# Naughty Firms, Noisy Disclosure:
## The Effects of Cartel Enforcement on Corporate Disclosure[*]

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### Abstract

We empirically study how collusion in product markets affects firms' financial disclosure strategies. We exploit exogenous variations in the cost of illegal price-fixing and find that 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 findings suggest that transparency in financial statements can come at the expense of consumer welfare.

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

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

# 1 Introduction

Financial market regulation has been strengthening over time. Recent legislation such as Regulation FD and the Sarbannes-Oxley Act has 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 them to monitor managers more efficiently through reduced information asymmetry (Leuz and Wysocki, 2016; Goldstein and Yang, 2017). However, increased 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 the disclosure that is 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]

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[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, throughout the paper we refer to explicit collusion as situations where firms communicate directly with each other, 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.

Discerning causality between collusion and disclosure targeted at 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 constitute 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, thus, for some firms tacit collusion becomes a more profitable strategy than explicit collusion.[4] In other words, with higher costs of private communication, which is likely to be the firms' first choice given the potential antitrust action, public communication becomes 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 that has variation in cartel incentives

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

[4]Such pecking order between these product market strategies – i.e., that stronger antitrust leads firms to switch from more explicit to more tacit collusion – is our main identifying assumption. We base it on theoretical work, e.g., McAfee and McMillan (1992), who show that strong explicit cartels that allow redistribution of spoils are preferred over weak implicit cartels, but the latter can become more advantageous when antitrust enforcement is higher. Our claim is also in line with the argument 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 (Block et al., 1981).

to collude that varies across firms. In order 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 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 ascertain 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.

We next turn our investigation to how firms communicate their product-market strategies in their financial disclosure documents in order to sustain a tacit coordination equilibrium. To do so, we examine two distinct communication channels. First, we focus on the material contracts with customers where firms face strong disclosure requirements. 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 flexibility in their financial statements to credibly and unilaterally signal information about their product-market strategies to industry members. In particular, we look at whether firms request confidential treatment in filing material contracts with customers (Verrecchia and Weber, 2006).[5] To the extent that such contracts contain a substantial amount of proprietary information, including transaction prices, transaction volumes, geographical location, and product quality, international or domestic rivals might use that information to form

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[5]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.

their product strategies. Second, we examine earnings conference calls with equity analysts. Specifically, we focus on the presentation by the CEO and CFO and count the frequency of product-market-related words. This measure is motivated by recent legal cases where antitrust agencies claimed that firms where using earnings conference calls to alter competition in product markets.[6]

We find robust evidence that after foreign leniency laws are passed and thus the costs of explicit collusion rise, firms are less likely to redact information from their publicly disclosed customer contracts. For instance, following Canada's 1999 passage of its leniency program, to which the pharmaceutical industry was exposed, three U.S. pharmaceutical companies stopped redacting sales contracts. Similarly, following Japan's 2005 passage of 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. We next concentrate on our sample of earnings conference calls. Following the same empirical model, we 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 in the discussion about products in conference calls.

These results are robust to controlling for industry and firm characteristics such as import penetration, industry concentration, firm size, and operating performance that could affect both market structures and disclosure choices. We also control for time-invariant unobservable differences between firms using firm fixed effects, and for time-varying unobservable aggregate economic effects using year fixed effects. Importantly, we show that the passage

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[6]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.

of leniency laws does not proxy for a general strengthening of the rule of law in foreign countries, but the results are stronger if we consider only countries with a higher degree of legal enforcement.

We further study whether these disclosure changes have real economic consequences. We find that firms that adapt their disclosure strategies by increasing their product-market-related communication do not experience a drop in profitability following the passage of foreign leniency laws, while the profitability of the firms that do not change their disclosure suffers. 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.

Finally, given that our identification is at the industry level, we are careful to study industry trends that could correlate with the passage of the leniency law and higher disclosure in general. For instance, firms could be switching to stronger competition and thus increasing disclosure to raise more capital that would help them compete in the product markets. Alternatively, they might increase their disclosure to reduce their litigation risk. However, we find that firms do not increase all types of disclosure on competition. First, we find that firms do not increase their disclosure on purchase contracts. Moreover, we look at the disclosure from which potential tacit coordination peers are unlikely to benefit but which could be useful for antitrust authorities to understand which industries are more likely to show signs of collusive behavior. The SEC recommends that the management discussion and analysis (MD&A) section of a firm's 10-K filing includes a discussion of the firm's competitive position. We find that as explicit collusion costs rise, the firms reduce the extent to which they communicate about their competitive position and provide such disclosure in a more dispersed fashion, even though such information may benefit investors. These results do not support the alternative explanations that firms disclose more to raise capital to compete more aggressively with their industry peers or to reduce their litigation risk by signaling their type through a systematic increase in transparency.

All in all, our evidence suggests that when illegal price-fixing becomes more difficult, firms adjust their disclosure on multiple margins. They are eager to increase the disclosure of information that potentially benefits product-market peers to sustain tacit coordination. Similarly, they reduce the disclosure that might help antitrust authorities to uncover collusive activities but contains little marginal new information for industry peers.

## 2    Related Literature

Our paper relates to a few strands of literature. First, our results speak to the literature on information exchange with the intention to stabilize cartels (see Kühn and Vives (1995) for an extensive review on this topic). The empirical literature on such information exchange mechanisms has largely found that trade associations and similar voluntary organizational arrangements have facilitated collusion (Kirby, 1988; Doyle and Snyder, 1999; Genesove and Mullin, 2001; Page, 2009; Bertomeu et al., 2015). Meanwhile, the findings on whether mandated price disclosure helps or harms collusion have been mixed. While in some contexts transparency disciplines firms (Ater and Rigbi, 2017; Rossi and Chintagunta, 2016), in others it facilitates collusion (Albaek et al., 1991; Luco, 2017). We explore an alternative regulated information exchange mechanism: financial disclosure by listed firms. In line with the latter set of studies, we find that SEC-regulated disclosure channels could help firms to coordinate in product markets.

