

Separation of Powers: The Case of Antitrust*

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Abstract

We present a simple game-theoretic model that captures the differences in antitrust enforcement in the U.S. and Europe. The European system is characterized by a combination of investigation, prosecution and adjudication within the European Commission as antitrust authority. This has raised concerns about the impartiality of the system. We provide conditions under which the two systems differ and the European Commission is more likely to issue antitrust infringement decisions than the Department of Justice or the Federal Trade Commission are to bring a case to trial. Assuming otherwise identical systems (with respect to fines and cost allocation), we show that for strictly positive litigation costs the lack of separation of power (rather than an a priori prosecutorial bias) increases the likelihood of a firm in Europe being convicted of an antitrust violation.

JEL classification: D02, L40, K21, K40

Keywords: antitrust, competition policy, Federal Trade Commission, Department of Justice, European Commission, separation of powers

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1 Introduction

In the area of administrative law, the enforcement systems in the U.S. and Europe differ in one distinct procedural feature. The U.S. system is characterized by court consultation, whereas in Europe decisions are taken by politically appointed governmental agencies. This is particularly true for the case of antitrust enforcement. The antitrust division of the U.S. Department of Justice (DOJ) makes its arguments in front of courts to convict parties. The Federal Trade Commission (FTC) appoints a judge to preside over hearings and follows transparent procedures. In the European Union, only after an infringement is found by the politically appointed European Commission, without an open legal process, defendants can appeal this decision to a court. Consequently, the European Commission fulfills the task of a prosecutor and court in one. In contrast, the DOJ and FTC play the role of the prosecutor whereas a court or an Administrative Law Judge rules upon the facts independently.

Due to this concentration of prosecution and adjudication in one agency, the European system is said to suffer from a prosecutorial bias, meaning that the very same case is investigated, hearings are conducted and also the verdict is proposed and decided by the same juridical body, even denying companies a fair hearing. In the end, politically appointed Commissioners sign the final decision instead of an independent body. This has been at the heart of a public debate. In 2002, the *Financial Times* argues that former Commissioner “Mario Monti should not be judge and jury.”¹ A more recent verdict by *The Economist* is rather blunt: “In no other area of law would it be thought acceptable for the outcome of such important cases to be determined by a bunch of politicians.”² The comment continues to say that “antitrust appeals to the European Court of Human Rights (based on the unfairness of a process that levies huge fines but falls short of the standards expected of the criminal law)” are likely to “succeed.”

Legal scholars have critically observed the violation of the key legal principle of power separation stemming from the combined investigative, prosecutorial and adjudicative power of the European Commission (Ahlborn, 2002; Winckler, 2003; Wils, 2004; Slater, Thomas, and Waelbroeck, 2008; Castillo de la Torre, 2010). In addition, the question on the fairness of the proceeding is heavily debated. Numerous studies (e.g., Schwarze, Bechtold, and Bosch, 2008; Forrester, 2009; Wils, 2010) investigate whether or not an administrative law agency (e.g. European Commission, Federal Trade Agency, Department of Justice) should be allowed to levy fines without juridical review by a court, as is currently the practice by the European Commission.

In this paper, we study the impact of this systemic asymmetry on a competition agency’s case selection to understand the source of the claimed prosecutorial bias. We argue that, as “unfair” the administratively investigative and prosecutorial biases may be, a more fundamental issue is the lack of separation of power among the investigative, prosecutorial, and adjudicative function in the European Commission. We show

¹ “Mario Monti should not be judge and jury.” *Financial Times*, October 21, 2002; p. 17.

² “Prosecutor, judge and jury: Enforcement of competition law in Europe is unjust and must change.” *The Economist*, February 18, 2010.

that the regime asymmetry gives rise to significant differences in case selection as an equilibrium outcome. We are not aware of any other formal game-theoretical analyses studying this phenomenon.³

Constructing a simple extensive form game of antitrust enforcement, in line with existing enforcement rules, we show that different outcomes will result. Rather than just assuming a “prosecutorial bias” we derive it as equilibrium outcome from the underlying governance structure. The basic idea of the model is as follows: An antitrust agency opens investigations against firms of a given type, where the “type” denotes the likelihood that the firm will in court be found guilty of an antitrust violation. The agency’s investigation reveals this probability, meaning the agency gets a good picture of its chances of prevailing in court. Given this information, the agency decides to either *dismiss* the case, *resolve* it by offering the firm the chance to discontinue the anticompetitive conduct without imposing a fine, or *charge* the firm by imposing a fine or taking the case to trial. The firm can accept or reject an offer to resolve; or appeal a fine (directly imposed by the European Commission or the outcome of a trial initiated by the FTC or DOJ).

We solve for the subgame-perfect Nash equilibrium of this extensive form game—accounting for the agency’s anticipation of the firm’s decision—to determine the equilibrium distribution of investigations *dismissed*, *resolved*, and *charged*. The asymmetry (missing separation of prosecution and adjudication in Europe) in the two systems under consideration results in bias of case selection. The European Commission is more likely to charge a firm with a violation of antitrust laws than the competition agencies in the U.S. when facing the same distribution of firms (Proposition 1). This difference is not result of an a priori bias, but it is the equilibrium outcome of otherwise symmetric systems; identical for all but the European Commission’s option to issue an infringement decision. We further show that even for identical case selection, the outcomes of cases in equilibrium differ if legal costs are strictly positive (Proposition 2 and Corollary 1). We calibrate our model using data from U.S. (litigation costs and damages) and E.U. (profits and fines) antitrust cases to illustrate the significance of our findings.

The structure of the paper is as follows: Section 2 briefly explains the structure of the antitrust law enforcement system on both continents. Section 3 presents a simple model of antitrust enforcement and discusses the main underlying assumptions in more detail. We then present the subgame-perfect Nash equilibria and main theoretical results. In section 4 we calibrate the model using data from the U.S. and Europe to compare the equilibrium outcomes. Section 5 concludes.

³Posner (1974), by endogenizing the outcome of litigation, analyzes the agency’s incentives to devote resources to different cases.

2 Antitrust Enforcement in the U.S. and EU

A widely accepted role of antitrust policy is to “ensure that competition in the marketplace is not restricted in a way that is detrimental to society” (Motta, 2004:30). Both the U.S. and the European Union have established systems of antitrust laws that—in essence—pursue the same goal. In the U.S., the *Sherman Act* (1890) prohibits contracts that restrain trade, and the *Clayton Act* (1914) explicitly lists types of business practices distorting fair competition, such as price discrimination (Section 2), exclusive dealing (Section 3), or mergers that substantially lessen competition (Section 7).⁴ In the European Union, Articles 101 and 102 of the *Treaty of the European Communities (EC)* hold provisions analogous to the antitrust laws in the U.S.^{5,6} The differences in the details of what is considered a violation of antitrust laws are found in the fine print.⁷ As similar the two regimes are in their substance, they do exhibit significant differences in the way antitrust laws are enforced.

In the European Union, the Commission does not need to consult a court to levy fines and impose legal sanctions.⁸ It may issue an *infringement decision* and fine up to 10% of the sanctioned firm’s annual turnover.⁹ Alternatively, the Commission can adopt a *commitment decision*, a binding order obligating a firm to discontinue the alleged anticompetitive conduct.¹⁰ This *commitment decision* does not entail a fine.¹¹

In the U.S., the Federal Trade Commission and the Department of Justice¹², too, can obtain effective relief¹³ from antitrust violations without taking the case to trial.

⁴15 U.S.C. §§1-7 and 15 U.S.C. §§12-27, respectively.

⁵For a more detailed discussion see Motta (2004:30-38) or Russo, Schinkel, Günster, and Carree (2010:5-19).

⁶The current enumeration was adopted in the Treaty of Lisbon (2010). Previously, under the Treaty of Amsterdam (1997), the Articles were enumerated 81 and 82.

⁷For an overview of how antitrust enforcement by the U.S. Department of Justice’s Antitrust Division and the Federal Trade Commission was implemented and changed over time see Edwards (1950); Posner (1970); Gallo, Craycraft, and Bush (1985); Salop and White (1986); Gallo, Craycraft, and Dutta (1986); Gallo, Dau-Schmidt, Craycraft, and Parker (1994, 2000); Lin, Raj, Sandfort, and Slotte (2000); Kovacic and Shapiro (2000); Ghosal and Gallo (2001); Posner (2001); Baker (2003), and Ghosal and Stennek (2007). Carree, Günster, and Schinkel (2010) provide a historical overview for Europe similar to the U.S. studies. Russo, Schinkel, Günster, and Carree (2010) provide a catalogue of all landmark antitrust and merger cases. Additional accounts on enforcement by the European Commission are Neven (2006), Schinkel (2007), Veljanovski (2007), and Gual and Mas (2007).

