Corporate Disclosure as a Tacit Coordination Mechanism: Evidence from Cartel Enforcement Regulations*

Thomas Bourveau **Guoman She** **Alminas Žaldokas**

This version: December 2019 - First version: October 2016

Abstract

We empirically study how collusion in product markets affects firms' financial disclosure strategies. We find that after a rise in cartel enforcement, U.S. firms start sharing more detailed information in their financial disclosure about their customers, contracts, and products. This new information potentially benefits peers by helping to tacitly coordinate actions in product markets. Indeed, changes in disclosure are associated with higher future profitability. Our results highlight the potential conflict between securities and antitrust regulations.

Keywords: Financial Disclosure, Antitrust Enforcement, Collusion, Tacit Coordination

JEL Classification: D43, G38, M41, L15, L41

---

*Bourveau is at Columbia Business School. She and Žaldokas are at the Hong Kong University of Science and Technology (HKUST). Thomas Bourveau: tb2797@columbia.edu; Guoman She: gshe@connect.ust.hk; Alminas Žaldokas: alminas@ust.hk. We thank our editor Haresh Sapra and the anonymous referee for their constructive comments and guidance. We thank our discussants Julian Atanassov, Luzi Hail, Rachel Hayes, Gerard Hoberg, Hyo Kang, Vardges Levonyan, Xi Li, Tse-Chun Lin, Tim Loughran, Leslie Marx, Mike Minnis, Vladimir Mukharlyamov, Vikram Nanda, Kevin Tseng, Jiang Xuefeng, and Xintong Zhan for comments that helped to improve this paper. We also thank Sumit Agarwal, Phil Berger, Jeremy Bertomeu, Matthias Breuer, Jason Chen, Hans Christensen, Anna Costello, Sudipto Dasgupta, Wouter Dessein, Hila Fogel-Yaari, Joey Engelberg, Eric Floyd, Yuk-Fai Fong, Jonathan Glover, Kai Wai Hui, Bruno Jullien, Christian Leuz, Jūra Liaukonytė, Daniele Macciocchi, Nathan Miller, Jeff Ng, Kasper Meisner Nielsen, Giorgo Sertsios, Daniel D. Sokol, Yossi Spiegel, Rodrigo Verdi, Stefan Zeume, and Guochang Zhang as well as participants at the 2017 HK Junior Accounting Faculty Conference, the 2017 CEIBS Accounting and Finance Conference, the 2017 ABFER Conference, the 2017 FMA Asia Meetings, the 2017 Barcelona GSE Summer Forum Applied IO Workshop, the 2017 Colorado Summer Accounting Research Conference, the 2017 LBS Accounting Symposium, the 2017 Lithuanian Conference on Economic Research, the 2017 CRESSE, the 2017 CICF, the 2017 SAIF-CKGSB Summer Institute of Finance, the informal session at the 2017 CEPR ESSFM (Gerzensee), the 2018 Northeastern University Finance Conference, the 2018 Texas A&M Young Scholars Finance Consortium, the 2018 CEPR Spring Symposium in Financial Economics, the 2018 FIRS Conference, the 2018 Asian Finance Association Annual Conference, the 2019 Midwest Finance Association Annual Meeting, the 2019 International Industrial Organization conference, the 2019 Journal of Accounting Research conference, the 6^{th} SEC Annual Conference on Financial Market Regulation, the 2019 European Finance Association Annual Meeting, the 2019 FTC Microeconomics Conference, the seminar participants at the University of Michigan, Columbia University, Georgetown University, the University of California San Diego, Darden Business School, University of Texas School of Law, Georgia Institute of Technology, Southern Methodist University, the University of Texas at Austin, Purdue University, University of Illinois at Chicago, the Columbia Micro-economics Lunch Seminar, Bank of Lithuania, the Lithuanian Competition Council, Seoul National University, and the HKUST. Bourveau acknowledges the General Research Fund of the Hong Kong Research Grants Council for financial support provided for this project (Project Number: 26503416) in the 2015/2016 funding round. This paper was previously circulated under the title "Naughty Firms, Noisy Disclosure."

1 Introduction

Financial market regulation has been strengthening over time. Legislation such as Regulation FD and the Sarbanes-Oxley Act have mandated that publicly listed firms increase transparency by disclosing more information in their financial statements. Such disclosure reduces the cost of capital, levels the information playing field for different investors, and allows investors to monitor managers more efficiently through reduced information asymmetry (Goldstein and Yang [2017], Leuz and Wysocki [2016]). However, transparency can come at a cost to consumers in product markets. Indeed, regulators have been expressing concerns about unintended product-market consequences of increasing transparency in financial markets, as doing so could provide firms with ways to coordinate product-market actions.[1]

In this paper, we aim to shed light on this unexplored cost of transparency in financial markets by examining empirically whether firms use disclosure targeted at investors in order to coordinate actions in product markets. Since firms have imperfect information about rival behavior (Green and Porter [1984]), the observability of each other's past, current and expected future actions, expressed through public financial disclosure, can help them stabilize the cartels. For instance, such disclosure can suggest a collusive price and help monitor whether colluding peer firms have deviated from that price. Such publicly verifiable information is even more important when there is no direct communication between firms, i.e., when firms are engaged in tacit collusion arrangements.[2]

Discerning between disclosure designed to facilitate collusion and disclosure targeted at

[1] In its report, the Organisation for Economic Co-operation and Development (OECD) writes that "*greater transparency in the market is generally efficiency enhancing and, as such, welcome by competition agencies. However, it can also produce anticompetitive effects by facilitating collusion or providing firms with focal points around which to align their behaviour*" (OECD [2012]).

[2] In line with the earlier literature, we define explicit collusion as direct communication between firms, which represents a violation of antitrust law. In contrast, tacit coordination involves situations where firms do not communicate privately to exchange information. From a legal perspective, tacit collusion cases are much harder to prosecute. For instance, in the decision *Text Messaging Antitrust Litigation* (No 14-2301, April 9, 2015), Judge Richard Posner stated that it is "difficult to prove illegal collusion without witnesses to an agreement" and that circumstantial evidence "consistent with an inference of collusion, but [...] equally consistent with independent parallel behavior" is not sufficient.

investors[3] is challenging, given that both product-market and disclosure choices are likely to be endogenously determined. Moreover, it is difficult, if not impossible, to directly observe colluding firms. For instance, comparing convicted and non-convicted firms would not yield conclusive evidence, as non-convicted firms might be engaging in the most profitable and stable cartels. Our identification strategy thus relies on exogenously varying *incentives* to tacitly collude. In particular, we investigate a setting where antitrust authorities gain more power to detect price-fixing activities. We argue that this leads to higher explicit collusion costs and, for some firms, tacit collusion thus becomes a more profitable strategy than explicit collusion. In other words, higher costs of private communication make public communication more appealing. This allows us to study whether higher incentives to tacitly coordinate actions in product markets push firms to start unilaterally providing more information on product market strategies in their financial disclosure documents.

We consider a sample of U.S. publicly listed companies from 1994-2012 and develop a measure meant to capture exogenous increase in explicit collusion costs at the industry level. Specifically, given the rise in the prominence of international cartels and the focus of U.S. antitrust authorities on investigations involving non-U.S. conspirators (Ghosal and Sokol [2014]), we rely on the passage of antitrust laws in the countries with which the firm's industry trades. In particular, we study leniency laws, which have been passed or strengthened in a staggered manner around the world starting in 1993. A leniency law allows the cartel member, who provides crucial evidence to the cartel prosecutors, to obtain amnesty and thus reduce legal exposure. Our analysis requires a measure of incentives to collude that varies across firms. To construct this measure, we take a weighted average of the passage of such laws in foreign countries, where weights are determined by the share of U.S. industry trade links with that particular country. Our treatment variable thus captures changes in behavior for firms that belong to industries that trade relatively more with the countries adopting a leniency law, as compared to those that belong to industries that trade

[3]For the sake of brevity, in the paper we refer to the disclosure targeted at investors as *financial disclosure*.

less with those countries at a given point in time. We argue that when more countries with which U.S. industries trade pass such laws, antitrust authorities find it easier to cooperate with each other and convict members of international cartels, which increases the industry's costs of collusion. To assess the validity of our identification strategy, we start our empirical analyses by documenting that foreign leniency laws predict the dissolution of known cartels involving U.S. firms. We also document a decline in the profit margins, equity returns, and product prices of the affected U.S. firms, in line with the theoretical prediction that increased costs of collusion should lead to stronger product-market competition.

Next, we investigate how firms communicate their product-market strategies in their financial disclosure documents in order to sustain a tacit coordination equilibrium. While financial disclosure is a unique information exchange mechanism in that it is regulated by the SEC, managers have some flexibility in the depth and details of the information that they choose to make public (Verrecchia and Weber [2006]). We thus look at how managers use this flexibility to credibly and unilaterally signal information about their product-market strategies to industry members. To do so, we examine two distinct communication channels. First, we focus on material contracts with customers, where firms face strong disclosure requirements. In particular, we look at whether firms request confidential treatment in filing material contracts with customers.[4] To the extent that such contracts contain a substantial amount of proprietary information, including product prices, transaction volumes, geographical location, and product quality, international or domestic rivals might use that information to form their product strategies.

Second, motivated by recent legal cases where antitrust agencies claimed that firms were using earnings conference calls with equity analysts to alter competition in product markets[5],

[4]Our Internet Appendix A1 provides two excerpts from such contracts. In one case, the firm redacts product prices, while in the other case, the firm does not redact and thus shares its product prices publicly.

[5]For instance, in Valassis Communications (FTC File No 051-0008) and Matter of U-Haul Int and AMERCO (FTC File No 081-0157), the Federal Trade Commission (FTC) presented evidence that firms unilaterally signaled to their competitors their willingness to increase prices in their public conference call with stock analysts. Such invitations to collude may violate Section 5 of the FTC Act. In July 2015, the Department of Justice (DoJ) started an investigation on the collusion between airlines regarding flight capacity and requested among other documents relevant communication between airlines and stock analysts.

we examine the transcripts of these conference calls. Prior studies have established that the information content of the calls helps to predict firms' future performance (Davis et al. [2015]) as they contain significant forward-looking disclosure, such as expected product releases, price movements, and marketing strategies (Brochet et al. [2018]). Such information could be used to engage in and sustain tacit collusion arrangements. Relative to sales contracts, conference calls contain less precise focal points on which firms can collude, but they do allow us study a larger sample of firms. Specifically, we focus on the conference calls of $1,605$ unique firms and count the frequency of product-market-related words.

We find robust evidence that after foreign leniency laws are passed and the costs of explicit collusion thus rise, firms are less likely to redact information from their publicly disclosed customer contracts. For instance, following the 1999 passage of Canada's leniency program, to which the pharmaceutical industry was exposed, three U.S. pharmaceutical companies stopped redacting sales contracts. Similarly, following the 2005 passage of Japan's leniency program, to which the storage device industry was exposed, two U.S. manufacturers of storage devices stopped redacting sales contracts. To understand the magnitude of our estimate, we select the industry that is the most exposed to each foreign law in our sample. Focusing on these most-exposed industries, we find that each adoption of a leniency law explains, on average, 19% of within-firm variance of redaction. We next concentrate on our sample of earnings conference calls and find that managers reveal more about their product-market strategies during the calls with equity analysts after foreign leniency laws are adopted. In this case, each foreign law explains, on average, 5% of within-firm variance of the product-market discussion.

Motivated by the theoretical cross-sectional predictions, we find that the change in disclosure is more pronounced in the industries that are more likely to engage in collusive behavior (more concentrated industries, industries with more homogenous products, industries with higher entry costs, industries with lower sales growth, and industries with recently convicted cartel cases), industries that have better ability to sustain coordination using unilateral dis-

closure (industries with a higher prevalence of publicly listed firms and those where decision variables are strategic complements), and larger firms that are more likely to be leaders in unilateral disclosure.

We further study whether these disclosure changes have economic consequences. In the cross-section, we find that firms that adapt their disclosure strategies by increasing their product-market-related communication experience only a very modest drop in profitability following the passage of foreign leniency laws, while the profitability of the firms that do not change their disclosure suffers substantially. This finding is consistent with the change in disclosure allowing firms to coordinate and maintain a level of profitability higher than that of a more competitive market equilibrium.

Our paper makes several contributions to the literature. First, it speaks to the literature on information exchange with the intention to stabilize cartels (see Kühn and Vives [1995] for an extensive review). The empirical literature on information exchange mechanisms has largely found that trade associations and similar voluntary organizational arrangements have facilitated collusion (Bertomeu et al. [2015], Doyle and Snyder [1999], Genesove and Mullin [2001], Harrington and Skrzypacz [2007; 2011], Kirby [1988], Page [2009]). We explore an alternative voluntary yet regulated information exchange mechanism to sustain collusion: financial disclosure by U.S.-listed firms. We find that financial disclosure (regulated by the SEC) could help firms to coordinate in product markets. Overall, our results highlight the potential conflict between securities and antitrust regulations. While transparency aims to protect investors, it may also foster negative externalities in product markets by helping to sustain collusive arrangements, partially explaining the documented decline in competition in the U.S. economy (Gutierrez and Philippon [2017]).

Second, our study relates to the broad accounting literature on the role of disclosure by U.S.-listed firms. One strand of this literature examines the capital markets benefits of disclosure: it translates into lower adverse selection (higher liquidity and lower cost of capital) and improves investors' ability to monitor management (see Leuz and Wysocki [2016] for a

comprehensive discussion). Within the accounting disclosure literature, our paper is more closely related to the set of studies that focus on how product-market considerations affect firms' disclosure choices (see Beyer et al. [2010] for a thorough review). The common intuition behind this strand of research is that public financial information disclosure might be costly, as rivals could learn a firm's innovative capabilities and its demand or cost components and adjust their strategies accordingly. Moreover, disclosing information such as product prices could harm the firm when it bargains with its customers (e.g., if different customer groups are charged different prices). This can lead to a partial disclosure equilibrium (Jovanovic [1982], Verrecchia [1983]).

Most of the early empirical literature in this area looks at cross-sectional variations in disclosure based on various industry characteristics (e.g., Li [2010]). Recent studies have used identification strategies based on industry deregulation (Burks et al. [2018]) or increased import penetration (Huang et al. [2016]) that result in a new entry or in increased competition from existing foreign exporters. In both cases, the incumbent local players have incentives to reduce truthful disclosure. They could either increase the provision of negative or misleading information to deter potential entrants, or decrease overall voluntary provision of information. Similarly, Li et al. [2018] exploit the adoption of the inevitable disclosure doctrine across U.S. states, which increased the costs of public disclosure, and show that this led to less disclosure of major customers' identities.

In this paper, we argue that when explicit collusion costs increase, instead of switching to competition and reducing truthful disclosure, incumbents mitigate the antitrust shock by relying more intensively on sharing information publicly to coordinate more tacitly in product markets. Thus, the benefits of disclosing proprietary information to industry peers increase, thereby reducing the net disclosure costs. As a result, firms switch to a second-best equilibrium where the optimal level of disclosure of proprietary information is higher. This refines our understanding of the link between product-market structures and disclosure and highlights that the various drivers of the changes in competition among existing rivals may

lead to contrasting predictions.

Finally, our results also speak to the literature on the wider role of disclosure outside capital markets. Disclosure has generally been documented to have positive effects (see, e.g., studies on food hygiene (Jin and Leslie [2003]), healthcare prices (Christensen et al. [2018]), and social responsibility (Christensen et al. [2017])). However, when there are strategic interactions between firms, the effects of disclosure are likely to be less straightforward. While in some contexts regulatory-induced price transparency has been found to discipline firms (Rossi and Chintagunta [2016]), in others it has facilitated collusion (Albaek et al. [1997], Luco [2019]). Our findings relate to these studies as we examine how firms voluntarily choose to share more product-market information in financial disclosure documents, plausibly in order to sustain collusive arrangements.

2 Conceptual Background

In this section, we provide theoretical background on (a) firms' strategies in choosing to collude rather than compete; (b) selecting a particular form of tacit over explicit collusion; (c) unilateral disclosure as a mechanism of tacit coordination; (d) financial disclosure as one particular channel of unilateral disclosure that helps to sustain tacit coordination.

2.1 Collusion Stability

Just as they decide whether to engage in other illegal activities, firms decide to enter collusive arrangements based on the net expected benefits of such actions (Becker [1968]). That is, potential rational corporate wrongdoers compare the expected returns from violating antitrust laws relative to the expected returns from complying with them.

The benefits consist of the premium that firms can charge to customers, yielding higher profits than in the pure competition equilibrium.[6] On the other hand, the costs are two-fold.

[6]To simplify, we consider the question only from the perspective of the firm rather than the executives who might be individually liable for violations of antitrust laws.

First, if a country's antitrust policy outlaws collusive arrangements, firms take into account the probability of investigation (detection) and the expected fines, which reduces cartel formation and the stability of existing cartels.

Second, even absent antitrust enforcement, the ability to sustain collusive arrangements also contributes to the net benefits of collusion. In particular, product-market structure and dynamics affect firms' decision to choose collusion over competition. Not all collusive arrangements are stable, since firms have incentives to deviate from the collusive agreement if the short-term gains from undercutting the rivals in the cartel and then reverting to the competitive price outweigh the profits from maintaining the collusive price. The industrial organization literature has extensively studied factors that, absent antitrust enforcement, contribute to the stability of collusion, thereby increasing its benefits (or reducing its costs). Motta [2004] discusses these structural factors and suggests that fewer and more symmetric players in the market, higher entry barriers, industry booms, cross-ownership of minority stakes and board interlocks, regularity and frequency of orders, lower buyer power, and multi-market contacts have been shown to facilitate collusion. McAfee and McMillan [1992] suggest similar factors, emphasizing entry restrictions, buyer power, and the ability to divide the gains (if the players are asymmetric) and enforce the agreements.

The benefit and cost trade-off of sustaining collusion or shifting to competition thus depends on the existing product market structure that affects the firm's ability to sustain collusion and the general incentives to deviate and cooperate with the enforcement agency. When leniency programs are introduced, they reduce the expected fines if cartel members cooperate to help the enforcement agency prosecute other members, thereby increasing the area where the collusion will break down (Motta and Polo [2003]). Firms might then choose collusion or competition depending on this changed benefit and cost trade-off.

2.2 Explicit Collusion versus Tacit Collusion

The literature suggests that explicit coordination with direct communication is more stable than tacit coordination without direct communication. For instance, McAfee and McMillan [1992] argue that strong explicit cartels that allow redistribution of spoils are preferred over weak implicit cartels where redistribution is more difficult, but the latter can become more advantageous when antitrust enforcement is higher. Moreover, Block et al. [1981] argue that when it is harder to collude explicitly on prices, firms switch to the forms of collusion that are harder for antitrust authorities to catch, e.g., to partial collusion. Also, Harrington [2017] shows that even when it is common knowledge that price increases will be matched, tacit coordination might not lead to the collusive prices if the mutual beliefs of all firm strategies are not shared (while such mutual beliefs can converge fast with direct communication). Finally, these arguments are also in line with the seminal email game (Rubinstein [1989]), in which under common knowledge the players can achieve efficient coordination (i.e., direct private communication in our context), but "almost" common knowledge can lead to inefficient outcomes (i.e., public communication that might be misinterpreted).

All these theoretical arguments suggest that noisy communication in tacit collusion makes it less efficient and sustainable than explicit collusion. However, tacit coordination might still be preferable to competition. For instance, when antitrust enforcement becomes stronger, the firms that initially might prefer explicit collusion over competition could consider switching from explicit collusion to tacit coordination, rather than competing. This implies that there might be a pecking order of shifting from explicit collusion to tacit collusion before reverting to competition. Such a "pecking order" is implicitly suggested by Markham [1951] who argued that collusive price leadership can occur in lieu of explicit collusion. For example, if meetings in "smoked-filled rooms" violate antitrust laws, then firms may use public pre-announcements to coordinate on a collusive outcome.