Financial disclosure differs from previously studied information mechanisms in several ways. First, such disclosure is credible since it is regularly verified by external audit teams, and managers are legally liable for their statements. Credibility constitutes a necessary condition to sustain tacit coordination, as information has to be perceived as more than "cheap talk" and 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 mandate or capacity to limit such behavior.[7]  Moreover, we study unilateral

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[7]The FTC cases cited in footnote (6) provoked legal discussion on whether SEC regulations that facilitate

information announcements rather than quid pro quo agreements such as trade associations. Finally, while the financial disclosure is regulated, firms still have considerable leeway in which disclosure to provide.

We believe that these differences make financial disclosure an important mechanism to study from the antitrust perspective. In a related paper, Goncharov and Peter (2015) find that when firms switch to internationally recognized accounting standards and thus 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. We reverse the question and ask how firms change their financial disclosure following the need to sustain coordination in product markets.

Second, our study relates to the literature on how product-market considerations affect firms' disclosure choices (see Beyer et al. (2010) for a thorough review). Public financial information disclosure might be costly as rivals could learn a firm's 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 means that it might be optimal to disclose less rather than full information.

Most of the empirical literature in this area looks at how firms adapt their financial disclosure when competition changes (e.g., Li (2010)). The identification in these papers comes from industry deregulation (e.g., Burks et al. (2017)) or increased import penetration (e.g., 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. This relates to the proprietary cost hypothesis (Jovanovic, 1982; Verrecchia, 1983), which suggests that

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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* where the Supreme Court has 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).

a firm discloses information only when the increase in firm value from disclosure exceeds the costs of disclosure.

In this paper, we argue that when explicit collusion costs increase, instead of switching to competition and reducing truthful disclosure, incumbents could mitigate the antitrust shock by sharing more information that helps tacit coordination 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 sources of the changes in competition among existing rivals may lead to contrasting predictions.

Third, our paper relates to the literature that looks at the impact of product-market collusion on various corporate policies. Dasgupta and Žaldokas (2016) and Dong et al. (2014) find that increases in collusion costs lead to changes in capital structure and acquisition activity. Gilo et al. (2006) study how partial cross-ownership stabilizes collusion, while Azar et al. (2016b) and Azar et al. (2016a) document that common ownership of firms by large asset managers increases product prices in the airline and banking industries.

Finally, our results also speak to the literature on the real effects of the financial disclosure. Empirical studies have generally found positive real effects of increased transparency, e.g., in food hygiene (Jin and Leslie, 2003), corporate investment (Biddle et al., 2009; Shroff et al., 2014), and social responsibility (Christensen et al., 2017a,b). Our results instead document a source of negative real consequences to more transparent financial statements and suggest that policy makers should take into account the potential adverse effects of financial statement transparency on consumer welfare when setting the level of mandatory disclosure.

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# 3 Identification Strategy

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 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[8], 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 the leniency law effects). Leniency programs allow market regulators (or the courts) to grant full or partial amnesty to those firms that, despite being a part of a collusive agreement, cooperate in providing information about it. In particular, a typical leniency law stipulates that the first firm that provides 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. As Hammond (2005) suggests, U.S. leniency law, which was strengthened in 1993, proved successful in destabilizing existing cartels and deterring the formation of new ones and has thus inspired other countries to pass similar laws. In a difference-in-differences setting, Dong et al. (2014) show that the global wave of leniency law passage significantly harmed collusion. In particular, leniency laws increased conviction rates and generally lowered gross margins of affected firms. Internet Appendix A2 reports the list of leniency law passage years around the world.

Our reading of online discussions and press announcements suggests that countries do not seem to have one particular trend and reason for adopting these laws. Some countries

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

passed the leniency program after prominent collusion cases. For instance, Hungary did so after it faced significant criticism concerning its competition investigation against mobile telephone operators, while Switzerland made its competition 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.

Other countries passed leniency laws after significant pressures from the U.S., the European Union (EU) or supranational organizations (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, which reported that its antitrust authority needed better investigative tools, including the ability to give leniency to a whistleblower revealing secret cartel conduct. Similarly, the U.S. pushed Singapore to strengthen its antitrust law in negotiations for a bilateral free trade agreement.[9] Moreover, the EU has encouraged its member states to adopt leniency laws. The IMF and the World Bank regularly ask for the 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 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.[10]

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[9]We are not aware of any other case apart from Singapore where a leniency law was passed as an outcome of a trade deal. Also, in all our regressions we control for the industry's import penetration, so it is unlikely that our results are driven by rising trade. Moreover, 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 such reason does not include external pressure from the U.S.

[10]We estimate a Cox proportional hazard model, trying to predict foreign leniency law passage by the

## 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 the knowledge about 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 to bring private civil action by affected parties 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 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 are 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).[11]

We therefore argue that foreign leniency laws increase the costs of explicit collusion for

characteristics of the U.S. industries that are exposed to those countries. We fail to find consistent predictors.

[11] This has been also 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."*

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. $w_{kjt}$ is the share of two-digit SIC industry $j$'s imports from country $k$ out of all industry $j$'s output 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.[12]

As it is based on political decisions made outside of the U.S., *Foreign Leniency* should be largely exogenous to the domestic political and economic conditions surrounding U.S. firms.

## 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

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[12]In Section 5.6.3, we use alternative weighting schemes, for instance, by weighting according to the export shares, adopting a binary treatment based on the foreign country to which the industry is most exposed, or using only the weights based on the imports of final goods. The latter scheme should minimize concerns that imports might be intermediate goods used for the production of the final goods of U.S. firms in the same two-digit SIC industry, in which case there would be little scope for horizontal collusion.

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:

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

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 on increased exposure to foreign leniency laws on various firms' disclosure choices relative to a set of control firms that do not have an exposure to these foreign laws since their industries have less trade with these law-passing countries. In this baseline model, $\alpha_i$ denotes firm fixed effects, which deal with firm-level time-invariant omitted variables, and $\gamma_t$ year fixed effects, which account for unobserved heterogeneity that varies across time (e.g., macroeconomic shocks). $X_{ijt}$ corresponds to a vector of firm-level and industry-level control variables, described in the next section. Since our treatment variable that captures plausibly unexpected changes in collusion costs is defined at the industry level, we cluster standard errors by industry (Bertrand et al., 2004).