⁸*Council Regulation (EC) No 1/2003 of 16 December 2002 on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty*, (2003) OJ L 1/1 of 4.1.2003. Regulation 1/2003 replaced *Council Regulation No 17 (EEC): First Regulation Implementing Articles 85 and 86 of the Treaty*, (1962) OJ 13/204 of 21.02.1962.

⁹Council Regulation 1/2003, Article 23(2).

¹⁰Council Regulation 1/2003, Article 9(1).

¹¹Council Regulation 1/2003, Preamble para 13: “Commitment decisions are not appropriate in cases where the Commission intends to impose a fine.”

¹²The role and scope of the Federal Trade Commission is defined by the Federal Trade Commission Act, 15 U.S.C. §§41-58. For antitrust enforcement by the Department of Justice, see Department of Justice (2008).

¹³An order that “will (1) stop the illegal practices alleged in the complaint, (2) prevent their renewal,

Table 1: Antitrust Enforcement in the U.S. and the EU

	United States	European Union
(a) “Dismiss”	Close investigations	Close investigations
(b) “Resolve” : Stop anti-competitive conduct without imposing fines	<i>Cease and desist order (CD)</i> issued by FTC or <i>consent decree (CD)</i> by DOJ	<i>Commitment decision (CD)</i> issued by the European Commission
(c) “Charge” : Stop anti-competitive conduct and impose significant fines	Trial in front of an Administrative Law Judge (FTC) or district court (DOJ)	European Commission issues an <i>infringement decision</i>

Without addressing civil courts, however, they are limited to *cease and desist orders* (Federal Trade Commission) or *consent decrees* (Department of Justice) that do not entail any significant fines—only up to \$10,000. These tools are analogous to *commitment decisions* in the European Union, as they “carry no criminal or civil penalties [...]”; rather, like a judicial injunction, they undo and prevent further unlawful action” (Areeda and Kaplow, 1997:78).¹⁴ If U.S. antitrust agencies seek to impose significant fines—in the ballpark of the European Commission’s fines—they have to do so through a court of law.¹⁵ This asymmetry in the separation of power is the underlying difference between U.S. and European antitrust enforcement. As we show below, the claimed “prosecutorial bias” is just a result of this.

[TABLE 1 ABOUT HERE.]

Table 1 summarizes the two enforcement regimes. We will refer to a *cease and desist order*, a *consent decree*, or a *commitment decision* (CD) as the agency *resolving* the case; and to a *trial* or *infringement decision* as the agency *charging* the firm. In the U.S. appeals are handled by the Court of Appeals (Areeda and Kaplow, 1997:110); in the European Union the Commission’s decisions can be appealed to the *Court of First Instance (CFI)* and eventually the *European Court of Justice (ECJ)*.¹⁶

and (3) restore competition to the state that would have existed had the violation not occurred” (Department of Justice, 2008:IV-56).

¹⁴According to Areeda and Kaplow (1997:79) a *cease and desist order* is “roughly similar” to the Justice Department’s *consent decree*. The rules for the Federal Trade Commission’s “non-adjudicative procedures” such as the *cease and desist order* are laid out in 16 C.F.R. §§2.31-2.34., for the *consent decree* see Department of Justice (2008:IV-56–65). A discussion can be found in Areeda and Kaplow (1997:72-83).

¹⁵The Department of Justice brings civil cases through a district court (Department of Justice, 2008:IV-65–69); the Federal Trade Commission has its cases tried at a hearing by an Administrative Law Judge. The Federal Trade Commission’s “rules of practice for adjudicative proceedings” are laid out in 16 C.F.R. §3. They provide rules similar to—but not as broad as—the Federal Rules of Civil Procedure (Areeda and Kaplow, 1997:79,n77).

¹⁶An appeal to a CFI judgment is possible under Article 49 of the E.C. Statute. In 1989, the European Council introduced the CFI as the the first instance of the ECJ (Council decision 88/591 of

3 Game-Theoretic Analysis

3.1 Setup

3.1.1 Players and Information

We consider an economy with risk-neutral payoff maximizing firms and a competition agency. Firms are of two types: *violators* or *abiders*. Violators make strictly positive profits by employing an anticompetitive conduct and thus being in violation of antitrust laws. Abiders make strictly positive profits but abide by antitrust laws. A firm's type is exogenously given. For now we assume neither firms nor agencies know the firms true type but have symmetric information as to the distribution of these types.

The objective of competition agencies is to detect and punish anticompetitive conduct. The agency opens antitrust investigations to discover the facts about a firm's case. These investigations reveal a signal $\alpha \in (0, 1)$ about the firm's type. Both the agency and the firm observe this signal α . The signal denotes the probability with which the firm is violator, meaning the fraction of violators in the population. We assume a simple litigation technology so that α denotes the probability with which the agency expects to prevail in court and obtain a verdict against the firm.

3.1.2 Structure

Once the agency has observed the signal α , it can choose among three options (see Table 1): (a) *dismiss* the case, (b) *resolve* the case by offering a CD, or (c) *charge* the firm by taking the case to trial (FTC/DOJ) or by issuing an infringement decision that may entail a fine (European Commission).¹⁷

The consequences of the agency's choices, in particular the firm's responses, depend on the jurisdiction. We first discuss the structure of our model for antitrust enforcement in the U.S. and then turn to the situation in Europe.

Antitrust Enforcement in the U.S. The firm's response to the agency's decision is two-fold. If the FTC or DOJ decides to resolve the case, the firm can either *accept* the CD offer or *reject* it. If the offer is accepted, the game ends. If it is rejected, the agency's offer is automatically transformed into a charge (i.e., trial).

In trial, the firm is found guilty of an antitrust violation with probability α and not guilty with probability $1 - \alpha$.¹⁸ If found guilty, the firm can appeal this judgment in front of a first instance appellate court¹⁹; if found not guilty, the agency can appeal

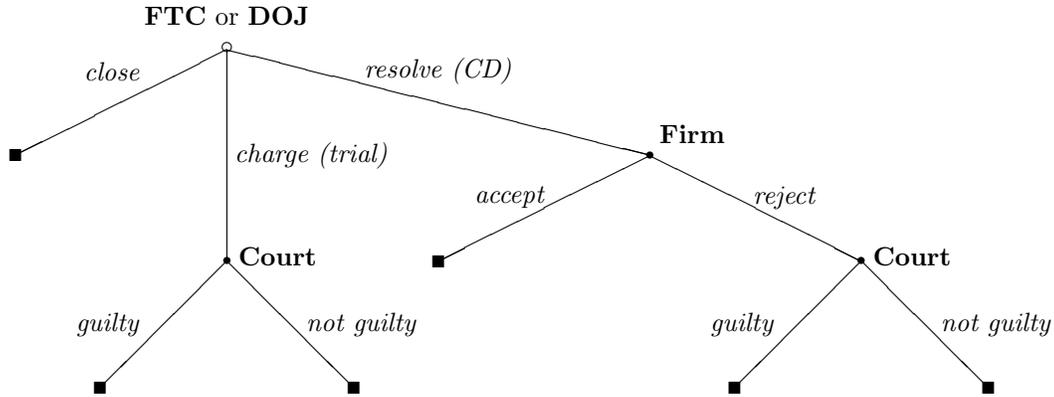
24 October 1988 L 319/1). Prior to 1989, there was just one instance at the ECJ deciding in appeal proceedings.

¹⁷In fact, in all cartel cases since 1991, if the European Commission has issued an infringement decision it came with a significant fine (Carree, Günster, and Schinkel, 2010:123).

¹⁸Studies indicate that the agencies prevail and firms are found guilty less than one third of the time, suggesting $\alpha < 1/3$ (Viscusi, Harrington, and Vernon, 2005:73).

¹⁹Appeals are brought in front of the Circuit Court of Appeal in first instance.