In fact, even explicitly colluding firms use a mix of illegal private communication and tacit coordination via public communication. Anecdotally, in its antitrust action against

U-Haul, the FTC accused the company of attempts to collude through both private and public communications. In this case, the private communications took the form of direct exchanges between the regional office managers of U-Haul and those of its major rival Budget, while unilateral public communication took place during an earnings conference call where U-Haul's CEO suggested that Budget follow his move and increase its rental rates. In this way, U-Haul acted as the industry leader and threatened to intensify competition if the rival company failed to subsequently increase its rates.[7]

Hence, the stability of collusive arrangements is likely achieved through some combination of both types of communication.[8] We argue that when the costs of explicit collusion increase, firms rely relatively more on public information to sustain collusive agreements. In other words, "the need for cartel members to communicate intensifies precisely when collusion is harder to sustain" (Grout and Sonderegger [2005]), and they shift to partial collusion (Block et al. [1981]), which involves more public communication than explicit collusion does.

2.3 Unilateral Disclosure and Price Leadership

Tacit coordination using public financial disclosure is likely to involve sequential actions, with some firms taking an earlier lead and making unilateral disclosures. The literature on collusive leadership has discussed the sequential games that occur when one firm changes its product prices (or quantities) to a collusive level, expecting other firms to follow. Given that taking the lead is costly – as a firm raises its price before others do and thus loses market share – each firm would like another firm to take the lead, and this could generate mis-coordination. While the presence of mutual beliefs that price increases will be matched could eventually lead to collusive prices, such prices might not result because of the lack of shared understanding about who will lead, when they will lead, and at what prices (Harrington [2017]). Pastine and Pastine [2004] argue that "a leader-follower pattern where a single firm

[7]The complaint document describing those attempts can be accessed at https://www.ftc.gov/sites/default/files/documents/cases/2010/07/100720uhaulcmpt.pdf

[8]The possibility that any communication improves collusion stability over monitoring without communication has been studied in Fonseca and Normann [2012] and Awaya and Krishna [2016].

consistently leads all price changes is unlikely."[9]

Given such a cost of tacit coordination (as compared to explicit direct communication that quickly achieves the convergence of mutual beliefs), firms might engage in public communication that provides guidance to their rivals about their intended product-market strategies. In studying which firms act as the leaders, we rely on the theoretical literature that studies price and quantity leadership. We assume that firms that are more likely to act as the price (or quantity) leaders are also those that have largest incentives in communicating their collusive intent to their rivals, thereby making their price leadership more credible.[10]

First, a larger or a more efficient firm might set the price first, followed by a smaller or a less efficient firm (Deneckere and Kovenock [1992], Furth and Kovenock [1993], Van Damme and Hurkens [2004]). Second, leadership might arise in situations with costly information acquisition where some firms become better informed about market conditions than others and can act as so-called "barometers" (Cooper [1997]). Third, Mouraviev and Rey [2011] show that unilateral disclosure is more beneficial to an industry leader when the decision variables are strategic complements (e.g., Bertrand competition), while it is less optimal when the decision variables are strategic substitutes (e.g., Cournot competition).

2.4 Unilateral Financial Disclosure

While other mechanisms that make tacit coordination possible exist, in this paper we focus on the disclosure that is originally intended for financial investors.[11] Financial disclosure differs from previously studied information mechanisms in several ways. First, such disclosure is

[9] In their study of price announcements in the vitamin industry, Marshall et al. [2008] suggest that "none of the participants in the cartel wanted to lead all the price announcements because that might put one of them in the position of appearing to be the ringleader of the illegal activity, increasing its culpability in the eyes of enforcement authorities if caught."

[10] Mouraviev and Rey [2011] cite the decision of the European Commission in the Vitamins case: "The parties normally agreed that one producer should first 'announce' the increase, either in a trade journal or in direct communication with major customers. Once the price increase was announced by one cartel member, the others would generally follow suit." In their review of the European Commission cases, they find that such price leadership was present in 16 of the 49 cases they reviewed.

[11] Please see Section 6.2, where we discuss advertising and common ownership as two of these alternative coordination mechanisms.

more credible than other mechanisms since it is regularly verified by external audit teams, and managers are largely legally liable for their statements. Credibility is a necessary condition to sustain tacit coordination, as information must be perceived as more than "cheap talk" and must not be discounted by peer firms (Baliga and Morris [2002]). Second, disclosure is targeted at investors and mandated by stock exchange regulators, so antitrust authorities have limited capacity to regulate such behavior.[12] Finally, even though financial disclosure is regulated, firms still have considerable discretion in how much to disclose.

We believe that these differences make financial disclosure an important mechanism to study from the antitrust perspective. In a related paper, Goncharov and Peter [2018] find that when firms switch to international accounting standards and thereby increase the transparency of their statements, cartel members can more easily identify deviating peers, and the stability of the cartels that are eventually convicted drops. Instead, we ask how firms change their financial disclosure following the need to sustain coordination in product markets.

We use two measures in our analysis: whether the firms redact information in the material contracts with the customers that they submit as part of the SEC filings, and whether the firms discuss product-market information in their conference calls with equity analysts.[13] The two measures complement each other in several ways.

First, conference calls are likely to be forward-looking invitations to collude that could accompany price or quantity leadership.[14] That would help establish trust between peers and make mutual beliefs converge faster either to start an arrangement or to modify the parameters of an existing collusive scheme. On the other hand, sales contracts filed with the SEC include realized price and quantity data for specific customers that could become

[12]The FTC cases cited earlier provoked legal discussion on whether SEC regulations that facilitate public disclosure are at odds with antitrust regulation (see, e.g., Steuer et al. [2011] for an extensive discussion and a related ruling by the Supreme Court in *Credit Suisse v. Billing*, in which the Supreme Court ruled that where antitrust and securities laws regulate the same conduct and the application of antitrust law is "clearly incompatible" with the securities laws, the latter dominate and there should be no antitrust liability).

[13]See Cao et al. [2018] for a discussion on aligning the empirical disclosure variable with the tested theory, rather than, e.g., using management forecasts that are perceived as conveying little proprietary information.

[14]Invitations to collude are not covered by the Sherman Act but are legally restricted by Section 5 of the FTC Act.

focal points in coordination because they reveal whether there is deviation from established collusive outcomes. The theoretical literature supports the idea that communication about future, current, and past prices and quantities can benefit collusive arrangements (e.g., Kandori and Matsushima [1998], Porter [1983]).

Second, while the redaction of contract data, especially such information as the product price, is a direct measure of what we want to capture in our study, conference call data are useful insofar as they validate the evidence on a larger sample.

Finally, one difference between conference calls and contract redactions is that calls are likely to be relevant to firms in industries with many small consumers, while by the SEC requirements, material contracts cover large customers. Our research findings thus have implications both for industries with large customers and for those with small customers.

2.5 Cross-sectional Predictions

The preceding discussion on the costs and benefits of tacit collusion and unilateral disclosure motivates our main hypothesis that increasing costs of explicit collusion will induce firms to switch to tacit coordination, and some of this tacit coordination will be cemented with unilateral financial disclosure. It also generates a number of cross-sectional predictions, which we group into four categories: (a) industry characteristics that make firms more likely to engage in collusion in general; (b) industries that are likely to shift from explicit to tacit collusion; (c) industry characteristics that make firms more likely to engage in unilateral disclosure to sustain collusion; (d) firm characteristics that make firms more likely to be the leaders in unilateral disclosure.

Our first group of cross-sectional predictions involves four characteristics associated with an industry's likelihood of conspiring in explicit collusion or engaging in tacit coordination. First, we study market concentration. Motta [2004] argues that this is the most important cross-sectional factor empirically predicting collusion, and Huck et al. [2004] provide supporting experimental evidence. Second, we look at the homogeneity of a firm's products.

Indeed, Raith [1996] argues that the ability of firms to collude in restricting output or raising prices in repeated games is harder to achieve in non-transparent markets when product differentiation is higher. Third, we look at the opposite prediction and consider industries with high barriers of entry. As argued in Section 2.1, it is easier to sustain collusion in industries that can protect their profits from new entrants. We thus look at industries that engage in high patenting activity, as patents create barriers to entry and thus could facilitate collusion (Gilbert and Newbery [1982]). Fourth, we look at recent industry growth. In general, a high-growth industry is associated with less collusion (Ivaldi et al. [2003]). Indeed, high growth encourages new entry, and the industry is expected to become less profitable in the future. In this scenario, deviating from the collusion today (i.e., not cooperating with industry peers) is likely to be a more profitable action. In addition, if the recent high growth is associated with a (temporary) upturn in a cyclical industry, the gain from deviation today would also outweigh the loss from punishment in the future, and collusion could be more difficult to sustain (Rotemberg and Saloner [1986]).[15] According to McAfee and McMillan [1992], quoted in Section 2.1, one obstacle to a successful collusive arrangement is the inability to self-enforce it, and high industry growth might be one such factor.

Our second group explores the likelihood that the industry will shift from explicity to tacit collusion. Here we look at the industry's recent convictions in cartel cases or predicted convictions based on observable characteristics. Cartels are known to proliferate in certain industries (see, for instance, a survey by Levenstein and Suslow [2006], who discuss a number of historical examples of industries in which there are repeated episodes of collusion).

Our third group of cross-sectional predictions looks at the industry's ability to sustain tacit coordination through unilateral disclosure. We look at two characteristics. First, we study whether the results are stronger in the industries with a higher prevalence of publicly listed (as opposed to privately held) firms. In an industry that has more publicly listed firms that disclose information via material contracts, it is easier to coordinate actions than in

[15]This theoretical prediction received some empirical support in Doyle and Snyder [1999] and Bertomeu et al. [2015].

an industry that has a higher prevalence of privately held firms.[16] Second, drawing on the discussion in Mouraviev and Rey [2011], we partition firms into those whose decision variables are strategic complements and those whose decision variables are strategic substitutes.

Our fourth group looks at the firm characteristics that make firms more likely to be leaders in tacit collusion. Here we rely on the literature that suggests that larger, more dominant, and more efficient firms are more likely to be leaders (Deneckere and Kovenock [1992], Furth and Kovenock [1993], Van Damme and Hurkens [2004]).

3 Identification Strategy

We now describe the identificaton strategy we implement to test whether firms use financial disclosure to tacitly coordinate their product-market strategies. Our identification strategy relies on varying incentives to tacitly collude that we measure by the passage of leniency laws in the foreign countries with which an industry trades. We first describe leniency laws in general and then present our identification strategy.

3.1 Background of Leniency Laws

Given the importance of cartels and their anti-welfare implications[17], governments have devoted considerable resources to tackling them. One of the most effective tools has been the introduction of leniency programs, or leniency laws (see Marvão and Spagnolo [2016] for a recent survey of the empirical, theoretical, and experimental evidence of leniency laws' effects). Leniency programs allow market regulators (or the courts) to grant full or partial amnesty to those firms that are part of a collusive agreement but cooperate in providing information

[16] However, the fact that not all industry participants are public helps firms to avoid the attention of antitrust authorities, as these do not observe the whole product-market behavior. Meanwhile, publicly listed firms are likely to have a better sense of privately held firms' reaction curves than the antitrust authorities do. Such knowledge can substitute for the observability of the full product market behavior: publicly listed firms can act as coordination leaders, anticipate that privately held firms will act rationally in response to such unilateral coordination, and internalize the externalities from the actions taken by the private firms.

[17] Connor [2014] estimates that worldwide consumer welfare loss due to discovered cartels has amounted to least $797 billion since 1990.

about it. A typical leniency law stipulates that the first firm to provide substantial evidence to the regulators (if the latter do not yet have sufficient evidence to prosecute the cartel) gets automatic amnesty. In countries where the firm's managers, employees, and directors face criminal liability for participating in a collusive agreement, amnesty also extends to waiving such criminal liability. U.S. leniency law, which was strengthened in 1993, proved successful in destabilizing existing cartels and deterring the formation of new ones (Miller [2009]). As Hammond [2005] suggests, it has thus inspired other countries to pass similar laws. In a difference-in-differences setting, Dong et al. [2019] show that the global wave of leniency law passage significantly harmed collusion. In particular, leniency laws increased conviction rates and generally lowered the gross margins of affected firms. Internet Appendix A2 reports the list of leniency law passage years around the world.

Some countries passed the leniency program after prominent collusion cases. For instance, Hungary did so after it faced significant criticism concerning its antitrust investigation against mobile telephone operators, while Switzerland made its antitrust law stronger in 2003, in part by passing leniency laws, after it failed to prosecute firms involved in the vitamin cartel. Taiwan passed the law as a response to general concerns about rising consumer prices, while Korea passed it after the financial crisis.

Other countries passed leniency laws after facing significant pressure from outside parties (Lipsky [2009]). For instance, Mexico passed the law in 2006 following the general recommendations of an OECD Peers Review in 2004 on Competition Law and Policy. Similarly, the U.S. pushed Singapore to strengthen its antitrust law in negotiations for a bilateral free trade agreement,[18] and the EU has encouraged its member states to adopt leniency laws. The IMF and the World Bank regularly ask for an overhaul of antitrust laws as a condition for funding (Bradford [2012]).

Even if not explicitly pressured, some countries passed the law after noticing its success

[18]We are not aware of any other case where a leniency law was passed as an outcome of a trade deal. Also, all our regressions control for the industry's import penetration, so it is unlikely that our results are driven by rising trade. Finally, we perform a robustness check in which we consider only those countries for which we could find a clear reason for the law's passage, and that reason did not include external pressure.

in other countries. As more countries passed leniency laws, firms from non-passing countries could have been left at a disadvantage. For instance, Japanese companies involved in international cartels that also affected the Japanese market faced a significant risk of an investigation in Japan even if they applied for leniency in the foreign jurisdiction. That hampered the Japanese antitrust authority's cooperation with authorities in other countries.

In summary, leniency laws have been shown to be an effective tool in combating cartels, and many countries have passed such programs. That said, the timing of their passage in different countries is unlikely to have been driven by one particular economic trend that could correlate with the U.S. firm behavior that we study in this paper.[19]

3.2 Increase in Explicit Collusion Costs

Against this background, we create a treatment variable based on a U.S. firm's exposure to the passage of leniency laws in those countries from which the U.S. firm's industry gets a significant fraction of its imports. Similarly, as in the above-mentioned example of Japanese firms, the passage of more leniency programs makes the coordination between the antitrust authorities easier, and firms that could consider colluding in multiple foreign markets might find it more difficult to form international cartels with industry peers. Even if the antitrust authority promises a leniency applicant that the information it provides will not be shared with other antitrust authorities, often knowledge of the cartel becomes public, and other antitrust authorities may initiate prosecution if they have observed similar market behavior in their own jurisdictions. Moreover, even if U.S. antitrust authorities cannot bring actions against the suspected cartel in the U.S., the conviction of cartels in foreign jurisdictions can help affected parties to bring private civil action within the U.S.

All in all, this means that if cartels are international, the passage of leniency laws in another country increases the costs of collusion even in the U.S., as it becomes easier for rivals

[19] We estimate a Cox proportional hazard model in an attempt to predict foreign leniency law passage by the characteristics of the U.S. industries that are exposed to those countries. Except for the country size, we fail to find consistent predictors.

to apply for leniency in foreign markets. And many cartels are indeed international: at least 1,014 price-fixing cartels, involving members from multiple countries, were either convicted or under investigation during 1990-2013 (Connor [2014]). At the same time, U.S. antitrust authorities were also shifting their focus to investigations involving non-U.S. conspirators, as these tend to have a larger impact on consumer welfare (Ghosal and Sokol [2014]).[20]

We therefore argue that foreign leniency laws increase the costs of explicit collusion for U.S. firms. We construct a continuous variable that we call *Foreign Leniency* and estimate it as the weighted average of the passage of laws in all other countries, excluding the U.S.:

$$Foreign\ Leniency_{jt} = \sum_{k} w_{kj} L_{kt}$$

where k denotes a foreign country, j denotes a two-digit SIC industry, and t denotes year. w_{kj} is the share of two-digit SIC industry j's sales that is imported from country k out of all industry j's sales in 1990. L_{kt} is an indicator variable that takes a value of 1 if country k has passed a leniency law by year t, and zero otherwise. To avoid spurious correlation due to changes in industry structure or industry classification, we remove the time variation and base the weights on the data in year 1990. The variable ranges from 0 when leniency laws are not passed in any country with any market share in the firm's industry to, theoretically, 1 when all foreign countries with any share in the firm's industry have passed the leniency law and the industry imports all its output. Unless no country from which a firm's industry is importing has passed a leniency law, a firm is considered as *treated*, and the intensity of treatment changes as more countries from which this industry imports adopt leniency laws.

As it is based on political decisions made outside of the U.S., *Foreign Leniency* should be

[20] This has also been recognized by the U.S. authorities, as suggested by the DoJ's statement in the Flat Glass case (No 08-180, Oct. 6, 2009): *"The DoJ recognizes that the interconnected nature of modern cartels is such that the viability of foreign leniency programs is also critical to U.S. anti-cartel enforcement efforts: the emergence of leniency policies of different governments with similar requirements has made it much easier and far more attractive for companies to develop a global strategy for reporting international cartel offenses and had led leniency applicants to report their conduct to multiple jurisdictions simultaneously. For instance, the European Commission has been one of the Division's closest partners in the fight against international cartels and over ninety percent of the international cartels that have been prosecuted by the Division were active in Europe as well as in the United States."*

largely exogenous to the domestic political and economic conditions surrounding U.S. firms. It is important to note that while our variable is constructed using import data, it does not imply that U.S. firms exclusively collude with their foreign suppliers. Instead, it can indicate that firms collude with foreign firms that produce similar products abroad and export them to the U.S. markets. To further explain this point we develop a hypothetical example. Let's assume that widget manufacturers are competing in multiple geographic markets. For instance, these could be Japanese widget manufacturers and U.S. widget manufacturers that are competing both in the Japanese and the U.S. markets. For the sake of the argument, assume that both markets are of equal size and the U.S. and Japanese manufacturers split the market equally. It is likely that their product market strategies are same across different markets and if they are colluding in one market, they would be colluding in the other market too. In the industrial organization literature this behavior is termed as "multimarket contact" and theory literature (e.g., Bernheim and Whinston [1990]) has discussed conditions under which such multimarket contact in fact facilitates collusion. In this scenario, stronger antitrust enforcement in one market, such as the passage of a leniency program in Japan, is thus likely to disrupt the stability of collusive arrangement in the other market, i.e., the U.S. (see Choi and Gerlach [2013]) for the theoretical argument. The empirical challenge is then how to measure industry's or firm's exposure to these foreign laws. In our hypothetical example of symmetric markets, it would not matter if we measured it with export or import exposure. However, in most instances we believe that the market which is more important for the U.S. manufacturers is its domestic market, and while foreign leniency laws primarily disrupt the collusive profits in foreign markets, they are most motivated to protect their domestic market. In that case, measuring it with the import shares seems more appropriate.

3.3 Empirical Strategy

We use *Foreign Leniency* to identify a causal impact of increases in explicit collusion costs on firms' disclosure choices. We argue that the passage of foreign leniency laws makes tacit

collusion the next-best alternative for some of the firms. Our empirical tests will thus be a joint test of this identifying assumption and our hypothesis that higher incentives to tacitly coordinate actions in product markets change firm disclosure strategies. We estimate the following model, reminiscent of the difference-in-differences specification:

$$Disclosure_{ijt} = \beta_0 + \beta_1 Foreign\ Leniency_{jt} + \theta X_{ijt} + \alpha_i + \gamma_t + \epsilon_{ijt} \quad (1)$$

where i indexes the firm, j denotes a two-digit SIC industry, and t denotes year. Equation (1) essentially represents a difference-in-differences specification where the estimate on *Foreign Leniency* captures the effect of increased exposure to foreign leniency laws on various firms' disclosure choices relative to a set of control firms that are not exposed to these foreign laws, since their industries have less trade with these law-passing countries. In this baseline model, α_i denotes firm fixed effects, which deal with firm-level time-invariant omitted variables, while γ_t captures year fixed effects, which account for unobserved aggregate shocks across time. X_{ijt} corresponds to a vector of firm-level and industry-level control variables, described in the next section. Since our treatment variable is defined at the industry level, we cluster standard errors by industry (Bertrand et al. [2004]).[21]

Figure 1 shows how the measure develops over time for different industries that we include in the analysis. We now conduct two tests to assess the validity of our identification strategy and specifically to test whether our measure captures the increase in collusion costs. We first examine whether *Foreign Leniency* is associated with more cartel convictions in future years. We obtain information on convicted cartels from the Private International Cartel database on cartel sanctions (Connor [2014]), which covers all major international cartels discovered, disclosed and sanctioned by regulators since 1986. We conduct our tests based on the two-digit SIC industry-year panel data, where the industry is defined according to the cartel market specified by the antitrust authorities. In performing the analysis at the industry level, we also capture privately held firms. Specifically, we calculate the number

[21] Our results are robust to clustering standard errors by industry and year, or by firm.

of international cartels or firms involved in international cartels that are convicted in each industry-year, and we estimate the relationship of the number of convictions with the increase in collusion costs, controlling for year and industry fixed effects. The control variables are based on the sample average of the publicly listed firms for each industry-year. The results, reported in Panel A of Table 1, show that *Foreign Leniency* is positively associated with the conviction and dissolution of cartels, in line with the expectation that the leniency laws help antitrust authorities uncover the cartel.

