1.88 firms in the pre-settlement era to about 2.32 in the settlement era, the duration of cartel participation by the groups experienced a remarkable decrease from about 88 to 48 months.

[26] Due to the fact that the first two settled cases in 2010 (DRAMs, Case COMP/38.511; and Animal Feed Phosphates, Case COMP/38.866) were specific 'test' cases (see Sect. 3.2 above for further information), our 'settlement era' applies to all cases that were decided after 2010. Besides disregarding these two 'test' cases we also had to exclude the most recent case (Optical Disc Drives, Case COMP/39.639) from the settlement era as—at the time of writing—only an EC press release that provided incomplete information was available.

[27] In our sample, this is only the case for Printeos, a member of the Envelopes cartel (Case COMP/39.780). The second case mentioned in Footnote 22 above (Euro Interest Rate Derivatives, Case COMP/39.914) had to be excluded from the sample due to insufficient data.

Table 2 further reveals that—although both aggravating and mitigating circumstances[28] generally play a minor role, with a presence in only 15 or 17% of all firm groups, respectively—especially the aggravating circumstances lose further in significance in the settlement era (being present in only about 1% of the firm groups). A very comparable development can be observed for the repeat offender variable, which experienced a downward trend from about 11% in the pre-settlement era to about 1% in the settlement era.

With respect to the average final fine that was imposed by the EC,[29] we observe a reduction of about €1.5 million when we compare the pre-settlement and settlement eras. Furthermore, we find that appellants in the pre-settlement era and settling firm groups in the settlement era are characterized by substantially higher final fines (about €45.2 million and about €36.9 million, respectively) than the respective averages.

The two leniency-related variables reveal that about 16% of all firm groups in the data set successfully applied for leniency as the first applicant—often receiving a fine waiver—while a further 51% successfully received a fine reduction as a leniency follower. Interestingly, for the sub-sample of settling firm groups, the respective percentage of firm groups that received a fine waiver is particularly high: an average of 29% (compared to 16% for the entire sample).

Our data set also includes a variable that indicates whether the firm group consists of small or medium sized firms (SME's). As shown in Table 2, in sum only 17% of the firm groups fall into this category. While in the pre-settlement era, the share of appealing SME's is smaller than the overall share, in the settlement era, we generally observe more SME's in the respective cases (26%). However, SME's represent only 8% of the settling firm groups.

With regard to the *cartel-related* variables: Table 2 reveals that about half of all firm groups operated in cartels that have been detected while operating. However, an analysis of the respective values for the pre-settlement era and the settlement era separately reveals a substantial drop from 61 to 30% (which suggests changes in the types of cartels that are detected by the EC). Furthermore, the number of firms that are involved in a cartel experiences a decrease from 15.2 firms in the pre-settlement era to 12.3 firms in the settlement era.

The settlement era sub-sample further shows a remarkable increase in the share of firm groups that participated in worldwide cartels. While this characteristic was attached to only about 4% of all firm groups in the pre-settlement era, the respective value increased to about 34% in the settlement era.

[28] Aggravating circumstances considered by the EC are, e.g.: repeat offenses; 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.

[29] We are fully aware of the fact that the final fine is affected by the settlement procedure. In this respect, it would be desirable to, e.g., use the basic fine as a measure for the expected fine. However, as this information was often unavailable in the respective EC case documents, we use the final fine in our empirical analysis (and thus assume that it is highly correlated with the expected fine at the stage of the investigation).

Last but not least, three out of four firm groups were active in cartels that operated in the manufacturing sector (NACE code 'C') and about 15% dealt with end consumer products, i.e., products that are typically purchased by end consumers—in contrast to intermediate goods that are used as input goods in downstream production processes.

4.2 Empirical Strategy

Following the initial description of the construction of our data set and the descriptive statistics, we continue with the development of our empirical strategy. Based on our aim to assess the impact of the settlement procedure on the probability to file an appeal, the main empirical challenge lies in the separation of the effect of the settlement procedure and other confounding factors such as, e.g., changes in the composition of firm groups and cases.

