

Enforcement of anticollusion laws against domestic and foreign firms

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Abstract

Do antitrust authorities consider the national identities of firms when enforcing anticollusion laws? Authorities may follow a neutral enforcement approach or focus on either foreign or domestic firms. We investigate these issues in the context of cartel enforcement against EU, US, and rest-of-the-world (ROW) firms by the European Union and the United States—the two jurisdictions with the longest and most robust enforcement histories. Our results indicate that national identities matter. The European Union is more likely to fine domestic and ROW firms than US firms. The United States also disproportionately targets ROW firms, but is no more likely to fine EU firms than domestic firms. With respect to the size of fines, EU enforcement outcomes show no significant differences among categories of firms. The United States, however, levies significantly higher fines on foreign firms than domestic firms, whether from the European Union or the rest of the world.

* We thank Gustavo Vicentini, Courtney Asher, Andres Shahidinejad, and John Maney for research assistance. We are grateful for comments received from participants at the 2016 conference Problems with Global Antitrust Enforcement at Yale University and the 2013 American Law and Economics Association annual meeting. We also thank Deniz Aydin, Elaine Fleming, Jim Levinsohn, Shannon Seitz, and Jeremy Smith for comments.

Published in *Concurrences* online version with authorization (November 20, 2017). Originally published in *The Journal of Law and Economics*, Vol. 59, No. 4 (November 2016).

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I. Introduction

1. Given the huge increase in the number of countries with enforcement regimes, antitrust enforcement is prominent within the emerging “global administrative space” that is also occupied by intellectual property law and environmental law (Mitchell and Farnik 2009, p. 238).¹ Whether law and policy will converge has been a central concern to academics and practitioners. Wood (2002) and others recognize that existing statutes diverge in important respects within the three major areas of antitrust law—anticollusion, mergers, and monopolization—and argue that comity will be achieved only through a slow process of harmonization. Closely related to the question of convergence is whether antitrust authorities will favor domestic firms over foreign firms. With globalization, individual authorities will decide with increasing frequency whether to proceed with actions against foreign firms and what penalties to impose when they are found liable. In principle, individual authorities might exhibit a neutral approach whereby the national identities of firms do not influence enforcement actions, treat foreign firms more harshly than domestic firms, or focus their enforcement efforts on domestic firms.

2. Enforcement behaviors toward foreign and domestic firms can shed light on the underlying objectives that guide antitrust enforcement (on the goals of antitrust regimes, see Elzinga 1977; Carlton 2007; Blair and Sokol 2012; Crane 2015) and reveal, for example, whether political interests known to affect international trade policies also affect antitrust enforcement. The patterns of enforcement, which may introduce variance in penalties and deterrence, are also of interest for efficiency reasons. Neutral enforcement would be consistent with the efficient allocation of scarce enforcement resources. An efficiency-oriented authority also may focus on domestic firms if it has advantages in discovering, prosecuting, and imposing penalties on domestic firms or if enforcement actions against domestic firms yield greater deterrent benefits. More aggressive enforcement against foreign firms than domestic firms, however, would likely be inconsistent with overall efficiency: along with greater difficulties in dealing with foreign entities, targeting foreign firms could adversely affect entry and investment decisions and increase the potential for retaliation across jurisdictions.

3. With more than 120 antitrust regimes capable of bringing a wide range of actions, many inquiries into the role of the national identities of the firms in global antitrust enforcement are possible. Few of these would, however, generate systematic evidence for the role of national identities. Here we focus on anticollusion law; enforcement by two prominent authorities, the European Union and the United States; and the national identities of three types of firms—EU firms, US firms, and rest-of-the-world (ROW) firms. This empirical strategy has the potential to yield reliable insights for several reasons. First, the European Union and the United States each have a long history of enforcement. Indeed, our data span a 21-year period and include 938 fines imposed by the two jurisdictions. Second, the European Union and the United States trade extensively with each other and with the rest of the world. As a result, we can examine many instances in which EU, US, and ROW firms may face potential antitrust liability in both jurisdictions. Third, the legal prohibitions against price-fixing agreements, bid rigging, and market allocation are relatively clear-cut in both EU and US enforcement regimes.² Hence, revealed differences in how domestic and foreign firms are treated are less likely to reflect divergent policies and more likely to reflect enforcement biases and resource allocation decisions. Fourth and related, the authorities can exercise substantial discretion in their enforcement decisions. Their methodologies for setting fines include an array of factors that go

¹ Intellectual property law is currently influenced by two multijurisdictional platforms—the World Intellectual Property Organization and the Agreement on Trade-Related Aspects of Intellectual Property Rights. Similarly, environmental impact assessment requirements have been widely adopted across multiple jurisdictions and are part of several international environmental treaties on climate change and marine standards, for example, the European Union’s 2006 Environmental Impact Assessment Directive 85/337/EEC.

² The convergence among enforcement regimes in focusing on agreements among horizontal competitors as opposed to the exercise of market power should not suggest, however, a supporting consensus among scholars. See Kaplow (2013).

beyond so-called affected sales, including judgments about the severity of the violation, the firm's role in the collusion, and the need to deter similar conduct.³ In addition, guilty pleas are often like settlements in that the accompanying fines may be based on time periods, product lines, and market segments that are narrower than the scope of the allegations in the original complaint.⁴

4. Our focused empirical strategy, however, implies limitations in drawing broader inferences about the role of national identities in global antitrust enforcement. Anticollusion enforcement by the two most important enforcement regimes in recent decades is not where one would first look to find pronounced indications of enforcement bias related to national identities. Indeed, the consensus on what constitutes illegal cartel activity and the long enforcement and trade histories between the European Union and the United States might combine to reduce the influence of national identities. One might view, therefore, our inquiry as constituting a weak test for the presence of such biases in the increasingly dynamic and expanding landscape of antitrust enforcement. A further issue with our focused empirical strategy concerns the role of other types of penalties. In the United States, civil penalties are often observed alongside potent private follow-on claims and companion criminal cases. If US enforcement on these other dimensions differs among EU, US, and ROW firms, then observed differences in civil penalties might be counterbalanced or enhanced.

5. We proceed in Section II by discussing the three potential hypotheses concerning the behavior of antitrust authorities in a global context. In Section III, we describe the data we collected and the empirical methods for estimating the likelihood of fines and their size. These methods rely on temporal conditional probabilities that correspond to whether cartel activity punished in one jurisdiction was punished in the other, irrespective of timing. We report our results in Section IV and offer concluding remarks in Section V.

II. Hypotheses concerning global antitrust enforcement

6. From the passage of the Sherman Act in 1890 to the present, the share of world gross domestic product (GDP) in countries with antitrust enforcement rose from less than 20% to over 95%.⁵ Important expansions of antitrust enforcement include the 1947 Japanese Antimonopoly Act, the 1957 Treaty Establishing the European Economic Community, and the 2008 Antimonopoly Act in China. In the last 15 years, over 20 countries have adopted forms of antitrust enforcement.⁶ In addition, several jurisdictions have intensified enforcement of existing laws in recent decades.⁷ The expansion of antitrust enforcement has occurred in parallel with the globalization of the world economy. In part because of trade negotiations that significantly decreased tariffs and other barriers, imported goods and services increased as a percentage of global GDP from 13% in 1960

³ See the Appendix for information on EU and US methodologies for calculating fines.

⁴ An instructive example in this regard concerns settlements in the vitamin price-fixing cases brought in the European Union and the United States. The European Union fined Roche, one of the cartel members, on the basis of its sales of 12 different vitamin product lines, whereas the US fine of Roche was based on its sales of five product lines (European Commission 2001; US DOJ 1999a).

⁵ Canada's Competition Act, enacted in 1889, was the first antitrust statute in the Western world, and the Sherman Act followed in 1890. The gross domestic product (GDP) percentages cited are based on a list of countries with antitrust statutes assembled by the authors and World Bank, GDP (current US\$) (<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>).

⁶ See Federal Trade Commission, Competition and Consumer Protection Authorities Worldwide (<http://www.ftc.gov/policy/international/competition-consumer-protection-authorities-worldwide>); Palim (1998).

⁷ For example, while competition issues at the European level were covered by the 1957 Treaty Establishing the European Economic Commission (Art. 85 and 86), systematic antitrust enforcement by the European Union started only in the mid-1980s.

to 30% in 2012.⁸ Net global foreign direct investment increased more dramatically, from \$10.2 billion in 1970 to \$1.5 trillion in 2012 in current US dollars.⁹ Relevant to our empirical focus, the European Union and the United States are major trading partners.