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

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industry level, we also capture privately held firms. Specifically, we calculate the number of international cartels or firms involved in international cartels that are convicted in each industry-year, and estimate the relationship of the number of convictions with the increase in the 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. Results, reported in Panel A of Table 2, 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 2. 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 NAICS industry-level producer price index (PPI) in columns (5)-(6). We find that profit margins, equity returns, and product prices drop, which suggests that increased cost of collusion led to an increase in competition, and a decrease in product prices, and thus adversely affected firm performance.[13]

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[13]Indeed, theoretically, the effect of leniency laws on the 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 it 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 (Spagnolo, 2000; Motta and Polo, 2003; Chen and Rey, 2013). The results in Table 2, coupled with the previous empirical evidence (e.g., Dong et al. (2014)) and the wide adoption of leniency laws around the world, suggest that these laws were in fact effective. For instance, on Jun 8, 2015, DoJ's Deputy Assistant Attorney General Brent Snyder gave a speech in which he said that *"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"* and 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. The US is now almost always joined in investigating and punishing international cartels by the European Commission, Japan, Brazil, Canada, Australia and others. These jurisdictions investigate with vigor and impose tough sanctions. As a result, companies are now exposed to enormous monetary penalties around the world."*

# 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 the material contracts with the customers and whether the firms discuss product market information in the conference calls with equity analysts. 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 is useful insofar as it validates the evidence on a larger sample. Moreover, conference calls cover different aspects of tacit coordination. While sales contracts include actual price and quantity data that could become focal points in coordination, it might take time to establish trust between peers. In contrast, conference calls might involve invitations to collude, which could facilitate such coordination.

### 4.2.1 Main Measures

*Disclosure through 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 (Verrecchia and Weber, 2006; Boone et al., 2016). 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 plausibly 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-year filing material sales contracts with required information over 2000-2012. *Redacted Contracts* is then defined as a binary variable capturing whether requests for confidential treatment of at least one material sales contract in the particular year. We also provide results for *%Redacted Contracts*, which is the ratio of the number of requests for confidential treatment in the particular year over the total number of filed material sales contracts. In both cases, we exclude the firms that do not disclose material contracts from the analysis. In Internet Appendix A3, we explain our data collection methods in detail. We show how this measure develops over time in Figure *A1*, suggesting that there is no significant average time trend.

*Conference calls.* We also examine firms' earnings conference calls with equity analysts. Recenet studies have established that earnings conference calls are associated with large intra-industry information transfers (Kimbrough and Louis, 2011; Brochet et al., 2017). During those calls, managers strategically interact with participants to manage the flow of information released (Mayew, 2008; Hollander et al., 2010). Motivated by the FTC cases cited in footnote (6) we introduce a new measure, *%Product Conference Calls*, where 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 less than 150 words, and we scale product-market-related words by the total number of words in the script. When a firm has multiple conference calls in a given year, we take the average value of the measure over the period.

We further construct three alternative measures based on variations of our word dictionary. First, we add *price*, *pricing*, *prices*, *priced*, and *discount* to the word list. This is meant to capture firms' discussion about product pricing strategy. We remove any instance where

*share*, *stock*, or *security* is mentioned in the five words around these words, in order to avoid capturing the discussion on firm's share price. Second, we develop a word dictionary based on the two FTC cases cited in footnote (6). We first extract the sections that are suspected of collusion from these two conference call scripts (namely 2008 Q3 Amerco Earnings Conference Call and 2004 Q2 Valassis Communications Earnings Conference Call), and 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.[14] Third, 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 a binary variable *Quote_Rival* and code it as one if the CEO or the CFO mention at least one of its competitors during the earnings conference call presentations in the year. We exclude conference calls of the firms that are not covered by Factset Revere database.

### 4.2.2 Additional Measures

*Financial statement comparability.* We obtain data on financial statement comparability from De Franco et al. (2011). Specifically, the pairwise financial statement comparability between firm $i$ and firm $j$ is defined as the similarity of the accounting systems that maps from economic events (proxied by stock returns) to earnings between the two firms. We define a firm $i$'s overall financial statement comparability *Comparability* as the average pairwise financial statement comparability of all firms $j$ in the same industry as firm $i$. Firms with a

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

higher value of *Comparability* have financial statements that are more comparable to their group of industry peers.

*Description of competition.* In order to rule out some alternative explanations, we explore two measures of aggregated competition disclosure. Our main measure in this context, *%Competition*, hinges on the management's reference to competition in the MD&A section of the 10-K filing. Inspired by Li et al. (2013) and Bushman et al. (2016), we count the frequency of occurrences of the competition-related words, including those words with an "s" appended, and scale them by the total number of words in the 10-K filing. We assume that the number of mentions of the competition-related words is positively correlated with the overall discussion of the competitive environment in firms' 10-K filings.[15] Unlike Li et al. (2013), we consider all instances of competition-related words and do not restrict our count to positive instances. We do so because we believe that the overall discussion of competition, regardless of its sentiment, is what matters to antitrust agencies.

*Concentration of competition words.* Our second measure of competition disclosure, *Competition Noise*, is a novel measure with which we attempt to capture the concentration of the reference to competition words in the MD&A section of the 10-K filing. In some cases, manager discusses the firm's competitive environment predominantly in separate subsections (e.g., "Section X. Competition"), while in other cases the competition-related words are dispersed across the text. We posit that a separate subsection on competitive environment more effectively helps outsiders to understand the competitive environment that the firm faces than the same number of words dispersed across the text. For each paragraph of the 10-K filing's MD&A section, we calculate the proportion of competition-related words over the total number of words in the paragraph. Next, across all paragraphs, we pick the maximum value of this proportion of competition-related words. We require that the MD&A section has at least 150 words, and also require that the paragraph itself has at least 15 words,

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[15]Indeed, Li et al. (2013) find that the disclosed amount of competition in financial statements is related to firms' market structure. In line with our results, they also suggest that in certain industries managers might strategically distort their disclosure about competition.

in order to exclude the cases that correspond to the titles (e.g., "Section X. Competition"), as this would inflate the value substantially. We then define a binary variable, *Competition Noise*, which equals one if this maximum value of the proportion of competition-related words is larger than 2.7%, which corresponds to 80% in the sample distribution. Our results are robust if we use 5% as the cutoff.

## 4.3   Additional 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 next include the industry concentration ratio, as proxied by the Herfindahl-Hirschman Index of the two-digit SIC industry, as prior studies have shown that it drives voluntary disclosure (e.g., Ali et al., 2014). In the results, available on request, we show that our main conclusions are robust if we measure the industry concentration ratio based on U.S. Census data (Ali et al., 2009). We also control for the 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 (Dasgupta and Žaldokas, 2016). Appendix A lists all variable definitions. We report summary statistics in Table 1.