In principle, a suitable empirical strategy to answer our research question would be to take all observations of the settlement era to identify the determinants of a firm's decision to settle with the EC and subsequently to use this information to back-cast the respective decisions for the pre-settlement era. A simple comparison of the predicted shares with the actual shares would then give an indication how an earlier introduction of the settlement procedure would have affected the number of appeals.

Although the described empirical strategy appears straightforward, (at least) two severe obstacles prevent an application in our case: first, the fact that a firm is engaged in a settlement is the result of an iterative decision process: the EC decides first whether to offer the opening of a settlement procedure—making use of (at least partly) unobservable criteria; and the firm subsequently has the final decision as to whether to settle or not.

Second, factors typically exist that make firms (or cases) more eligible for an application of the settlement procedure from the EC's perspective (which are partly perfectly correlated with the observable settlement decisions). For example, we find no case in our data with either a repeat offender or the presence of aggravating circumstances that was eventually settled. In technical terms, there is a lack of variation, which forecloses the possibility to pursue such an estimation strategy.

Due to these severe problems with the back-casting approach just described, we simply reverse our empirical strategy: we start by estimating a model of a firm group's decision to appeal an EC cartel decision in the pre-settlement era. This model is then taken to conduct an out-of-sample prediction of the firm group's decision to file an appeal for the settlement era under the hypothetical (counterfactual) situation that the settlement procedure would not have been introduced.

This 'forecasting' approach has the additional advantage that it provides a better fit to the real-world implementation of settlement and appeals procedures: while the decision to appeal is entirely with the firm group itself, the settlement decision is made iteratively by the two (opposing) parties (after the EC decided to open the procedure). Consequently, a comparison of the predicted with the actual shares allows conclusions as to the effect of the settlement procedure on the probability to appeal.

Turning to the concrete implementation of our empirical strategy, the first step focuses on the identification of possible determinants of a firm group's decision to file an appeal against a cartel decision by the EC. In this respect, our choice of variables is generally guided by the analysis in Hüschelrath and Smuda (2016), who investigate both the characteristics of firm groups that file an appeal and the factors that determine their success in terms of fine reduction in the pre-settlement era.

However, in adapting this general approach to our more specific research question of the impact of the settlement procedure on the probability to appeal, we not only implement several adjustments[30] to improve the forecast performance of our model using a longer data set, but we also introduce new cartel- and firm group-related characteristics (such as, e.g., *g_sme, c_manufacturing, c_endusers*) explicitly to take account of the existing literature on antitrust settlements and appeals that were reviewed in Sect. 2.

As already mentioned in Sect. 4.1, we generally differentiate between three sets of independent variables that are likely to influence the probability to file an appeal—legal environment-related, firm group-related, and cartel-related—and we structure the remainder of this section accordingly.

4.2.1 Legal Environment-Related Variables

Starting with the *legal environment-related* variables, we control for the application of the revised 2006 EC Guidelines for the Method of Setting Fines (*fine_glines_06)* and of both the 2002 and 2006 EC Leniency Notice (*len_notice*) as all three reforms are likely to have increased the transparency of EC decisions thus reducing the probability to appeal. While the 2006 Fine Guidelines specified the fine calculation process, the 2002 and 2006 reforms (of the original 1996 Leniency Notice) clarified the conditions under which an applicant can expect either a fine waiver or at least a fine reduction.

4.2.2 Firm Group-Related Variables

With respect to the *firm group-related* drivers of the decision to appeal, we, first, hypothesize that the larger is the number of firms within one firm group (*g_no_firms)* the more likely it becomes that at least one firm identifies a reason to file an appeal [be it either alleged errors in the decision or other (tactical[31]) motives].