We further motivate our identification strategy by investigating the impact on firms' performance of the increase in collusion costs caused by the passage of leniency laws in other countries. We estimate our empirical model, Equation (1), on the U.S. Compustat firm-year panel data over the 1994-2012 period and report results in Panel B of Table 1. We use firm-level gross profit margins as the dependent variable in columns (1)-(2), firm-level size-adjusted stock returns in columns (3)-(4), and the NAICS[22] industry-level producer price index (PPI) in columns (5)-(6). We find that profit margins, equity returns, and product prices drop, which suggests that the increased cost of collusion led to an increase in competition and a decrease in product prices, and thus adversely affected firm performance.[23]

[22]We use NAICS classification in these tests due to data availability.

[23]Indeed, theoretically, the effect of leniency laws on collusion is uncertain. On the one hand, leniency laws destabilize cartels as they reduce a firm's costs of defection and potentially increase the costs of the rivals if the antitrust authority imposes fines on them (Ellis and Wilson [2003], Harrington [2008]). On the other hand, if the firm expects to be the first one to apply for leniency and thus expects to pay lower fines than it would have otherwise, the costs of collusion would be lower, stabilizing existing cartels or even inducing the formation of new ones (Chen and Rey [2013], Motta and Polo [2003], Spagnolo [2000]). The results in Table 1, coupled with the previous empirical evidence (e.g., Dong et al. [2019]) and the wide adoption of leniency laws around the world, suggest that these laws were in fact effective. For instance, according to DoJ's Deputy Assistant Attorney General Brent Snyder, "*the Corporate Leniency Program revolutionized cartel enforcement, led to the successful prosecution of many long-running and egregious international cartels, and served as a model for leniency programs subsequently adopted in dozens of jurisdictions around the world.*" Snyder also stated that "*leniency is more valuable than it has ever been because the consequences of participating in a cartel and not securing leniency are increasing: more jurisdictions than ever before are effectively investigating and seriously punishing cartel offenses*" (June 8, 2015).

4 Sample Selection and Main Measures

4.1 Sample Selection

Our initial sample on firm disclosure strategies is based on all Compustat firms incorporated in the U.S. from 1994 to 2012. We exclude financial firms (SIC codes 6000-6999), utilities (SIC codes 4900-4999), and firms with total assets smaller than 0.5 million dollars.

4.2 Disclosure Measures

We use two main measures in our analysis: whether the firms redact information in their material contracts with customers and whether the firms discuss product-market information in their conference calls with equity analysts.

4.2.1 Material Contracts

We start with the type of disclosure that might benefit rivals the most by looking at how firms disclose their material sales contracts (Boone et al. [2016], Costello [2013], Verrecchia and Weber [2006]). To the extent that such contracts contain a substantial amount of proprietary information, including transaction prices, transaction volumes, and product quality, we test whether firms communicate with their cartel peers by revealing more information. The material contract is filed as Exhibit 10 and could be identified in a current report or period report by searching for EX-10(.XXX). We extract all the material contracts from SEC filings and exclude contracts that are identified as contracts not related to product sales (e.g., employment contracts, stock purchase, purchase of accounts receivable, purchase of assets). We then search for *confidential treatment*, *confidential request* and *confidential...redacted* in the file to identify the confidential request by the firm. We identify 414 unique firm-years filing material sales contracts with required information over 2000-2012.[24] *Redacted*

[24]We were able to manually collect the duration for 70% of the contracts in our sample. The average duration is 4.2 years, with an average of 1,310 days between the filing date with the SEC and the expiration date of the contract. This suggests that the contracts in our sample are predominantly forward looking.

Contracts is then defined as a binary variable capturing whether the firm requests confidential treatment of at least one material sales contract in a given year. We exclude the firms that do not disclose material contracts. In Internet Appendix A3, we explain our data collection methods in detail. We show how the average of this measure develops over time in Internet Appendix Figure *A*1, suggesting that there is no significant time trend.

4.2.2 Conference Calls

We also examine firms' earnings conference calls with equity analysts. Recent studies have established that earnings conference calls are associated with large intra-industry information transfers (Brochet et al. [2018], Kimbrough and Louis [2011]). During these calls, managers strategically interact with participants to manage the flow of information (Hollander et al. [2010], Mayew [2008]). Motivated by the FTC cases cited in footnote (5), we introduce a new measure, *%Product Conference Calls*. We count the frequency of product-market-related words in the presentation by the CEO and CFO during earnings conference calls. Our main product-market-related word list includes *product*, *service*, *customer*, *consumer*, *user*, and *client*. We exclude scripts with fewer than 150 words, and we scale product-market-related words by the total number of words in the script. We focus on the opening statements, as we expect that managers are more likely to have control over the choice of topics in opening statements than in Q&A sessions. When a firm has multiple conference calls in a given year, we take the average value of the measure over the period. We also use a few alternative word dictionaries and present the results in the Internet Appendix.

4.3 Other Variables

We control for time-varying firm and industry characteristics. We use the returns on assets (ROA) to proxy for profitability, and the size of assets to proxy for firm size. We also control for the industry concentration ratio, as proxied by the Herfindahl-Hirschman Index of the two-digit SIC industry. We also control for import penetration at the industry level

to address the possibility that the results are driven by trade policy changes rather than the passage of leniency laws. Appendix A lists all variable definitions. We report summary statistics in Table 2.

5 Main Empirical Findings

5.1 Baseline Results

We now turn to our main research question on how firms change their disclosure choices when costs of explicit collusion rise. The passage of leniency laws makes explicit collusion more costly, and, as we demonstrated in Section 3.3, leads to the dissolution of cartels. One could argue that firms now face a more competitive environment and are less likely to disclose proprietary information. Alternatively, as we posit in this paper, they might shift from costly explicit collusion to tacit coordination in product markets. Under this scenario, firms then have an incentive to disclose more proprietary information to communicate with their cartel peers and facilitate tacit coordination.

Our first main measure of information sharing about customers, *Redacted Contracts*, is based on how much information firms redact in their material sales contracts with customers in their regulatory filings. These contracts contain substantial information on firm relationships with customers, including the price, quality, and quantity of products to be provided, as well as the identity of the customers. Such information can be helpful for rivals in coordinating product-market strategies. While firms have to file their *material* sales contracts with the SEC, they have considerable discretion in determining the threshold of what constitutes a material contract, and this makes the disclosure of these contracts somewhat voluntary. We follow Verrecchia and Weber [2006] and examine how often firms request confidential treatment in filing material sales contracts.

We check whether *Foreign Leniency* is associated with fewer requests for confidential treatment. Our findings are tabulated in Table 3, columns (1)-(2). Column (1) presents the

tests where we control only for year- and firm-fixed effects. We find that firms conceal less information about the product market through sales contracts. Column (2) further includes a set of covariates to control for firm and industry characteristics. Our results are robust. To understand the magnitude of our estimate, we select the industry that is the most exposed to each foreign law in our sample. Focusing on these most exposed industries, we find that each adoption of a leniency law explains, on average, 19% of within-firm variance.[25]

Our second main measure, *%Product Conference Calls*, captures how much CEOs and CFOs discuss product-market-related topics during earnings conference calls. We use the same empirical model as with our previous dependent variable. The results are displayed in columns (3) and (4) of Table 3. We find that managers increase their communication about product-market topics when explicit collusion becomes more costly. Focusing on these most exposed industries, we find that each adoption of a leniency law explains, on average, 5% of within-firm variance. While the magnitude may appear low in terms of absolute number of words, we note that just one or two words in a sentence are sufficient to send a signal to sustain a tacit agreement with industry peers.

Overall, the results, which show that information exchange increases after costs of explicit collusion increase, can be explained by the firms moving from explicit collusion to tacit coordination. Since the firms do not want to risk conducting private meetings, they continue communicating via public disclosure or use such disclosure as the verification mechanism.

[25]We do not necessarily claim that firms collude on the product prices revealed in these contracts. In fact, they do not even need to collude in the product market for this information to be helpful in coordinating product actions. The firms might compete in multiple market segments. For instance, one segment could deal with large customers and the other with atomistic small customers. If the firm wants to collude with its rival in the atomistic customer market, it could signal this intent by revealing its contracts with the large customer. This signaling is costly, as the rival can now undercut the firm on the large customer segment if the firm deviates from the collusive price. The tacit collusion in the atomistic customer market is then sustained by the firm's knowledge that it will be undercut in the large customer market, and this costly additional punishment in the large customer market stabilizes collusion in the atomistic customer market.

5.2 Heterogeneity

Motivated by the theoretical cross-sectional predictions, we study whether the impact of the passage of leniency laws differs across affected firms in predictable ways. We expect our results to be stronger when a firm finds it easier to coordinate product prices or quantities with its peers. We develop three sets of partitions: (a) industries that are more likely to engage in the collusive behavior, (b) industries that are likely to shift from explicit to tacit collusion, (c) industries that have better ability to sustain coordination using unilateral disclosure, and (d) firms that are more likely to be leaders in unilateral disclosure. We present the interaction terms in Table 4 for our measures of redacted contracts (column (1)) and discussions in conference calls (column (2)). The full set of tables with all coefficients is reported in the Internet Appendix.

5.2.1 Collusion versus Competition

Our first group of cross-sectional predictions looks at the conditions that make collusive arrangements easier to sustain and more likely. First, we examine whether our results vary by market structure. We posit that concentration facilitates either explicit collusion or tacit coordination. We use the four-digit NAICS industry concentration measure calculated by the U.S. Census as the proxy for industry concentration level. As row (1) shows, the results are stronger for firms in concentrated industries, consistent with the claim that it is easier to collude in concentrated markets.

Second, we look at whether our results vary by the homogeneity of the industry's products. We define a binary variable, *Differentiation*, which equals one if the number of the firm's peers with similar products falls in the lowest quartile of the sample distribution. A peer is defined as having similar products if the product similarity score between the peer and the firm is larger than 0.0784, which is the highest tercile of the product similarity score across all pairs in the sample. As row (2) shows, the results are weaker for firms with relatively more differentiated products.

Third, we look at whether our results vary with the entry barriers at the industry level. For each industry-year, we calculate the median number of patents owned by a firm. We then create a dummy variable, *High Industry Patent*, that equals one if the median number of patents in a given year falls in the top quartile of the distribution. As row (3) shows, our effects are stronger for firms in industries with higher barriers to entry.

Finally, we investigate whether our effects differ based on industries' economic cycle. Specifically, we create a dummy variable, *High Industry Growth*, that equals one if a given industry falls in the top quartile of the distribution in terms of aggregated revenue growth in a given year. In line with our predictions, our reported estimates in row (4) suggest that our results are weaker for firms in industries experiencing higher growth.

5.2.2 Explicit Collusion across Industries

Our second group of cross-sectional predictions studies an industry's likelihood of conspiring in an explicit collusion or engaging in tacit coordination. We estimate the likelihood that the firm will be detected in a cartel case. We use a prediction model based on time-varying firm characteristics (asset size, leverage, and ROA). Row (5) reports the results of the estimation in which we interact foreign leniency law with the binary variable that equals one if the predicted likelihood of conviction is in the highest quartile of the sample distribution. We find that firms that are more likely to be detected in a cartel case experience an increase in disclosure. We also look at the actual cartel detections as reported in Connor [2014] and interact a recent cartel investigation with the passage of foreign leniency laws. In row (6), we interact leniency law passage with the dummy if any firm in the industry was detected in the past three years. The effect is consistent.

5.2.3 Unilateral Disclosure across Industries

Our third group of cross-sectional predictions looks at the industry's ability to sustain tacit coordination through unilateral disclosure. We look at two characteristics.

First, we look at whether the results are stronger in the industries with a higher prevalence of publicly listed (as opposed to privately held) firms. We follow Badertscher et al. [2013] and construct a binary variable that equals one if the proportion of private firms in the NAICS industry falls in the highest quartile of the sample distribution, and zero otherwise, and we find that the effect is stronger for industries with more public firms.

Second, based on the discussion in Mouraviev and Rey [2011], we partition firms into those whose decision variables are strategic complements (e.g., Bertrand competition) and those whose decision variables are strategic substitutes (e.g., Cournot competition). We follow Kedia [2006] and Bloomfield [2016] in constructing the measure of whether the firm is operating in an environment of strategic complements or strategic substitutes and find a stronger effect for firms in the industries associated with the strategic complements, as predicted by Mouraviev and Rey [2011].

5.2.4 Firm Leadership in Unilateral Disclosure

Finally, we look at one firm characteristic that makes a firm more likely to be the leader in tacit collusion. Here we rely on the literature that provides an unambiguous prediction that larger, more dominant firms are more likely to be leaders (Deneckere and Kovenock [1992], Furth and Kovenock [1993], Van Damme and Hurkens [2004]). We create a binary variable that equals one if the firm size falls in the highest quartile of the sample distribution, and zero otherwise. We find that results are stronger for larger firms.

5.3 Disclosure and Profit Margins

We further study whether our documented changes in product-market disclosures have any real effects by looking at the changes in firms' profit margins. To do so, we look at whether a firm's profitability depends positively on how much information its peers disclose. Indeed, industry peers could have increased disclosure to respond to investors' demand for information in order to raise external capital and compete more aggressively (i.e., they optimally

found that in their competitive environment, proprietary costs of disclosure were dominated by the benefits of disclosure in reducing firms' cost of capital, at least when competition intensifies unexpectedly).[26] In such a case, it is likely this would have negatively affected firm profitability, as external capital would have allowed peers to pursue more aggressive competitive strategies. Meanwhile, if a firm discloses for collusive reasons, peer disclosure should be positively correlated with the firm's profitability. Indeed, in Table 5, we find that while in general the effect of *High Disclosure* is negative, the coefficient of the interaction term with *Foreign Leniency* is positive and significant. These findings suggest that relatively higher level of product-market disclosure helps to sustain collusion by maintaining average industry profits at a higher level than in the industries that redact more after a change in the costs of explicit collusion.

6 Robustness Tests and Caveats

In this paper, we argue that when the costs of explicit collusion increase, some firms find it optimal to switch to tacit collusion. In this section, we first assess the robustness of our identification strategy. Second, we examine whether our findings can be explained by increased competition. Indeed, given that public communication is noisy and that it might take time for beliefs about the collusive price to converge, some firms might find it too costly to sustain tacit coordination and switch to competition. Finally, we discuss the limitations of our findings.

6.1 Pre-Trends and Dynamics of the Effect

We further perform the robustness tests by assigning a binary treatment instead of the continuous measure. This allows us to implement a more standard difference-in-differences

[26] This alternative explanation would be consistent with the results of Burks et al. [2018], who find that after an unexpected increase in competition from existing industry rivals, firms disclose more negative information aimed at deterring entry while also communicating more positive information to investors.

estimation of staggered assignment of treatment, examine pre-trends, and study the dynamics of the effect.

For each three-digit SIC code, we select the country that is the most important in terms of import volume from the country to that industry. In this set of analyses, each industry starts to be treated just once over the sample period. In particular, an industry is categorized as a *treated industry* starting with the year when the country most important to that industry adopted the law. We then define a binary variable, *Binary Foreign Leniency*, that is set to one for the treated industry after the adoption of the law, and zero otherwise. We then replicate our previous findings of the measure of *Redacted Contracts*, and tabulate the results in column (1) of Table 6. In line with our previous findings, the coefficient on *Binary Foreign Leniency* is negative and statistically significant at the 5% level.

Next, we perform two additional falsification tests. We first define a pseudo adoption year as four years before the actual adoption year and re-run our estimation. As expected, the results displayed in column (2) show that the pseudo adoption of the foreign leniency law has a statistically insignificant effect on contract redaction. These results give confidence that our main estimates are not driven by long-term industry trends. Second, we change the definition of *Binary Foreign Leniency* by replacing the main country in terms of imports with the least important country in terms of imports. Specifically, each three-digit SIC industry is categorized as treated starting from the year when the country least important to the industry adopted the law. If there is limited trade between the industry and a country, a leniency law in this country should have little impact on U.S. firms' collusion costs. As column (3) shows, we do not find significant changes in disclosure behavior.

Furthermore, we explore the dynamics of the effect. For each industry, we create the following binary dummies: *Binary Leniency (T-3)*, *Binary Leniency (T-2)*, *Binary Leniency (T-1)*, *Binary Leniency (T)*, *Binary Leniency (T+1)*, *Binary Leniency (T+2)*, *Binary Leniency (T+3)*, and *Binary Leniency (4+)*, which are equal to one, respectively, three years before, two years before, one year before, in, one year after, two years after, three years after,

and at least three years after the year when the country most important to that industry adopted the law. Results in column (4) show a quick adjustment effect.

Lastly, in columns (5) to (8), we report the same set of tests based on *%Product Conference Calls* and find consistent results.

6.2 Alternative Strategy: Increase in Competition

The finding that firms increase information provision on their product-market strategies following increased costs of explicit collusion can also be explained by the fact that they release information for alternative audiences such as investors. Indeed, one might argue that after the passage of leniency laws, firms choose to compete more aggressively, and for that reason they raise more equity capital (Dasgupta and Žaldokas [2019]). Thus, they aim to provide more precise information to investors. We explore several tests to separate this explanation that firms increase disclosure in response to increased competition from our hypothesis that firms increase disclosure with the aim to collude.[27]

Our first test looks at whether a firm's profitability depends positively on how much information its peers disclose. This result, tabulated in Table 5, has already been discussed in section 5.3 where we assess whether this disclosure strategy is paying-off or not. In short, we find that more disclosure is associated with higher profitability at the industry level after a change in our *Foreign Leniency* measure. This suggests that disclosure is more likely used as a coordination mechanism rather than reflecting an intensification of competition with disclosure used to raise external capital.

Our second test relies on the intuition that if the increased disclosure is an outcome of attempts to provide investors with more information, firms should also provide more information in other material contracts, not only the contracts with customers. Thus, instead of looking at the material contracts with *customers*, we look at the material contracts with *suppliers*. We construct the variable in the same way as *Redacted Contracts* by looking at

[27] In all tables throughout the paper, we control for the competitive pressure in the industry, as measured by HHI and import penetration.

whether firms redact information in their purchase (rather than sales) contracts. Such contracts should be less helpful in assisting collusion. We report the results in Internet Appendix Table *A*1. We do not find that firms disclose more information in the material contracts with *suppliers*, so they do not increase *all* information on product-market strategies.

While these tests do not suggest that firms increase their disclosure to attract investors in response to higher competition, there might be other reasons they would increase disclosure. For instance, they could be attracting new customers via higher financial disclosure, or they could be hedging their litigation risk and disclosing more information on product markets, thereby signaling good behavior, and hoping that this would stop antitrust authorities from investigating past cartels. Non-colluding firms might also increase disclosure to avoid being mistaken for colluding firms.[28] We leave such reasons as an open possibility.

6.3 Other Robustness Tests

To ascertain the validity of our findings, we perform a number of additional robustness tests that are both tabulated and described in the online appendix associated with this manuscript.

First, we re-estimate our specification by varying the definition of the treatment variable using either a binary approach, export data, different weighing schemes, and final goods data. We next ensure that our results are not driven by foreign countries' changes in legal institutions and discuss the role of lobbying for law passage. Also, for a subset of firms in our sample, we construct a firm-level measure of changes in explicit collusion costs. All these results are located in Internet Appendix Table A2.

Moving to our disclosure variables, we investigate changes in the different characteristics of redacted contracts individually in Internet Appendix Table A3. As for the conference call data, we explore various word dictionaries and examine different parts of the conference

[28]Internet Appendix Tables *A*7 and *A*8 show that while internet traffic to firm 10-Ks that could be seen as coming from antitrust regulators increases after *Foreign Leniency*, more disclosure is weakly positively associated with a higher rate of convictions, i.e., not negatively as this argument would predict.

calls as well as the role of backward versus forward-looking statements (Internet Appendix Table A4). We further perform some falsification tests using non-product-market related word dictionaries and report our results in Internet Appendix Figure A2.