Figure 1: Antitrust Enforcement in the U.S.



the judgment in front of an appellate court. Moreover, if the appellate court upholds or reverses the lower court’s judgment, either party can appeal the appellate court’s judgment in front of the Supreme Court. For simplicity and because we are not interested in *how* courts make their decision, we assume that an earlier judgment has no impact on a higher court’s judgment. The firm will be ultimately be found guilty with probability α and not guilty with probability $1 - \alpha$.

[FIGURE 1 ABOUT HERE.]

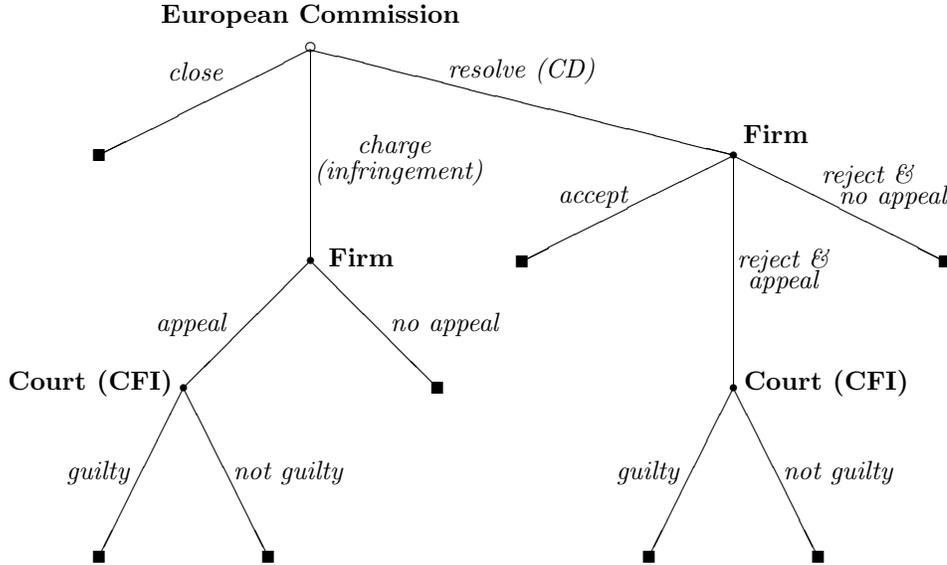
Figure 1 depicts the decision tree of the extensive form game for antitrust enforcement in the U.S. The competition agency (FTC or DOJ) and the Court (Administrative Law Judge or District Court) make their decisions without knowing the firm’s type. Note that the two appeal stages are omitted from the picture.

Antitrust Enforcement in the EU The decision tree of the extensive form game for antitrust enforcement in the EU is depicted in Figure 2. If the European Commission decides to resolve the case, the firm can either *accept* the offer of CD or *reject* it. If the offer is accepted, the game ends. If it is rejected, the Commission’s offer is automatically transformed into a charge (i.e., infringement decision).

[FIGURE 2 ABOUT HERE.]

An infringement decision by the Commission can be appealed in front of the Court of First Instance (CFI). During the period from 1964 to 2004, on average every second infringement decision was appealed (Carree, Günster, and Schinkel, 2010:128). If appealed, the CFI will with probability α uphold the Commission’s decision and the

Figure 2: Antitrust Enforcement in the European Union



firm is found guilty. The firm can appeal this judgment in front of the European Court of Justice. Likewise, if the CFI reverses the Commission’s decision with probability $1 - \alpha$, the Commission can appeal the CFI’s judgment in front of the higher court. Ultimately, the firm is found guilty of an antitrust violation with probability α and found not guilty with probability $1 - \alpha$ ²⁰. Note that the second appeal stage is omitted from the picture.

In Figure 2, we depict the firm’s response to a CD offer as a simultaneous decision with three choices, where in fact it is a sequential decision. This means, if the firm accepts a CD the game ends. If it rejects the agency’s CD but does not appeal the subsequent infringement decision, the game ends. We refer to this choice as *reject & no appeal*. If the the firm rejects the CD and appeals the infringement decision, the game continues to the CFI. We refer to this choice as *reject & appeal*.

3.1.3 Payoffs

Firms and agencies choose their actions so as to maximize their expected payoffs. The firm’s expected payoffs are expected *profits*, π , net of expected *finest*, f , and *litigation or legal costs*, c . For the agency, the expected payoffs are equal to the *intrinsic value*, ω of

²⁰In fact, only half of those appealed infringement decisions are upheld by the CFI (Carree, Günster, and Schinkel, 2010:128).

stopping alleged anticompetitive conduct plus expected fines net of expected litigation or legal costs.

Profits π : Irrespective of its type, the firm initially makes a profit $\pi > 0$.²¹ If the agency succeeds and the firm is forced to stop the allegedly anticompetitive conduct, the firm's profits are normalized to zero.

Intrinsic value ω : Unlike for firms, the notion of profit for an agency is not as straightforward. We assume agencies have an intrinsic value $\omega > 0$ of detecting and disallowing (alleged) anticompetitive conduct.

Fines f : The European Commission (in case of infringement) and the Courts (in case of a guilty verdict) impose a fine $f > 0$.

Litigation costs c : We assume the *English rule* for the burden of litigation costs, meaning that the party who loses in court pays the litigation costs for both party. Litigation costs are assumed to be identical for both parties and equal to $c/2 \geq 0$, the losing party thus pays costs of $c \geq 0$. Note that we assume litigation costs equal to zero for all litigation stages other than the first, meaning litigation costs are incurred only for the ALJ/District Court in the U.S. and the CFI in Europe.

The players' payoffs are then as follows: If the agency decides to close the case, the firm's payoffs are π and the agency's payoffs are 0,

$$\begin{pmatrix} \pi \\ 0 \end{pmatrix}. \quad (1)$$

If the agency charges and the firm is found guilty²², the payoffs are

$$\begin{pmatrix} -f - c \\ \omega + f \end{pmatrix}. \quad (2)$$

If the agency charges and the firm is found not guilty, the payoffs are

$$\begin{pmatrix} \pi \\ -c \end{pmatrix}. \quad (3)$$

²¹A firm makes positive profits π either because it has legally acquired market power in an industry or it is employing anticompetitive measures and thus obtains a competitive edge over other firms in its industry.

²²In the U.S., the firm is found guilty if the agency takes the case to trial and the Court decides in favor of agency; or if the agency offers a CD, the firm rejects the CD, and the Court sides with the agency in the subsequent trial. In the EU, the firm is found guilty if the agency makes an infringement decision, the firm appeals the decision, and the CFI sides with the agency; or if the agency offers a CD, the firm rejects the CD, appeals the subsequent infringement, and the CFI sides with the agency.

If the firm accepts the agency’s CD, then no litigation costs are incurred and no fine paid. The payoffs are

$$\begin{pmatrix} 0 \\ \omega \end{pmatrix}. \tag{4}$$

These payoff vectors apply to both the U.S. and the European antitrust enforcement regime. The European system is richer in its options as the European Commission can issue an infringement decision and impose a fine without having to address a court of law. If the firm accepts such an infringement decision—either directly or by not appealing the infringement decision once it has rejected the CD offer—the payoff vector is

$$\begin{pmatrix} -f \\ \omega + f \end{pmatrix}. \tag{5}$$

Table 2 reports the firm’s and agency’s expected payoffs for a given probability α .

[TABLE 2 ABOUT HERE.]

For the formal analysis in this section and the empirical analysis in later sections we restrict attention to public enforcement of antitrust cases. We do not consider private antitrust litigation²³, criminal cases brought by the Department of Justice²⁴ and merger cases.

3.2 Equilibrium Results with Symmetric Information

In Lemmata 1 and 2 we present the subgame-perfect Nash equilibria for the antitrust enforcement regimes introduced in the previous section and characterized by the decision trees in Figures 1 and 2 and the payoffs in Table 2.

Note that because the litigation costs for further appeals are assumed to be zero, it is always optimal for the firm to appeal a guilty verdict and for the agency to appeal a not guilty verdict. We omit these parts of the players’ strategies from the results below.

We first define four critical values for the signal α :

$$\alpha_1 = \frac{c}{\omega + f + c} \tag{6}$$

$$\alpha_2 = \frac{\pi}{\pi + f + c} \tag{7}$$

$$\alpha_3 = \frac{\pi + f}{\pi + f + c} \tag{8}$$

$$\alpha_4 = \frac{\omega + c}{\omega + f + c}. \tag{9}$$

²³See Landes (1971); Gould (1973); Priest (1982); Bebchuk (1984); Priest and Klein (1984); Rosenberg and Shavell (1985); Reinganum and Wilde (1986); Nalebuff (1987); Fournier and Zuehlke (1989).