Second, the longer that the respective firm group participated in the cartel (*g_dur*), the more difficult it becomes for the EC to collect sufficient evidence to decide on, e.g., the exact start date of cartel participation, which thereby increases the probability that the firm group will disagree and therefore decides to appeal.

[30] These adjustments are driven by quality criteria such as the quality of in- and out-of-sample predictions or information criteria such as the Akaike information criterion (AIC).

[31] As is discussed in greater detail in Hüschelrath and Smuda (2016), possible tactical motives to file an appeal include the delay of fine payments (motivated by, e.g., current liquidity problems) or the postponement of follow-on private damage claims into the distant future.

Third, both aggravating and mitigating circumstances—identified by the EC during its case assessment—may influence the probability to appeal. While the presence of aggravating circumstances (*g_aggravating*) such as status as ringleader that leads to fine increases suggests an increased probability to appeal the respective decision, the presence of mitigating circumstances (*g_mitigating*) such as a (erroneous) prior approval of an infringement by a public authority is expected to reduce the probability to file an appeal.

Fourth, for reasons that are similar to the aggravating circumstances just discussed, the characteristic as repeat offender (*g_rep_off*) may result in an increased probability to appeal the respective EC decision: e.g., as the respective firms are left with the impression that the EC imposed disproportionate fine levels for both punishment and deterrence purposes (see Hüschelrath and Smuda 2016).

Fifth, we further hypothesize that the larger is the fine (*g_def_fine_final)*, the larger are the consequences for the respective firms with respect to both share- and stakeholders and the larger therefore is the desire to reduce the fine through an appeals process.

Sixth, we assume that cooperating with the EC as part of the leniency program reduces the firms' incentives to file an appeal. Due to the fact that leniency applicants have to cooperate fully with the EC in order to qualify for a fine reduction or even a fine waiver, the EC can base its fining decision on detailed documentation thereby reducing the probability of error. As only the first firm group that reports an infringement to the EC will receive a fine waiver—however, the following firm groups are still eligible to get (smaller but still significant) fine reductions—we capture the overall impact of the leniency program with two separate variables (*g_lfirst* and *g_lfollower*).

Finally, guided by the existing empirical literature on settlements and appeals, we hypothesize that smaller firm groups (*g_sme*) have a lower probability to appeal as they are expected to be financially weaker and thus aiming at avoiding jeopardizing their future business success through substantial pecuniary costs as well as legal uncertainties that are attached to an appeals process.

4.2.3 Cartel-Related Variables

In addition, we include five *cartel-related* variables. First, we expect that it is easier for the EC to collect sufficient evidence for cartels that are caught while operating (*c_detect*) compared to cartels that were already terminated at the point of detection. Ceteris paribus, we therefore expect that a cartel 'caught in the act' has a reduced probability to file an appeal (as it anticipates the reduced success probabilities).

Second, we hypothesize that both worldwide cartel markets (*c_worldwide*) and the number of cartel firms (*c_no_firms)* make it, on the one hand, more difficult for the EC to collect sufficient evidence. On the other hand, an increasing number of (non-European) countries and firms generally makes it more likely that at least one party decides to file an appeal. Both variables are therefore expected to have a positive effect on the probability to file an appeal.

Third, as the propensity of cartelization might be different between industries, we aim at capturing potential unobserved heterogeneity by controlling for cartels in the manufacturing sector (*c_manufacturing*) against all other sectors.

Finally (yet importantly), the probability to appeal might also depend on the position of the cartel in the value chain. In particular, firms that produce final consumer goods (*c_endusers*) are more likely to avoid lengthy appeals processes—which would likely generate further negative media coverage—compared to often anonymous intermediate goods producers. Furthermore, private enforcement activities appear less likely in end consumer goods markets—as the individual stakes for the damaged individuals are typically (too) low and the purchased amounts are often hard to prove—and there is consequently no need to use an appeals process strategically to delay private damage actions.