Furthermore, we fail to find that our documented changes in disclosure are primarily driven by changes in advertising expenses or common ownership, two alternative coordination mechanisms (Internet Appendix Table A5). Also, we fail to find that observable characteristics of the most exposed U.S. industry to a particular country explain that country's adoption of a leniency program (Internet Appendix Table A6).

Next, we study whether antitrust authorities pay attention to the corporate disclosure. We find evidence that antitrust authorities are more likely to view firms' financial statements on SEC EDGAR after an increase in explicit collusion costs (Internet Appendix Table A7). On a related topic, we find evidence that product market discussions in conference calls are associated with higher likelihood of cartel discovery (Internet Appendix Table A8).

Finally, we tabulate the detailed tables for our cross-section tests (Internet Appendix Table A9) and explore the robustness of these heterogeneity tests to our various treatment definitions (Internet Appendix Table A10).

6.4 Caveats

Despite this extensive list of supplemental tests, we ultimately acknowledge that we face some limitations pertaining to the measurement of our identifying variable and the interpretation of our tests. Since it is challenging to acquire a comprehensive sample of narrow well-defined product markets, assign competing firms to those markets, and match them to import or export exposure, we face an inevitable trade-off between two measurement errors: misclassifying the firms to narrower industries relative to their true set of underlying peers and imposing the identification at the broader level (here the two-digit SIC level), which in effect is the weighted average of the more precise industries. We acknowledge that our market (industry) definition is much larger than the average number of co-conspirators in

cartels, which likely introduces substantial noise and measurement error. Thus, quantifying the exact economic effect and discussing the policy implications of that effect might require looking at more narrowly defined product markets. We hope that with better measurement, further studies will improve our understanding of the potential conflict between the objectives of securities and antitrust regulations with respect to firms' financial disclosure.[29]

Next, one might be concerned about alternative interpretations of our baseline effects. We interpret our results as plausible evidence that a change in the costs of illegal price-fixing cartels leads to the increased use of unilateral financial disclosure, and that such disclosure helps firms sustain collusive arrangements. We motivate our large-sample tests using product market discussions in conference calls by anecdotal evidence from two cases that led firms to be prosecuted for alleged anticompetitive behavior based on communication during conference calls. Furthermore, our cross-sectional results are consistent with theoretically motivated predictions to identify situations where collusion is more likely to be achievable.

However, we acknowledge that it is not possible for us to fully rule out all alternative explanations. In particular, since collusion is a latent variable, our interpretation relies on the identifying assumption that leniency law passage increased incentives of tacit collusion. Despite our best effort to show otherwise, it is possible that the increase in disclosure is driven by some change in fundamentals (e.g., increased competition) and the associated incentives for increased disclosure for firms. In light of these concerns, we caution that our paper does not speak to the prevalence of collusion in the marketplace, nor does it provide evidence on the optimal level of regulatory oversight of collusive behavior.

7 Conclusion

Despite its benefits, greater transparency in financial markets might also produce anti-competitive effects by facilitating collusion in product markets. This paper takes a first

[29] In this spirit, a recent study by Aryal et al. [2019] focuses exclusively on the airline industry and find that airlines use public communication to coordinate on decreasing capacity in competitive routes, corroborating our general results.

step in establishing a link between unilateral communication through SEC-regulated disclosure channels and anti-competitive outcomes.

Our identification strategy exploits the wave of leniency law adoption around the world. These laws made it easier for firms to get amnesty if they submit evidence about their complicity in the cartels and thus had a strong effect on cartel convictions and breakups. We study the effect of foreign leniency law passage on U.S. firms and first confirm that these laws reduced U.S. firms' gross margins, equity returns, and product prices, and also increased cartel convictions, thereby arguably increasing the costs of explicit collusion.

We find that the higher cartel enforcement induced firms to communicate differently about their customers and product pricing in their financial disclosure documents. Firms were less inclined to request confidential treatment in filing the material sales contracts they sign with customers. They also included more discussion of their product-market strategies during their earnings' conference calls with equity analysts. Thus, facing higher costs of explicit collusion, firms shifted from more explicit collusion to a more tacit collusion equilibrium, where some coordination among peers is implemented through public information disclosure.

Given the legal and policy debates on the possible conflict between antitrust and securities legislation, these results have potential important policy implications. They suggest that financial disclosure rules should take into account potential externalities to antitrust enforcement, and they support calls for more regulatory cooperation.

References

Albaek, S.; P. Mollgaard; and P. Overgaard. "Government-Assisted Oligopoly Coordination? A Concrete Case." *Journal of Industrial Economics* 45 (1997): 429–443.

Aryal, G.; F. Ciliberto; and B. Leyden. "Coordinated Capacity Reductions and Public Communication in the Airline Industry." (2019). Working Paper.

Awaya, Y. and V. Krishna. "On Communication and Collusion." *American Economic Review* 106 (2016): 285–315.

Badertscher, B.; N. Shroff; and H. White. "Externalities of Public Firm Presence: Evidence from Private Firms' Investment Decisions." *Journal of Financial Economics* 109 (2013): 682–706.

Baliga, S. and S. Morris. "Co-ordination, Spillovers, and Cheap Talk." *Journal of Economic Theory* 105 (2002): 450–468.

Becker, G. "Crime and Punishment: An Economic Approach." *Journal of Political Economy* 76 (1968): 169–217.

Bertomeu, J.; J. Evans III; M. Feng; and A. Tseng. "Tacit Collusion and Voluntary Disclosure: Theory and Evidence from the U.S. Automotive Industry." (2015). Working Paper.

Bertrand, M.; E. Duflo; and S. Mullainathan. "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics* 119 (2004): 249–275.

Beyer, A.; D. Cohen; T. Lys; and B. Walther. "The Financial Reporting Environment: Review of the Recent Literature." *Journal of Accounting & Economics* 50 (2010): 296–343.

Block, M.; F. Nold; and J. Sidak. "The Deterrent Effect of Antitrust Enforcement." *Journal of Political Economy* 89 (1981): 429–445.

Bloomfield, M. "Product Market Competition, Disclosure and Strategic Delegation: Evidence from Revenue-based Compensation." (2016). Working Paper.

Boone, A.; I. Floros; and S. Johnson. "Redacting Proprietary Information at the Initial Public Offering." *Journal of Financial Economics* 120 (2016): 102–123.

Bradford, A. "Antitrust Law in Global Markets." *in Elhauge Einer (Ed), "Research Handbook on the Economics of Antitrust Law", Edward Elgar Publishing* (2012).

Brochet, F.; K. Kolev; and A. Lerman. "Information Transfer and Conference Calls." *Review of Accounting Studies* 23 (2018): 907–957.

Burks, J.; C. Cuny; J. Gerakos; and J. Granja. "Competition and Voluntary Disclosure: Evidence from Deregulation in the Banking Industry." *Review of Accounting Studies* 23 (2018): 1471–1511.

Cao, S.; G. Ma; J. Tucker; and C. Wan. "Technological Peer Pressure and Product Disclosure." *The Accounting Review* 93 (2018): 95–126.

Chen, Z. and P. Rey. "On the Design of Leniency Programs." *Journal of Law & Economics* 56 (2013): 917–957.

Christensen, H.; E. Floyd; L. Liu; and M. Maffett. "The Real Effects of Mandated Information on Social Responsibility in Financial Reports: Evidence from Mine-Safety Records." *Journal of Accounting & Economics* 64 (2017): 284–304.

Christensen, H.; E. Floyd; and M. Maffett. "The Effects of Charge-Price Transparency Regulation on Prices in the Healthcare Industry." (2018). Working Paper.

Connor, J. "The Private International Cartels (PIC) Data Set: Guide and Summary Statistics, 1990-2013." (2014). Working Paper.

Cooper, D. "Barometric Price Leadership." *International Journal of Industrial Organization* 15 (1997): 301–325.

Costello, A. "Mitigating Incentive Conflicts in Inter-Firm Felationships: Evidence from Long-Term Supply Contracts." *Journal of Accounting & Economics* 56 (2013): 19–39.

Dasgupta, S. and A. Žaldokas. "Anticollusion Enforcement: Justice for Consumers and Equity for Firms." *Review of Financial Studies,* 32 (2019): 2587–2624.

Davis, A.; W. Ge; D. Matsumoto; and J. Zhang. "The Effect of Manager-specific Optimism on the Tone of Earnings Conference Calls." *Review of Accounting Studies* 20 (2015): 639–673.

Deneckere, R. and D. Kovenock. "Price Leadership." *The Review of Economic Studies* 59 (1992): 143–162.

Dong, A.; M. Massa; and A. Žaldokas. "The Effect of Global Leniency Programs on Margins and Mergers." *RAND Journal of Economics* (2019). Forthcoming.

Doyle, M. and C. Snyder. "Information Sharing and Competition in the Motor Vehicle Industry." *Journal of Political Economy* 107 (1999): 1326–1364.

Ellis, C. and W. Wilson. "Cartels, Price-fixing, and Corporate Leniency Policy: What Doesn't Kill Us Makes Us Stronger." (2003). Working Paper.

Fonseca, M. and H.-T. Normann. "Explicit vs. Tacit Collusion – The Impact of Communication in Oligopoly Experiments." *European Economic Review* 56 (2012): 1759–1772.

Furth, D. and D. Kovenock. "Price Leadership in a Duopoly with Capacity Constraints and Product Differentiation." *Journal of Economics* 57 (1993): 1–35.

Genesove, D. and W. Mullin. "Rules, Communication, and Collusion: Narrative Evidence from the Sugar Institute Case." *American Economic Review* 91 (2001): 379–398.

Ghosal, V. and D. Sokol. "The Evolution of U.S. Cartel Enforcement." *Journal of Law & Economics* 57 (2014): S51–S65.

Gilbert, R. J. and D. M. Newbery. "Preemptive patenting and the persistence of monopoly." *American Economic Review* (1982): 514–526.

Goldstein, I. and L. Yang. "Information Disclosure in Financial Markets." *Annual Reviews of Financial Economics* 9 (2017): 101–125.

Goncharov, I. and C. Peter. "Does Reporting Transparency Affect Industry Coordination? Evidence from the Duration of International Cartels." *The Accounting Review* (2018). Forthcoming.

Green, E. and R. Porter. "Noncooperative Collusion under Imperfect Price Information." *Econometrica* 52 (1984): 87–100.

Grout, P. and S. Sonderegger. "Predicting Cartels." (2005). Office of Fair Trading Economic Discussion Paper No 773.

Gutierrez, G. and T. Philippon. "Declining Competition and Investment in the U.S." (2017). Working Paper.

Hammond, S. "An Update of the Antitrust Division's Criminal Enforcement Program." *Speech Before the ABA Section of Antitrust Law, Cartel Enforcement Roundtable* (2005).

Harrington, J. "Optimal Corporate Leniency Programs." *Journal of Industrial Economics* 56 (2008): 215–246.

Harrington, J. "A Theory of Collusion with Partial Mutual Understanding." *Research in Economics* 71 (2017): 140–158.

Harrington, J. and A. Skrzypacz. "Collusion under Monitoring of Sales." *RAND Journal of Economics* 38 (2007): 314–331.

Harrington, J. and A. Skrzypacz. "Private Monitoring and Communication in Cartels: Explaining Recent Collusive Practices." *American Economic Review* 101 (2011): 1–25.

Hoberg, G. and G. Phillips. "Product Market Synergies and Competition in Mergers and Acquisitions: A Text-based Analysis." *Review of Financial Studies* 23 (2010): 3773–3811.

Hollander, S.; M. Pronk; and E. Roelofsen. "Does Silence Speak? An Empirical Analysis of Disclosure Choices during Conference Calls." *Journal of Accounting Research* 48 (2010): 531–563.

Huang, Y.; R. Jennings; and Y. Yu. "Product Market Competition and Managerial Disclosure of Earnings Forecasts: Evidence from Import Tariff Rate Reductions." *The Accounting Review* 92 (2016): 185–207.

Huck, S.; H.-T. Normann; and J. Oechssler. "Two Are Few and Four Are Many: Number Effects in Experimental Oligopolies." *Journal of Economic Behavior & Organization* 53 (2004): 435–446.

Ivaldi, M.; B. Jullien; P. Rey; P. Seabright; and J. Tirole. "Final Report for DG Competition." *Working Paper, European Commission* (2003).

Jin, G. and P. Leslie. "The Effect of Information on Product Quality: Evidence from Restaurant Hygiene Grade Cards." *Quarterly Journal of Economics* 118 (2003): 409–451.

Jovanovic, B. "Truthful Disclosure of Information." *Bell Journal of Economics* 13 (1982): 36–44.

Kandori, M. and H. Matsushima. "Price Observation, Communication and Collusion." *Econometrica* 66 (1998): 627–652.

Kedia, S. "Estimating Product Market Competition: Methodology and Application." *Journal of Banking & Finance* 30 (2006): 875–894.

Kimbrough, M. and H. Louis. "Voluntary Disclosure to Influence Investor Reactions to Merger Announcements: An Examination of Conference Calls." *The Accounting Review* 86 (2011): 637–667.

Kirby, A. "Trade Associations as Information Exchange Mechanisms." *RAND Journal of Economics* 19 (1988): 138–146.

Kogan, L.; D. Papanikolaou; A. Seru; and N. Stoffman. "Technological innovation, resource allocation, and growth." *Quarterly Journal of Economics* 132 (2017): 665–712.

Kühn, K.-U. and X. Vives. "Information Exchanges Among Firms and Their Impact on Competition." *Office for Official Publications of the European Communities* (1995).

Leuz, C. and P. Wysocki. "The Economics of Disclosure and Financial Reporting Regulation: Evidence and Suggestions for Future Research." *Journal of Accounting Research* 54 (2016): 525–622.

Levenstein, M. and V. Suslow. "What Determines Cartel Success?" *Journal of Economic Literature* 44 (2006): 43–95.

Li, X. "The Impacts of Product Market Competition on the Quantity and Quality of Voluntary Disclosures." *Review of Accounting Studies* 15 (2010): 663–711.

Li, Y.; Y. Lin; and L. Zhang. "Trade Secrets Law and Corporate Disclosure: Causal Evidence on the Proprietary Cost Hypothesis." *Journal of Accounting Research* 56 (2018): 265–308.

Lipsky, A. "Managing Antitrust Compliance through the Continuing Surge in Global Enforcement." *Antitrust Law Journal* 75 (2009): 965–995.

Luco, F. "Who Benefits from Information Disclosure? The Case of Retail Gasoline." *American Economic Journal: Microeconomics* 11 (2019): 277–305.

Markham, J. "The Nature and Significance of Price Leadership." *American Economic Review* 41 (1951): 891–905.

Marshall, R.; L. Marx; and M. Raiff. "Cartel Price Announcements: The Vitamins Industry." *International Journal of Industrial Organization* 26 (2008): 762–802.

Marvão, C. and G. Spagnolo. "Cartels and Leniency: Taking Stock of What We Learnt." *in Marini, Marco A. and Corchon, Luis (Eds), "Handbook of Game Theory and Industrial Organization", Edward Elgar Publishing* (2016).

Mayew, W. "Evidence of Management Discrimination among Analysts during Earnings Conference Calls." *Journal of Accounting Research* 46 (2008): 627–659.

McAfee, P. and J. McMillan. "Bidding Rings." *American Economic Review* 82 (1992): 579–599.

Miller, N. "Strategic Leniency and Cartel Enforcement." *American Economic Review* 99 (2009): 750–768.

Motta, M. Competition Policy: Theory and Practice. Cambridge University Press (2004).

Motta, M. and M. Polo. "Leniency Programs and Cartel Prosecution." *International Journal of Industrial Organization* 21 (2003): 347–379.

Mouraviev, I. and P. Rey. "Collusion and Leadership." *International Journal of Industrial Organization* 29 (2011): 705–717.

OECD. "Unilateral Disclosure of Information with Anticompetitive Effects." *Competition Policy Roundtables* (2012).

Page, W. "The Gary Dinners and the Meaning of Concerted Action." *SMU Law Review* 62 (2009): 597–620.

Pastine, I. and T. Pastine. "Cost of Delay and Endogenous Price Leadership." *International Journal of Industrial Organization* 22 (2004): 135–145.

Porter, R. "Optimal Carter Trigger Strategies." *Journal of Economic Theory* 29 (1983): 313–338.

Raith, M. "Product Differentiation, Uncertainty and the Stability of Collusion." (1996). Working Paper.

Rossi, F. and P. Chintagunta. "Price Transparency and Retail Prices: Evidence from Fuel Price Signs in the Italian Highway System." *Journal of Marketing Research* 53 (2016): 407–423.

Rotemberg, J. and G. Saloner. "A Supergame-Theoretic Model of Price Wars during Booms." *American Economic Review* 76 (1986): 390–407.

Rubinstein, A. "The Electronic Mail Game: Strategic Behavior under Almost Common Knowledge." *American Economic Review* 79 (1989): 385–391.

Spagnolo, G. "Optimal Leniency Programs." (2000). Working Paper.

Steuer, R.; J. Roberti; and D. Jones. "The Application of Antitrust to Public Companies' Disclosures." *Administrative Law Review* 63 (2011): 159–179.

Van Damme, E. and S. Hurkens. "Endogenous Price Leadership." *Games and Economic Behavior* 47 (2004): 404–420.

Verrecchia, R. "Discretionary Disclosure." *Journal of Accounting & Economics* 5 (1983): 179–194.

Verrecchia, R. and J. Weber. "Redacted Disclosure." *Journal of Accounting Research* 44 (2006): 791–814.

Table 1: Validating the Measure of Increased Collusion Costs

This table presents the validity tests for *Foreign Leniency* as our measure of increased collusion costs. Panel A investigates the relation between the exposure to foreign leniency laws and the convictions of cartels, based on the two-digit SIC industry-year panel data over 1994-2012. The dependent variable in column (1) is the logarithm of one plus the number of convicted cartels in the two-digit SIC industry, and in column (2) it is the logarithm of one plus the number of convicted firms in the two-digit SIC industry. Panel B presents the OLS regression relating firm and industry performance to the exposure to foreign leniency law. In columns (1) to (4), the sample consists of U.S. Compustat firms over 1994-2012. In columns (5) and (6), the sample is based on the NAICS industry-year panel data over 1998-2012. The dependent variable is the gross profit margin in columns (1) and (2), the size-adjusted stock returns in columns (3) and (4), and the producer price index (PPI) at the NAICS industry level in columns (5) and (6). Variable definitions appear in Appendix A. All continuous variables are winsorized at the 1% and 99% levels. All the columns report results controlling for industry- (or firm-) and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level (except in columns (5) and (6) of Panel B, where standard errors are clustered at the NAICS industry level) and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Cartel Dissolution

	Convicted Cartels	*Convicted Firms*
	(1)	(2)
Foreign Leniency	1.129**	2.245*
	(0.537)	(1.090)
Industry FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R-squared	0.226	0.175
Observations	380	380

Panel B: Firm and Industry Performance

	Gross Margin		*Size Adjusted Returns*		*Producer Price Index*	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Leniency	-0.656*	-0.596*	-0.452	-0.684**	-1.402***	-1.265***
	(0.345)	(0.300)	(0.285)	(0.276)	(0.345)	(0.315)
Lagged ROA		0.110***		0.019		-0.234*
		(0.008)		(0.018)		(0.133)
Lagged Size		0.032		-0.246***		-0.038*
		(0.020)		(0.012)		(0.023)
HHI		-0.048		-0.099		0.027
		(0.177)		(0.415)		(0.150)
Import Penetration		0.119		-0.134		0.000
		(0.090)		(0.095)		(0.000)
Firm FE	Yes	Yes	Yes	Yes	No	No
NAICS FE	No	No	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.728	0.736	0.009	0.055	0.041	0.041
Observations	25,256	25,256	25,256	25,256	4,034	4,034

Table 2: Summary Statistics

This table displays the summary statistics for the variables employed in the main specifications. We report the number of observations, mean, standard deviation, and 10th, 25th, 50th, 75th and 90th percentiles for each variable. The variable definitions appear in Appendix A. All continuous variables are winsorized at the 1% and 99% levels.