²⁴See, for instance, Gallo, Craycraft, and Dutta (1986); Gallo, Dau-Schmidt, Craycraft, and Parker (1994, 2000), or Kobayashi (2001).

Table 2: Expected Payoffs of Antitrust Enforcement

UNITED STATES	
Outcome	Expected Payoffs
Agency (FTC/DOJ) closes the case	$\begin{pmatrix} \pi \\ 0 \end{pmatrix}$
Agency charges the firm (trial)	$\begin{pmatrix} \pi - \alpha(\pi + f + c) \\ \alpha(\omega + f + c) - c \end{pmatrix}$
Agency resolves (offers CD) and firm accepts	$\begin{pmatrix} 0 \\ \omega \end{pmatrix}$
Agency resolves and firm rejects, trial	$\begin{pmatrix} \pi - \alpha(\pi + f + c) \\ \alpha(\omega + f + c) - c \end{pmatrix}$
EUROPEAN UNION	
Outcome	Expected Payoffs
Agency (Commission) closes the case	$\begin{pmatrix} \pi \\ 0 \end{pmatrix}$
Agency charges the firm (infringement), firm does not appeal	$\begin{pmatrix} -f \\ \omega + f \end{pmatrix}$
Agency charges and firm appeals	$\begin{pmatrix} \pi - \alpha(\pi + f + c) \\ \alpha(\omega + f + c) - c \end{pmatrix}$
Agency resolves (offers CD) and firm accepts	$\begin{pmatrix} 0 \\ \omega \end{pmatrix}$
Agency resolves and firm rejects, firm does not appeal infringement	$\begin{pmatrix} -f \\ \omega + f \end{pmatrix}$
Agency resolves and firm rejects, firm appeals infringement	$\begin{pmatrix} \pi - \alpha(\pi + f + c) \\ \alpha(\omega + f + c) - c \end{pmatrix}$

Note: Top element constitutes firm's payoffs and bottom element agency's payoffs.

For $\pi > 0$, $\omega > 0$, $f > 0$, and $c > 0$ these critical values are strictly positive and strictly less than unity. Moreover, $\alpha_1 < \alpha_4$ and $\alpha_2 < \alpha_3$.

The subgame-perfect Nash equilibrium of the extensive form game of antitrust enforcement in the United States as depicted in Figure 1 with payoffs in Table 2 is given in Lemma 1. Note that for $\alpha_1 \leq \alpha < \alpha_2$ the agency is indifferent between *resolve* or *charge* and plays any mixed strategy, including the pure strategies.

LEMMA 1 (Equilibrium for the U.S.). *In subgame-perfect Nash equilibrium, the agency's strategy is*

$$\left\{ \begin{array}{ll} \text{dismiss} & \text{if } \alpha < \min[\alpha_1, \alpha_2] \\ \text{resolve or charge} & \text{if } \alpha_1 \leq \alpha < \alpha_2 \\ \text{resolve} & \text{if } \alpha_2 \leq \alpha < \alpha_4 \\ \text{charge} & \text{if } \max[\alpha_2, \alpha_4] \leq \alpha; \end{array} \right.$$

the firm's strategy is to reject an offer of CD (resolve) if $\alpha < \alpha_2$ and accept otherwise.

Proof. See the appendix.

Q.E.D.

In the top panel (a) of Figure 3 we depict the agency's equilibrium case selection as function of signal α for the three cases: *US.I* when $\alpha_2 < \alpha_1$ or $\pi < \frac{c(f+c)}{\omega+f}$; *US.II* when $\alpha_1 < \alpha_2 < \alpha_4$ or $\frac{c(f+c)}{\omega+f} < \pi < \frac{(\omega+c)(f+c)}{f}$; and *US.III* when $\alpha_2 > \alpha_4$ or $\pi > \frac{(\omega+c)(f+c)}{f}$.²⁵ This figure is read as follows: Consider case *US.II*. Given that firms reject an offer of CD if $\alpha < \alpha_2$, it is optimal for the agency to dismiss the case for all $\alpha < \alpha_1$. If $\alpha_1 \leq \alpha < \alpha_2$, the agency is indifferent between making an offer of CD (resolve) or taking the case to court (trial) because the firm will reject the former in which case we assume the case automatically proceeds to trial. Thus, for some signals α just below α_2 the case is tried, whereas signals α just above α_2 the cases are resolved. The agency receives a better signal but does not charge the firm because it anticipates that the firm will accept such an offer of CD. This is because for all $\alpha < \alpha_4$ the expected court costs and the threat of losing ω in case the defendant prevails in court more than outweigh the expected benefits from a trial over an offer of CD, namely the fine f . For high enough signals, $\alpha \geq \alpha_4$, the probability of prevailing in court is high enough for the agency to prefer the uncertain court outcome over the safe payoffs ω from an offer of CD.

[FIGURE 3 ABOUT HERE.]

Let us now turn to the European enforcement system. The subgame-perfect Nash equilibrium of the extensive form game of antitrust enforcement by the European Commission in Europe as depicted in Figure 2 with payoffs in Table 2 is given in Lemma 2. Note that for $\alpha_1 \leq \alpha < \alpha_2$ the agency is indifferent between *resolve* or *charge* and plays any mixed strategy, including the pure strategies.

LEMMA 2 (Equilibrium for the European Commission). *In subgame-perfect Nash equilibrium, the agency's strategy is*

$$\left\{ \begin{array}{ll} \text{dismiss} & \text{if } \alpha < \min[\alpha_1, \alpha_2] \\ \text{resolve or charge} & \text{if } \alpha_1 \leq \alpha < \alpha_2 \\ \text{resolve} & \text{if } \alpha_2 \leq \alpha < \min[\alpha_3, \alpha_4] \\ \text{charge} & \text{if } \min[\max[\alpha_2, \alpha_4], \alpha_3] \leq \alpha \end{array} \right.$$

the firm's strategy is to appeal an infringement decision (charge) and reject an appeal a commitment decision (resolve) if $\alpha < \alpha_2$; appeal an infringement decision and accept a commitment decision if $\alpha_2 \leq \alpha < \alpha_3$; do not appeal an infringement decision and accept a commitment decision if $\alpha \geq \alpha_3$.

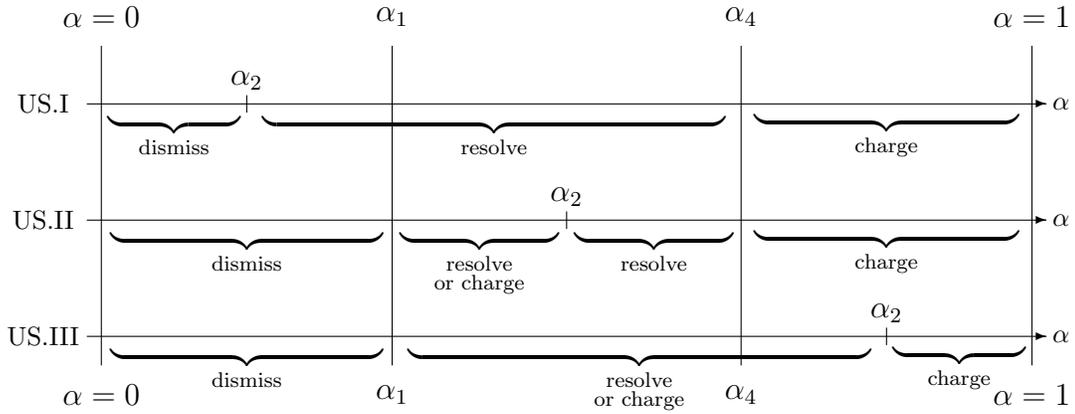
Proof. See the appendix.

Q.E.D.