4.2.4 Model Approach

Turning to our main model to estimate the probability of filing an appeal, the binary character of our dependent variable—being equal to one if a firm group appealed the EC decision and zero otherwise—suggests an application of a Probit model of the following form:

$$P(Appeal = 1|\boldsymbol{x}, Pre{-}Settlement\ Era) = F(\beta_0 + \beta_1' X),$$

with $P(Appeal = 1|\boldsymbol{x}, Pre{-}Settlement\ Era)$ indicating the response probability of a firm group in the pre-settlement era to appeal an EC decision and $\boldsymbol{x}$ denoting the set of explanatory variables that determines a firm group's decision to appeal.

The estimated coefficients are then used to conduct an out-of-sample prediction of (hypothetical) appeals of firm groups in the settlement era absent the introduction of the settlement procedure. More specifically, we use the following estimated latent equation to predict the probability of an appeal

$$\hat{P}(Appeal|x, Settlement\ Era) = F\left(\hat{\beta}_0 + \hat{\beta}_1' X\right).$$

For predicted probabilities $\hat{P}$ above 50%, we classify the corresponding firm group as a *hypothetical* appellant. We are particularly interested in the respective predictions for firm groups that settled in order to assess whether the introduction of the settlement procedure was causal for the decline in appeals proceedings.

4.3 Estimation Results

In this section, we present the results of our empirical analysis. Along the lines of the empirical strategy just described, we start with a discussion of the results for the Probit estimations that aim at identifying important determinants of the decision to appeal an EC cartel decision. We then continue with a discussion of the predictive power of the model and our out-of-sample predictions of appeals filings in the settlement era.

Table 3 Estimation results for the decision to file an appeal (avg. marginal effects)

	Coefficient	SE
Legal environment-related variables		
fine_glines_06	−0.117*	(0.061)
len_notice	−0.070	(0.064)
Firm group-related variables		
g_no_firms	0.045***	(0.014)
g_dur	−0.001	(0.000)
g_mitigating	0.100*	(0.060)
g_aggravating	−0.083	(0.080)
g_rep_off	0.230**	(0.105)
g_def_fine_final	0.003***	(0.001)
g_lfirst	−0.586***	(0.060)
g_lfollower	−0.117***	(0.044)
g_sme	−0.119*	(0.066)
Cartel-related variables		
c_detect	0.040	(0.052)
c_worldwide	0.035	(0.068)
c_no_firms	0.003*	(0.002)
c_manufacturing	−0.293***	(0.082)
c_endusers	−0.122*	(0.070)
Observations	426	
McFadden Pseudo R^2	0.29	
Correctly classified	0.76	
False appeals for non-appellants	0.45	

The sample consists of all cartel cases decided by the EC from 2000 until 2010 (the pre-settlement era). Data are exclusively at the firm group level: firms that are linked through ownership and are jointly liable for fines are grouped together. The table shows average marginal effects (with standard errors clustered on the case level) for the firm groups for which all information was available; standard errors are in parentheses

* indicates $p < 0.1$; ** indicates $p < 0.05$; and *** indicates $p < 0.01$

4.3.1 Determinants of the Decision to File an Appeal

With respect to the determinants of the decision to file an appeal, Table 3 reports the estimation results. Starting with the *legal environment-related* variables, we find that firm groups that were fined under the revised 2006 EC Fine Guidelines have a significantly lower probability to file an appeal—compared to firm groups that were fined under the preceding guidelines from 1998—which thus supports our hypothesis derived above that the reform increased the transparency of EC cartel decisions. Furthermore, although the EC Leniency Program as such has no significant effect on the probability to file an appeal, the (diverging) results for the two specific leniency-related characteristics (first applicants and followers) will be discussed as part of the group-related variables below.