# 5   Empirical Findings

## 5.1   Main 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 have 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.[16]

Our first main measure of information sharing about customers is based on how much firms redact information on 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 discretionary power 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. In columns (1)-(2) we use *Redacted Contracts*, which is a binary variable capturing a firm's request for confidential treatment in any sales contract in the year, and in columns (3)-(4) we use *%Redacted Contracts*, the proportion of contracts that request confidential treatment in the year, as the dependent variable.

Columns (1) and (3) present 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. Columns (2) and (4) further include 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

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[16]Thus, our estimates are identified on the subpopulation of firms for which explicit collusion dominates tacit coordination, which dominates competition. The presence of such firms is based on two assumptions. First, we assume that if explicit collusion were legal, because of direct information exchange it would be easier to implement and monitor than tacit coordination without direct information exchange (Fonseca and Normann, 2012; Awaya and Krishna, 2016). Also, as McAfee and McMillan (1992) point out, explicit collusion allows firms to split the spoils and thus leads to more efficient cartels. Second, if firms could previously sustain explicit collusion, it is likely that they would prefer tacit coordination over competition.

on these most exposed industries, we find that each adoption of leniency law explains, on average, 19% of within-firm variance.

Our second main measure *%Product Conference Calls* captures how much CEOs and CFOs discuss about 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 (5) and (6) of Table 1. 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 leniency law explains, on average, 5% of within-firm variance.

Overall, these results of increased information exchange following increased costs of explicit collusion can be explained by the firms moving from explicit collusion to tacit coordination. That said, increased communication about the customers might also represent the continuation of the previous explicit collusion arrangements. Since the firms do not want to risk conducting private meetings, they could continue communicating via public disclosure or use such disclosure as the verification mechanism. We cannot rule out this alternative explanation but it is consistent with our overall conclusion that firms increase public information exchange to coordinate their actions.[17]

## 5.2  Heterogeneity

If our hypotheses are correct, we should observe that the impact of the passage of leniency laws differs across affected firms in predictable ways (Angrist and Krueger, 2001). We expect our results to be stronger when a firm finds it easier to coordinate product prices or quantities

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[17]Also, we do not necessarily claim that firms collude around the product prices revealed in these particular contracts. In fact, they do not even need to collude in this 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 the rival in the atomistic customer market, it could signal this intent by revealing 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.

with its peers. We develop five partitions meant to capture such variations across firms. We present our results separately in two panels in Table 4 for our measures of redacted contracts (Panel A) and discussions in conference calls (Panel B).

Our first cross-sectional characteristic is the stability of an industry. We posit that firms in stable industries are more ready to collude with their peers. For instance, collusion is harder to sustain in periods of high demand, because in such periods firms are more tempted to deviate as the deviation gain is the highest (e.g., Rotemberg and Saloner, 1986; Kandori, 1991). We use the industry average of sales growth as the proxy for maturity of an industry, and define a binary variable, *Growth Industry*, equal to one if the industry sales growth falls in the lowest quartile of the sample distribution. The results are presented in Table 4, column (1). As predicted, the impact of increased collusion costs on firms' decisions to redact information in their sales contracts and to discuss about product market topics in conference calls is more pronounced in stable industries.

Second, we look at whether our results vary by 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. To test this prediction, we first obtain the product similarity score for each firm pair from Hoberg and Phillips (2010). We then define a binary variable, *Heterogeneity*, 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 with the firm if the product similarity score between the peer and the firm is larger than 0.046, which is the median product similarity score between each firm pair in the sample. As column (2) shows, the results are weaker for firms with relatively more differentiated products.

Third, we examine whether our results vary by the market structure. We posit that concentration facilitates either explicit collusion or tacit coordination. We use the four-digit NAICS industry concentration measure calculated by U.S. census as the proxy for industry

concentration level. As column (3) shows, the results are stronger for firms in concentrated industries, consistent with the claim that it is easier to collude in concentrated markets.

Fourth, the collusive activities should be driven by the firms with a larger power in the product markets. 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.

Finally, we look at 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 an industry that has a higher prevalence of privately held firms.[18] We thus 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.

## 5.3   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-difference estimation of staggered assignment of treatment. Moreover, a binary treatment also lets us show the treatment effect in a graphical form.

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

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[18]However, the fact that not all industry participants are public helps to avoid the attention of antitrust authorities as they 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. Knowing the reaction curves can substitute the observability of the full product market behavior, so publicly listed firms can act as coordination leaders, anticipate privately held firms to act rationally to such unilateral coordination, and internalize the externalities from the actions taken by the private firms, even if they do not observe their sales contracts.

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 *Redact Contracts*, and tabulate the results in column (1) of Table 5. 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) of Table 5 show that the pseudo adoption of the foreign leniency law has a statistically insignificant effect on the 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* in column (1) by replacing the main country in terms of imports with the least important country in terms of imports when defining our treated industries. Specifically, for each three-digit SIC industry, we select the country that is the least important in terms of the volume of imports from the country to the industry. An industry is categorized as treated starting from the year when the country least important to the industry adopted the law. If there is little or no trade between the industry and a country, the passage of a leniency law in this country should have little impact on U.S. firms' collusion costs. As column (3) shows, we again fail to find significant changes in disclosure behavior.

Furthermore, we explore the dynamics of the effect. For each industry, we create binary dummies of *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 in, respectively, three years before, two years before, one year before, on, 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 are shown in column (4) of Table 5, we find that the adjustment effect happens quickly.

Lastly, we estimat the dynamic effects for *%Product Conference Calls* and report the results in column (5). We find that firms' product-market-related disclosure during conference calls does not change significantly prior to the adoption of foreign leniency, and it increases quickly after the adoption of foreign leniency. The estimates of the specifications in columns (1)-(3) where we use *%Product Conference Calls* as the dependent variable also give consistent results.