Variables	N	Mean	SD	P10	P25	P50	P75	P90
Foreign Leniency	25,256	0.067	0.072	0.000	0.007	0.047	0.082	0.203
Gross Margin	25,256	0.276	0.439	-0.167	0.208	0.355	0.525	0.671
Size-Adjusted Return	25,256	0.008	0.598	-0.585	-0.364	-0.092	0.203	0.662
ROA	25,256	-0.093	0.439	-0.469	-0.119	0.030	0.093	0.164
Size	25,256	5.101	2.076	2.590	3.573	4.820	6.453	8.046
HHI	25,256	0.060	0.049	0.031	0.035	0.045	0.062	0.107
Import Penetration	25,256	0.296	0.210	0.065	0.142	0.248	0.423	0.583
Redact Contracts	414	0.599	0.491	0.000	0.000	1.000	1.000	1.000
%Product Conference Calls	9,713	12.967	7.685	3.728	7.197	12.015	17.579	23.436
NAICS PPT	4,034	1.566	0.516	1.055	1.238	1.470	1.787	2.143

Table 3: Foreign Leniency Law and Public Disclosure

This table presents results from the OLS regressions relating redaction of information in material contracts and the product-market-related disclosure during conference calls to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is *Redacted Contracts* in columns (1) and (2), and *%Product Conference Calls* in columns (3) and (4). Variable definitions appear in Appendix A. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Redacted Contracts		*%Product Conference Calls*	
	(1)	(2)	(3)	(4)
Foreign Leniency	-4.043***	-3.655***	10.705**	11.889**
	(1.202)	(1.007)	(4.854)	(5.155)
Lagged ROA		-0.204***		0.075
		(0.058)		(0.119)
Lagged Size		0.040		-0.055
		(0.039)		(0.377)
HHI		-4.267*		-6.667*
		(2.081)		(3.336)
Import Penetration		-0.236		0.203
		(0.786)		(1.140)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.587	0.612	0.674	0.674
Observations	414	414	9,713	9,713

Table 4: Heterogeneity in Public Disclosure

This table presents results from the OLS regressions relating redaction of information in material contracts or product-market-related disclosure during conference calls to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is *Redacted Contracts* in column (1) and *%Product Conference Calls* in column (2). In this summary table, we report only the coefficient estimates on the interaction terms. The full tables with all coefficient estimates are reported in Internet Appendix Table *A*7. *HHI Census* is the four-digit census HHI ratio. *Differentiation* is a binary variable that equals one if the number of the firm's peers with similar products falls in the lowest quartile of the sample distribution, and zero otherwise. *High Industry Patent* is a binary variable that equals one if number of patents possessed by a median firm in the industry falls in the highest quartile of the sample distribution, and zero otherwise. *High Industry Growth* is a binary variable that equals one if the industry average sales growth is in the highest quartile of the sample distribution, and zero otherwise. *High Prob(Convict)* is a binary variable that equals one if the predicted likelihood of conviction is in the highest quartile of the sample distribution. *Recent Conviction* is a binary variable that equals one if there is at least one conviction case in the industry in the most recent three years. *High %Public* is a binary variable that equals one if the proportion of public firms in the three-digit NAICS industry falls in the highest quartile of the sample distribution, and zero otherwise. *Strategic Complements* is a binary variable that equals one if the median value of the estimated degree of complementarity of all Compustat firms in the three-digit SIC industry is greater than zero. *Large Firm* is a binary variable that equals one if the firm size falls in the highest quartile of the sample distribution, and zero otherwise. Variable definitions appear in Appendix A. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Redacted Contracts	%Product Conference Calls
	(1)	(2)
(1) HHI Census×Foreign Leniency	-0.004*	0.008*
	(0.002)	(0.004)
(2) Differentiation×Foreign Leniency	6.672*	-2.475*
	(3.470)	(1.262)
(3) High Industry Patent×Foreign Leniency	-2.254**	9.116***
	(0.856)	(2.284)
(4) High Industry Growth×Foreign Leniency	4.309*	-14.756*
	(2.037)	(7.575)
(5) High Prob(Convict)×Foreign Leniency	-2.137*	6.831***
	(0.997)	(2.033)
(6) Recent Conviction×Foreign Leniency	-3.864*	6.724**
	(1.771)	(3.085)
(7) High %Public×Foreign Leniency	-1.164**	3.642*
	(0.512)	(1.896)
(8) Strategic Complements×Foreign Leniency	-1.227*	3.344*
	(0.580)	(1.818)
(9) Large Firm×Foreign Leniency	-2.726***	4.012*
	(0.870)	(2.304)

Table 5: Public Disclosure and Firm Performance

This table presents results from the OLS regressions relating profitability to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 1994-2012. The dependent variable is the gross profit margin. *High Disclosure* is a binary variable that equals one if the industry-level product-market-related disclosure during conference calls falls in the highest quartile of the sample distribution, and zero otherwise. Industry-level product-market-related disclosure during conference calls refers to the mean of *%Product Conference Calls* excluding the firm itself. Variable definitions appear in Appendix A. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Gross Margin	
	(1)	(2)
Foreign Leniency	-0.823*	-0.807*
	(0.457)	(0.439)
High Disclosure	-0.069***	-0.061**
	(0.023)	(0.022)
High Disclosure×Foreign Leniency	0.368**	0.325*
	(0.163)	(0.155)
Lagged ROA		0.061***
		(0.009)
Lagged Size		0.007
		(0.010)
HHI		0.240
		(0.189)
Import Penetration		0.034
		(0.046)
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R-squared	0.756	0.759
Observations	16,023	16,023

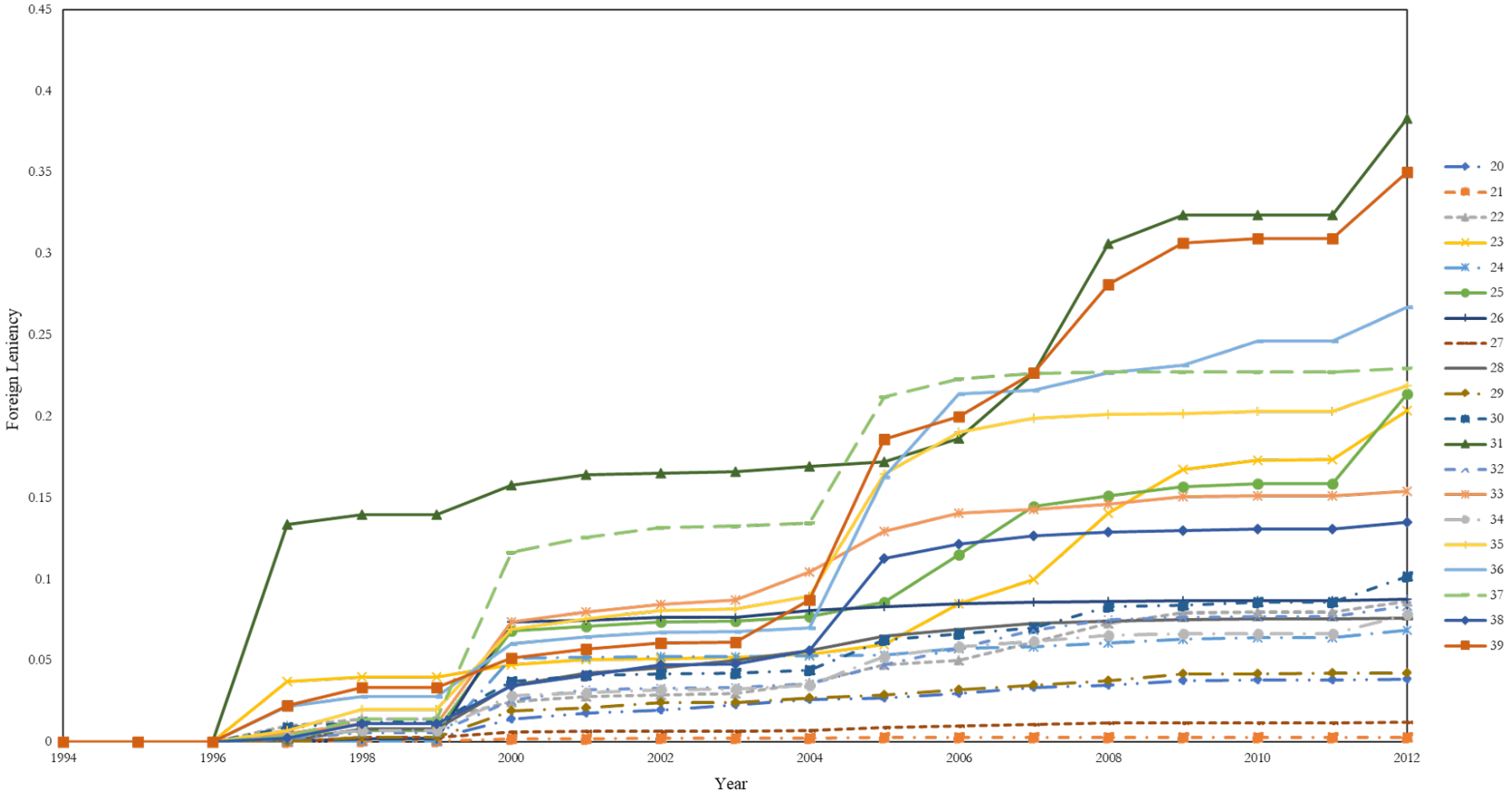
Table 6: Pre-Trends and Dynamics

This table presents results from the OLS regressions relating redaction of information in material contracts and product-market-related disclosure during conference calls to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is *Redacted Contracts* in columns (1) to (4) and *%Product Conference Calls* in columns (5) to (8). We modify our identification strategy. For each three-digit SIC code, we select the country that is the most important to that industry in terms of import volume. For each industry, *Binary Foreign Leniency* is equal to one starting with the year when the country most important to that industry adopted the law. In Columns (2) and (6), we redefine *Binary Foreign Leniency* by anticipating adoption year by four years before the actual adoption. In Column (3) and (7), *Binary Foreign Leniency* is redefined by replacing the most important country in terms of imports with the least important country in terms of imports. In columns (4) and (8), *Binary Leniency (T-3)*, *Binary Leniency (T-2)*, *Binary Leniency (T-1)*, *Binary Leniency (T)*, *Binary Leniency (T+1)*, *Binary Leniency (T+2)*, *Binary Leniency (T+3)*, and *Binary Leniency (4+)* are equal to one, respectively, three years before, two years before, one year before, in, one year after, two years after, three years after and at least four years after the year when the country most important to the industry adopted the law. Variable definitions appear in Appendix A. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for industry- (or firm-) and year-fixed effects. Standard errors are clustered at the three-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Redacted Contracts				*%Product Conference Calls*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Binary Leniency	-0.336**				1.313*			
	(0.136)				(0.705)			
Binary Leniency (T-4)		0.233				-0.069		
		(0.273)				(1.099)		
Binary Leniency (Least Exposed)			0.118				-0.639*	
			(0.077)				(0.329)	
Binary Leniency (T-3)				-0.081				-0.174
				(0.118)				(1.078)
Binary Leniency (T-2)				-0.406				1.002
				(0.246)				(1.129)
Binary Leniency (T-1)				0.065				1.933
				(0.187)				(1.224)
Binary Leniency (T)				-0.323***				2.211*
				(0.112)				(1.188)
Binary Leniency (T+1)				-0.246				1.908
				(0.146)				(1.376)
Binary Leniency (T+2)				-0.650***				2.554*
				(0.102)				(1.377)
Binary Leniency (T+3)				-0.508***				2.875**
				(0.160)				(1.372)
Binary Leniency (4+)				-0.503***				3.269**
				(0.136)				(1.457)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.618	0.600	0.600	0.625	0.673	0.672	0.673	0.675
Observations	414	414	414	414	9,713	9,713	9,713	9,713

Figure 1: *Foreign Leniency* across Years

We plot *Foreign Leniency* across industries for the sample period.



Appendix A: Variable Definitions

Variable	Definition	Data Source
Foreign Leniency	The weighted average of the passage of laws in all other countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country.	*Cartel Regulation 2013, Schott's Data Library*
Binary Foreign Leniency	A binary variable that is equal to one starting with the year when the country most important to that industry adopted the law. We define the most important country for each three-digit SIC code based on the import volume from the country to that industry.	*Cartel Regulation 2013, Schott's Data Library*
Convicted Cartels	The logarithm of one plus the number of cartels in the industry that were convicted during the year.	*Connor [2014]*
Convicted Firms	The logarithm of one plus the number of cartel firms in the industry that were convicted during the year.	*Connor [2014]*
Redacted Contract	A binary variable that equals one if the firm files material sales contracts during the year and requests confidential treatment in the contract. We search for *confidential treatment*, *confidential request* and *confidential...redacted* in the file to identify the confidential request by the firm.	*SEC Edgar*
%Product Conference Calls	The ratio of product-market-related words to the total number of words in the CEO / CFO presentation during earnings conference calls multiplied by 1,000. The list of words includes *product*, *service*, *offering*, *offer*, *customers* and *client*.	*StreetEvents*
HHI	Herfindahl-Hirschman Index of the two-digit industry.	*Compustat*
Import Penetration	Four-digit SIC industry-level import penetration, which is defined as the value of imports scaled by the sum of the value of imports and the shipment value minus value of exports.	*Schott's Data Library*
Gross Margin	Gross profit scaled by net sales.	*Compustat*
Size-Adjusted Return	The 12-month buy-and-hold stock return in the year, adjusted by the return in the same capitalization decile.	*CRSP*
Producer Price Index	The producer price index at the NAICS industry level, scaled by 100.	*Bureau of Labor Statistics*
ROA	Operating earnings before extraordinary items scaled by lagged total assets.	*Compustat*
Size	The logarithm of total assets.	*Compustat*
HHI Census	The four-digit NAICS census HHI ratio.	*U.S. Census Bureau*
Differentiation	A binary variable that equals one if the number of the firm's peers with similar products falls in the lowest quartile of the sample distribution.	Hoberg and Phillips [2010]
High Industry Patent	A binary variable that equals one if the number of patents possessed by a median firm in the industry falls in the highest quartile of the sample distribution.	Kogan et al. [2017]
High Industry Growth	A binary variable that equals one if the industry revenue growth falls in the highest quartile of the sample distribution.	*Compustat*
High Prob(Convict)	A binary variable that equals one if the predicted likelihood of conviction is in the highest quartile of the sample distribution.	*Cartel Regulation 2013, Schott's Data Library*
Recent Conviction	A binary variable that equals one if there is at least one conviction case in the industry in the most recent three years.	*Cartel Regulation 2013, Compustat*

Variable	Definition	Data Source
High %Public	A binary variable that equals one if the proportion of public firms in the three-digit NAICS industry falls in the highest quartile of the sample distribution, and zero otherwise.	*U.S. Census Bureau*
Strategic Complements	A binary variable that equals one if the median value of the estimated degree of complementarity of all Compustat fims in the three-digit SIC industry-year is greater than zero, as per the methodology in Kedia [2006] and Bloomfield [2016].	*Compustat*
Large Firm	A binary variable that equals one if the firm size falls in the highest quartile of the sample distribution.	*Compustat*
High Disclosure	A binary variable that equals one if the industry-level product-market-related disclosure during conference calls falls in the highest quartile of the sample distribution, and zero otherwise.	*StreetEvents*

Corporate Disclosure as a Tacit Coordination Mechanism: Evidence from Cartel Enforcement Regulations

Internet Appendix (Not for Publication)

Appendix A1: Examples of Sales Contracts with Redacted and Non-redacted Information

Example 1: Redacted Disclosure

The document is from a sales agreement in ***Molecular Insight Pharmaceuticals, Inc.***'s 10-Q filing on 2009-11-06 with redacted information.

EX-10.5 5 dex105.htm SUPPLY AGREEMENT

Exhibit 10.5

SUPPLY AGREEMENT

This supply agreement ("Agreement"), dated this 19th day of October, 2009 (the "Effective Date") is entered into by and between Molecular Insight Pharmaceuticals, Inc. (referred to herein as "MIP"), a corporation organized and existing under the laws of The Commonwealth of Massachusetts and having its principal office at 160 Second Street, Cambridge, MA 02142 USA, and BIOMEDICA Life Sciences S.A., a corporation organized and existing under the laws of Greece, with offices at 4 Papanikoli Str., 15232 Halandri, Athens, Greece (referred to herein as "BIOMEDICA"), with Greek Tax ID of EL 094413470, from the tax office of FAEE Athens; each a "Party" and collectively the "Parties" hereto.

. . .

WHEREAS, MIP agrees to source and/or manufacture the products (defined below) and supply such products to **BIOMEDICA**;

. . .

3.2.1 Pricing ******

- Compound Transfer Price is set at ****** per Dose
- Product for clinical trials is set at ****** per Dose
- Product Transfer Price. The BIOMEDICA price per dose of the Product will be determined by the national competent authority of each country of the Territory in which the Product will be launched. If the price per dose for the Product by the national competent authority is set below ****** then the Parties will renegotiate in good faith the transfer price for Product in that country in the Territory.

Price Per Dose*	Transfer Price	Percentage of Onalta Price Per Dose**
******	******	******
******	******	******
******	******	******
******	******	******
******	******	******
******	******	******
******	******	******

* Confidential Treatment Required *

Example 2: Non-Redacted Disclosure

The document is from a sales agreement in ***MOSAIC CO***'s 10-K filing on 2007-08-09 without redacted information.

EX-10.II.OO 3 dex10iioo.htm SALE CONTRACT

Exhibit 10.ii.oo

SALE CONTRACT

This Sale Contract is made this 1st day of January, 2007 by and between the Salt Business Unit of Cargill, Incorporated with principal offices at 12800 Whitewater Drive #21, Minnetonka, MN 55343 ("Buyer") and Mosaic Crop Nutrition, LLC with its principal offices located at Atria Corporate Center, Suite E490, 3033 Campus Drive, Plymouth, MN 55441 ("Seller").

1. Seller agrees to sell to Buyer Untreated White Muriate of Potash (the "Commodity") at the terms and conditions set forth below and as further set forth in Exhibit A, attached hereto and by this reference made a part hereof.

. . .

Additional terms and conditions are set forth in Exhibit A.

EXHIBIT A

QUANTITY:	Approximately 20,000 short tons. Buyer agrees to purchase 100% of its requirements from Seller during the term of this Agreement.
PRICE:	For the January 1 through June 30, 2007 time period pricing will be as follows:
	$218/st FFR at Buyer's designated facility Timpie, UT.
	$203/st FFR at Buyer's designated facility Savage, MN.
	$204/st FFR at Buyer's designated facility Buffalo, IA.
	$230/st FFR at Buyer's designated facility White Marsh, MD.
	$234/st FFR at Buyer's designated facility Tampa, FL.
	Pricing after July 1st, 2007 will be done for 6 month time periods with final pricing determined 15 days prior to the start of the period. For example, July 1 through December 31, 2007 pricing will be finalized by June 15, 2007.
PAYMENT TERMS:	Net 30 cash from date of invoice.
SHIPMENT PERIOD:	01/01/07 to 12/31/08
RAIL DEMURRAGE:	Buyer is exempt from demurrage on actual placement date plus two free days succeeding actual placement date, after which Seller will charge $40 per day per railcar for private cars. If product shipped in railroad owned equipment, then demurrage will be charged per the railroads going rate.
STATE TONNAGE TAX:	For the account of Buyer

Appendix A2: The Passage of Foreign Leniency Laws

The table presents years of leniency law adoption by country. The original source of the information is Cartel Regulation 2013, published by Getting the Deal Through. We complement the dataset using press releases and news articles.