Turning to these *firm group-related* variables, we find empirical support for our hypothesis that the probability to file an appeal increases with the number of firms in a group. However, against our prior expectations, the firm group's probability to appeal is found to be independent of the duration of cartel participation. Equally contradictory to our prior expectations are the results for the presence of both mitigating and aggravating factors. While the presence of the former leads to an

increase in the probability to appeal, the coefficient of the latter shows a negative but insignificant sign.

As already argued in Hüschelrath and Smuda (2016), a possible explanation for the positive effect of mitigating factors is that the respective firm groups expected larger fine reductions than was actually imposed by the EC and therefore decided with a higher probability to appeal the decision. For the aggravating factors, the substantial reduction in their presence in the settlement era—shown in Table 2—generally suggests that the observed effect is driven by a small number of firm groups/cases.

Again confirming our prior expectations, we find that repeat offenders are more inclined to challenge an EC decision through an appeal than are first-time offenders. Furthermore, the size of the final fine that is imposed by the EC has the expected positive impact on the probability of filing an appeal.

We also find support for our hypothesis that firm groups that participated in the leniency program have a significantly lower probability to file an appeal. On average, the probability of appealing an EC decision is about 59% lower for the first applicants and about 12% lower for the followers (compared to firms that did not apply for leniency). Finally (yet importantly), consistent with our prior expectations, we find that small firms have about a 12% lower probability to file an appeal than do larger firms.

Turning to the *cartel-related* variables, we find that firm groups whose cartel was detected while operating have no significant effect on the probability to file an appeal. We also find no support for our hypothesis that firm groups that are part of worldwide cartels have a higher probability of filing an appeal. However, the expected positive effect of the number of firms involved in the cartel on the probability to appeal is found in the model.

Finally, our results also show that firm groups that colluded in the manufacturing sector are less likely to file an appeal. Furthermore, if the cartel operated in an end consumer goods market, the probability of appeal is also reduced compared to cartels in intermediate goods markets—again confirming our prior expectations.

4.3.2 Predictive Power and Out-of-Sample Predictions

When we turn to an assessment of the predictive power of our model, the different statistics reported in the lower part of Table 3 provide important insights. The McFadden Pseudo R^2 indicates that our model predicts the outcome better than does the constant. In fact, our model is found to predict more than three quarters of all appeal and non-appeal decisions correctly. However, it should also be clearly stated that—for about 45% of the non-appealing firm groups—an appeal is falsely predicted.

With regard to the out-of-sample predictions of appeals filings in the settlement era absent the settlement procedure, Table 4 provides actual and predicted shares of firm groups that filed an appeal.

As is shown in Table 4, the prediction for the settlement era is that 54% of firm groups would have filed an appeal—instead of only 26% that actually decided to do so. This difference can (as expected) mainly be attributed to hypothetical appeals by

Table 4 Prediction of hypothetical appellants in the settlement era

	Predictions in settlement era	Actual shares
Appeals	0.54	0.26
Appeals | settlement	0.50	0.02
Appeals | no settlement	0.58	0.43
Quality of out-of-sample predictions		
Correctly predicted appeals	0.82	
Correctly predicted non-appeals in non-settled cases	0.51	

firm groups that decided to settle: while our model predicts appeals by 50% of all firm groups, the actual share is only 2%. This substantial difference further suggests that the settlement procedure was not only applied by firm groups that just wanted the case to be closed, but also by those that—without the option to settle—would have found it more profitable to appeal.

However, Table 4 also reveals that our model predicts more appeals for firm groups in non-settled cases (58% in contrast to actual 43%). Although this divergence is likely to be generally related to differences between the pre-settlement period and the settlement period—in ways that are not completely captured by our model—a more concrete explanation for the over-prediction is the presence of a composition effect that is driven by different types of firms in the pre-settlement period and the settlement period (partly reflected in the descriptive statistics reported in Sect. 4.1 above). An alternative explanation could be the presence of a time trend that results in fewer appeals over time, e.g., as the practice of appealing is better known.[32] If such a trend exists, the predictions of our model would represent an upper bound.