7. With these changes, individual antitrust authorities must decide with increasing frequency whether to proceed with enforcement actions against foreign firms (Budzinski 2014). Along with promoting consumer welfare and economic efficiency, authorities may protect particular interest groups and, in the case of the European Union, foster economic integration (Fox 2000). The potential behaviors of individual authorities can be categorized as follows. First, authorities may follow a neutral approach whereby the national identities of firms play no role in enforcement decisions to impose a fine or its amount. Second, they may treat foreign firms more harshly than domestic firms. Third, they may focus their enforcement efforts on domestic firms and treat them more harshly than foreign firms.

8. None of these behaviors can be ruled out on an a priori basis. Along with the similarity of the prohibitions against collusion in Article 101 of the European Commission's Treaty on the Functioning of the European Union (hereafter, "EC Treaty") and Section 1 of the Sherman Act,¹⁰ various bilateral and multilateral institutions favor neutral enforcement by encouraging authorities to share information and consult on actual and potential investigations.¹¹ The European Union has actively cooperated with competition authorities in the United States, Canada, Japan, Korea, and other countries for exchanging information and coordinating enforcement.¹² The United States has similar agreements with a large set of countries and several mutual legal assistance treaties outlining assistance on criminal law enforcement matters (Guzman 2001; US DOJ 2000; Kendall and Funk 2014). Operative since 2001, the International Competition Network involves the European Union, the United States, and 12 other jurisdictions and promotes coordination and nondiscrimination.¹³

9. Another factor favoring neutral enforcement is the potential for retaliation (Kerber and Budzinski 2003). Enforcement actions that benefit domestic firms at the expense of foreign firms may prompt enforcement actions with similar effects by foreign authorities, which results in a mix of winning and losing domestic firms in each jurisdiction. Whether the threat of retaliation will constrain an authority's use of antitrust enforcement for domestic political economy purposes depends on the likelihood of responses from foreign authorities and their effects.¹⁴ The substantial EU-US trade relationship and the high frequency of anticollusion enforcement actions may contribute to a significant retaliation constraint for the European Union when dealing with US firms and for the United States when dealing with EU firms. By contrast, the retaliation constraint may be weaker between the European Union and other jurisdictions and between the

⁸ World Bank, Imports of Goods and Services (% of GDP) (<http://data.worldbank.org/indicator/NE.IMP.GNFS.ZS>).

⁹ World Bank, Foreign Direct Investment, Net Flows (BoP, current US\$) (<http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD>).

¹⁰ Despite important questions, for example, whether anticollusion laws should emphasize the concept of an agreement (Kaplow 2011, 2013), the relevant statutes in the European Union (Article 101) and the United States (Section 1 of the Sherman Act) are similar.

¹¹ The European Union has antitrust cooperation agreements with the United States, Canada, Japan, and Korea. Likewise, the United States has arrangements with the European Union, Germany, Israel, Canada, Australia, Japan, Brazil, and Mexico. Multilateral agreements include the International Competition Network (ICN) created in October 2001 by 14 governments, including Canada, the European Union, Japan, Korea, the United Kingdom, and the United States; the Competition Law and Policy program at the United Nations; and the Organisation for Economic Co-operation and Development's Competition Committee. These agreements call for antitrust authorities to account for the impact of anticompetitive conduct on other countries when considering enforcement actions (Guzman 2001).

¹² See European Union, Bilateral Relations on Competition Issues (<http://ec.europa.eu/competition/international/bilateral>).

¹³ The ICN originated from recommendations made by the now-defunct International Competition Policy Advisory Committee, which favored greater convergence of competition policy (Hufbauer and Kim 2008).

¹⁴ There is a substantial game theory literature demonstrating conditions under which cooperation can be maintained over repeated interactions with tit-for-tat strategies or the threat of other punishments for deviations from cooperation. See, for example, Abreu (1988), Kreps et al. (1982), and Fudenberg and Maskin (1986). Regarding international relations of all kinds, cooperation can break down when such necessary conditions are not present, including where political, bureaucratic, or other issues limit a country's ability to retaliate in response to another country's deviation from cooperation or to commit to a tit-for-tat strategy. See, for example, Oye (1985).

United States and other jurisdictions. If so, differential effects may be found in how the two jurisdictions treat ROW firms.

10. It is important to recognize that the bilateral and multilateral institutional arrangements identified above do not limit the antitrust actions by any jurisdiction.¹⁵ Enforcers might focus their actions against foreign firms to advantage domestic interests, including national champions, and potentially promote investment and research and development in particular sectors (Utton 2003).¹⁶ While potential retaliation may deter protectionist-oriented actions, the political benefits from helping particular domestic firms may outweigh the diffuse and uncertain costs of possible future retaliations (Kerber and Budzinski 2003). Foreign-focused antitrust enforcement could be broadly consistent with legislation that supports export cartels (15 U.S.C. 61–66; 15 U.S.C. 6a)¹⁷ and protections of domestic firms against foreign competition.¹⁸ Foreign-focused antitrust enforcement could also be broadly consistent with the European Union’s policies of coordinating economic activity.¹⁹

11. Finally, we cannot rule out domestically focused enforcement resulting from differential advantages in investigating and prosecuting domestic entities. Authorities encounter a range of practical problems in dealing with foreign firms, including accessing witnesses, forcing discovery responses, translating information, and collecting penalties. These are more salient when an authority’s budget depends on the aggregate fines collected. Given the more visible roles of domestic firms in the economy and their greater collective share of GDP, authorities also may focus on prosecutions of domestic companies to the extent that they yield greater deterrent benefits than do prosecutions of foreign firms and may enhance the competitiveness of domestic industries (Stephan 2003).

III. Data and empirical methods

12. In this section we summarize the data we collected on EU enforcement of Article 101 of the EC Treaty and US enforcement of Section 1 of the Sherman Act during the period 1994–2014. (See the Appendix for additional details of the data collection.) We then describe the empirical methods we use for estimating the likelihood that a firm is fined in one jurisdiction and the size of the fine given a fine in the other jurisdiction.

¹⁵ The ICN states that it “does not exercise any rule-making function (...) [, and] individual competition authorities decide whether and how to implement the recommendations, through unilateral, bilateral or multilateral arrangements” (International Competition Network, About [<http://www.internationalcompetitionnetwork.org/about.aspx>]).

¹⁶ In the context of mergers and acquisitions, Dinc and Erel (2009) contend that nationalist policies are expressed in government interventions that assist domestic bidders and raise obstacles to foreign bidders.

¹⁷ The Webb-Pomerene Act of 1918 provides antitrust exemption for firms engaged in collective export sales of goods provided that the exporting activity does not have an anticompetitive effect in the United States. Associations currently exempted under this act include the American Cotton Exporters Association, the California Dried Fruit Export Association, and the Phosphate Chemicals Export Association (Federal Trade Commission, Webb-Pomerene Act Filings [<http://www.ftc.gov/policy/reports/webb-pomerene-act-filings>]). The Export Trading Company Act of 1982 also allows US exporting firms to obtain a license granting immunity from antitrust laws. Again, firms must demonstrate that the export conduct will not restrain competition in the United States and will not result in the resale of the good in the United States (US DOJ and Federal Trade Commission 1995). Such legislation has been characterized as “*alternatives to protectionist responses such as quotas, higher duties, export subsidies, etc.*” (Marion 1991, p. 6).

¹⁸ For example, the Revenue (Antidumping) Act of 1916 established sanctions for importers selling goods in the United States at prices below the prices charged in their home markets (US DOJ and Federal Trade Commission 1995). The Tariff Act of 1930 prohibits “*unfair methods of competition (...) in the importation of articles (...) into the United States*” if the effect is to injure a US industry, and it allows US firms to petition the government for offsetting duties on foreign imports sold in the United States at unreasonably low prices (US DOJ and Federal Trade Commission 1995, sec. 2.833). The Trade Act of 1974 (title 2, chap. 1, sec. 201, 2[b][1]) allows US firms to petition the government for relief if a good is “*being imported into the United States in such increased quantities as to be a substantial cause of serious injury*” to the domestic firm.

¹⁹ The European Union provides antitrust exemptions to some industries and exempts certain horizontal agreements involving research and development (see European Union 2013). In addition, export cartels are exempted in the European Union, as its competition policy law applies to intermember trade relations only, and therefore agreements between firms to coordinate exports are not covered under the law (Utton 2003).