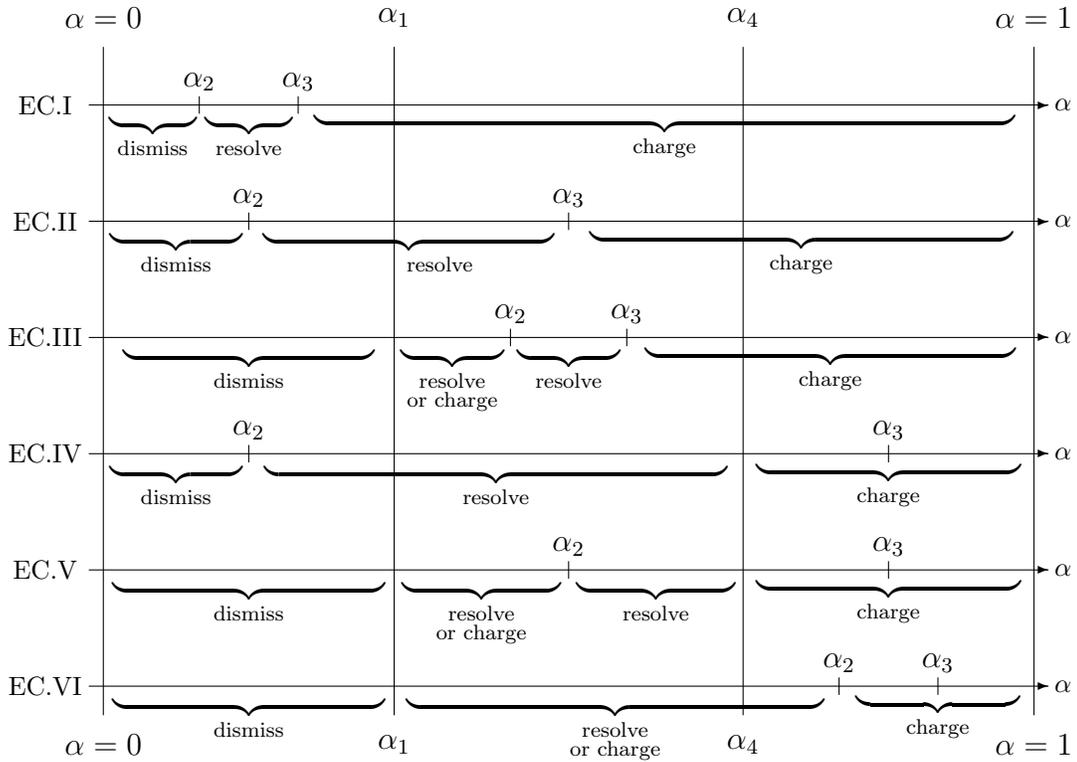
²⁵Because α_2 is increasing in π and both α_1 and α_4 are independent of π , we move from case *US.I* to *US.II* and *US.III* as π increases.

Figure 3: U.S. and EU Equilibrium Case Selection with Symmetric Information

(a) Equilibrium Case Selection: U.S. FTC and U.S. DOJ



(b) Equilibrium Case Selection: European Commission



The bottom panel (b) in Figure 3 depicts the European Commission’s case selection for the six cases to be considered, *EC.I* through *EC.VI*. Recall that $\alpha_2 < \alpha_3$ and $\alpha_1 < \alpha_4$. The cases are: *EC.I* when $\alpha_3 < \alpha_1$; *EC.II* when $\alpha_2 < \alpha_1 < \alpha_3 < \alpha_4$; *EC.III* when $\alpha_1 < \alpha_2 < \alpha_3 < \alpha_4$; *EC.IV* when $\alpha_2 < \alpha_1 < \alpha_4 < \alpha_3$; *EC.V* when $\alpha_1 < \alpha_2 < \alpha_4 < \alpha_3$; and *EC.VI* when $\alpha_4 < \alpha_2$.²⁶

First, note that the same cases are dismissed in the U.S. and in the European Union. Also, note that cases *US.I* and *EC.IV*, *US.II* and *EC.V*, and *US.III* and *EC.VI* are parallel cases with identical case selection. In all these cases, the parameters π , ω , f , and c are such that $\alpha_3 \geq \alpha_4$. For parameters such that $\alpha_3 < \alpha_4$ the case selection in the U.S. and in the EU differ. We can see this when comparing *US.I* with *EC.I* and *EC.II*. In all these cases, $\alpha_2 < \alpha_1$. These U.S. and European cases are identical but for α_3 . In the U.S., the agencies choose to resolve the case for all $\alpha_2 < \alpha < \alpha_4$ and charge for $\alpha \geq \alpha_4$, whereas the European Commission resolves for $\alpha_2 < \alpha < \alpha_3$ and charges for $\alpha \geq \alpha_3$. Because $\alpha_3 < \alpha_4$, more cases are resolved in the U.S. than in Europe, and fewer cases are charged in the U.S. than in Europe. The analogous argument applies to cases *US.II* and *EC.III*.

PROPOSITION 1 (Equilibrium Case Selection). *The equilibrium case selection in the U.S. and the EU is identical if and only if $\alpha_3 \geq \alpha_4$ or*

$$\begin{aligned} \pi &\geq \frac{c(\omega+c)}{f} - f && \text{or} \\ \omega &\leq \frac{f(\pi+f)}{c} - c && \text{or} \\ c &\leq \frac{\sqrt{4f(\pi+f)+\omega^2}-\omega}{2} && \text{or} \\ f &\geq \frac{\sqrt{4c(\omega+c)+\pi^2}-\pi}{2}. \end{aligned}$$

If otherwise, the European Commission charges more often than the U.S. antitrust agencies, i.e., for signals $\alpha_3 \leq \alpha < \alpha_4$ the European Commission issues infringement decisions whereas the U.S. agencies choose to resolve the case.

The crucial difference between the European system and the U.S. system is that in the latter, the firm has a credible threat of making the agency pay some of the litigation costs in case of a trial. This is because, in the U.S., the firm does not get to choose whether or not to appeal the agency’s trial decision—the agency will incur strictly positive expected litigation costs. In Europe, on the other hand, giving the firm the option to choose to appeal rather than introducing an automatic review of infringement decisions by the CFI harms the firm, because the Commission can correctly anticipate that firms will *not* appeal an infringement decision if $\alpha \geq \alpha_3$ and can safely charge the firm. Only have of all infringement decisions were appealed in the time horizon from 1964 to 2004. The main determinants for filing an appeal proceeding to the CFI are whether an acclaimed former partner in crime and the height of the

²⁶Because α_2 and α_3 are both increasing in π and both α_1 and α_4 are independent of π , we move from case *EC.I* to *EC.II* to either *EC.III* or *EC.IV* (depending on the α_1 and α_4) to *EC.V* and *EC.VI* as π increases.

fine Carree, Günster, and Schinkel (2010:128). For the European Commission, a not appealed infringement decision generates strictly higher payoffs than trial for the U.S. agencies, whereas an appealed infringement decision and a trial are payoff equivalent (see Table 2). When for any $\alpha < \alpha_3$ the European Commission anticipates the firms to appeal an infringement decision, it will follow the U.S. agencies strategy and resolve by making an offer of CD.

Proposition 1 summarizes the differences in the agencies' equilibrium case selection as a result of regime differences. In Proposition 2 below we provide results for the equilibrium *outcomes*. Even in a situation of identical case selection, the outcome of cases differs if in the U.S. firms reject offers of CD but accept them in Europe, vice versa, or if in Europe firms do not appeal infringement decisions. The former does not apply, meaning that a firm accepts an offer of CD in the U.S. if and only if the very same firm (i.e., the signal α) accepts an offer of CD in Europe.

Outcomes may nevertheless differ, because firms in Europe accept infringement decisions if $\alpha \geq \alpha_3$. Unlike in the U.S. where a trial results in the firms being found guilty with a probability of α , accepted infringement decisions render the firms guilty with certainty. It is straightforward to see that firms will never accept infringement decisions if $\alpha_3 \geq 1$. Proposition summarizes this result.

PROPOSITION 2 (Equilibrium Outcomes). *The U.S. and European antitrust enforcement systems yield the same equilibrium outcomes $\alpha_3 = 1$ so that all infringement decisions issued by the European Commission are appealed.*

Propositions 1 and 2 imply the following.

COROLLARY 1. *The U.S. and European antitrust enforcement systems are identical in equilibrium case selection and equilibrium outcomes if and only if $\alpha_3 = 1$ or $c = 0$.*

The proof is straightforward by $\alpha_3 = 1$ for $c = 0$. With no litigation or legal costs, all firms with $\alpha < 1$ strictly prefer appealing an infringement decision over accepting; and firms with $\alpha = 1$ are indifferent as the CFI will uphold the European Commissions' decision with certainty.