Country	**Year**	**Country**	**Year**
Argentina	None	Latvia	2004
Australia	2003	Lithuania	2008
Austria	2006	Luxembourg	2004
Belgium	2004	Malaysia	2010
Brazil	2000	Mexico	2006
Bulgaria	2003	Netherlands	2002
Canada	2000	New Zealand	2004
Chile	2009	Nigeria	None
China	2008	Norway	2005
Colombia	2009	Oman	None
Croatia	2010	Pakistan	2007
Cyprus	2011	Peru	2005
Czech Republic	2001	Philippines	2009
Denmark	2007	Poland	2004
Ecuador	2011	Portugal	2006
Estonia	2002	Romania	2004
Finland	2004	Russia	2007
France	2001	Singapore	2006
Germany	2000	Slovakia	2001
Greece	2006	Slovenia	2010
Hong Kong	None	South Africa	2004
Hungary	2003	Spain	2008
Iceland	2005	Sweden	2002
India	2009	Switzerland	2004
Indonesia	None	Taiwan	2012
Ireland	2001	Thailand	None
Israel	2005	Turkey	2009
Italy	2007	Ukraine	2012
Japan	2005	United Kingdom	1998
Jordan	None	Venezuela	None
Korea	1997	Zambia	None

Appendix A3: Data Collection Process

A material supply contract is typically disclosed as Exhibit 10 as part of an annual report 10-K, quarterly report 10-Q, and current report 10-K, in the following form:

$< Document >$
$< TYPE > EX - 10(.)XXX$
...
$< TITLE > Supply\ Contract\ Title < /TITLE >$
CONTEXT

$< /Document >$

We first obtain the URL address of annual, quarterly and current reports filed by non-financial firms incorporated in the U.S. from WRDS, then download all material business contracts filed as Exhibit 10 through the 10-K, 10-Q and 8-K. As we are interested in supply contracts only, we require the contract's title to include at least one word from the following list: *sell, sale, order, procurement, supply, supplier, purchase, purchaser.*

If the title is not specified in the form of $< TITLE >$ "$Title$" $< /TITLE >$, we require the contract to 1) have a word from the word list of *sell, sale, order, procurement, supply, supplier, purchase, purchaser* in conjunction with a word in the same sentence from the word list of *agreement, agrmt, agree, agmt, form, plan, contract, letter, confirmation, commitment, order, NO*; 2) have a word from the word list of *seller, purchaser, buyer, subscriber, producer, carrier, supplier, customer, consumer, manufacturer.*

Meanwhile, we exclude a contract automatically if it has a word in the beginning 200 words from the list of *interest, registration, receivable, acquisition, merge, real estate, patent, lease, compensation plan, real property, property, properties, bonus, financing, equity, loan, debt, lend, borrow, debenture, incentive plan, executive, stock, security, securities, bond, option, employee, asset, note, land, credit, warrant, residual, rent, share, bank, dollar, employ.* This word list is developed based on our manual reading of 500 business contracts. This results in 6,671 contracts from 4,007 unique firm-years over 2000 to 2012.

We next manually read each contract and exclude non-supply contracts, such as asset

purchase agreements, stock purchase agreements, and transactions that contain only a transfer of license, properties, notes or accounts receivable, which results in 3,066 contracts. This number is comparable to that of Costello [2013], who has 3,855 customer-supplier contracts over 1996 to 2012. We obtain the name of the customer and the supplier from the contract and exclude contracts filed by the customer, which results in 1,611 contracts from 1,096 unique firm-years. Lastly, we exclude non-manufacturing firms. The data collection procedure is summarized in the following table.

Step		No. Contracts	No. Firm-years
Material contracts filed with the SEC from 2000 to 2012, containing specific words		6,671	4,007
Excluding non-customer-supplier contracts	(-3,605)	3,066	1,861
Requiring filer to be the supplier	(-1,455)	1,611	1,096
Excluding non-manufacturing firms	(-652)	959	652
Requiring information on control variables			414

Appendix A4: Additional Robustness Checks

1 Redaction in Purchase Contract

In Internet Appendix Table *A*1, we perform a falsification test where we look at the material contracts with *suppliers*, which should be less helpful in assisting collusion. We find a statistically insignificant association between *Foreign Leniency* and redaction in material contracts with *suppliers*, which indicates that firms do not increase *all* information on product-market strategies.

2 Robustness of Foreign Leniency Measures

Weighting schemes. In Internet Appendix Table *A*2, we explore the robustness of our results to alternative weighting schemes. Panel A1 reports results for *Redacted Contract*, and Panel A2 reports results for *%Product Conference Calls*. In column (1), we re-estimate *Foreign Leniency* by setting the weight as the share of the *three-digit* SIC industry's imports from other countries in 1990. Second, in column (2), we report the results based on the *Export-based Foreign Leniency* by setting the weight as the share of exports of each two-digit SIC industry from the U.S. to other countries. If a firm's industry exports a lot to a certain country, it is likely that this country is an important product market for the firm. In column (3), we further report the results based on the weight of the share of exports of each three-digit SIC industry from the U.S. to other countries. Third, one might worry that our default weighting scheme is capturing vertical rather than horizontal collusion, since imports might be intermediate goods, whereas U.S. products in the same two-digit SIC industry might be final goods. In column (4), *Foreign Leniency* is recalculated according to weights based on the imports of only the *final* goods.[1] Finally, in column (5), we abstract

[1]We gather the information about the imports of final goods from the World Input-Output Database, available at http://www.wiod.org/database/int_suts13. We use the import data in 1995 to compute the weights. We convert the International SIC to the U.S. SIC using the concordance table provided by Jon

from the industry effects by repeating the analysis in column (1) and including two-digit SIC industry times year fixed effects. Our baseline results continue to hold when we use these alternative measures.

Rule of law and enforcement. The enforcement of leniency laws can differ across countries. While we are not able to measure which leniency laws will be more successful ex ante at the time of their implementation, we can focus on the countries that are known to have a judicial system that is relatively more efficient. In Internet Appendix Table *A*2, Panel B, columns (1)-(2), we thus reconstruct *Foreign Leniency* by considering only leniency laws from countries whose score on the efficiency of the judicial system (based on the measure in La Porta et al. [1998]) is larger than the sample median. Our result holds when we limit the sample to countries with more efficient judicial systems.

Second, one potential concern is that leniency law passage is correlated with a general increase in a country's rule of law, and we are thus capturing some other correlated legal change. To address this concern, we construct a *Foreign Rule of Law* measure, which is the weighted average of the rule of law index of other countries. As with *Foreign Leniency*, the weight to estimate *Foreign Rule of Law* is based on the imports of the two-digit SIC industry from other countries, while individual rule of law indices are based on World Bank data. In column (3), we show that an increase in rule of law is not driving our results. In column (4), we also show that *Foreign Leniency* is significant after controlling for *Foreign Rule of Law*.

Given that the EU has a supranational competition policy, we perform a robustness check where we treat all EU member states as one country. We then focus on the European Commission's strengthening of its antitrust enforcement in 2002 instead of the implementation of individual laws in EU countries and consider the later of this year or the year the country joined the EU as the relevant year for each EU country. As columns (5) and (6) of Panel B show, we still find that an increase in *Foreign Leniency* leads to less redaction of information in material contracts and more product-market-related discussions during conference calls.

Haveman. If multiple international SICs are mapped to one U.S. SIC, we set the weight for this U.S. SIC as the median value of the international SICs.

Anticipation and lobbying. One concern with our study is that leniency laws might have been anticipated, and the change in disclosure behavior might have started before the actual adoption of laws. In addition, if stringent laws were anticipated but weaker laws were ultimately passed, focusing on the actual adoption year might even reverse the sign of the estimates (Hennessy and Strebulaev [2015]). Our binary adoption treatment mitigates the latter concern, but we perform an additional test to rule out this possibility. Specifically, for each country we collect data on when the first discussion about leniency laws by policy makers took place. To collect this information, we use the Factiva News Database and search for news in the local language about the leniency program adoption. Out of the 54 countries that have the laws in our sample, we found leniency programs discussed in the media of 35 countries. Some smaller countries, especially those in Central and Eastern Europe, are not covered by Factiva. Even for a handful of those that are covered, we were not able to establish media discussion about leniency laws before the adoption year. Out of the 35 countries that had discussions, we found that 26 had discussions about leniency laws at least a year before the law passage. For the countries for which we did not find any discussion, we instead use the actual year of leniency law passage. We then reconstruct our measure *Foreign Leniency* based on this updated year. Results tabulated in columns (1) and (2) in Internet Appendix Table *A*2, Panel C, show that our effect is not materially affected.

Firm-level exposure. Next, we reconstruct our treatment variable at the firm level. Specifically, while *Foreign Leniency* measures a firm's exposure to the leniency laws in other countries based on the industry's trade with that country, for a subset of firms we collect data on their actual international operations. We then measure *Foreign Leniency* by looking at the distribution of the firm's operations around the world in terms of sales as recorded in the Lexis-Nexis Corporate Affiliations database. We construct a measure of exposure to leniency law changes based on the proportion of firm activity that takes place in the country that experiences the law change. As columns (3) and (4) show, we find consistent results that firms redact less information in material contracts and have more discussions about

product-market topics when the costs of explicit collusion are measured at the firm level.

3 Robustness on Redacted Contracts Measures

Contract types. In Internet Appendix Table *A*3, we perform a more detailed analysis by manually reading all contracts and identifying the type of redacted information. Columns (1)-(2) focus on a set of contracts where firms explicitly specify product price, and examine firms' decision to redact information about product price. Columns (3)-(4) focus on a set of contracts where firms explicitly specify product quantity, and examine firms' decision to redact information about product quantity. We find that firms redact less information about both product price and quantity when the cost of explicit collusion increases.

Time trend. Finally, in Figure *A*1, we plot the average of our primary measure of disclosure, *Redacted Contract*, across years. It shows that there is no significant time trend.

4 Robustness on Conference Call Measures

We next show that our finding that managers increase their communication about product-market topics during conference calls when explicit collusion becomes more costly is robust to different ways of constructing our *%Product Conference Calls* measure. We present the results in Internet Appendix Table *A*7.

Alternative work dictionary. First, we augment the word dictionary in Table 3 with *price*, *pricing*, *prices*, *priced*, and *discount* to capture managers' discussion about pricing strategy. We remove any instance where *share*, *stock*, or *security* is mentioned in the five words around these words, in order to avoid including discussion of the firm's share price. Results are tabulated in column (1) of Internet Appendix Table *A*4, Panel A. We find consistent results: product-market-related disclosure increases when explicit collusion becomes more costly. Second, we construct a word dictionary based on the two FTC cases cited in footnote (5) in the main body of the paper. We first extract the sections that are suspected

of collusion from these two conference call scripts (namely the 2008 Q3 Amerco Earnings Conference Call and the 2004 Q2 Valassis Communications Earnings Conference Call), and we count the frequency of each word used in these sections after stemming words and removing stop words. The word dictionary is defined as the 20 most frequently used words.[2] The results, tabulated in columns (3)-(4), are consistent with our previous findings. Lastly, also motivated by the above-mentioned FTC cases, we investigate whether firms quote their competitors during conference calls. For instance, Valassis Communications mentioned its competitor *News America* 13 times during the 2004 Q2 conference call. We first identify a firm's competitors using the Factset Revere relationships database, which collects information from SEC filings, investor presentations, corporate action announcements, and press releases. We use the relationships identified by Factset Revere from April 2003, when the Factset Revere database started, to December 2012, when our sample period ends. We next define the binary variable *Quote Competitor* and code it as one if the CEO or the CFO mentions at least one of the firm's competitors during the earnings conference call presentations in the year. We exclude the conference calls of the firms that are not covered by Factset Revere. Since the Fatcset Revere database is available only after April 2003, we limit our analysis to the sample period of 2004-2012. Results are tabulated in columns (5)-(6). We find that managers quote their competitors more frequently when the costs of explicit collusion increase.

Falsification tests. Another concern is that our findings are driven by a general trend that managers provide more information in conference calls. To mitigate this concern, we conduct another falsification test by documenting that our *Foreign Leniency* measure is not associated with management discussion of topics unrelated to product-market concerns. To perform this test, we first construct a dictionary of words (*Falsification Words*) that are unlikely to be related to product markets based on the cosine similarity of each word in

[2]These words include *market share*, *customer*, *floor*, *time*, *news*, *industry*, *goal*, *need*, *budget*, *invest*, *client*, *standpoint*, *opportunity*, and *create*. We exclude *price*, *quote*, and *return* from the list due to their possible relations with the stock price.

our base dictionary (*product*, *service*, *customer*, *consumer*, *user*, *client*). For instance, in the case of *product*, we use the *word2vec* approach to calculate the cosine similarity between each word appears in conference calls and *product*.[3] Higher cosine similarity indicates that the two words are more likely to be associated in similar contexts. We then retain the list of the least similar words (*Least_Product*), i.e., words for which the cosine similarity is negative and falls in the lowest decile of the distribution. We repeat this process for the remaining five words in our base dictionary and obtain the five lists of the least similar words. *Falsification Words* is defined as the intersection of these six lists[4] and consists of 24 stemwords (e.g., *preannouncement*, *pension*, *settle*, *immaterial*).

We randomly draw six words without replacement from the *Falsification Words* and conduct the analysis in column (4) of Table 3 using the proportion of these six words in a conference call as the dependent variable. We repeat this process 1000 times and plot the coefficients in Internet Appendix Figure A2. Results show that all the coefficients are smaller than the actual value. Also, in 919 out of 1000 cases, we cannot reject the null hypothesis that the passage of foreign leniency laws is not associated with the word frequency. In sum, the falsification test suggests that we are not simply capturing the fact that managers provide more information in general.

Including other executives. Throughout the paper, we focus on the opening statements by CEOs and CFOs. We do so because CEOs and CFOs are the most common participants in conference calls and are the most knowledgeable about the firm (Chen et al. [2017], Davis et al. [2015], Larcker and Zakolyukina [2012]). In columns (7) and (8) of Internet Appendix Table A7, we show that our results are robust when we take into account opening statements by other executives. We find that including all executives' statements in the sample leads to an increase in their discussion about product-market topics when the costs of explicit collusion increase.

[3]See Mikolov et al. [2013] for a more detailed description of the *word2vec* approach.

[4]We remove from *Falsification Words* 35 stemwords that appear in fewer than 5% of the scripts, and 10 stemwords that are too general (e.g., *Monday*, *take*, *when*, etc.).

Including Q&A sections. Furthermore, we incorporate the Q&A sections of the conference calls into our analysis. Specifically, we repeat our analysis using all executives' statements during both the opening presentation section and the Q&A section after removing the statements by analysts and other members of the audience (e.g., operator and moderator). In columns (9) and (10), we show that the association between *Foreign Leniency* and the combined discussion on product-market topics in the opening statement and the Q&A sections remains significantly positive, although it is less economically and statistically significant than to the results in columns (7) and (8). This is consistent with the argument that managers have less control over the topics during the Q&A.

Forward-looking statements. Finally, we separate the conference call disclosures on product-market strategies with forward-looking indicators from those without forward-looking indicators. Specifically, we count the frequency of product-market-related words with forward-looking indicators (e.g., *will*, *would*, *plan*) appearing within the preceding or the following 10 words (Li [2010]) in the presentation by the CEO and CFO during earnings conference calls, and we define it as *Forward-looking Statement*. In contrast, we count the frequency of product-market-related words without forward-looking indicators appearing within the preceding or the following 10 words, and we define it as *Current Statement*. We report these tests in Panel B of Internet Appendix Table *A*4. Columns (1) and (2) report results for *Forward-looking Statement*, and columns (3) and (4) report results for *Current Statement*. To make the estimated coefficients comparable across specifications, we standardize the dependent variable (i.e., *Forward-looking Statement* or *Current Statement*) by subtracting its sample mean and scaling it by its standard deviation. We find that *Foreign Leniency* is positively associated with both types of disclosure. The test on the differences in the coefficients shows that the effect on *Forward-looking Statement* is statistically larger than the effect on *Current Statement*.

5 Alternative Coordination Channels

One might be concerned that financial disclosure is not the only mechanism of tacit coordination and that it always comes together with one of the more important mechanisms. That is, firms respond to higher costs of collusion by tacitly coordinating their product-market decisions, but they do so through other channels. We explore two alternative channels of tacit collusion – product-market advertising and common ownership of the firm's equity – and we look at whether our effects remain when we exclude firms that increase advertising or see increased common ownership.

First, firms might increase their advertising expenditures (e.g., Gasmi et al. [1992], Greer [1971], Sutton [1974]) in order to exchange information on their pricing through public advertising. We check whether the effect on financial disclosure is present in the subsample where advertising has not increased substantially following the foreign leniency laws. In other words, we exclude firms whose change in advertising intensity is in the top quartile of the sample distribution. In Internet Appendix Table $A5$, columns (1) and (2), we report that this is indeed what we find.

Second, the theoretical literature (see, e.g., Gilo et al. [2006]) has argued that partial cross-ownership can facilitate tacit collusion, and Heim et al. [2019] suggest that corporate cross-ownership could be a response to increased antitrust enforcement. We look at the change in the number of blockholders shared with industrial peers (Park et al. [2019]) and exclude firms in the top quartile of the sample distribution. In Internet Appendix Table $A5$, columns (3) and (4) we find that the effect on financial disclosure remains consistent when we exclude these firms.

These findings suggest that even if the firms follow alternative coordination strategies, financial disclosure is a distinct mechanism that is not a byproduct of the other channels.

6 Predicting Leniency Law Adoption

A threat to our identification strategy is that the adoption of leniency programs by foreign countries was systematically correlated with the underlying economics of the most exposed U.S. industry to a given country. To tackle this concern, we estimated a Cox proportional hazard model to test if U.S. industry level characteristics predict the adoption of leniency programs by foreign countries. In Appendix Table *A*6, we report various specifications of our Cox model. Importantly, we fail to find that a concentration measure and a profitability measure of the U.S. industry (defined at the two-digit SIC level) that is the most exposed to each adopting country's imports predict the change in anti-trust regulation. While this non-significant result cannot substantiate our identifying assumption, it fails to document a violation of it.

7 Disclosure and Antitrust Authorities

7.1 Antitrust Authorities and 10-K Documents

We investigate whether antitrust regulators use firms' publicly disclosed financial information by looking at how frequently they access firms' 10-K filings through EDGAR. We obtain the server request records from the EDGAR Log File Data Set available on the SEC's web servers. The EDGAR Log File Data Set is available from 2003 and contains such information as the client IP address, timestamp of the request, and page request. We link the log file to the EDGAR Master File and gather the information about the form type and filing date of the files that a user accesses.[5] We then define a binary variable, *Regulator Viewing*, which equals one if the 10-K filing filed during the year is accessed through the IP associated with the

[5]We exclude years 2005 and 2006, as the daily EDGAR log files from September 24, 2005 to May 10, 2006 are labeled by the SEC as "lost or damaged" (Loughran and McDonald [2017]). Our results are not affected materially if we include these two years.

DoJ or FTC within one year following the filing date.[6]

As presented in Internet Appendix Table *A*7, columns (1)-(2), we find consistent results that internet traffic to 10-K filings that could be associated with antitrust regulators increases following higher antitrust powers. In columns (3)-(4), we repeat our analysis by including 10-Q and 8-K filings, as such filings may also contain product-market information. Our results are robust. Finally, we perform a placebo test by examining the effect of increased collusion costs on other filings (i.e., filings with the SEC excluding 10-K, 10-Q and 8-K filings) that are unlikely to contain product-market information. In this case, we fail to document a change in viewing behavior for those filings by the DoJ and FTC (see columns (5)-(6)).

7.2 Conference Call Disclosure and Antitrust Authorities

We examine whether firms' product-market-related disclosure during conference calls is associated with the likelihood that antitrust authorities uncover cartel activities. As in Panel A of Table 1, we conduct our tests based on the two-digit SIC industry-year panel data. For each industry-year, we define the industry-level product-market-related disclosure as the median of *%Product Conference Calls* of all firms in the industry. We then regress either the number of convicted cartels in the industry (*Convicted Cartels*) or the number of convicted firms in the industry (*Convicted Firms*) on the lagged-one-period value of the industry-level product-market-related disclosure. The results appear in Internet Appendix Table *A*8. We find that the product-market-related disclosure is indeed associated with a higher probability that antitrust agencies uncovered these price-fixing activities in their industries.

8 Heterogeneity

In Internet Appendix Table *A*9, we provide all coefficients for the heterogeneity tests reported in Table 4 and discussed in Section 5.2. Panel A shows results for *Redacted Contracts*, and

[6]We use the 149.101.0.0 - 149.101.255.255 IP range to proxy for the queries from the DoJ and the 164.62.0.0 - 164.62.255.255 IP range to proxy for the queries from the FTC.

Panel B shows results for *%Product Conference Calls*.