1. Data on enforcement

13. For each enforcement action against a firm for a horizontal cartel activity, we identified the fine imposed, the location of the firm's parent company, the infringement period, the relevant product market, and affected sales.²⁰ We categorized firms as EU firms, US firms, or ROW firms on the basis of the location of their parent companies. Thus, both General Motors and Opel Nederland in Germany, a subsidiary of General Motors, are classified as US firms. (See the Appendix for details about the data.)²¹ As indicated in Figure 1, the European Union imposed 627 fines and the United States imposed 267 fines on firms for violations of anticollusion laws during the period of study. While aggregate fines imposed by the European Union (€18.0 billion) exceed those imposed by the United States (\$9.6 billion), Figures 2 and 3, which show the distribution of individual fines over time, indicate that the average fines imposed by the two authorities are of a similar magnitude.²²

14. The incidences of fines imposed by each authority across types of firms are of interest. As shown in Figure 1, of the 627 firms fined by the European Union, 442 (70%) were EU firms. Of the 267 firms fined by the United States, 106 (40%) were US firms.²³ Of the 463 firms with sales in both the United States and the European Union that were fined in at least one jurisdiction, 82 (18%) were fined in both the European Union and the United States.²⁴ The ROW firms accounted for 145 (23%) of fines imposed by the EU authorities and 115 (43 %) of fines imposed by the US authorities. As reported in Table 1, 39% of fines were imposed on firms in the industrial goods industry, 20% were in services, 16% were in basic materials, 16% were in consumer goods, and 9% were in health care, financial services, and technology combined.

²⁰ Fines associated with vertical cartels are not considered in our analysis. Between 1994 and 2014, 42 firms were fined by the European authorities. There were no vertical violations included in the US enforcement database.

²¹ The Appendix also summarizes the institutional framework and legislation underlying enforcement of anticollusion laws in the European Union and the United States and describes their methodologies for setting fines. As of December 1, 2009, Article 81 has been renumbered Article 101 under the EC Treaty. Until the Treaty Establishing the European Communities was introduced on May 1, 1999, Article 81 was Article 85 under the 1957 Treaty Establishing the European Economic Community (also known as the Treaty of Rome). For consistency, we refer to all EU anticompetitive agreement enforcement actions between 1994 and 2014 as Article 101 of the EC Treaty. Affected sales in the United States are measured as the total sales during the period of infringement, while affected sales in the European Union are measured as sales during the last year of infringement. This difference suggests care in interpreting results on the relationship between sales and fines, but the measured relationships between the national identity of the firm and amount or likelihood of fine should not be affected.

²² The data for Figure 2 are from EC antitrust case decisions (European Commission, Competition, Antitrust Cases [<http://ec.europa.eu/competition/antitrust/cases/index.html>]), annual reports for 1994–2007 (European Commission, Competition, Report on Competition Policy [http://ec.europa.eu/competition/annual_reports/]), and press releases (European Commission, Press Release Database. [<http://europa.eu/rapid/search.htm>]). The data for Figure 3 are compiled from US DOJ, Sherman Act Violations Yielding a Corporate Fine of \$10 Million or More (<http://www.usdoj.gov/atr/public/criminal/sherman10.htm>), as of May 22, 2009; US DOJ (1999b); and US DOJ press releases, plea agreements, case information, indictments, and briefs for the appellee (US DOJ, Antitrust Case Filings [<https://www.justice.gov/atr/antitrust-case-filings-alpha>]). Firms that were found guilty but granted leniency programs are treated as having received a zero fine.

²³ For the European Union and the United States, these percentages are obtained by summing the number of firms by parent company location in Figure 1: 442 (= 27 + 229 + 186) of 627 firms fined by the European Union were EU firms, or 70%, and 106 (= 7 + 22 + 77) of 267 firms fined by the US were US firms, or 40%.

²⁴ The 463 firms with sales in both the United States and the European Union comprise 300 firms fined by the European Union but not the United States, 81 firms fined by the United States but not the European Union, and 82 firms fined by both (see Figure 1).