## 5.4  Economic Consequences

We further look at whether the changes in disclosure have any economic consequences. First, we look at firm profitability. For ease of exposition, we again use binary treatment. In Figure 2, we show that firms that increase their discussion about product market topics during conference calls after significant increases in our *Foreign Leniency* measure do not experience changes in profitability over three years after the foreign leniency law.[19] On the other hand, firms that did not change their communication strategy experience a decline in profitability. The difference between the two groups is statistically significant. While this figure does not establish causality, it reveals an important correlation: firms that adjusted their disclosure have experienced better outcomes in product markets. We show that the firms that disclosed more (and presumably switched to tacit coordination) did not experience a decrease in profits, while those that did not change their disclosure saw their profits drop as explicit collusion became less sustainable.

We find corresponding results in the regression setting in Table 6, where we show that profits fared better when explicit collusion costs increase in the cases where firms adjust their disclosure strategies. We test this by creating a dummy *High Disclosure*, capturing whether the industry-level product market discussions in conference calls falls in the lowest quartile of the sample distribution. Our estimates with and without control variables suggest that the effect of *Foreign Leniency* is fully mitigated in industries with increased disclosure.

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[19]We use conference call data here as the sample is much larger than that of the redacted contracts.

Indeed, the sum of the coefficients on *Foreign* and *Foreign×High Disclosure* is not statistically different from zero with an associated *p-value* of 0.14.

## 5.5 Coordination

Finally, we study whether firms coordinate public disclosure on the product-market strategies within industries. If our hypothesis is correct, firms within the industry should be adjusting the disclosure strategies at the same time. We again rely on the conference calls due to a larger sample. First, in Panel A of Table 7, we check whether peer average *%Product Conference Call* within an industry is correlated with the firm's own measure. While we do not claim that the presence of peer effects and indeed unobservable factors might be driving the correlation between the average industry trend and the product-market-related disclosure during conference calls (Manski, 1993; Gormley and Matsa, 2014), we find that such within-industry correlation is indeed present and becomes stronger when *Foreign Leniency* increases. This finding suggests not only that firms move together in their disclosure of individual product market data, but also that such tendencies are facilitated by *Foreign Leniency*, in line with the tacit coordination interpretation.

Next, we examine the comparability between a firm's financial statement and its peers' financial statements based on the measure that has been previously developed in the literature (De Franco et al., 2011). Conceptually, financial statement comparability (*Comparability*) refers to the similarity of a firm's and its peers' financial reporting systems that map from economic events to reported earnings. As shown in columns (1)-(2) of Table 8, Panel B, we find that *Foreign Leniency* is positively associated with *Comparability*, suggesting that a firm's financial statement becomes more comparable to its peers' when the costs of explicit collusion increase.

## 5.6 Robustness Tests

### 5.6.1 Contract Types

In Internet Appendix Table $A1$, we perform a more detailed analysis by manually reading all contracts and identifying the type of redacted information. First, we look at the contracts where firms explicitly specify product price but either disclose or redact such information. In columns (1)-(2), we find that firms redact less information on prices. Further, we look at the contracts that explicitly specify quantity obligation, and we study whether they disclose or redact the quantity obligation. We find that there is also a reduction in the quantity redaction. Finally, we find that firms also redact less information on contract duration. These tests also address a possible concern that the firms could have switched to more vague customer contracts in which they do not mention the price, quantity, or duration, and thus they did not need to redact this information as the contracts became less informative. Indeed, even if we focus on the cases where this information is explicitly mentioned, we find that they redact less.

Second, we perform a falsification test where 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 whether firms redact information in their purchase (rather than sales) contracts. Such contracts should be less helpful in assisting collusion, but a potential alternative hypothesis (that we explore in detail in Section 6) is that firms increased disclosure in general. We report results in Internet Appendix Table $A2$. 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.

### 5.6.2 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 to construct our *%Product Conference Calls* measure. First, we augment the word dictionary in Table 3 with *price*, *pricing*, *prices*, *priced*, and *discount* to capture managers' discussion about pricing strategy. Results are tabulated in column (1) of Internet Appendix Table *A*3, Panel A. We find consistent result that 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 (6). We extract the sections that are suspected of collussion and define the 20 most frequently used terms as the word dictionary. Results, tabulated in columns (3)-(4), are consistent our previous findings. Lastly, we investigate whether firms quote their competitor during conference calls, inspired by the observation that the convicted firms in these two FTC cases frequently mention their competitors during their conference calls. We identify a firm's competitors using the Factset Revere relationships database. 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) of Internet Appendix Table *A*3, Panel A. We find managers quote their competitors more frequently when the costs of explicit collusion increase.

One could argue that one of the reasons firms changed their discussions of their customers is that their product-market strategies, e.g., towards acquiring new customers, changed beyond what can be captured by the *HHI* or *Import Penetration* measures of industry competition. We try to control for this explicitly by using the data on new customer announcements from Capital IQ Key Development database, which gathers information from more than 20,000 public news sources, company press releases, regulatory filings, call transcripts, and investor presentations. We report results for the specifications where we control for new customer announcements in Internet Appendix Table *A*3, Panel B. While we find that a lagged number of new customer announcements is indeed associated with more discussion of customers during the conference calls, *Foreign Leniency* remains statistically significant at conventional levels.

### 5.6.3 Weighting Schemes

In Internet Appendix Table *A4*, Panel A, column (1), we reestimate *Foreign Leniency* measure at the three-digit SIC industry level by setting the weight as the share of the *three-digit* SIC industry's imports from other countries in 1990. Second, in columns (2) and (3), we report the results based on the *Export-based Foreign Leniency* by using as the weight the share of exports of each two-digit or three-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. Third, one could be concerned that our default weighting scheme is capturing vertical rather than horizontal collusion,[20] since imports might be intermediate goods whereas U.S. products in the same two-digit SIC industry might be final goods. In column (4), we present the results on *Foreign Leniency* recalculated according to the weights based on the imports of only the *final* goods.[21] Our results are consistent using various weighting schemes.

In Internet Appendix Table *A4*, Panel B, columns (1) and (3), we further abstract from the industry effects by constructing our measure of collusion costs at the three-digit SIC industry level, adjusted by the two-digit SIC industry level. Specifically, we construct the measure *Adj. Foreign Leniency*, which is the difference between the measure based on the weights of the industry's imports (exports) from (to) other countries defined at the three-digit SIC level and the respective measure based on the weights at the two-digit SIC level. In columns (2) and (4), we further construct the measure $\sum_k (w_{SIC3} - w_{SIC2}) L_{kt}$ by setting the weight as the share of the three-digit SIC industry's imports (exports) from a country minus the share of the two-digit SIC industry's imports (exports) from (to) the country. We provide results separately for export- and import- based measures. Our conclusion that firms redact less information in their contracts after the increase in collusion costs continues

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[20]In fact, this concern is limited as our arguments should equally hold for vertical collusion cases.