These results are at odds with previous analyses. Posner (1974:257) concludes that “[t]he results of our inquiry into whether the combination of prosecution and adjudication biases an agency’s adjudication, although hardly definite, suggest that it does not.” Our equilibrium analysis suggests that the combination of prosecution and adjudication with the European Commission indeed results in a case selection bias. Moreover, even if case selection is identical, for positive legal costs the expected outcomes of cases will differ.

4 Calibration Results

In this section, we present the results of a calibration exercise that illustrates the equilibria reported in Lemmata 1 and 2. Table 3 reports the different parameter values used. They are derived as follows:

Table 3: Calibration Parameters

	π	ω	f	c	α_1	α_2	α_3	α_4
(I)	1.037	2.599	1.273	1	0.205	0.313	0.698	0.739
(II)	2.697	2.599	1.273	1	0.205	0.543	0.799	0.739
(III)	3.862	2.599	1.273	1	0.205	0.629	0.837	0.739
(IV)	2.697	2.599	2.697	1	0.159	0.422	0.844	0.572
(V)	2.697	2.599	17.982	1	0.046	0.124	0.954	0.167

- (I) [Kelly \(1972:1679-1682\)](#) reports attorney’s fees as percentage of the (single) damages awarded in the U.S. We use attorney’s fees as a proxy for litigation costs and single damages as a proxy for fines. The cost/fine ratio is 0.7857. Normalizing costs to unity, $c = 1$, we option $f = 1.273$. [Veljanovski \(2007:80\)](#) reports the fine/harm ratio for 24 European cartel cases. The average fine/harm ratio is 0.4896. Harm is equal to consumer losses which we use as proxy for the agency’s intrinsic value ω . Given the normalized value for fines we obtain a normalized value for intrinsic value equal to $\omega = 2.599$. For a normalized value of firms’ profits π , we use the number presented in [Allain, Boyer, Kotchoni, and Ponsard \(2011:27, Table 5\)](#). For demand elasticity of 2, a cartel overcharge of 13%, and a competitive markup of 27% (total marginal cost markup of 40%) they report excess profits of 5% as a percentage of sales ([Buccirossi and Spagnolo, 2006](#)). Using annual sales data in [Veljanovski \(2007:80\)](#) we derive a profit/fine ratio of 0.8150, yielding normalized profits of $\pi = 1.037$.
- (II) For demand elasticity of 2, a cartel overcharge of 30%, and a competitive markup of 10% (total marginal cost markup of 40%) they report excess profits of 5%. This yields a profit/fine ratio of 2.1190 and normalized profits of $\pi = 2.697$.
- (III) For the profit/fine ratio we use the information for publicly listed firms in [Carree, Günster, and Schinkel \(2010\)](#) for which information on cartel duration and sub-market size is available. We use net margin as a proxy for profits. The profit/fine ratio is 3.034 and normalized profits equal to $\pi = 3.862$.
- (IV) [Combe and Monnier \(2010\)](#) define a *restitution fine* as annual access profits times the duration of the cartel. Instead of actual fines ([Veljanovski, 2007](#)) we use restitution fine; all other normalized parameters in calibration (II) fixed. The ratio of restitution fines over actual fines is 2.1190; normalized restitution fines are 2.697.
- (V) [Combe and Monnier \(2010\)](#) define a *dissuasive fine* as restitution fine divided by the probability of detection, for which they use 15% ([Bryant and Eckard, 1991](#); [Combe, Monnier, and Legal, 2007](#)). The ratio of dissuasive fines over actual fines is 14.1267; normalized dissuasive fines are 17.982.

Table 4: Calibrated Equilibrium Selection

	U.S.				Europe			
	<i>dismiss</i>	<i>resolve</i> <i>charge</i>	<i>resolve</i>	<i>charge</i>	<i>dismiss</i>	<i>resolve</i> <i>charge</i>	<i>resolve</i>	<i>charge</i>
(I)	20.52%	10.82%	42.54%	26.12%	20.52%	10.82%	38.45%	30.21%
(II)	20.52%	33.74%	19.61%	26.12%	20.52%	33.74%	19.61%	26.12%
(III)	20.52%	15.38%	37.98%	26.12%	20.52%	15.38%	35.90%	28.20%
(IV)	15.88%	26.30%	14.99%	42.83%	15.88%	26.30%	14.99%	42.83%
(V)	4.63%	7.81%	4.24%	83.32%	4.63%	7.81%	4.24%	83.32%

[TABLE 3 ABOUT HERE.]

In Table 3 we further report the critical values α_1 , α_2 , α_3 , and α_4 given the values for parameters π , ω , f , and c . Note calibration (I) yields equilibria *US.II* and *EC.III* and calibrations (II)-(V) yield *US.II* and *EC.V*.

In Table 4 we report the calibrated equilibrium decisions by the agencies. The values denote the percentage of cases the agency chooses to *dismiss*, *resolve*, or *charge*—the distribution of the agency’s decision. We report them in ascending order of α , assuming a uniform distribution of α . This means, e.g., for calibration (I), observing an $\alpha < 0.205\alpha_1$ the U.S. agencies dismiss the case in 20.5% of all cases; for $0.205 \leq \alpha < 0.313 = \alpha_2$ (amounting to 10.8% of all cases) the agencies *resolve* or *charge* the case; for $\alpha_2 = 0.313 \leq \alpha < 0.739 = \alpha_4$ (38.45% of all cases) the agencies *resolve* the case; for all $\alpha \geq 0.739 = \alpha_4$ (30.21% of all cases) the agencies charge. Because $\alpha_3 < \alpha_4$ for calibration (I), the European Commission charges more cases than the U.S. agencies, as predicted in Proposition 1.

[TABLE 4 ABOUT HERE.]

5 Concluding Remarks

We present a game-theoretic model that captures the differences in antitrust enforcement in the U.S. and Europe. In Europe, a first judicial instance or, put differently, a neutral player deciding upon facts of a case, is initially not available. The European Commission is both prosecutor and judge. This has raised concern about the impartiality of the European system. We provide conditions under which the two systems differ and the European Commission is more likely to issue antitrust infringement decisions than the DOJ or FTC in the U.S. are to bring a case to trial. Moreover, we show that for strictly positive legal costs, not all firms will appeal the Commission’s infringement decision. Assuming otherwise identical systems (with respect to fines and cost allocation), the lack of separation of power therefore increases the likelihood of a

firm in Europe being convicted for an antitrust violation irrespective of being guilty or not.

References

- AHLBORN, C. (2002): “Comment: Airtours/First Choice: CFI Clips MTF’s Wings,” *In Competition*, available at <http://www.linklaters.com/incompetition/200206.htm>.
- ALLAIN, M.-L., M. BOYER, R. KOTCHONI, AND J.-P. PONSSARD (2011): “The Determination of Optimal Fines in Cartel Cases: The Myth of Underdeterrence,” unpublished manuscript, *École Polytechnique, Paris*.
- AREEDA, P., AND L. KAPLOW (1997): *Antitrust Analysis: Problems, Text, Cases*. Aspen Law & Business, New York, 5th edn.
- BAKER, J. B. (2003): “The Case for Antitrust Enforcement,” *Journal of Economic Perspectives*, 17(4), 27–50.
- BEBCHUK, L. A. (1984): “Litigation and Settlement Under Imperfect Information,” *RAND Journal of Economics*, 15(3), 404–415.
- BRYANT, P., AND W. ECKARD (1991): “Price Fixing: The Probability of Getting Caught,” *Review of Economics and Statistics*, 73, 531–540.
- BUCCIROSSI, P., AND G. SPAGNOLO (2006): “Optimal Fines in the Era of Whistle Blowers,” Discussion Paper 5465, CEPR.
- CARREE, M., A. GÜNSTER, AND M. P. SCHINKEL (2010): “European Antitrust Policy 1957-2004: An Analysis of Commission Decisions,” *Review of Industrial Organization*, 36(2), 97–131.
- CASTILLO DE LA TORRE, F. (2010): “Evidence, Proof and Judicial Review in Legal Cases,” in *European Competition Law Annual 2009: Evaluation of Evidence and its Judicial Review in Competition Cases*, ed. by C.-D. Ehlermann, and M. Marquis. Hart Publishing, Oxford and Portland.
- COMBE, E., AND C. MONNIER (2010): “Fines Against Hard-Core Cartels in Europe: The Myth of Overenforcement,” *Antitrust Bulletin*, forthcoming.
- COMBE, E., C. MONNIER, AND R. LEGAL (2007): “Cartels: The Probability of Detection in the European Union,” Working paper, PRISM-Sorbonne.
- DEPARTMENT OF JUSTICE (2008): *Antitrust Division Manual*. U.S. Department of Justice, Antitrust Division, 4th edn., available at <http://www.justice.gov/atr/public/divisionmanual/atrdvman.pdf>.
- EDWARDS, C. D. (1950): “Trends in Enforcement of the Antimonopoly Laws,” *Journal of Marketing*, 14(5), 657–665.
- FORRESTER, I. S. (2009): “Due Process in EC Competition Cases: A Distinguished Institution with Flawed Procedures,” *European Law Review*, 34(6), 817–.