Figure 1. Distribution of US and EU fines by parent company location, 1994–2014

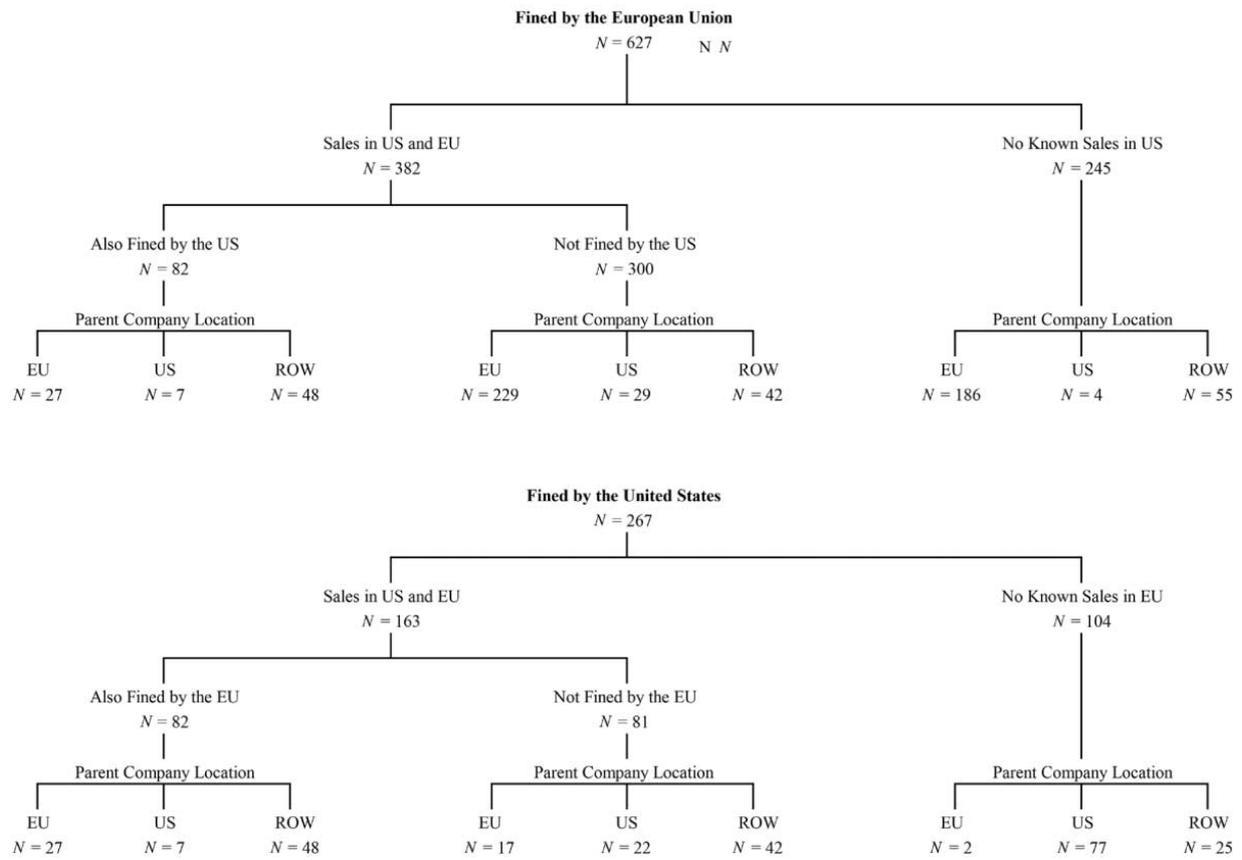


Figure 2. Fines imposed by the European Union, 1994–2014

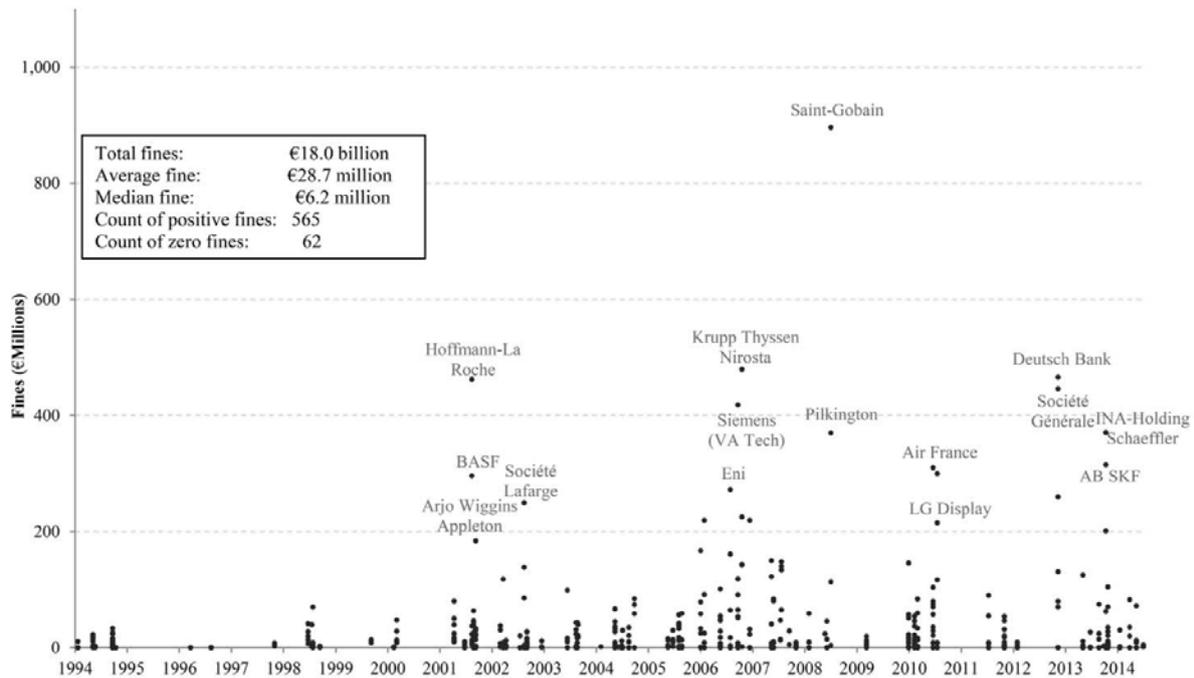


Figure 3. Fines imposed by the United States, 1994–2014

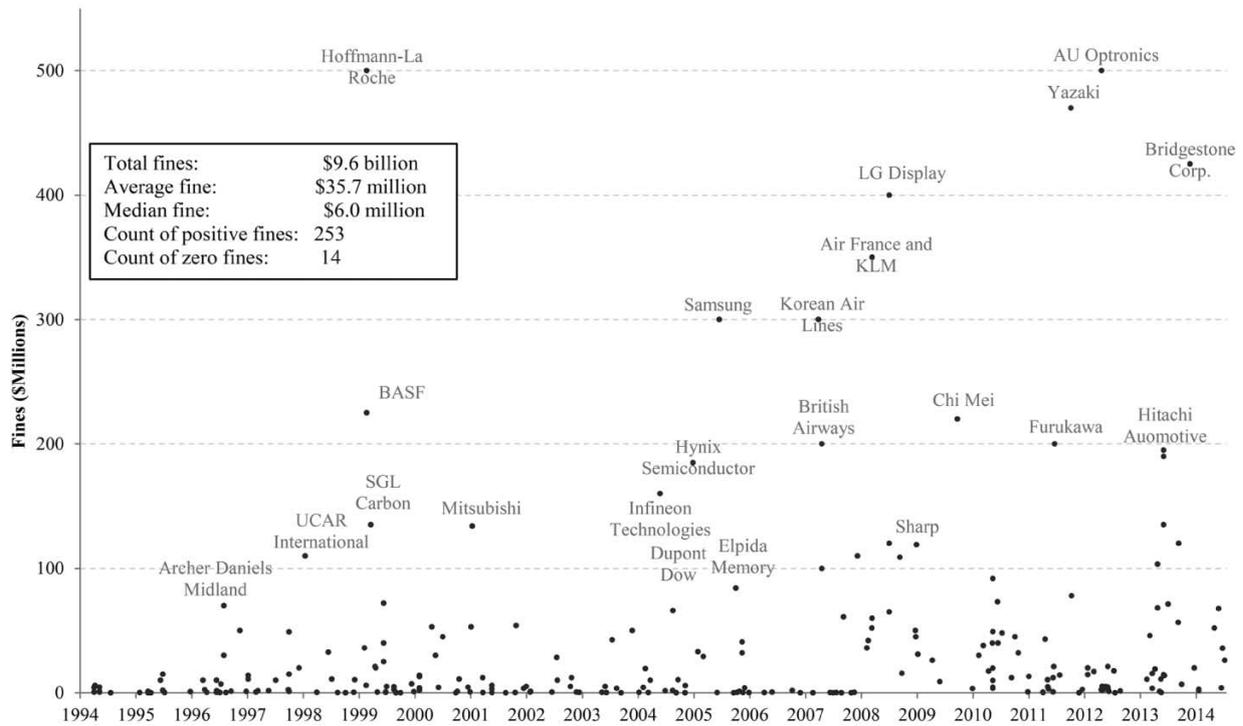


Table 1. Fines by product market, 1994–2014

Product Market	European Union		United States		<u>European Union and United States</u>	
	Fines	% of Fines	Fines	% of Fines	Fines	% of Fines
Basic materials	105	17	35	13	140	16
Consumer goods	75	12	68	25	143	16
Health care	15	2	15	6	30	3
Industrial	281	45	65	24	346	39
Services	109	17	70	26	179	20
Technology	15	2	13	5	28	3
Financial	<u>27</u>	<u>4</u>	<u>1</u>	<u>0</u>	<u>28</u>	<u>3</u>
Total	627	100	267	99	894	100

Note. Product markets for each firm were classified according to Yahoo industry classifications (Yahoo Finance, Industries [https://biz.yahoo.com/ic/ind_index.html]). Percentages do not all total to 100 because of rounding.

15. The identification of specific product markets in which the violation occurred and the pattern of sales of the firms across the European Union and the United States are critical to the empirical methodology. For each judgment, we collected information about the product market and affected sales from the European Commission’s records, records from the US Department of Justice (US DOJ), and other sources. We determined from public sources whether a firm fined in one jurisdiction made relevant sales in the other jurisdiction, even if the volume of sales in the other jurisdiction could not be determined. As summarized in Table 2, of the 627 firms fined by

the European Union, 382 (61%) had sales in both jurisdictions. Similarly, of the 267 firms fined by the United States, 163 (61%) had sales in both jurisdictions. As indicated in Table 2, we can identify the volume of affected sales for 210 firms fined by the European Union and 146 fined by the United States.

Table 2. Sales by jurisdiction imposing the fine

Firms	European Union	United States
Total fines	627	267
Probit analysis:		
Sales in jurisdiction of fine only	149	57
No evidence of sales in the other jurisdiction	96	47
Sales in both jurisdictions	382	163
<i>N</i>	353	136
Ordinary least squares regression analysis:		
Affected sales volumes in jurisdiction of fine	210	146
<i>N</i>	184	139

Note. The probit sample is limited to firms with evidence of sales in both jurisdictions, excluding firms fined by one agency after 2012. These firms may still be under investigation by the opposing jurisdiction. The sample for ordinary least squares regressions on fine amount is limited to firms with available affected sales volumes and nonzero fines. Firms that were found guilty but not fined because they cooperated with an investigation were excluded.

2. Empirical methods

16. Our method is to identify cartel activities involving EU, US, and ROW firms that may span the EU and US jurisdictions and then investigate differences in enforcement against firms with these different national identities. When a firm is observed to have been fined in one jurisdiction and sold the relevant product in the other jurisdiction, we ask both whether the other authority fines the firm and, if so, what the size of the fine is. With respect to the likelihood of a fine by the other authority, we assign no temporal meaning to the decision to impose a fine and so refer to their likelihoods as atemporal conditional probabilities.²⁵ We analyze this first question by evaluating the aggregate data and estimating a probit regression using the set of over 450 firms that were fined by at least one jurisdiction and had sales in both jurisdictions. To evaluate the influence of national identity on the size of fine, we limit our sample to 184 firms with affected sales volumes in both jurisdictions and nonzero fines in the European Union and to 139 firms with affected sales volumes in both jurisdictions and nonzero fines in the United States.²⁶

17. Our approach to assessing the role of national identity has potential shortcomings. First, we encounter the standard problem in empirical analysis of enforcement—namely, that underlying illegal activity is not observed. Even when firms are found to have violated anticollusion laws in one jurisdiction and are known to have made relevant sales in the other jurisdiction, we do not know if the collusive activity extended to the other jurisdiction. In general, a cartel’s decision to extend its geographic scope depends on factors such as the ease of arbitrage, differences in the numbers and identities of firms in the relevant market, and differences in demand characteristics. The absence of these factors as explanatory variables in our analysis could weaken our tests or introduce bias if, for example, the underlying decisions to extend cartel activities were

²⁵ Alternatively, one could analyze enforcement outcomes in a single jurisdiction and identify the numbers of domestic firms and foreign firms fined and the size of the fines. Without having some means of setting a baseline, however, it would be difficult to isolate how the national identities of firms influence outcomes from other factors. Another approach might be to analyze outcomes in a given cartel by measuring fines relative to sales for each firm in the cartel and taking into account factors such as culpability, litigation strategy, and financial condition; however, a lack of systematic data on culpability or litigation strategy makes that approach infeasible.