[21]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. Because of data availability, we use the import data in 1995 to compute the weights. We convert the International SIC to U.S. SIC using the concordance table provided by Jon Haveman.

to hold when we use these alternative measures of increased collusion costs.

### 5.6.4 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*4, Panel C, columns (1)-(2) we thus reconstruct *Foreign Leniency* where we consider 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. We find that our result holds if we limit the sample to countries with a higher degree of efficiency of the judicial system.

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 all 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 any other countries. We gather individual rule of law indices from World Bank data and show in column (3) of Internet Appendix Table *A*4, Panel C that a general increase in rule of law is not driving our results. In column (4), we also show that *Foreign Leniency* is significant even after we control for *Foreign Rule of Law*.

### 5.6.5 Other Robustness Tests

Our results also hold if we exclude the industries one by one, which shows that the results are not driven by one particular industry, as well as when we exclude countries one by one, which shows that the results are not driven by one particular country. Moreover, we check 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* was somehow correlated with CEO change and

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the new CEO prefers different disclosure policies, we might be capturing these preferences and not an independent effect on disclosure. Further, our results remain unaffected if we cluster standard errors by firm instead of industry. Finally, all of our results hold if we control for geographic trends by adding headquarter state times year fixed effects.

Our identification strategy would be undermined if the changes in regulation across countries were driven by lobbying from the U.S. for reasons related to market structures or industry performance. To rule out this concern, we read news articles discussing the reasons for the laws' passage in different countries and re-estimate our main specifications by forming our treatment variable based only on the countries for which we could find a clear driver for the law passage and we are certain that U.S. lobbying was not among these drivers.

Finally, given that the EU has a supranational competition policy, in addition to the member countries, 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. All these results are available on request.

# 6 Alternative Explanations

The findings that firms increase information provision on their product-market strategies following increased costs of explicit collusion can also be explained by their releasing information for two alternative reasons. We discuss those two reasons in this section and perform additional analyses to plausibly rule them out.

## 6.1 Increased Disclosure to Raise Capital

First, after the passage of leniency laws, they have to raise more equity capital (as shown by Dasgupta and Žaldokas (2016)) and thus aim to provide more precise information to

investors.[22] Moreover, the firms could be hedging their litigation risk and disclosing more information on product markets, 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 and thus also to reduce the risk of litigation. Finally, some unobservable industry trends could be correlated with the needs to increase product-market-related disclosure.

We provide some conflicting evidence regarding these alternative explanations. First, we have already shown in Table 6 that firm's profitability does not depend negatively but rather positively on its industry peers redacting little information from their customer contracts. Indeed, if industry peers redacted little to raise externally raised capital, it is likely this would have negatively affected firm profitability as external capital would have allowed peers to pursue more aggressive competitive strategies. Instead, we find that while in general the effect of *High Disclosure* is negative, the coefficient of the interaction term with *Foreign Leniency* is positively significant, which does not support this explanation. These findings rather suggest that the redaction helps to sustain collusion by maintaining average industry profits at a higher level than in the industries that redact more.

## 6.2 Antitrust Action

We further investigate these potential alternative explanations by looking at whether the firms increase *all* information on their competitive environment and their product-market strategies after explicit collusion costs increase. If the increased disclosure is an outcome of signaling attempts to provide more information antitrust authorities, the firms should also provide more information on the competitive environment.[23]

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[22]Indeed, any additional information is useful for investors as it reduces adverse selection in financial markets (e.g., Leuz and Verecchia, 2000). In Internet Appendix Table $A$5, we demonstrate the association between *Foreign Leniency* and common industry-level measures of liquidity, i.e., a drop in bid-ask spread and an increase in stock turnover.

[23]We have already referred to the results in Internet Appendix Table $A$2, showing that firms do not disclose more information in their material contracts with *suppliers*, so they do not increase *all* information related to product markets.

To rule out the explanation that firms increase information on competition on all dimensions, we look for the type of disclosure that is less useful in coordinating product-market strategies and could be useful for investors (Li et al., 2013) but could also have an additional cost in that antitrust authorities could use it to understand which industries are more likely to show signs of collusive behavior. Assuming that the antitrust authorities operate under budgetary constraints and cannot continuously screen all product markets, precise self-reported information on the product markets coming from financial disclosure documents might act as a signal to start investigations. While such information is unlikely to be used as evidence of collusion, more precise disclosure about the industry might bring some firms into the spotlight and contribute to initiating more serious antitrust investigations. So when antitrust authorities gain better tools to investigate and convict cartels, and thus the costs of explicit collusion increase, firms might start reducing the precision of such information disclosure, which is otherwise valuable to the investors to get a better sense of the firm's operations. On the other hand, if they are not concerned about antitrust authorities and are instead pursuing expansion strategies by raising more capital and thus providing more information to investors, they should increase discussion on competition.

We explore management's references to the firm's competition in its 10-K filings. We proceed as follows. First, we show that antitrust authorities indeed pay attention to the 10-K filings, and second, we show that *Foreign Leniency* is negatively associated with both references to competition in 10-Ks and how dispersed such discussion on competition is throughout the 10-K filings. Our findings rebut the alternative explanation that after the costs of explicit collusion increase, firms are not concerned about the tacit collusion with rivals, and they increase disclosure primarily to provide more information to investors or antitrust authorities.

### 6.2.1 Antitrust Authorities and 10-K Documents

We start by investigating 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 onward and contains information including the client IP address, timestamp of the request, and page request. We focus on the records of requests to HTML file types, as they are more likely to be accessed by users who are viewing the data through a web browser. We then 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.[24] 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 DoJ or FTC within one year following the filing date. Results are presented in Internet Appendix Table $A6$, columns (1)-(2). We find consistent results that internet traffic to 10-K filings that could be associated with antitrust regulators increases following more antitrust regulatory powers. In columns (3)-(4), we repeat our analysis by including also 10-Q and 8-K filings as such filings may 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. As expected, we fail to document a change in behavior for those filings by the DoJ and FTC (see columns (5)-(6)).