In addition, in Internet Appendix Table *A*10, we explore the robustness of our heterogeneity tests to alternative weighting schemes. In columns (1) and (2), we construct binary treatment variable based on the three-digit SIC. Our results are robust in 7/18 of the cases. In columns (3) and (4), we report the results based on the *Export-based Foreign Leniency* by setting the weight as the share of exports of each two-digit SIC industry from the U.S. to other countries. All of our heterogeneity tests point to the correct direction and are significant at conventional statistical levels in 10/18 of cases. In columns (5) and (6), we re-estimate *Foreign Leniency* by setting the weight as the share of the *three-digit* SIC industry's imports from other countries in 1990. The results are also largely supportive of our hypotheses being significant in 8/18 of the cases.

9 Other Robustness Checks

Our results also hold if we exclude the industries one by one, which means that the results are not driven by one particular industry, and also when we exclude countries one by one, which means that the results are not driven by one particular country. Moreover, we find that our results are consistent if we limit the sample to the firms that do not change CEOs over the sample period. If *Foreign Leniency* were somehow correlated with CEO change and the new CEO prefers different disclosure policies, we might be capturing these preferences rather than an independent effect on disclosure. Further, our results remain unaffected if we cluster standard errors by firm instead of industry, or by industry and year. Finally, all of our results hold if we control for geographic trends by adding headquarter state times year fixed effects.

References

Bloomfield, M. "Product Market Competition, Disclosure and Strategic Delegation: Evidence from Revenue-based Compensation." (2016). Working Paper.

Chen, J.; V. Nagar; and J. Schoenfeld. "Manager-Analyst Conversations in Earnings Conference Calls." *Review of Accounting Studies* 23 (2017): 1315–1354.

Connor, J. "The Private International Cartels (PIC) Data Set: Guide and Summary Statistics, 1990-2013." (2014). Working Paper.

Costello, A. "The Determinants and Economic Consequences of Trade Credit Policy." (2013). Working Paper.

Davis, A.; W. Ge; D. Matsumoto; and J. Zhang. "The Effect of Manager-specific Optimism on the Tone of Earnings Conference Calls." *Review of Accounting Studies* 20 (2015): 639–673.

Gasmi, F.; J.-J. Laffont; and Q. Vuong. "Econometric Analysis of Collusive Behavior in a Soft-Drink Market." *Journal of Economics & Management Strategy* 1 (1992): 277–311.

Gilo, D.; Y. Moshe; and Y. Spiegel. "Partial Cross Ownership and Tacit Collusion." *The RAND Journal of Economics* 37 (2006): 81–99.

Greer, D. "Advertising and Market Concentration." *Southern Economic Journal* (1971): 19–32.

Heim, S.; K. Huschelrath; U. Laitenbergere; and Y. Spiegel. "Minority Share Acquisitions and Collusion: Evidence from the Introduction of National Leniency Programs." (2019). Working Paper.

Hennessy, C. and I. Strebulaev. "Beyond Random Assignment: Credible Inference of Causal Effects in Dynamic Economies." (2015). Working Paper.

Hoberg, G. and G. Phillips. "Product Market Synergies and Competition in Mergers and Acquisitions: A Text-based Analysis." *Review of Financial Studies* 23 (2010): 3773–3811.

Kedia, S. "Estimating Product Market Competition: Methodology and Application." *Journal of Banking & Finance* 30 (2006): 875–894.

Kogan, L.; D. Papanikolaou; A. Seru; and N. Stoffman. "Technological innovation, resource allocation, and growth." *The Quarterly Journal of Economics* 132 (2017): 665–712.

La Porta, R.; F. Lopez-de-Silanes; A. Shleifer; and R. Vishny. "Law and Finance." *Journal of Political Economy* 106 (1998): 1113–1155.

Larcker, D. and A. Zakolyukina. "Detecting Deceptive Discussions in Conference Calls." *Journal of Accounting Research* 50 (2012): 495–540.

Li, F. "The Information Content of Forward-looking Statements in Corporate Filings—A naïve Bayesian Machine Learning Approach." *Journal of Accounting Research* 48 (2010): 1049–1102.

Loughran, T. and B. McDonald. "The Use of EDGAR Filings by Investors." *Journal of Behavioral Finance* 18 (2017): 231–248.

Mikolov, T.; I. Sutskever; K. Chen; G. Corrado; and J. Dean. "Distributed Representations of Words and Phrases and Their Compositionality." *Advances in Neuronal Information Processing Systems* (2013): 3111–3119.

Park, J.; J. Sani; N. Shroff; and H. White. "Disclosure Incentives When Competing Firms Have Common Ownership." *Journal of Accounting and Economics* (2019). Forthcoming.

Sutton, C. "Advertising, Concentration and Competition." *The Economic Journal* 84 (1974): 56–69.

Table A1: Redacting Information in Purchase Contracts

This table presents results from OLS regressions relating redaction of information in material contracts to the exposure to the rule of law. The sample consists of U.S. Compustat firms that filed purchase material contracts (the firm is the customer of the agreement) with the SEC over 2000-2012. The dependent variable is *Redacted Purchase Contracts* in columns (1) and (2) and *%Redacted Purchase Contracts* in columns (3) and (4). Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Redacted Purchase Contracts		*%Redacted Purchase Contracts*	
	(1)	(2)	(3)	(4)
Foreign Leniency	-1.716	-1.224	-1.649	-1.715
	(1.950)	(2.837)	(1.789)	(2.936)
Lagged ROA		-0.046		-0.058
		(0.053)		(0.061)
Lagged Size		0.034		0.034
		(0.145)		(0.142)
HHI		1.569		1.621*
		(0.891)		(0.858)
Import Penetration		-2.796		-1.285
		(2.018)		(2.315)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.515	0.513	0.516	0.506
Observations	302	302	302	302

Table A2: Further Robustness Tests

This table presents results from the OLS regressions relating redaction of information in material contracts or product-market-related disclosure during conference calls to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is *Redacted Contracts* in Panels A1, B1, C1 and *%Product Conference Calls* in Panels A2, B2, C2. In Panels A1-A2, we repeat the analysis in Table 3 using various alternative weights to estimate industry-level exposure to foreign leniency laws. *Foreign Leniency* in columns (1) to (3) is estimated based on, respectively, the imports of the three-digit SIC industry from any other countries, the exports of the two-digit SIC industry to any other countries, the exports of the three-digit SIC industry to any other countries, and the imports of final goods of the two-digit SIC industry from any other countries. In column (5), we repeat the analysis in column (1) and control for the two-digit SIC industry times year-fixed effects. In Panels B1-B2, we investigate the variation in enforcement level and the rule of law. *Foreign Leniency (High Enforcement)* is the weighted average of the passage of laws in high-enforcement countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country. A country is categorized as a high-enforcement country if its score on the efficiency of the judicial system is larger than the sample median. *Rule of Law* is the weighted average of the rule of law of all countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country. The score of the rule of law for each country is obtained from the World Bank Data. *Foreign Leniency (EU)* differs from *Foreign Leniency* by treating all EU member states as one country and coding the year of 2002 as the adoption year for these states. In Panels C1-C2, in columns (1) and (2), for each country, instead of defining the event year as the year when a country adopted the leniency law, we define the event year as the year when the discussion about leniency laws by policy makers has started in the local media (*Foreign Leniency (Anticipated)*). In columns (3) and (4) of Panels C1-C2, we reconstruct our measure *Foreign Leniency (Firm-level)* at the firm level based on where firms have their subsidiaries in different countries according to LexisNexis data. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Alternative Weighting Schemes of Foreign Leniency

Panel A1: Redacted Contracts

	Redacted Contracts				
	3-digit SIC, Import	2-digit SIC, Export	3-digit SIC, Export	Final Goods	3-digit SIC, Import, Industry FE
	(1)	(2)	(3)	(4)	(5)
Foreign Leniency	-3.134***	-7.086**	-3.590***	-6.888**	-15.256***
	(0.575)	(3.102)	(0.958)	(2.854)	(2.558)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	No
Industry FE	No	No	No	No	Yes
Adjusted R-squared	0.622	0.600	0.605	0.605	0.429
Observations	414	414	414	414	414

Panel A2: Conference Calls

	%Product Conference Calls				
	3-digit SIC, Import	2-digit SIC, Export	3-digit SIC, Export	Final Goods	3-digit SIC, Import, Industry FE
	(1)	(2)	(3)	(4)	(5)
Foreign Leniency	8.969**	24.520*	10.289	20.810*	5.786*
	(4.097)	(13.887)	(8.583)	(11.522)	(3.177)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	No
Industry FE	No	No	No	No	Yes
Adjusted R-squared	0.675	0.677	0.677	0.674	0.674
Observations	9713	9073	9073	9713	9713

Panel B: Enforcement and Rule of Law

Panel B1: Redacted Contracts

	Redacted Contracts					
	Enforcement		*Rule of Law*		*EU*	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Leniency (High Enforcement)	-4.881**	-4.413***				
	(1.585)	(1.294)				
Foreign Rule of Law			-9.131	-0.687		
			(6.794)	(6.071)		
Foreign Leniency				-3.613***		
				(1.077)		
Foreign Leniency (EU)					-4.187***	-3.753***
					(1.142)	(0.849)
Controls	No	Yes	Yes	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.586	0.612	0.594	0.609	0.591	0.615
Observations	414	414	414	414	414	414

Panel B2: Conference Calls

	%Product Conference Calls					
	Enforcement		*Rule of Law*		*EU*	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Leniency (High Enforcement)	17.550***	18.564***				
	(5.681)	(5.821)				
Foreign Rule of Law			54.826	38.23		
			(36.987)	(23.013)		
Foreign Leniency				10.556**		
				(4.276)		
Foreign Leniency (EU)					10.806**	11.961**
					(4.862)	(5.125)
Controls	No	Yes	Yes	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.675	0.675	0.674	0.675	0.674	0.674
Observations	9713	9713	9713	9713	9713	9713

Panel C: Alternative Measures of Foreign Leniency

Panel C1: Redacted Contracts

	Redacted Contracts			
	(1)	(2)	(3)	(4)
Foreign Leniency (Anticipated)	-4.639***	-4.167***		
	(1.066)	(0.800)		
Foreign Leniency (Firm-level)			-0.400**	-0.366**
			(0.137)	(0.123)
Controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.601	0.623	0.604	0.588
Observations	414	414	231	231

Panel C2: Product Conference Calls

	%Product Conference Calls			
	(1)	(2)	(3)	(4)
Foreign Leniency (Anticipated)	11.861**	12.914**		
	(5.234)	(5.720)		
Foreign Leniency (Firm-level)			1.592*	1.566*
			(0.844)	(0.885)
Controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.675	0.675	0.684	0.684
Observations	9,713	9,713	7,696	7,696

Table A3: Types of Redacted Information

This table presents results from the OLS regressions relating redaction of information in material contracts to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is *Redacted Price* in columns (1) and (2), and *Redacted Quantity* in columns (3) and (4). Columns (1) and (2) are based on contracts that explicitly specify product price and either disclose or redact product price. Columns (3) and (4) are based on contracts that explicitly specify purchase/procure quantity obligation and either disclose or redact the obligation. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Redacted Price		*Redacted Quantity*	
	(1)	(2)	(3)	(4)
Foreign Leniency	-4.787***	-4.419***	-2.920**	-2.274*
	(1.132)	(0.903)	(1.186)	(1.034)
Lagged ROA		-0.196***		-0.011
		(0.035)		(0.087)
Lagged Size		0.009		-0.000
		(0.035)		(0.125)
HHI		-3.564**		3.361
		(1.450)		(1.972)
Import Penetration		-0.551		1.854**
		(0.844)		(0.686)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.59	0.609	0.623	0.621
Observations	320	320	307	307

Table A4: Robustness Tests for Disclosure during Conference Calls

This table presents results from OLS regressions relating product-market-related disclosure during conference calls to the exposure to foreign leniency law for U.S. Compustat firms over 2002-2012. In Panel A, the dependent variable is the disclosure during conference calls based on various dictionaries. The dictionary in columns (1) and (2) adds *price* to the dictionary in Table 3. The dictionary in columns (3) and (4) is constructed based on the Amerco and Valassis cases. In columns (5) and (6), we construct a binary variable (Quote Competitor) that equals one if the firm mentions any of its competitors during conference calls, and zero otherwise. The list of competitors is obtained from the Factset Revere relationships database over 2003 to 2012. Since the Factset Revere relationships database starts from April 2003, we exclude conference calls that were initiated prior to 2003. In columns (7) and (8), we repeat our analysis using all executives' disclosures during the presentation section. In columns (9) and (10), we repeat our analysis using all executives' disclosures during both the presentation and Q&A section. In Panel B, we decompose *%Product Conference Calls* into forward-looking statements as shown in columns (1) and (2), and non-forward-looking statements as shown in columns (3) and (4). We standardize the dependent variables by scaling them by their corresponding standard deviations. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All the columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Various Dictionaries for Disclosure during Conference Calls

	%Conference Call Dic2		*%Conference Call Dic3*		*Quote Competitor*		*All Executives*		*All Executives Incl. Q&A*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign Leniency	9.396*	10.274*	13.439***	10.977**	0.479**	0.336**	7.147*	9.122**	4.959	6.447*
	(5.042)	(5.459)	(4.597)	(4.504)	(0.178)	(0.139)	(3.939)	(3.522)	(3.938)	(3.593)
Lagged ROA		0.068		-0.245		0.056***		-0.138		-0.043
		(0.124)		(0.217)		(0.015)		(0.143)		(0.194)
Lagged Size		0.001		0.281		-0.005		0.225		0.145
		(0.358)		(0.173)		(0.016)		(0.187)		(0.125)
HHI		-4.696		14.660**		0.625***		-8.786***		-6.725**
		(3.369)		(5.699)		(0.176)		(2.860)		(3.126)
Import Penetration		0.181		-3.270**		0.550		0.990		1.547
		(0.806)		(1.542)		(0.364)		(2.102)		(1.341)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.659	0.659	0.500	0.501	0.446	0.448	9,734	9,734	9,734	9,734
Observations	9,713	9,713	9,713	9,713	7,795	7,795	0.732	0.733	0.779	0.779

Panel B: Forward-looking Statement

	Forward-looking Statement		*Current Statement*	
	(1)	(2)	(3)	(4)
Foreign Leniency	2.069**	2.017**	1.173*	1.352**
	(0.787)	(0.898)	(0.563)	(0.585)
Lagged ROA		0.026		0.006
		(0.033)		(0.016)
Lagged Size		-0.024		-0.004
		(0.036)		(0.050)
HHI		0.081		-0.973**
		(0.493)		(0.424)
Import Penetration		-0.226		0.069
		(0.413)		(0.115)
χ^2 test on the equivalence of coef.		9.54***		3.64*
of (1) vs. (3), or (2) vs. (4):		(0.002)		(0.056)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.434	0.434	0.672	0.672
Observations	9713	9713	9713	9713

Table A5: Alternative Responses

This table presents results from the OLS regressions relating profitability to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 1994-2012. The dependent variable is *Redact Contracts* in columns (1) and (3), and *%Product Conference Calls* in columns (2) and (4). Every row reestimates our baseline specification by removing certain firm-year observations. In columns (1) and (2), we remove observations in which the change in the advertisement intensity is in the top quartile of the sample distribution, and in columns (3) and (4) – the change in the number of blockholders shared with industrial peers is in the top quartile of the sample distribution. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Excl. Large Increase in Advertising Expenses		Excl. Large Increase in Common Ownership	
	Redacted Contracts	*%Product Conference Calls*	*Redacted Contracts*	*%Product Conference Calls*
	(1)	(2)	(3)	(4)
Foreign Leniency	-2.344*	11.784**	-2.788*	11.565**
	(1.260)	(4.809)	(1.485)	(5.215)
Lagged ROA	-0.229***	0.111	-0.199***	-0.045
	(0.045)	(0.107)	(0.060)	(0.152)
Lagged Size	0.032	-0.071	0.009	-0.008
	(0.041)	(0.395)	(0.046)	(0.412)
HHI	-1.422	-8.506**	-3.207	-6.467**
	(1.684)	(3.580)	(3.206)	(3.076)
Import Penetration	-0.461	-0.300	0.495	1.086
	(1.033)	(1.322)	(1.098)	(1.297)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.628	0.674	0.590	0.675
Observations	378	8998	345	7993

Table A6: Predicting Foreign Leniency Law Adoption

This table reports the coefficients from the Cox proportional hazards model, estimated at the country level over the 1990-2012 period. Column (1) uses macro-economic variables and region dummies. Column (3) includes two measures of financial development. *US Major Industry HHI* is the Herfindahl-Hirschman Index of the two-digit U.S. SIC industry to which the country exported the most. *US Major Industry Profit Margin* is the profit margin of the two-digit U.S. SIC industry to which the country exported the most. *Log(GDP)* is the natural logarithm of GDP, *Unemployment* is the employment rate, *GDP Growth* is the growth rate of GDP, %Export/GDP is the ratio of the volume of exports to GDP in percentage, and %Private Credit/GDP is the ratio of private credit to GDP in percentage. Chinn-Ito index is an index measuring a country's degree of capital account openness. Standard errors are clustered at the country level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Leniency Law Adoption					
	(1)	(2)	(3)	(4)	(5)	(6)
US Major Industry HHI	0.433		-1.403	0.961		0.601
	(1.977)		(2.691)	(2.230)		(3.376)
US Major Industry Profit Margin		-1.543	-2.314		-0.726	-0.412
		(1.889)	(2.658)		(1.745)	(2.621)
log(GDP)	0.658***	0.604**	0.581**	0.814***	0.781***	0.799**
	(0.245)	(0.251)	(0.261)	(0.305)	(0.286)	(0.321)
Unemployment	-0.013	-0.010	-0.003	-0.031	-0.024	-0.028
	(0.041)	(0.042)	(0.044)	(0.057)	(0.050)	(0.062)
GDP Growth	0.591	0.500	0.574	1.282	1.278	1.263
	(1.384)	(1.431)	(1.378)	(1.864)	(1.864)	(1.873)
%Export/GDP	-0.005	-0.004	-0.004	-0.007	-0.007*	-0.007*
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Latin America	-2.070**	-1.945**	-1.664	-2.892*	-2.631*	-2.782
	(0.954)	(0.936)	(1.069)	(1.652)	(1.392)	(1.890)
Western Europe	-1.767*	-1.394	-1.055 -	2.748**	-2.466*	-2.610
	(0.958)	(1.182)	(1.361)	(1.387)	(1.305)	(1.715)
Central and Eastern Europe	-0.455	-0.089	0.203	-1.239	-0.955	-1.106
	(0.813)	(0.962)	(1.134)	(1.514)	(1.305)	(1.789)
North America	0.684	0.936	1.300	-0.479	-0.198	-0.353
	(1.159)	(1.164)	(1.436)	(1.559)	(1.318)	(1.795)
Asia	-1.814**	-1.487	-1.150	-2.462**	-2.182*	-2.327
	(0.884)	(1.074)	(1.282)	(1.227)	(1.171)	(1.607)
Oceania	-0.960	-0.457	-0.113	-1.989	-1.675	-1.824
	(1.001)	(1.350)	(1.574)	(1.397)	(1.400)	(1.850)
%Private Credit/GDP				-0.007	-0.006	-0.007
				(0.005)	(0.004)	(0.005)
Chinn-Ito index				0.226	0.231	0.224
				(0.252)	(0.230)	(0.246)
Log pseudolikelihood	111.306	-111.033	-110.940	-104.946	-104.949	-104.935
Observations	700	700	700	640	640	640

Table A7: Antitrust Regulators' Access to 10-K Filings

This table presents results from the OLS regressions relating access to SEC filing servers by antitrust regulators to the U.S. Compustat firms' exposure to foreign leniency laws over 2003-2012. The dependent variable, *Regulator IP Access*, is a binary variable that equals one if a firm's SEC filing is accessed through the IP address associated with the Department of Justice or FTC, within one year following the filing date. In columns (1) and (2), we limit our analysis to 10-K filings, in columns (3) and (4), we limit our analysis to 10-K, 10-Q, and 8-K filings, and in columns (5) and (6), we limit our analysis to public filings with the SEC, other than 10-K, 10-Q, and 8-K filings. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Regulator IP Access					
	10-K Filings		*10-K, 10-Q and 8-K*		*Other Filings*	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Leniency	0.166**	0.201**	0.191*	0.264**	0.073	0.012
	(0.079)	(0.075)	(0.109)	(0.111)	(0.059)	(0.070)
Lagged ROA		-0.007**		-0.008**		-0.002
		(0.003)		(0.004)		(0.003)
Lagged Size		0.033***		0.041***		-0.002
		(0.005)		(0.005)		(0.003)
HHI		-0.029		-0.238		0.360
		(0.176)		(0.221)		(0.248)
Import Penetration		-0.148		-0.181		0.083
		(0.169)		(0.240)		(0.131)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.238	0.240	0.284	0.287	0.153	0.154
Observations	11,670	11,670	11,670	11,670	11,670	11,670