²⁶ Many firms are recorded as fined but paid no fine in practice because of the presence of leniency programs.

asymmetric.²⁷ Second, the decision by firms to extend the collusive activity into the other jurisdiction could be influenced by the decision-making of enforcement authorities that are themselves the focus of the study. For example, the United States may require that enforcement actions, which typically include criminal sanctions, meet a higher threshold than EU enforcement actions, which could lead to a higher probability of an EU enforcement action conditional on a US action as compared with the alternative. In general, a caution is therefore sounded about endogeneity.²⁸ Third, our empirical tests use the individual firm for a given product, as opposed to the cartel, as the unit of observation. However, cartels may differ systematically from one another. For this reason, our econometric tests allow for clustering of firms within each cartel.

2.1 Likelihood of fines

18. The atemporal conditional probabilities that the European Union will fine an EU firm, a US firm, or an ROW firm, conditional on the firm being fined by the United States, can be expressed as:

$$\Pr(\text{Fined}^{\text{EU}} \mid \text{Fined}^{\text{US}}, \text{EU Firm}), \quad (1)$$

$$\Pr(\text{Fined}^{\text{EU}} \mid \text{Fined}^{\text{US}}, \text{US Firm}), \quad (2)$$

and

$$\Pr(\text{Fined}^{\text{EU}} \mid \text{Fined}^{\text{US}}, \text{ROW Firm}). \quad (3)$$

19. Three analogous atemporal conditional probabilities correspond to the likelihood that the United States will fine firms conditional on the firm being fined by the European Union:

$$\Pr(\text{Fined}^{\text{US}} \mid \text{Fined}^{\text{EU}}, \text{US Firm}), \quad (4)$$

$$\Pr(\text{Fined}^{\text{US}} \mid \text{Fined}^{\text{EU}}, \text{EU Firm}), \quad (5)$$

and

$$\Pr(\text{Fined}^{\text{US}} \mid \text{Fined}^{\text{EU}}, \text{ROW Firm}). \quad (6)$$

20. These six conditional probabilities can be estimated from the aggregate data with a simple frequency estimator for the EU and US authorities, as indicated in equation (7) for the case of the European Union fining an EU firm conditional on a fine by the United States:

$$\Pr(\text{Fined}^{\text{EU}} \mid \text{Fined}^{\text{US}}, \text{EU Firm}) = \frac{\text{Number of EU firms fined in the US and EU}}{\text{Number of EU firms fined in the US}} \quad (7)$$

²⁷ Criminal sanctions in the United States, which are not considered in this study, could introduce such asymmetries. Firms that engage in cartel activities outside the United States might be deterred from extending those activities to the United States.

²⁸ Firms may have prior beliefs about the likelihood of enforcement in a given jurisdiction and may focus their cartel activity in jurisdictions where they believe the likelihood of enforcement to be low. If so, high-enforcement jurisdictions will experience lower levels of cartel activity, while low-enforcement regions will experience the converse. As a result, in equilibrium, the observed enforcement activities will be less divergent than would be expected on the basis of only the enforcement practices.

21. We also estimated the atemporal conditional probabilities for the two authorities imposing fines with the following probit regressions with random effects to account for potential clustering of errors within individual cartels:

$$\text{PR}(\text{Fined}_i^{\text{EU}} = 1 \mid \text{Fined}_i^{\text{US}} = 1) = f(\beta_0 + \beta_1 \text{US Firm}_i + \beta_2 \text{ROW Firm}_i + \beta_3 \text{Year of Fine}_i + \sum_4^6 \beta_j \text{Industry}_{ji} + \varepsilon_i + \delta_k) \quad (8)$$

and

$$\text{PR}(\text{Fined}_i^{\text{US}} = 1 \mid \text{Fined}_i^{\text{EU}} = 1) = f(\beta_0 + \beta_1 \text{EU Firm}_i + \beta_2 \text{ROW Firm}_i + \beta_3 \text{Year of Fine}_i + \sum_4^6 \beta_j \text{Industry}_{ji} + \varepsilon_i + \delta_k). \quad (9)$$

22. The term $\text{Fined}_i^{\text{EU}}$ equals one if firm i was fined by the European Union and zero otherwise; $\text{Fined}_i^{\text{US}}$ equals one if firm i was fined by the United States and zero otherwise. Thus, the dependent variable in each regression equals one if the firm was fined in both jurisdictions and zero otherwise. The independent variables US Firm, EU Firm, and ROW Firm equal one if the firm is headquartered in the United States, the European Union, or the rest of the world, respectively, and zero otherwise. The term EU is the omitted category in the first regression, and US is the omitted category in the second regression. The term Year of Fine is the year that the fine was imposed. Four binary variables indicate the firm's industry classification: Health Care; Industrial Goods; Consumer Goods, Services, and Technology; and Basic Materials, which is the omitted category.²⁹ The term ε_i is the identically and independently distributed portion of the error term for each firm i , while δ_k is the cartel-specific random effect drawn from a normal distribution, where k indexes the cartel.

2.2 Size of fines

23. To examine whether a firm's national identity and volume of sales in the relevant jurisdiction affect the size of fines, we estimate a random-effects regression. Using 184 of 627 firms fined by the European Union and 139 of 267 firms fined by the United States for which sales levels are known, we estimate the following equations:

$$\text{Fine}_i^{\text{EU}} = \alpha_0 + \alpha_1 \text{US Firm}_i + \alpha_2 \text{ROW Firm}_i + \alpha_3 \text{Affected Sales}_{\text{EU}i} + \alpha_4 \text{Year of Fine}_i + \sum_5^7 \alpha_j \text{Industry}_{ji} + \varepsilon_i + \tau_k \quad (10)$$

and

$$\text{Fine}_i^{\text{US}} = \pi_0 + \pi_1 \text{EU Firm}_i + \pi_2 \text{ROW Firm}_i + \pi_3 \text{Affected Sales}_{\text{US}i} + \pi_4 \text{Year of Fine}_i + \sum_5^7 \pi_j \text{Industry}_{ji} + \varepsilon_i + \tau_k, \quad (11)$$

where $\text{Fine}_i^{\text{EU}}$ is the fine in millions of euros imposed by the European Union on firm i and $\text{Fine}_i^{\text{US}}$ is the fine in millions of dollars imposed by the United States on firm i .³⁰ Affected Sales is the size of the sales in the jurisdiction where the fine was imposed during the infringement period for US fines and for the last year of the infringement period for EU fines.

2.3 Predictions

24. The three behavioral hypotheses have straightforward implications. First, if an authority is neutral in its enforcement actions, then a firm's likelihood of being fined and the size of fine are not influenced by its national identity. Second, if an authority focuses its enforcement on foreign firms, then a foreign firm's likelihood of being fined and the size of fine will be greater than for a

²⁹ During the period of study, no firms in the financial industry that received fines from the United States or the European Union had sales in both the United States and the European Union.

³⁰ The financial industry category is dropped for the US regression, as no fines were imposed on firms in that industry during the period of study.

domestic firm. Third, if an authority is domestically focused in its enforcement, then a domestic firm’s likelihood of being fined and the size of fine will be greater than for a foreign firm.

25. In addition, to the extent that ROW firms are treated more harshly than other foreign firms—for example, the United States imposes higher fines on ROW firms than on EU firms—such findings would be consistent with a weaker retaliation constraint when dealing with ROW firms.

IV. Empirical results

26. We now turn to our empirical results concerning the likelihood of enforcement actions and the size of fines. For each inquiry, we review the aggregate data and then discuss the regression results.

1. Likelihood of fines

27. Table 3 reports six probability estimates from simple frequency estimators—two jurisdictions and three types of firms. With regard to enforcement actions by the European Union conditional on the atemporal imposition of a fine by the US authorities, we find that the conditional probability is 61%. This result, the highest conditional probability among the six estimates, suggests that the European Union has a domestic focus. The alternative explanation for the higher conditional probability, that US enforcement actions meet a high threshold and lead to a high conditional probability of EU action when there are overlapping sales, would also predict a high probability of EU actions against all firms conditional on a US enforcement action. We find, however, that the corresponding likelihood for EU enforcement against US firms is 24%. Does EU enforcement differ between US and ROW firms, conditional on a fine by the US authority? The results indicate a much higher conditional probability—53%—of an EU fine on an ROW firm.³¹ Hence, the pattern of EU results for the likelihood of enforcement actions is consistent with a domestic focus and suggestive that ROW firms may be treated differently from US firms.