### 6.2.2 Competitive Environment

We now show how firms change their disclosure on competition when the explicit collusion costs rise. Columns (1)-(2) in Table 8 display results based on our first measure of competition disclosure. We start with the specification without any controls, and then continue

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

with the specification that controls for firm characteristics. We find that *Foreign Leniency* is negatively associated with references to competition in the 10-K, and the effect is statistically significant at the 1% level. In order to interpret the economic magnitude, for each foreign law, we select the industry that is the most exposed in terms of trade. We find that for each foreign law the increase in collusion costs explains, on average, 3.40% of within-firm variance of disclosure for those firms.

We next investigate whether firms disclose information about their competitive environment in a more dispersed fashion. Columns (3) to (4) in Table 8 display results based on our second measure of competition disclosure, *Competition Noise*. We find consistent results that *Foreign Leniency* is significantly negatively related to the concentration of references to competition in the MD&A section of the 10-K filing, which indicates that firms start spreading out the information about their competitive environment.[25]

One could ask whether antitrust authorities benefit from disclosure on firms' competitive environment in convicting cartel activities. Using data on actual convicted cartel activity from Connor (2014), in Internet Appendix Table *A*7, we show that firms' disclosure policies during the cartel period were indeed associated with a higher probability that antitrust agencies uncovered these price-fixing activities in their industries.

These findings suggest that in situations where antitrust authorities might find it helpful to discern the degree of competition when they seek to fight anticompetitive activities, firms adjust their disclosure accordingly to minimize the chances of an investigation and thus reduce proprietary costs stemming from fines and lower cash flows. They conceal their true perceived competition position and make the disclosure about their competitive environment more fuzzy. Both of these disclosure components provide little new information to the rivals who observe each other in the product markets, but they can be useful to investors and antitrust regulators. This goes against the two alternative explanations of our earlier findings that firms increase disclosure primarily to raise more capital or reduce the litigation risk.

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[25]These results are not driven by MD&As without any reference to competition-related words.

# 7 Conclusion

Despite its benefits, greater transparency in the financial markets might also produce anti-competitive effects by facilitating collusion in the product markets. This paper presents empirical evidence that changing incentives to form illegal price-fixing cartels alter how firms talk about their product-market strategies in their disclosure documents targeted at investors. We suggest that in addition to benefiting financial market participants, such financial disclosure also benefits other audiences; in particular, some information helps firms tacitly coordinate product market behavior with their rivals.

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 such foreign 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 costs of collusion 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. Also, they included more discussion about their product-market strategies during their earnings' conference calls with equity analysts. Thus, facing higher costs of explicit collusion, firms shifted from a more explicit collusion to a more tacit coordination equilibrium, where some coordination among peers is implemented through public information disclosure.

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

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## Table 1: 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, 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 | 25256 | 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-Adjusted Return | 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 |
| Redacted Contracts | 414 | 0.599 | 0.491 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| %Redacted Contracts | 414 | 0.581 | 0.484 | 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 |
| Avg. CompAcc | 16,648 | -3.675 | 2.140 | -6.070 | -4.220 | -3.130 | -2.330 | -1.800 |
| Median CompAcc | 16,648 | -2.967 | 2.500 | -6.100 | -3.610 | -2.100 | -1.360 | -1.000 |
| %Competition | 23,981 | 0.995 | 0.544 | 0.374 | 0.604 | 0.917 | 1.288 | 1.703 |
| Competition Noise | 20,139 | 0.199 | 0.399 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| NAICS PPI | 4,034 | 1.566 | 0.516 | 1.055 | 1.238 | 1.470 | 1.787 | 2.143 |

## Table 2: 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 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* (1) | *Convicted Firms* (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 |
| Number of observations | 25,256 | 25,256 | 25,256 | 25,256 | 4,034 | 4,034 |

## Table 3: Foreign Leniency Law and Public Disclosure

This table presents results from the OLS regression 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*, *%Redacted Contracts* and *%Product Conference Calls* in columns (1) and (2), (3) and (4) and (5) and (6), respectively. 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* | | *%Redacted Contracts* | | *%Product Conference Calls* | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Foreign Leniency | -4.043*** | -3.655*** | -3.984*** | -3.688*** | 10.705** | 11.889** |
|  | (1.202) | (1.007) | (1.253) | (1.011) | (4.854) | (5.155) |
| Lagged ROA |  | -0.204*** |  | -0.208*** |  | 0.075 |
|  |  | (0.058) |  | (0.056) |  | (0.119) |
| Lagged Size |  | 0.040 |  | 0.027 |  | -0.055 |
|  |  | (0.039) |  | (0.044) |  | (0.377) |
| HHI |  | -4.267* |  | -4.038* |  | -6.667* |
|  |  | (2.081) |  | (2.246) |  | (3.336) |
| Import Penetration |  | -0.236 |  | -0.654 |  | 0.203 |
|  |  | (0.786) |  | (0.685) |  | (1.140) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.587 | 0.612 | 0.582 | 0.609 | 0.674 | 0.674 |
| Observations | 414 | 414 | 414 | 414 | 9713 | 9713 |

## Table 4: Heterogeneity in Public Disclosure

This table presents results from the OLS regression 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 Contracts* in Panel A and it is *%Product Conference Calls* in Panel B. *Growth Industry* is a binary variable that equals one if the sales growth at the industry level falls in the highest quartile of the sample distribution, and zero otherwise. *Heterogeneity* 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. *HHI Census* is the four-digit census HHI ratio. *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. *High %Private* is a binary variable that equals one if the proportion of private firms in the three-digit NAICS industry 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 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: Heterogeneity in Redacting Information in Contracts

| | | Redacted Contracts | | | |
| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Foreign Leniency | -4.970*** | -4.133*** | -1.282 | -2.183 | -4.539*** |
| | (0.655) | (1.050) | (1.495) | (1.441) | (1.173) |
| Growth Industry | -0.479 | | | | |
| | (0.382) | | | | |
| Growth Industry×Foreign Leniency | 4.309* | | | | |
| | (2.037) | | | | |
| Heterogeneity | | -0.511** | | | |
| | | (0.218) | | | |
| Heterogeneity×Foreign Leniency | | 6.672* | | | |
| | | (3.470) | | | |
| HHI Census | | | 0.001** | | |
| | | | (0.000) | | |
| HHI Census×Foreign Leniency | | | -0.004* | | |
| | | | (0.002) | | |
| Large Firm | | | | 0.323*** | |
| | | | | (0.079) | |
| Large Firm×Foreign Leniency | | | | -2.726*** | |
| | | | | (0.870) | |
| High %Private | | | | | -0.181 |
| | | | | | (0.161) |
| High %Private×Foreign Leniency | | | | | 2.672** |
| | | | | | (1.105) |
| Firm & Year FE | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.621 | 0.606 | 0.605 | 0.616 | 0.618 |
| Observations | 414 | 354 | 402 | 414 | 414 |