In sum, we find that our prediction of the hypothetical number of appeals in the settlement era—absent the settlement procedure—is about 54%. As the actually observed appeals rate of 26% is clearly below this range, we can conclude that the introduction of the settlement procedure had a significantly negative impact on the probability to file an appeal.

In absolute terms, we can say that out of the 149 firm groups that were convicted for cartelization in the settlement era, around 81 firm groups would have appealed the EC decision absent the settlement procedure, compared to the 38 firm groups that actually decided to do so. In other words, our estimation results suggest that the introduction of the settlement procedure avoided the filing of about 43 appeals against EC cartel decisions in the five-year period from 2011 to 2015: a substantial reduction of about 53%.

[32] In fact, such a (negative) time trend is found in Hüschelrath and Smuda (2016) for a shorter sample of EC cartel decisions from 2000 to 2012.

5 Conclusion

In many jurisdictions, a significant share of legal disputes is not investigated and decided in court but is solved through bargaining as part of settlement procedures. Examples include settlements in patent litigation or—more generally—plea bargaining as a settlement procedure that is frequently applied in criminal cases in the United States. Although the sets of motivations behind the introduction of settlement procedures partly differ, they all aim at saving resources in the form of legal fees, trial costs, or the opportunity costs of time that are associated with a trial.

The European Union (EU) settlement procedure in cartel cases—allowing the European Commission (EC) to close investigations faster by eliminating or reducing several procedural steps required under the standard procedure—is no exception to this rule. Although the procedure, which was introduced in 2008, has certain special characteristics—first, it focuses on the relationship between a public authority and private firms; and second, it does not avoid an official investigation and decision—the key aim that motivated its introduction was the faster and more efficient handling of cartel cases by the EC.

However, beyond this direct impact of the introduction of the settlement procedure on the procedural efficiency of EC cartel investigations, the question is raised whether a measurable impact on the subsequent (and final) stage of the cartel enforcement process—the appeals process—can be identified. In principle, by avoiding a significant share of follow-on appeals cases, the positive overall welfare impact of the settlement procedure could increase substantially—given the fact that (in the pre-settlement era) on average 63% of all convicted firm groups decided to file an appeal against the respective EC decision triggering follow-on proceedings with an average length of about 49 months.

In this context, we have used a data set that consists of 575 firms groups that were convicted by the EC for cartelization from 2000 to 2015 to investigate the impact of the settlement procedure on the probability to file an appeal. Based on the estimation of a model of a firm's decision to appeal in the pre-settlement era, we subsequently ran out-of-sample predictions to estimate the number of hypothetical appeals cases in the settlement era absent the settlement procedure.

Comparing these estimates with the actual number of appeals, we found a settlement-induced reduction in the number of appeals of about 53%—implying not only savings of the associated trial costs for the involved firm groups but also freeing additional resources at both the respective appellate courts and the EC itself (as less time is needed to defend its position in decided cases in court). Furthermore, our empirical results suggest a substantial need for resource reallocations in both legal and economic consulting practices from appeals cases to settlement cases.

Beyond these additional savings (and reallocation needs) triggered by the introduction of the settlement procedure through its knock-on effect on the number of appeals, an assessment of the overall welfare implications demands a more differentiated discussion: first, it is important to keep in mind the important control and error-correction functions of the appeals process in legal systems. As a consequence, a reduction in the number of appeals can only be considered welfare-

enhancing if inefficient appeals proceedings are avoided (but efficient appeals are still brought).

Although there is currently no apparent reason to believe that the settlement procedure deters efficient appeals, future research will have to investigate in greater detail what types of appeals cases are still brought and whether there are indications that the settlement procedure has a negative impact on the overall quality of EC cartel decisions—possibly triggered by the EC's anticipation that a subsequent (error-correcting) appeals process is much less likely.