Table 3. Likelihood of receiving a fine by location of the firm’s parent company, 1994–2014

	All Firms	EU Firms	US Firms	ROW Firms
EU fines conditional on US fines:				
US fines	163	44	29	90
Also fined by the EU	82	27	7	48
Pr (Fine by EU Fine by US) (%)	50	61	24	53
US fines conditional on EU fines:				
EU fines	382	256	36	90
Also fined by the US	82	27	7	48
Pr (Fine by US Fine by EU) (%)	21	11	19	53

Note. Only firms with sales in both the United States and the European Union are included. An EU firm is one located in an EU country by the year it received a fine. A rest-of-the-world (ROW) firm has a parent company not located in the European Union or the United States.

³¹ In Table 3, 27% of the 163 fines imposed by the United States on firms with sales in the European Union and the United States were levied on EU firms, 18% were imposed on US firms, and the remaining 55% were imposed on ROW firms.

28. The conditional probability that the United States will impose a fine on a US firm conditional on the firm being fined by the European Union is only 19%, not much different from the 11% for EU firms. This pairwise result is consistent with a fairly neutral treatment of US firms relative to EU firms for the United States. Yet, like the European Union, the United States appears to target ROW firms at a much higher rate, as the conditional probability of a US fine for ROW firms conditional on an EU action is 53%.³²

29. What do these results for the likelihood of enforcement indicate? First, for both the EU and the US authorities, the conditional probabilities of imposing a fine on ROW firms are high. An ROW firm has an identical 53% probability of being fined by one jurisdiction conditional on being fined by the other. In the United States, the conditional probability for ROW firms is statistically significantly higher than conditional probabilities for both EU and US firms. Second, regarding EU and US firms, we do not see evidence of a foreign focus from either authority, as the conditional likelihood that the European Union will fine a US firm is 24%, and the conditional likelihood that the United States will fine an EU firm is 11%. Third, the United States is statistically less likely (21%) to target any firm conditional on the firm being fined by the European Union as compared with the likelihood of action by the European Union (50%). This difference is the strongest indication of a potentially lower evidentiary standard in the European Union.

30. From the individual firm's point of view, this last result implies that EU firms experience the greatest difference in relative conditional probabilities across jurisdictions, with a 61% likelihood of an EU fine conditional on a US fine versus an 11% likelihood of a US fine conditional on an EU fine. For US firms, the results indicate that a US firm fined in one jurisdiction has a similarly low probability of being fined in the other jurisdiction: a 24% chance in the European Union (conditional on a fine in the United States) and a 19% chance in the United States (conditional on a fine in the European Union).

31. In Tables 4 and 5, we report the results concerning likelihoods of fines from the probit regressions (eqs. [8] and [9]) that use the subset of firms with affected sales in both the European Union and the United States.³³ The marginal effects show that an EU firm has a 31% greater probability of being fined by the European Union given a fine by the United States as compared with a US firm (Table 4). This compares with a 37-percentage-point difference in Table 3. The results further show that an ROW firm has a similar chance of being fined by the European Union given a fine by the United States relative to an EU firm (statistically insignificant 2% difference). This compares with an 8-percentage-point higher probability for an EU firm in Table 3.³⁴ The marginal effects in Table 5 show that EU and US firms (the omitted category) are equally likely to be fined, while ROW firms are 14% more likely to be fined than either of them.

32. The predicted probabilities of being fined by the European Union in Table 4 are 58% for EU firms, 27% for US firms, and 60% for ROW firms.³⁵ These are similar to the likelihood of fines by the European Union reported in Table 3 of 61, 24, and 53% for EU, US, and ROW firms,

³² Table 3 shows that 9% of the 382 fines imposed by the European Union on firms with sales in both jurisdictions were levied on US firms, 67% were on EU firms, and 24% were on ROW firms.

³³ The data in the probit models are limited to the set of firms whose initial fine occurred before 2012 to mitigate any censoring biases resulting from misclassification of firms that are fined in the second jurisdiction after the end of our data period. Our sample restriction provides a substantial 3-year catch-up period to establish whether firms were also fined in the other jurisdiction.

³⁴ Our data contain at least 84% of the relevant population and potentially more, as we are unable to determine whether firms that received 47 of the 267 fines imposed by the United States also had sales in the European Union and firms that received 96 of the 627 fines imposed by the European Union also had sales in the United States (Table 2). Firms that received 57 of the US fines did not have sales in the European Union, and firms that received 149 of the EU's fines did not have sales in the United States.

³⁵ The estimated marginal effects and predicted probabilities from the random-effects probit models are similar in sign, size, and significance to those from corresponding random-effects linear probability models. The random effects of the probit marginal effects models are average partial effects; that is, they are averages over the distribution of the random effects. *See* Wooldridge (2002, pp. 467–85). The predicted probabilities are likewise averages over the distribution of the random effects. In addition, these estimated marginal effects and predicted probabilities are calculated for every observation, and Tables 4 and 5 report the averages across observations in the estimation samples. For a given indicator variable, the marginal effect for an observation is calculated as the change in the predicted probability resulting from a unit change of zero to one in that variable for that observation.

respectively. We see no evidence of a foreign focus by the European Union, given that, conditional on a US fine, the likelihood of a fine on an EU firm is equal to the probability of a fine on an ROW firm (58% versus 60%) and more than twice that of a fine on a US firm (58% versus 27%).

Table 4. Likelihood of being fined by the European Union given a fine by the United States, 1994–2014

	Coefficient	Marginal Effect
US Firm	-1.47** (.45)	-.31** (.10)
ROW Firm	.09 (.30)	.02 (.07)
Year of Fine	.04 (.07)	.01 (.02)
Health Care	-2.35* (1.25)	-.53** (.20)
Industrial Goods	-2.03* (1.03)	-.45** (.15)
Consumer Goods, Services, and Technology	-2.39* (.99)	-.54** (.13)
Constant	-83.41 (130.39)	
Wald statistic	16.80	
N	136	
Likelihood of fine in both jurisdictions:		
EU firm	.58	
US firm	.27	
ROW firm	.60	

Note. Results are from a random-effects probit model; the dependent variable is Fine by EU. Marginal effects and predicted likelihoods are calculated as the averages across all observations in the sample and across the distribution of the random effects. Cartel-clustered standard errors are in parentheses.

ROW = rest of world.

+ $p < .10$

* $p < .05$

** $p < .01$

33. Table 5 presents the analogous estimates for US enforcement. There is no difference in conditional probabilities of a US fine given an EU fine for the EU and US firms. Again, we see no evidence of a foreign focus. But the United States is more likely to impose a fine on ROW firms given an EU fine. Given the absolute levels of predicted probabilities, this implies that ROW firms are roughly twice as likely to be fined by the United States given a fine by the European Union compared with EU and US firms. The results involving the European Union and the United States do not suggest a foreign focus by either authority when dealing with each other's firms but suggest that both authorities are focused on ROW firms.

Table 5. Likelihood of being fined by the United States given a fine by the European Union, 1994–2014

	Coefficient	Marginal Effect
EU Firm	.02 (.35)	.00 (.04)
ROW Firm	1.04** (.38)	.14* (.06)
Year of Fine	.11+ (.06)	.01+ (.01)
Health Care	-.05 (.87)	-.01 (.16)
Industrial Goods	-2.23** (.72)	-.31** (.09)
Consumer Goods, Services, and Technology	-1.25+ (.65)	-.20* (.10)
Constant	-216.70 (120.99)	
Wald statistic	25.23	
N	353	
Likelihood of fine in both jurisdictions:		
EU firm	.16	
US firm	.16	
ROW firm	.30	

Note. Results are from a random-effects probit model; the dependent variable is Fine by US. Marginal effects and predicted likelihoods are calculated as the averages across all observations in the sample and across the distribution of the random effects. Cartel-clustered standard errors are in parentheses.

ROW = rest of world.

+ $p < .10$

* $p < .05$

** $p < .01$

34. The results in Tables 4 and 5 confirm the observation of substantially less than complete overlap in enforcement actions between the US and EU authorities. First, conditional on the United States imposing a fine on an EU firm, the probability that the EU authority will impose a fine is 58%. Second, conditional on the European Union imposing a fine on a US firm, the probability that the US authority will impose a fine is 16%, and third, ROW firms face the highest conditional probabilities of receiving a fine—60% in the European Union and 30% in the United States.

35. These enforcement gaps could reflect a variety of factors, including differences in the effective burden of proof. While documents provided by leniency applicants are often sufficient in the European Union to initiate an investigation and ultimately impose a fine, enforcement agencies in the United States often require witness testimony as well as documentary evidence to proceed. Finally, there may be a deterrence effect resulting from the more established antitrust enforcement in the United States that may result in cartel behavior being more common in the European Union and the rest of the world than in the United States, even among firms with sales in both countries.