Table A8: Product-market-related Disclosure and Investigation by Antitrust Authorities

This table presents results from the OLS regressions relating product-market-related disclosure during conference calls to foreign leniency laws and to the probability of being investigated by antitrust authorities for U.S. Compustat firms over 2002-2012. The tests are based on two-digit SIC industry-year panel data. The dependent variable is *Convicted Cartels* in columns (1) and (2) and *Convicted Firms* in columns (3) and (4). *Lagged %Product Conference Calls* is the one-year lagged median value of *%Product Conference Calls* for each industry-year. The control variables include industry-level *Size*, *ROA* and *Leverage*. All columns report results controlling for industry- and year-fixed effects. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Convicted Cartels		*Convicted Firms*	
	(1)	(2)	(3)	(4)
Lagged %Product Conference Calls	0.021	0.023*	0.061*	0.067*
	(0.012)	(0.013)	(0.029)	(0.033)
Foreign Leniency		2.192		4.676
		(1.198)		(2.623)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.096	0.109	0.054	0.062
Observations	180	180	180	180

Table A9: Heterogeneity in Public Disclosure

This table presents results from the OLS regressions relating redaction of information in material contracts or product-market-related disclosure during conference calls to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is *Redacted Contracts* in Panel A and *%Product Conference Calls* in Panel B. *HHI Census* is the four-digit census HHI ratio. *Differentiation* is a binary variable that equals one if the number of the firm's peers with similar products falls in the lowest quartile of the sample distribution, and zero otherwise. *High Industry Patent* is a binary variable that equals one if number of patents possessed by a median firm in the industry falls in the highest quartile of the sample distribution, and zero otherwise. *High Industry Growth* is a binary variable that equals one if the industry average sales growth is in the highest quartile of the sample distribution, and zero otherwise. *High Prob(Convict)* is a binary variable that equals one if the predicted likelihood of conviction is in the highest quartile of the sample distribution. *Recent Conviction* is a binary variable that equals one if there is at least one conviction case in the industry in the most recent three years. *High %Public* is a binary variable that equals one if the proportion of public firms in the three-digit NAICS industry falls in the highest quartile of the sample distribution, and zero otherwise. *Strategic Complements* is a binary variable that equals one if the median value of the estimated degree of complementarity of all Compustat firms in the three-digit SIC industry is greater than zero. *Large Firm* is a binary variable that equals one if the firm size falls in the highest quartile of the sample distribution, and zero otherwise. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Heterogeneity in Redacting Information in Contracts

	Redacted Contracts								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign Leniency	-1.282	-4.133***	-2.875**	-4.970***	-2.053	-0.304	-2.501**	-2.767***	-2.183
	(1.495)	(1.050)	(1.031)	(0.655)	(1.551)	(1.314)	(1.125)	(0.855)	(1.441)
HHI Census	0.001**								
	(0.000)								
HHI Census×Foreign Leniency	-0.004*								
	(0.002)								
Differentiation		-0.511**							
		(0.218)							
Differentiation×Foreign Leniency		6.672*							
		(3.470)							
High Industry Patent			0.474***						
			(0.144)						
High Industry Patent×Foreign Leniency			-2.254**						
			(0.856)						
High Industry Growth				-0.479					
				(0.382)					
High Industry Growth×Foreign Leniency				4.309*					
				(2.037)					
High Prob(Convict)					0.098				
					(0.063)				
High Prob(Convict)×Foreign Leniency					-2.137*				
					(0.997)				
Recent Conviction						0.544**			
						(0.201)			
Recent Conviction×Foreign Leniency						-3.864*			
						(1.771)			
High %Public							0.322***		
							(0.088)		
High %Public×Foreign Leniency							-1.164**		
							(0.512)		
Strategic Complements								0.055	
								(0.118)	
Strategic Complements×Foreign Leniency								-1.227*	
								(0.580)	
Large Firm									0.323***
									(0.079)
Large Firm×Foreign Leniency									-2.726***
									(0.870)
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.605	0.606	0.612	0.621	0.616	0.620	0.618	0.613	0.616
Observations	402	354	414	414	414	414	414	414	414

Panel B: Heterogeneity in Disclosure during Conference Calls

	%Product Conference Calls								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign Leniency	8.044	12.499**	10.279**	8.340**	10.432*	6.483	10.353**	10.042*	10.885**
	(5.587)	(4.978)	(4.402)	(3.553)	(5.082)	(6.075)	(4.781)	(4.844)	(4.940)
HHI Census	-0.001								
	(0.001)								
HHI Census×Foreign Leniency	0.008*								
	(0.004)								
Differentiation		0.519**							
		(0.188)							
Differentiation×Foreign Leniency		-2.475*							
		(1.262)							
High Industry Patent			-1.764***						
			(0.334)						
High Industry Patent×Foreign Leniency			9.116***						
			(2.284)						
High Industry Growth				2.065***					
				(0.602)					
High Industry Growth×Foreign Leniency				-14.756*					
				(7.575)					
High Prob(Convict)					-1.621***				
					(0.296)				
High Prob(Convict)×Foreign Leniency					6.831***				
					(2.033)				
Recent Conviction						0.086			
						(0.396)			
Recent Conviction×Foreign Leniency						6.724**			
						(3.085)			
High %Public							-0.718*		
							(0.403)		
High %Public×Foreign Leniency							3.642*		
							(1.896)		
Strategic Complements								-0.269	
								(0.303)	
Strategic Complements×Foreign Leniency								3.344*	
								(1.818)	
Large Firm									-0.667
									(0.467)
Large Firm×Foreign Leniency									4.012*
									(2.304)
Firm&Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.674	0.679	0.675	0.675	0.675	0.675	0.675	0.675	0.675
Observations	9516	9279	9713	9713	9713	9713	9703	9688	9713

Table A10: Robustness Tests for Heterogeneity in Public Disclosure

This table presents results from the OLS regressions relating redaction of information in material contracts or product-market-related disclosure during conference calls to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 2000-2012. The dependent variable is either *Redacted Contracts* or *%Product Conference Calls* as inidcated or the top of the table. In this summary table, we report only the coefficient estimates on the interaction terms. *Foreign Leniency* in columns (1) and (2), (3) and (4) and (5) and (6) is estimated based on, respectively, the binary treatment variable as in Table 7, the exports of the two-digit SIC industry to any other countries, and the imports of the three-digit SIC industry from any other countries. *HHI Census* is the four-digit census HHI ratio. *Differentiation* is a binary variable that equals one if the number of the firm's peers with similar products falls in the lowest quartile of the sample distribution, and zero otherwise. *High Industry Patent* is a binary variable that equals one if the number of patents possessed by a median firm in the industry falls in the highest quartile of the sample distribution, and zero otherwise. *High Industry Growth* is a binary variable that equals one if the industry average sales growth is in the highest quartile of the sample distribution, and zero otherwise. *High Prob(Convict)* is a binary variable that equals one if the predicted likelihood of conviction is in the highest quartile of the sample distribution. *Recent Conviction* is a binary variable that equals one if there is at least one conviction case in the industry in the most recent three years. *High %Public* is a binary variable that equals one if the proportion of public firms in the three-digit NAICS industry falls in the highest quartile of the sample distribution, and zero otherwise. *Strategic Complements* is a binary variable that equals one if the median value of the estimated degree of complementarity of all Compustat firms in the three-digit SIC industry is greater than zero. *Large Firm* is a binary variable that equals one if the firm size falls in the highest quartile of the sample distribution, and zero otherwise. Variable definitions appear in Table A11. All continuous variables are winsorized at the 1% and 99% levels. All columns report results controlling for firm- and year-fixed effects. Standard errors are clustered at the two-digit SIC industry level and are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	Redacted Contracts	%Product Conference Calls	*Redacted Contracts*	%Product Conference Calls	*Redacted Contracts*	%Product Conference Calls
	Binary Leniency		2-digit SIC, Export		3-digit SIC, Import	
	(1)	(2)	(3)	(4)	(5)	(6)
(1) HHI Census×Foreign Leniency	-0.001**	0.001*	-0.009**	0.005	-0.001	0.003
	(0.000)	(0.000)	(0.003)	(0.007)	(0.001)	(0.002)
(2) Differentiation×Foreign Leniency	-0.147	-0.161	5.150	0.783	0.443	-0.923
	(0.149)	(0.236)	(4.086)	(4.305)	(0.693)	(1.574)
(3) High Industry Patent×Foreign Leniency	-0.370*	1.003***	-4.448**	17.037**	-0.408	5.582***
	(0.193)	(0.290)	(1.679)	(7.758)	(0.641)	(1.625)
(4) High Industry Growth×Foreign Leniency	0.383	-0.910**	5.568	-25.441	4.097***	-12.224*
	(0.301)	(0.421)	(3.687)	(22.955)	(1.489)	(6.994)
(5) High Prob(Convict)×Foreign Leniency	-0.241	0.437	-3.100*	11.509**	-0.989**	4.922**
	(0.195)	(0.274)	(1.470)	(4.817)	(0.423)	(2.212)
(6) Recent Conviction×Foreign Leniency	-0.295	0.591*	-1.164	1.475	3.247	4.281*
	(0.165)	(0.328)	(2.711)	(5.897)	(2.809)	(2.562)
(7) High %Public×Foreign Leniency	-0.224	0.931*	-2.691*	10.436**	-0.246	0.138
	(0.214)	(0.486)	(1.404)	(4.942)	(0.515)	(1.738)
(8) Strategic Complements×Foreign Leniency	0.091	0.254	-1.268	7.437**	-0.515	3.169***
	(0.104)	(0.182)	(0.879)	(3.428)	(0.415)	(1.111)
(9) Large Firm×Foreign Leniency	-0.285	0.263	-3.989**	10.583*	-1.694***	2.315
	(0.165)	(0.271)	(1.721)	(5.659)	(0.321)	(2.602)

Table A11: Variable Definitions

Variable	Definition	Data Source
Foreign Leniency	The weighted average of the passage of laws in all other countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country.	*Cartel Regulation 2013, Schott's Data Library*
Binary Foreign Leniency	A binary variable that is equal to one starting with the year when the country most important to that industry adopted the law. We define the most important country for each three-digit SIC code based on the import volume from the country to that industry.	*Cartel Regulation 2013, Schott's Data Library*
Foreign Rule of Law	The weighted average of the rule of law of all countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country.	*World Bank Data*
Foreign Leniency (High Enforcement)	The weighted average of the passage of laws in high-enforcement countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country. A country is categorized as a high-enforcement country if its score on the efficiency of the judical system is larger than the sample median.	*Cartel Regulation 2013, Schott's Data Library* *La Porta et al. [1998]*
Foreign Leniency (EU)	The weighted average of the passage of laws in all other countries, where the weight is equal to the share of the two-digit SIC industry's imports from a particular country. We treat all EU member states as one country and code 2002 as the adoption year for these states.	*Cartel Regulation 2013, Schott's Data Library*
Convicted Cartels	The logarithm of one plus the number of cartels in the industry that were convicted during the year.	*Connor [2014]*
Convicted Firms	The logarithm of one plus the number of cartel firms in the industry that were convicted during the year.	*Connor [2014]*
Redacted Contract	A binary variable that equals one if the firm files material sales contracts during the year and requests confidential treatment in the contract. We search for *confidential treatment*, *confidential request* and *confidential...redacted* in the file to identify the confidential request by the firm.	*SEC Edgar*
Redacted Price	A binary variable that equals one if the firm files a material sales contract that explicitly specifies product price but requests confidential treatment of the product price in the contract.	*SEC Edgar*
Redacted Quantity	A binary variable that equals one if the firm files a material sales contract that explicitly specifies purchase/procure quantity but requests confidential treatment of the purchase/procure quantity in the contract.	*SEC Edgar*
Redacted Purchase Contracts	A binary variable that equals one if the firm files a material purchase contract (the firm is the customer of the agreement) during the year and requests confidential treatment of the contract duration in the contract.	*SEC Edgar*
%Product Conference Calls	The ratio of product-market-related words to the total number of words in the CEO / CFO presentation during earnings conference calls multiplied by 1,000. The list of words includes *product*, *service*, *offering*, *offer*, *customers* and *client*.	*StreetEvents*
%Product Conference Calls Dic2	The ratio of product-market-related words to the total number of words in the CEO / CFO presentation during earnings conference calls multiplied by 1,000. The list of words includes *price*, *pricing*, *priced*, *discount*, *product*, *service*, *offering*, *offer*, *customers* and *client*.	*StreetEvents*
%Product Conference Calls Dic3	The ratio of product-market-related words to the total number of words in the CEO / CFO presentation during earnings conference calls multiplied by 1,000. The list of words is defined as the 20 most frequently used words in the 2008 Q3 Amerco Earnings Conference Call and the 2004 Q2 Valassis Communications Earnings Conference Call.	*StreetEvents*

Variable	Definition	Data Source
Quote Competitor	A binary variable that equals one if the CEO or the CFO mentions at least one of the firm's competitors during the earnings conference call presentations in the year.	*Factiva, StreetEvents*
All Executives	The ratio of product-market-related words to the total number of words by all executives in the presentation section during earnings conference calls multiplied by 1,000. The list of words includes *product*, *service*, *offering*, *offer*, *customers* and *client*.	*StreetEvents*
All Executives Incl. Q&A	The ratio of product-market-related words to the total number of words by all executives in the presentation and Q&A section during earnings conference calls multiplied by 1,000. The list of words includes *product*, *service*, *offering*, *offer*, *customers* and *client*.	*StreetEvents*
Forward-looking Statement	The ratio of product-market-related words with forward-looking indicators (e.g., *will*, *would*, *plan*) appearing within the preceding or following 10 words (Li [2010]) to the total number of words in the CEO / CFO presentation during earnings conference calls multiplied by 1,000.	*StreetEvents*
Current Statement	The ratio of product-market-related words without forward-looking indicators (e.g., *will*, *would*, *plan*) appearing within the preceding or following 10 words (Li [2010]), to the total number of words in the CEO / CFO presentation during earnings conference calls multiplied by 1,000.	*StreetEvents*
Regulator IP Access	A binary variable that equals one if a firm's SEC filing is accessed through the IP address associated with the Department of Justice or FTC, within one year following the filing date.	*SEC Edgar*
HHI	Herfindahl-Hirschman Index of the two-digit industry.	*Compustat*
Import Penetration	Four-digit SIC industry-level import penetration, which is defined as the value of imports scaled by the sum of the value of imports and the shipment value minus value of exports.	*Schott's Data Library*
ROA	Operating earnings before extraordinary items scaled by lagged total assets.	*Compustat*
Size	The logarithm of total assets.	*Compustat*
HHI Census	The four-digit NAICS census HHI ratio.	*U.S. Census Bureau*
Differentiation	A binary variable that equals one if the number of the firm's peers with similar products falls in the lowest quartile of the sample distribution.	Hoberg and Phillips [2010]
High Industry Patent	A binary variable that equals one if the number of patents possessed by a median firm in the industry falls in the highest quartile of the sample distribution.	Kogan et al. [2017]
High Industry Growth	A binary variable that equals one if the industry revenue growth falls in the highest quartile of the sample distribution.	*Compustat*
High Prob(Convict)	A binary variable that equals one if the predicted likelihood of conviction is in the highest quartile of the sample distribution.	*Cartel Regulation 2013, Schott's Data Library*
Recent Conviction	A binary variable that equals one if there is at least one conviction case in the industry in the most recent three years.	*Cartel Regulation 2013, Compustat*
High %Public	A binary variable that equals one if the proportion of public firms in the three-digit NAICS industry falls in the highest quartile of the sample distribution, and zero otherwise.	*U.S. Census Bureau*
Strategic Complements	A binary variable that equals one if the median value of the estimated degree of complementarity of all Compustat fims in the three-digit SIC industry-year is greater than zero, as per the methodology in Kedia [2006] and Bloomfield [2016].	*Compustat*
Large Firm	A binary variable that equals one if the firm size falls in the highest quartile of the sample distribution.	*Compustat*

Figure A1: *Redacted Contracts* across Years

We plot the average *Redacted Contracts* across years for the sample period.

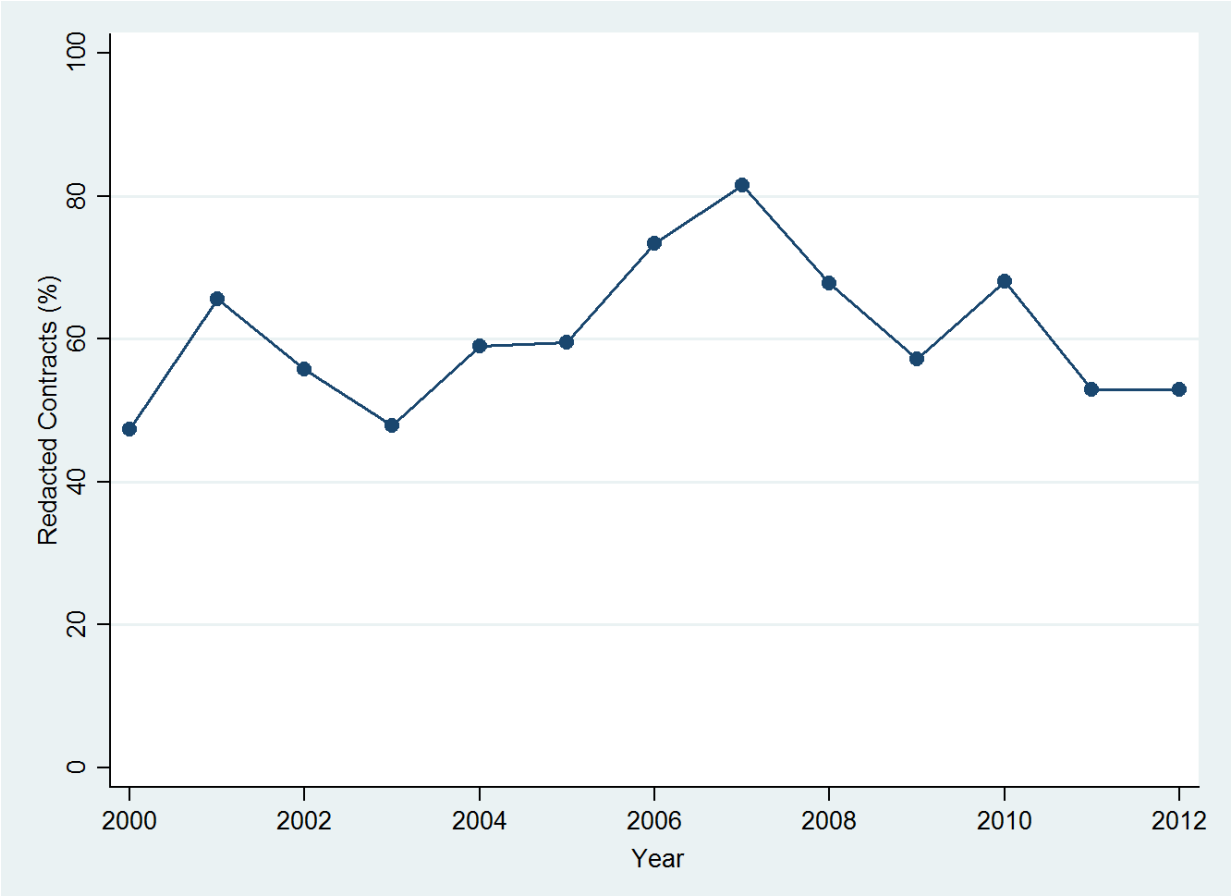


Figure A2: Falsification of Conference Call Disclosure

We plot the coefficient of *Foreign Leniency*. Each time we randomly draw six words without replacement from the falsification word list and conduct the regression analysis in column (4) of Table 3 using the proportion of these six words in a conference call as the dependent variable. The process is repeated 1,000 times.