Second, from an overall deterrence perspective, the introduction of the settlement procedure could be considered as counterproductive: ceteris paribus, it reduces the expected fine for cartelization. However, in the field of public enforcement, such a negative effect can be counterbalanced easily by an increase in the probability of detection, achieved by an investment of the freed EC resources into the detection and prosecution of additional cartels. In this respect, future research could investigate whether the introduction of the settlement procedure caused any (structural) changes in the number and types of detected cartels.

From the perspective of private cartel enforcement, on the surface the settlement procedure could be welcomed, since the avoidance of lengthy appeals proceedings allows a quicker start for private follow-on litigation. However, the size of such an additional deterrence effect will depend not only on the general success of the implementation of the Directive on Antitrust Damages Actions[33] but also on the availability of the detailed case information that is needed to substantiate (promising) private damage claims. In this respect, the streamlined EC decisions that are published in settled cases are certainly counterproductive and are thus likely to hamper the rise of private cartel enforcement in the Member States of the EU and the additional deterrence effect that is attached to it.

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References

Adelstein, R. (1978). The plea bargain in theory: A behavioral model of the negotiated guilty plea. *Southern Economic Journal, 44,* 488–503.

Ascione, A., & Motta, M. (2008). Settlements in cartel cases. *EU Competition law and policy workshop/ proceedings*, Florence.

Baxter, W. (1980). The political economy of antitrust. In R. Tollison (Ed.), *The political economy of antitrust* (pp. 3–49). D.C. Heath: Lexington.

Bay, M. (2010). EU *Cartel settlements: Theory and (first) practice*. Presentation, IBRAC Seminar, 26 November 2010, Guarujá.

Bellis, J.-F. (2014a). General overview of the EU cartel settlement procedure. *Competition Policy International*, 1–6.

[33] Directive of the European Parliament and the Council on Certain Rules Governing Actions for Damages under National Law for Infringements of the Competition Law Provisions of the Member States and of the EU (PE-CONS 80/14). The Directive was signed into law on 26 November 2014 and allowed the Member States two years to implement it into their national legal systems.