2. Size of fines

36. Table 6 reports the size of fines imposed by the European Union and the United States on firms with sales in both jurisdictions during the relevant time period.³⁶ The average fine imposed by the EU authorities on EU firms (€44.6 million) is higher than on US (€30.7 million) and ROW

³⁶ Aggregate fines imposed were approximately €18.0 billion by the European Union versus approximately \$9.6 billion by the United States over the relevant time period. The average fines imposed by the European Union and the United States were similar: €28.7 million and \$35.7 million, respectively. This comparison of average fines does not account for state and private class-action outcomes in the United States. In all cases, the average fine is higher than the median fine, which indicates a skewed distribution of fines, with a few firms receiving very large fines compared with the rest of the group. During the period studied, a few very large fines skew the average in both jurisdictions, as shown in Figures 2 and 3.

(€37 million) firms, but median fines are similar, which reflects the role of a few outlier EU fines in elevating that mean value. In contrast, the average and median fines imposed by the US authorities on EU and ROW firms are substantially higher than the average and median fines imposed on US firms. These patterns suggest that the United States may impose higher fines on both types of foreign firms, whereas the European Union's fines are more consistent across national identities except for a few outlier large fines imposed on domestic firms.

Table 6. Fines imposed on domestic and foreign firms, 1994–2014

Jurisdiction	EU Firms	US Firms	ROW Firms
European Union			
Total	10,388.4 (73)	797.9 (6)	2,994.7 (21)
Average	44.6	30.7	37.0
Median	13.1	14.4	13.2
N	233	26	81
United States			
Total	1,901.4 (21)	480.1 (5)	6,566.8 (73)
Average	47.5	17.1	74.6
Median	14.5	2.7	31.5
N	40	28	88

Note. An EU firm is one located in an EU country by the year it received a fine. A rest-of-the-world (ROW) firm has a parent company not located in the European Union or the United States. Nonzero fines are excluded. Euros and dollars are in millions. Percentages are in parentheses.

37. What about the role of affected sales and other factors in determining the size of fines? Table 7 reports results from the random-effects regressions defined in equations (10) and (11), where controls are introduced for affected sales, national identity, the year of the fine, and the sector of activity. The estimates show determinants of the size of fines conditional on fines being nonzero. The nonsignificant coefficients on the dummy variables for US and ROW firms indicate that national identity does not exert an influence on the size of fines imposed by the European Union, which appears neutral. The results also show that for every euro of affected sales during the last year of the infringement period, the European Union increased its fine on average by €.08. Neither the time trend nor industry categories affect the results.

38. Turning to the US enforcement results, we see that the coefficients on EU and ROW firms in Table 7 are positive and statistically significant, which indicates that, conditional on a nonzero fine, the United States imposes higher fines on both ROW and EU firms as compared with US firms—approximately \$39 million higher for ROW firms and \$46 million higher for EU firms. These results are consistent with the United States having a foreign focus. The estimated coefficient on Affected Sales also indicates, as expected, that higher affected sales lead to larger fines: for every dollar of sales during the infringement period, the fine increased on average by \$.14. This is consistent with sentencing guidelines that include volume of commerce at issue as part of the fine determination process.³⁷ The coefficients on Year of Fine and the industry categories show no statistical effect.³⁸

³⁷ See the Appendix for a description of the maximum allowed base fine amount for a violation of the Sherman Act.

³⁸ Our random-effects regression analysis excludes firms that received a fine of zero to control for cases in which firms received leniency because of their cooperation with investigators. Our results hold when we include cases with a fine of zero. Our results also hold when the analysis is limited to 2004–14. If, on top of including fines of zero, we incrementally exclude Saint-Gobain because its fine is almost 50% higher than the next highest fine, the coefficients on US Firm and ROW Firm in the EU analysis remain statistically insignificant.

Table 7. Fines levied, 1994–2014: Random-effects regression

	EU Fine	US Fine
EU Firm		45.79** (15.74)
US Firm	10.42 (12.07)	
ROW Firm	-6.80 (12.56)	38.92** (12.71)
Affected Sales	.08** (.02)	.14** (.03)
Year of Fine	.05 (1.79)	-.75 (.84)
Health Care	21.14 (14.65)	
Industrial Goods	27.04 (23.13)	36.62 (13.56)
Consumer Goods, Services, and Technology	22.77 (20.04)	48.86 (17.89)
Constant	-106.59 (3,594.64)	1,447.54 (1,676.36)
Overall R^2	.54	.62
N	184	139

Note. Clustered standard errors are in parentheses. Nonzero fines are excluded. The excluded industry category is basic materials. Euros and dollars are in millions. ROW = rest of world.

**p < .01

39. When comparing across the European Union and United States, therefore, the results for size of fines indicate a clear difference: EU enforcement is neutral, while the United States exhibits a foreign focus. The results for the United States are, as indicated above, significant in both statistical and economic terms. Our greatest concern is that, common to many empirical inquiries into enforcement, we cannot control for the severity of the alleged activity.

40. As indicated at the outset, our focused empirical approach raises questions about whether other types of penalties, in particular criminal penalties and private enforcement in the United States, could allow for alternative interpretations of our results. If, for example, ROW firms subject to US enforcement were shielded from criminal penalties and private treble-damage claims, then the higher civil penalties imposed by the United States on ROW firms could be consistent with a neutral enforcement based on total penalties. Available evidence does not, however, indicate that US criminal and private enforcement actions exclude foreign firms. According to a US DOJ official, 44% of individuals charged criminally in the 2014 and 2015 fiscal years were not US citizens.³⁹ While these data are incomplete, they do not indicate that US criminal enforcement is characterized by large asymmetries between domestic and foreign firms. Foreign firms are also often subject to private enforcement claims in the United States. Prominent examples of private actions against foreign companies during the period covered by our analysis include litigations involving vitamins, liquid crystal display, optical disk drives, dynamic random access memory, and auto parts. A further consideration in interpreting our results for the disparities in civil penalties imposed by the United States among types of firms is that US firms could more often benefit from the US DOJ's leniency programs. While leniency applications are not made public, US DOJ officials with whom we consulted report that a majority of leniency applications are filed by foreign firms.

³⁹ Senior leader, US Department of Justice, Antitrust Division, Criminal Section, email to authors, September 14, 2016.

V. Concluding remarks

41. Using enforcement actions involving overlapping sales of the affected products by EU, US, and ROW firms over 1994–2014, we investigated EU and US enforcement of anticollusion laws to assess whether enforcement actions by the two authorities are neutral with respect to the national identities of firms, focus on foreign firms, or focus on domestic firms. Taking account of affected sales and other observable factors, we analyzed the likelihoods of the European Union and the United States imposing fines on firms headquartered in the European Union, the United States, and the rest of the world and differences in the magnitude of fines imposed.

42. Most striking are the findings concerning ROW firms: both the European Union and the United States are more likely to impose fines on ROW firms conditional on fines in the other jurisdiction. While the European Union does not impose higher fines on ROW firms than on its domestic firms, we find that the United States does impose higher fines on ROW firms. Hence, three of the four results concerning ROW firms support the hypothesis that EU and US enforcement are foreign focused when ROW firms are implicated in violations.

43. By contrast, the results concerning the treatments of EU and US firms by the two authorities are nuanced and, taken as a whole, do not support the foreign-focus hypothesis. Regarding the likelihood of fines, we find that the European Union is more likely to target its domestic firms than US firms. The likelihood that the United States imposes a fine does not differ between EU and US firms. Regarding size of fines, the European Union imposes similar fines irrespective of the national identity of the firms. The only significant indicator of a foreign focus in the EU–US context is that the United States imposes higher fines on EU firms than US firms.

44. The contrast in the sets of findings for ROW firms and EU–US firms is consistent with the view that repetition of enforcement actions over a long period of time discourages disproportionate focus on foreign firms. Conversely, outside the context of a long history of bilateral enforcement actions that are guided by similar laws and policy, foreign-focused enforcement actions become more likely because of the lack of opportunities for retaliation.