- FOURNIER, G. M., AND T. W. ZUEHLKE (1989): "Litigation and Settlement: An Empirical Approach," *Review of Economics and Statistics*, 71(2), 189–195.
- GALLO, J. C., J. L. CRAYCRAFT, AND S. C. BUSH (1985): "Guess Who Came to Dinner: A Statistical Study of Federal Antitrust Enforcement for the Period 1963-1984," *Review of Industrial Organization*, 2(2), 106–130.
- GALLO, J. C., J. L. CRAYCRAFT, AND S. DUTTA (1986): "Incarceration and Fines: An Empirical Study of Antitrust Sanctions," *Review of Industrial Organization*, 3(2), 38–66.
- GALLO, J. C., K. G. DAU-SCHMIDT, J. L. CRAYCRAFT, AND C. J. PARKER (1994): "Criminal Penalties under the Sherman Act: A Study of Law and Economics," *Research in Law and Economics*, 16, 1–73.
- (2000): "Department of Justice Antitrust Enforcement, 1955-1997: An Empirical Study," *Review of Industrial Organization*, 17(1), 75–133.
- GHOSAL, V., AND J. C. GALLO (2001): "The Cyclical Behavior of the Department of Justice Antitrust Enforcement Activity," *International Journal of Industrial Organization*, 19(1-2), 27–54.
- GHOSAL, V., AND J. STENNEK (2007): *The Political Economy of Antitrust*. North-Holland, Amsterdam.
- GOULD, J. P. (1973): "The Economics of Legal Conflict," *Journal of Legal Studies*, 2(2), 279–300.
- GUAL, J., AND N. MAS (2007): "Industry Characteristics and Anti-Competitive Behaviour: Evidence from the EU," Working Paper 687, IESE Business School - University of Navarra.
- KELLY, K. F. (1972): "Attorney's Fees in Individual and Class Action Antitrust Litigation," *California Law Review*, 60, 1656–1682.
- KOBAYASHI, B. H. (2001): "Antitrust, Agency and Amnesty: An Economic Analysis of the Criminal Enforcement of the Antitrust Laws Against Corporations," *George Washington Law Review*, 69(5-6), 715–744.
- KOVACIC, W. E., AND C. SHAPIRO (2000): "Competition Policy: A Century of Economic and Legal Thinking," *Journal of Economic Perspectives*, 14(1), 43–60.
- LANDES, W. M. (1971): "An Economic Analysis of the Courts," *Journal of Law and Economics*, 14(1), 61–107.
- LIN, P., B. RAJ, M. SANDFORT, AND D. SLOTTJE (2000): "The US Antitrust System and Recent Trends in Antitrust Enforcement," *Journal of Economic Surveys*, 14(3), 255–306.
- MOTTA, M. (2004): *Competition Policy: Theory and Practice*. Cambridge University Press, Cambridge, UK.

- NALEBUFF, B. (1987): “Credible Pretrial Negotiations,” *RAND Journal of Economics*, 18(2), 198–210.
- NEVEN, D. J. (2006): “Competition Economics and Antitrust in Europe,” *Economic Policy*, 21(48), 741–791.
- POSNER, R. A. (1970): “A Statistical Study of Antitrust Enforcement,” *Journal of Law and Economics*, 13(2), 365–419.
- (1974): “The Behavior of Administrative Agencies,” in *Essays in the Economics of Crime and Punishment*, ed. by G. S. Becker, and W. M. Landes, pp. 215–261. UMI.
- POSNER, R. A. (2001): *Antitrust Law*. University of Chicago Press, Chicago, 2nd edn.
- PRIEST, G. L. (1982): “Regulating the Content and Volume of Litigation: An Economic Analysis,” *Supreme Court Economic Review*, 1, 163–183.
- PRIEST, G. L., AND B. KLEIN (1984): “The Selection of Disputes for Litigation,” *Journal of Legal Studies*, 13(1), 1–55.
- REINGANUM, J. F., AND L. L. WILDE (1986): “Settlement, Litigation, and the Allocation of Litigation Costs,” *RAND Journal of Economics*, 17(4), 557–566.
- ROSENBERG, D., AND S. SHAVELL (1985): “A Model in Which Suits are Brought for Their Nuisance Value,” *International Review of Law and Economics*, 5(1), 3–13.
- RUSSO, F., M. P. SCHINKEL, A. GÜNSTER, AND M. CARREE (2010): *European Commission Decisions on Competition: Economic Perspectives on Landmark Antitrust and Merger Cases*. Cambridge University Press, Cambridge, UK.
- SALOP, S. C., AND L. J. WHITE (1986): “Economic Analysis of Private Antitrust Litigation,” *Georgetown Law Journal*, 74, 1001–1064.
- SCHINKEL, M. P. (2007): “Effective Cartel Enforcement in Europe,” *Conferences on New Political Economy*, 24(1), 131–170.
- SCHWARZE, J., R. BECHTOLD, AND W. BOSCH (2008): “Deficiencies in European Community Competition Law: Critical Analysis of the Current Practice and Proposals for Change,” Discussion paper, GleissLutz Rechtsanwälte, Stuttgart.
- SLATER, D., S. THOMAS, AND D. WAELEBROECK (2008): “Competition Law Proceedings Before the European Commission and the Right to a Fair Trial: No Need for Reform?,” GCLC Working Paper 04/08, Global Competition Law Centre, College of Europe, Brugge.
- VELJANOVSKI, C. (2007): “Cartel Fines in Europe: Law, Practice and Deterrence,” *World Competition*, 30(1), 65–86.
- VISCUSI, W. K., J. E. HARRINGTON, AND J. M. VERNON (2005): *Economics of Regulation and Antitrust*. MIT Press, Cambridge, MA, 4th edn.

- WILS, W. P. J. (2004): “The Combination of the Investigative and Prosecutorial Function and the Adjudicative Function in EC Antitrust Enforcement: A Legal and Economic Analysis,” *World Competition*, 27(2), 201–224.
- (2010): “The Increased Level of EU Antitrust Fines, Judicial Review and the ECHR,” *World Competition*, 33(1), 5–.
- WINCKLER, A. (2003): “Some Comments on Procedure and Remedies under EC Merger Control Rules: Something Rotten in the Kingdom of the EC Merger Control?,” *World Competition*, 26(2), 219–232.

Proof of Lemma 1

Proof. To derive the subgame-perfect Nash-equilibria, we apply backward induction. The extensive form of the game is depicted in Figure 1, the payoffs are listed in Table 2.

Firms The firm's only decision is to either *accept* or *reject* the agencies' offer of CD. The firm rejects such an offer if $\pi - \alpha(\pi + f + c) > 0$ or

$$\alpha < \frac{\pi}{\pi + f + c} = \alpha_2.$$

It will accept an offer if $\alpha \geq \alpha_2$.

Agencies For the agencies' decision (*dismiss*, *resolve*, *charge*) we consider two cases. (1) The agencies anticipate the firm to accept an offer of CD if they observe a signal $\alpha \geq \alpha_2$. In this case, *dismiss* is strictly dominated, and the agencies choose *resolve* over *charge* if $\omega > (\omega + f + c) - c$ or

$$\alpha < \frac{\omega + c}{\omega + f + c} = \alpha_4,$$

and *charge* otherwise. (2) The agencies anticipate the firm to reject an offer of CD if they observe a signal $\alpha < \alpha_2$. For this case note that the agencies are indifferent between *resolve* (which the firm rejects, implying an automatic transfer to *charge*) and *charge*. The agencies will thus choose *dismiss* over *resolve* or *charge* if $0 > \alpha(\omega + f + c) - c$ or

$$\alpha \leq \frac{c}{\omega + f + c} = \alpha_1,$$

and *resolve* or *charge* otherwise.