Bellis, J.-F. (2014b). *Cartel settlements*. Van Bael & Bellis, Presentation, 28 November 2014, Madrid.
Briggs, H., Huryn, K., & McBride, M. (1996). Treble damages and the incentive to sue and settle. *RAND Journal of Economics, 27,* 770–786.
Carree, M., Günster, A., & Schinkel, M. P. (2010). European antitrust policy 1957–2004: An analysis of EC decisions. *Review of Industrial Organization, 36,* 97–131.
Chopard, B., Marion, E. & Roussey, L. (2014). *Appeals process, judicial errors and crime deterrence*. Working Paper, University of Paris Ouest, Nanterre.
Cooter, R., & Rubinfeld, D. (1989). Economic analysis of legal disputes and their resolution. *Journal of Economic Literature, 27,* 1067–1097.
Cooter, R., & Ulen, T. (2000). *Law and economics* (3rd ed.). Reading: Addison Wesley.
Daughety, A., & Reinganum, J. (2000). Appealing judgments. *RAND Journal of Economics, 31,* 502–525.
EC (2013). *Competition: Antitrust procedures in anticompetitive agreements*, Brussels.
Eisenberg, T. (2004). Appeal rates and outcomes in tried and nontried cases: Further exploration of anti-plaintiff appellate outcomes. *Journal of Empirical Legal Studies, 1,* 659–688.
Eisenberg, T., & Farber, H. (1997). The litigious plaintiff hypothesis: Case selection and resolution. *RAND Journal of Economics, 28,* 92–112.
Eisenberg, T., & Farber, H. (2013). Why do plaintiffs lose appeals? Biased trial courts, litigious losers, or low trial win rates? *American Law and Economics Review, 15,* 73–109.
Eisenberg, T., & Heise, M. (2015). Plaintiphobia in state courts redux? An empirical study of state court trials on appeal. *Journal of Empirical Legal Studies, 12,* 100–127.
Fournier, G., & Zuehlke, T. (1989). Litigation and settlement: An empirical approach. *Review of Economics and Statistics, 71,* 189–195.
Günster, A., Carree, M. & Schinkel, M. P. (2010). *A statistical analysis of court of appeals rulings in European antitrust enforcement, 1957–2004*. Working paper, University of Maastricht.
Harding, C., & Gibbs, A. (2005). Why go to court in Europe? An analysis of cartel appeals 1995–2004. *European Law Review, 30,* 349–362.
Hüschelrath, K. & Laitenberger, U. (2017). The settlement procedure in the European Commission's cartel cases: An early evaluation. *Journal of Antitrust Enforcement*. doi:10.1093/jaenfo/jnw015
Hüschelrath, K., & Smuda, F. (2016). The appeals process in the European Commission's cartel cases: An empirical assessment. *Journal of Empirical Legal Studies, 13,* 330–357.
Kroes, N. (2008). Settlements in cartel cases. *Speech manuscript, 12th annual competition conference*, 19 September 2008, Fiesole.
La Casse, C., & Payne, A. (1999). Federal sentencing guidelines and mandatory minimum sentences: Do defendants bargain in the shadow of the judge? *Journal of Law and Economics, 42,* 245–269.
Laina, F., & Bogdanov, A. (2014). The EU cartel settlement procedure: Latest developments. *Journal of European Competition Law & Practice, 5,* 717–727.
Laina, F., & Laurinen, E. (2013). The EU cartel settlement procedure: Current status and challenges. *Journal of European Competition Law & Practice, 4,* 302–311.
Landes, W. (1971). An economic analysis of the courts. *Journal of Law and Economics, 14,* 61–108.
Levy, G. (2005). Careerist judges and the appeals process. *RAND Journal of Economics, 36,* 275–297.
Miceli, T. (1996). Plea bargaining and deterrence: An institutional approach. *European Journal of Law and Economics, 3,* 249–264.
Olsen, G., & Jephcott, M. (2010). The EC's settlement procedure. *Antitrust, 25,* 76–80.
Perloff, J., & Rubinfeld, D. (1988). Settlements in private antitrust litigation. In L. White (Ed.), *Private antitrust litigation: New evidence, new learning* (pp. 149–184). Cambridge: MIT Press.
Perloff, J., Rubinfeld, D., & Ruud, P. (1996). Antitrust settlements and trial outcomes. *Review of Economics and Statistics, 78,* 401–409.
Posner, R. (1973). An economic approach to legal procedure and judicial administration. *Journal of Legal Studies, 2,* 399–458.
Priest, G., & Klein, B. (1984). The selection of disputes for litigation. *Journal of Legal Studies, 13,* 1–55.
Rubinfeld, D. (2015). Antitrust Settlements. In R. Blair & D. Sokol (Eds.), *The Oxford handbook of international antitrust economics* (pp. 172–184). New York: Oxford University Press.
Schinkel, M. P. (2011). Bargaining in the shadow of the european settlement procedure for cartels. *Antitrust Bulletin, 56,* 461–481.
Shavell, S. (1982). The social versus private incentive to bring suit in a costly legal system. *Journal of Legal Studies, 11,* 222–339.
Shavell, S. (1995). The appeals process as a means of error correction. *Journal of Legal Studies, 24,* 379–426.

Shavell, S. (2006). The appeals process and adjudicator incentives. *Journal of Legal Studies, 35,* 1–29.
Shavell, S. (2010). On the design of the appeals process: The optimal use of discretionary review versus direct appeal. *Journal of Legal Studies, 39,* 63–107.
Vascott, D. (2013). EU cartel settlements: Are they working? *Global Competition Review*, from https://www.lw.com/mediaCoverage/are-eu-cartel-settlements-working.