45. Our interpretation of these multifaceted results for the role of the national identity of firms on enforcement is subject to caveats, many of which arise from our inability to observe the underlying conduct. For example, given the small number of enforcement efforts against ROW firms prior to the time period studied, ROW firms might not have internalized the expected costs of enforcement and adjusted their behaviors accordingly, with the result that the severity of the violations involving ROW firms might be greater. Related—given that US enforcement focused primarily on US firms in the 1980s—is that the resulting deterrent effects including subsequent compliance programs instituted by US firms may have changed behaviors and corporate cultures that in turn explain the lower level and intensity of enforcement against US firms during the period of study. Separate from these factors, US firms are disproportionately in service industries where prices are difficult to observe, which could in turn make detection and proof of collusive efforts more difficult. In contrast, ROW firms export products, for example, vitamins, computer parts, and auto parts, whose prices are easier to observe.

46. To the extent that our results indicate that national identities do play a role in enforcement and result in important differences in penalties, potentially profound implications follow. As indicated, one should view our inquiry—focused only on EU and US enforcement of anticollusion laws—as a weak test for deviations from neutral enforcement. In other parts of the enforcement space—that is, merger and monopolization—deviations from neutral enforcement by various authorities may be more pronounced given that law and policy are less settled, the underlying

economic relationships among countries do not promote comity, and the more dichotomous nature of the competitive outcomes raises the stakes for enforcers. Viewed in this light, the dramatic expansion of antitrust laws in recent years may come to be viewed less favorably as the implications of multijurisdictional enforcement become more fully understood.

VI. Appendix: Relevant antitrust legislation, methodologies for determining fines, and data collection

1. European Union

1.1 Antitrust legislation

47. Antitrust policy and enforcement in the European Union are governed by Articles 101 and 102 of the EC Treaty and are enforced by the EU Competition Policy Committee (EC Treaty, pt. 3, title 7, chap. 1, sec. 1). Cartel behavior is regulated by Article 101, which prohibits “*all agreements between undertakings (...) which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market.*” In particular, it prohibits agreements between firms to “*(a) fix (...) prices or any other trading conditions; (b) limit or control production, markets, technical development, or investment; (c) share markets or sources of supply; (d) apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage; (e) make the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which (...) have no connection with the subject of such contracts.*”

1.2 Methodology for determining fines

48. Prior to 2006, the European Commission determined the basic amount of the fine for violators of Articles 101 and 102 of the EC Treaty by first classifying the gravity of the infringement of each firm into three categories: minor (fine between €1,000 and €1 million), serious (fine between €1 million and €20 million), and very serious (fine above €20 million). It then adjusted the basic amount for the duration of the infringement as follows: no adjustment if the duration was less than 1 year, an increase of up to 50% if infringement was between 1 and 5 years, and an increase of up to 10% per year if infringement was longer than 5 years (Guidelines on the method of setting fines imposed pursuant to Article 15[2] of Regulation No 17 and Article 65[5] of the ECSC Treaty, 1998 OJ [C 9] 3–5).

49. The methodology was revised in 2006. Under the new guidelines, the Commission now establishes the basic amount of the fine in the following sequence:

- calculates the value of sales of the infringing firm in the relevant geographic area in the European Union during the last full business year of its participation in the collusion;
- multiplies the value of sales in *a* by a proportion, not to exceed 30%, based on the gravity of the infringement; this gravity-based proportion is determined “on a case-by-case basis” and depends on factors such as “*the nature of the infringement, the combined market share of all the undertakings concerned, the geographic scope of the infringement and whether or*

not the infringement has been implemented” (Guidelines on the method of setting fines imposed pursuant to Article 23[2][a] of Regulation No 1/2003, 2006 OJ [C 210] 3);⁴⁰

- multiplies the proportioned amount from b by the number of years of infringement; and
- adds between 15% and 25% of the value of sales from a to deter firms from engaging in similar behavior in the future.

50. The Commission may increase this basic amount if the infringing firm is a repeated violator, refuses to cooperate with the investigation, or played a leading role in the collusion (2006 OJ [C 210] 2–5). The Commission may decrease the basic amount if the firm committed the infringement as a result of negligence, provides evidence that its involvement in the infringement was limited, cooperates with the investigation, or qualifies under the leniency rules (that is, is the first cartel member to disclose the infringement) (2006 OJ [C 210] 2–5; 2006 OJ [C 298] 17–22). Finally, the fine shall not exceed 10% of the firm’s revenue in the preceding business year (2006 OJ [C 210] 2–5). For example, the €1.06 billion fine imposed on Intel on May 13, 2009, represented, according to the Commission, 4.15% of Intel’s turnover in 2008 (European Commission 2009).

1.3 Data collection

51. Antitrust cases prosecuted by the European Union under Article 101 were located on the website of the European Commission.⁴¹ For each year between 1994 and 2014, all cases that resulted in a fine were identified, and for each case the European Commission’s official decision and press releases were obtained to identify the case number, the parties involved, the location of the parent company of the parties involved, the fine imposed on each firm (in euros), the date the fine was imposed, and the beginning and ending dates of the infringement. This information was then corroborated, to the extent possible, with the antitrust case activity reported in the 1994–2014 annual reports issued by the European Commission.⁴²

2. United States

2.1 Antitrust legislation

52. Anticollusion enforcement in the United States is primarily governed by the Sherman Act of 1890. Violations are felonies prosecuted by the US DOJ Antitrust Division. Section 1 of the Sherman Act prohibits agreements among firms to limit competition and states that “*every contract, combination, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal*” (15 U.S.C. 1). For example, price fixing, market allocation, and bid rigging are criminally prosecuted violations of Section 1 of the act (US DOJ Antitrust Division 2005). These violations are generally assumed to be unambiguously harmful and per se illegal, and fines may be imposed (US DOJ Antitrust Division 2005).

2.2 Methodology for determining fines

53. Before June 2004, violations of Section 1 of the Sherman Act were punishable by a fine of up to \$10 million for corporations and up to \$350,000 or 3 years’ imprisonment (or both) for individuals. With passage of the Antitrust Criminal Penalty Enhancement and Reform Act of 2004 (Pub. L. No. 108-237, 118 Stat. 666), penalties were increased to a maximum of \$100 million for corporations and up to \$1 million or 10 years’ imprisonment for individuals (US DOJ Antitrust Division 2005). In practice, judges in the United States impose sentences in federal cases based

⁴⁰ The Commission also states that this gravity-based proportion is generally higher for horizontal price-fixing, market-sharing, and output-limitation agreements (2006 OJ [C 210] 2–5).

⁴¹ European Commission, Antitrust Cases (<http://ec.europa.eu/competition/antitrust/cases/index.html>); European Commission, Antitrust Cases 1964–1998 (http://ec.europa.eu/competition/antitrust/cases/older_antitrust_cases.html).

⁴² For the annual reports, see European Commission, Report on Competition Policy (http://ec.europa.eu/competition/publications/annual_report/index.html).

on the US sentencing guidelines (US Sentencing Commission 2008), which establish ranges for fines (Hammond 2005). The maximum allowed base fine amount for a violation of the Sherman Act should be the greatest of (a) \$100 million (\$10 million until 2004; US DOJ Antitrust Division 2005; Antitrust Criminal Penalty Enhancement and Reform Act of 2004); (b) the dollar amount corresponding to the offense level of an infringing firm, which depends on its volume of sales during the infringement (US Sentencing Commission 2008, chap. 2, pt. R); or (c) the pecuniary loss caused by the firm, usually set at 20% of sales of the firm during the infringement (US Sentencing Commission 2008, chap. 8, pt. C).

54. The \$100 million fine imposed on Archer Daniels Midland in October 1996 for its role in the lysine cartel was the first time that alternative *c* was used to obtain a fine greater than the then-allowable maximum of \$10 million under alternative *a*. Alternative *c* has been widely used since. Next, minimum and maximum culpability score multipliers are applied to the base fine amount to obtain a range (US Sentencing Commission 2008, chap. 8, pt. C). These multipliers are influenced by factors such as the role the firm played in the infringement, prior criminal history, and the level of cooperation with the investigation. Finally, the fine may be reduced or eliminated under the Division's Corporate Leniency Program if the firm was the first to come forward (US DOJ Antitrust Division 2005). For cases of bid rigging against federal government projects, the US DOJ may obtain treble damages under Section 15 of the Clayton Act (15 U.S.C. 15a).

2.3 Data collection

55. A list of firms criminally prosecuted by the Antitrust Division of the US DOJ under Section 1 of the Sherman Act (horizontal agreements) from 1994 to 2014 was first obtained from the US DOJ. On the basis of this list, press releases and plea agreements were obtained from the US DOJ's website to collect information on the case number, the parties involved, the location of the parent company of the parties involved, the fine imposed on each firm (in US dollars), the date the fine was imposed, and the beginning and ending dates of the infringement.⁴³

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⁴³ US DOJ Antitrust Division, Press Releases (<https://www.justice.gov/atr/press-releases>).

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