Given these critical values α_1 , α_2 , and α_4 , where $\alpha_1 < \alpha_4$ by assumption of $\omega > 0$, we must consider three cases (these cases are summarized in Figure 3):

US.I for $\alpha_2 < \alpha_1 < \alpha_4$: The agencies *dismiss* the case for all $\alpha < \alpha_2$; they *resolve* the case (and the firms *accept*) for all $\alpha_2 \leq \alpha < \alpha_4$; the agencies *charge* for $\alpha \geq \alpha_4$.

US.II for $\alpha_1 \leq \alpha_2 < \alpha_4$: The agencies *dismiss* the case for all $\alpha < \alpha_1$; they *resolve* or *charge* the case (if resolve the firms reject) if $\alpha_1 \leq \alpha \leq \alpha_2$; they *resolve* the case for $\alpha_2 \leq \alpha < \alpha_4$; they *charge* for $\alpha \geq \alpha_4$.

US.III for $\alpha_1 < \alpha_4 \leq \alpha_2$: The agencies *dismiss* for all $\alpha < \alpha_1$; they *resolve* or *charge* for $\alpha_1 \leq \alpha < \alpha_2$; they *charge* for $\alpha \geq \alpha_4$.

From the case discussion it follows that the agencies will dismiss the case for $\alpha < \min[\alpha_1, \alpha_2]$; they *resolve* or *charge* the case for $\alpha_1 \leq \alpha < \alpha_2$; they *resolve* the case for $\alpha_2 \leq \alpha < \alpha_4$; they *charge* for $\alpha \geq \alpha_4$. Q.E.D.

Proof of Lemma 2

Proof. The extensive form of the game is depicted in Figure 2, the payoffs are listed in Table 2.

Firms The firm's strategy prescribes what to do (*accept*, *reject* \mathcal{E} *appeal*, *reject* \mathcal{E} *no appeal*) if the agency *resolves* (and the case is automatically charged if *reject*), and what to do (*appeal* or *no appeal*) if the agency *charges*.

First, note that *reject* \mathcal{E} *no appeal* is strictly dominated by *accept*. The firm *rejects* \mathcal{E} *appeals* an offer of CD (agency *resolves*) if $\pi - \alpha(\pi + f + c) > 0$ or

$$\alpha < \frac{\pi}{\pi + f + c} = \alpha_2$$

and accepts otherwise. The firm appeals a *charge* (infringement decision) if $\pi - \alpha(\pi + f + c) > -f$ or

$$\alpha < \frac{\pi + f}{\pi + f + c} = \alpha_4$$

and does not appeal otherwise. Note that $\alpha_2 < \alpha_3$ by assumption of $f > 0$. Hence, for $\alpha < \alpha_2$, the firm rejects an offer of CD and appeals an infringement decision; for $\alpha_2 \leq \alpha < \alpha_3$ the firm accepts the offer of CD and appeals the infringement decision; for $\alpha \geq \alpha_3$ it accepts the offer of CD and does not appeal the infringement decision.

Agency For the agency's decision (*dismiss*, *resolve*, *charge*) we consider the three cases:

(1) The agency anticipates the firm to reject a CD (*resolve*) and appeal an infringement (*charge*) for $\alpha < \alpha_2$. In this case, the agency is indifferent between *resolve* and *charge* and will *dismiss* the case if $0 > \alpha(\omega + f + c) - c$ or

$$\alpha < \frac{c}{\omega + f + c} = \alpha_1,$$

resolve or *charge* otherwise.

(2) The agency anticipates the firm to accept a CD (*resolve*) and not appeal an infringement (*charge*) for $\alpha \geq \alpha_3$. In this case, the agency will always *charge*, i.e., for all $\alpha \geq \alpha_3$.

(3) The agency anticipates the firm to accept a CD (*resolve*) and appeal an infringement (*charge*) for $\alpha_2 \leq \alpha < \alpha_3$. *Dismiss* is dominated by *resolve*, and the agency chooses *resolve* over *charge* if $\omega > \alpha(\omega + f + c) - c$ or

$$\alpha < \frac{\omega + c}{\omega + f + c} = \alpha_4,$$

charge otherwise.

Given these critical values α_1 , α_2 , α_3 , and α_4 , where $\alpha_1 < \alpha_4$ and $\alpha_2 < \alpha_3$, we must consider six cases (these cases are summarized in Figure 3):

EC.I for $\alpha_2 < \alpha_3 < \alpha_1 < \alpha_4$: The agency *dismisses* for $\alpha < \alpha_2$; it *resolves* for $\alpha_2 \leq \alpha < \alpha_3$; it *charges* for $\alpha \geq \alpha_3$. The firm accepts the CD and does not appeal the infringement decision.

EC.II for $\alpha_2 < \alpha_1 \leq \alpha_3 < \alpha_4$: The agency *dismisses* for $\alpha < \alpha_2$; it *resolves* for $\alpha_2 \leq \alpha < \alpha_3$; it *charges* for $\alpha \geq \alpha_3$. The firm accepts the CD and does not appeal the infringement.

EC.III for $\alpha_1 \leq \alpha_2 < \alpha_3 < \alpha_4$: The agency *dismisses* for $\alpha < \alpha_1$; it *resolves or charges* for $\alpha_1 \leq \alpha < \alpha_2$; it *resolves* for $\alpha_2 \leq \alpha < \alpha_3$; it *charges* for $\alpha \leq \alpha_3$. The firm rejects and appeals the CD (or appeals the infringement for $\alpha_1 \leq \alpha < \alpha_2$) and does not appeal the infringement.

EC.IV for $\alpha_2 < \alpha_1 < \alpha_4 \leq \alpha_3$: The agency *dismisses* for $\alpha < \alpha_2$; it *resolves* for $\alpha_2 \leq \alpha < \alpha_4$; it *charges* for $\alpha \geq \alpha_4$. The firm accepts the CD; appeals the infringement for $\alpha_4 \leq \alpha < \alpha_3$ and does not appeal otherwise.

EC.V for $\alpha_1 \leq \alpha_2 < \alpha_4 \leq \alpha_3$: The agency *dismisses* for $\alpha < \alpha_1$; it *resolves or charges* for $\alpha_1 \leq \alpha < \alpha_2$; it *resolves* for $\alpha_2 \leq \alpha < \alpha_4$; it *charges* for $\alpha \geq \alpha_4$. The firm rejects and appeals the CD (or appeals the infringement for $\alpha_1 \leq \alpha < \alpha_2$), appeals the infringement for $\alpha_4 \leq \alpha < \alpha_3$ and does not appeal otherwise.

EC.VI for $\alpha_1 < \alpha_4 \leq \alpha_2 < \alpha_3$: The agency *dismisses* for $\alpha < \alpha_1$; it *resolves or charges* for $\alpha_1 \leq \alpha < \alpha_2$; it *charges* for $\alpha \geq \alpha_2$. The firm rejects and appeals the CD (or appeals the infringement for $\alpha_1 \leq \alpha < \alpha_2$), appeals the infringement for $\alpha_2 \leq \alpha < \alpha_3$ and does not appeal otherwise.

From the case discussion it follows that the agency will dismiss the case for $\alpha < \min[\alpha_1, \alpha_2]$; it *resolves or charges* the case for $\alpha_1 \leq \alpha < \alpha_2$; it *resolves* the case for $\alpha_2 \leq \alpha < \min[\alpha_3, \alpha_4]$; it *charges* for $\alpha \geq \max[\alpha_2, \min[\alpha_3, \alpha_4]]$ or equivalently $\alpha \geq \min[\max[\alpha_2, \alpha_4], \alpha_3]$. Q.E.D.

Proof of Proposition 1

Proof. Identical case selection for $\alpha_3 \geq \alpha_4$ follows straight from the equilibria in Lemmata 1 and 2. The cutoff values for π , ω , c , and f are derived by setting $\alpha_3 = \alpha_4$ and solving for the respective parameter. Q.E.D.

Proof of Proposition 2

Proof. When all infringement decisions issued by the European Commission are appealed, than the expected outcome (guilty or not guilty) of *charge* are identical in the two systems. By Lemma 2, the firms do not appeal infringement decisions for $\alpha \geq \alpha_3$. If $\alpha_3 = 1$, then all infringement decisions are appealed. Q.E.D.