Panel B: Heterogeneity in Disclosure during Conference Calls

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | *%Product Conference Calls* | | |
| Foreign Leniency | 8.340** | 12.499** | 8.044 | 10.885** | 12.278** |
| | (3.553) | (4.978) | (5.587) | (4.940) | (4.967) |
| Growth Indudstry | 2.065*** | | | | |
| | (0.602) | | | | |
| Growth Indudstry×Foreign Leniency | -14.756* | | | | |
| | (7.575) | | | | |
| Heterogeneity | | 0.519** | | | |
| | | (0.188) | | | |
| Heterogeneity×Foreign Leniency | | -2.475* | | | |
| | | (1.262) | | | |
| HHI Census | | | -0.001 | | |
| | | | (0.001) | | |
| HHI Census×Foreign Leniency | | | 0.008* | | |
| | | | (0.004) | | |
| Large Firm | | | | -0.667 | |
| | | | | (0.467) | |
| Large Firm×Foreign Leniency | | | | 4.012* | |
| | | | | (2.304) | |
| High %Private | | | | | 0.636 |
| | | | | | (0.661) |
| High %Private×Foreign Leniency | | | | | -3.144 |
| | | | | | (3.934) |
| Firm & Year FE | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 9,713 | 9,279 | 9,516 | 9,713 | 9,713 |
| Observations | 0.675 | 0.679 | 0.674 | 0.675 | 0.674 |

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## Table 5: Alternative Identification Strategies

The table presents results from the OLS regression relating redaction of information in material contracts and product-market-related disclosuring 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 it is *%Product Conference Calls* in column (5). 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 Column (2), we redefine *Binary Foreign Leniency* by anticipating adoption year by four years before the actual adoption. In Column (3), *Binary Foreign Leniency* is redefined by replacing the main country in terms of imports with the least important country in terms of the imports. In columns (4) and (5), *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 in, respectively, three years before, two years before, one year before, the year, 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) |
| Binary Foreign Leniency | -0.336** | | | | |
| | (0.136) | | | | |
| Binary Foreign Leniency (T-4) | | 0.233 | | | |
| | | (0.273) | | | |
| Binary Foreign Leniency(Least Exposed) | | | 0.118 | | |
| | | | (0.077) | | |
| Binary Foreign Leniency (T-3) | | | | -0.034 | -0.174 |
| | | | | (0.149) | (1.078) |
| Binary Foreign Leniency (T-2) | | | | -0.366 | 1.002 |
| | | | | (0.253) | (1.129) |
| Binary Foreign Leniency (T-1) | | | | 0.099 | 1.933 |
| | | | | (0.203) | (1.224) |
| Binary Foreign Leniency (T) | | | | -0.292** | 2.211* |
| | | | | (0.143) | (1.188) |
| Binary Foreign Leniency (T+1) | | | | -0.190 | 1.908 |
| | | | | (0.183) | (1.376) |
| Binary Foreign Leniency (T+2) | | | | -0.550*** | 2.554* |
| | | | | (0.076) | (1.377) |
| Binary Foreign Leniency (T+3) | | | | -0.492*** | 2.875** |
| | | | | (0.157) | (1.372) |
| Binary Foreign Leniency (4+) | | | | -0.448** | 3.269** |
| | | | | (0.200) | (1.457) |
| Firm FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.618 | 0.600 | 0.600 | 0.624 | 0.675 |
| Observations | 414 | 414 | 414 | 414 | 9,713 |

### Table 6: Public Disclosure and Firm Performance

The table presents results from the OLS regression 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 7: Coordination of Public Disclosure

The table presents results from the OLS regression relating peer effects of public disclosure to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. In Panel A, the dependent variable is *%Product Conference Calls*. *Peer Disclosure* is the mean of *%Product Conference Calls* excluding the firm itself. *High Exposure to Foreign Leniency* is a binary variable that equals one if the collusion costs fall in the highest quartile of the sample distribution. Panel B presents results from the OLS regression relating financial statement comparability to the exposure to foreign leniency laws for Compustat firms incorporated in the U.S. over 1994-2012. The dependent variable is *Coordination*. The sample period in columns (1) and (2) is from 1994 to 2012, and the sample period in columns (3) and (4) is from from 2002 to 2012. 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.

### Panel A: Peer Disclosure

| | *%Product Conference Calls* | |
| --- | --- | --- |
| | (1) | (2) |
| Peer Disclosure | 0.179 | 0.108 |
| | (0.178) | (0.142) |
| High Exposure to Foreign Leniency | | -1.249 |
| | | (0.826) |
| Peer Disclosure×High Exposure to Foreign Leniency | | 0.130** |
| | | (0.051) |
| Lagged ROA | 0.097 | 0.075 |
| | (0.108) | (0.115) |
| Lagged Size | -0.099 | -0.083 |
| | (0.381) | (0.373) |
| HHI | -2.235 | -3.382 |
| | (2.834) | (2.900) |
| Import Penetration | 0.117 | 0.450 |
| | (1.165) | (1.119) |
| | | |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |
| Adjusted R-squared | 0.674 | 0.674 |
| Observations | 9,704 | 9,704 |

## Panel B: Financial Statement Comparability

| | *Comparability* | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Foreign Leniency | 2.893* | 3.644** | 8.610*** | 9.381*** |
| | (1.568) | (1.566) | (1.649) | (1.339) |
| Lagged ROA | | 1.089*** | | 0.966*** |
| | | (0.291) | | (0.308) |
| Lagged Size | | 0.476*** | | 0.627*** |
| | | (0.034) | | (0.066) |
| HHI | | -1.248 | | -2.345 |
| | | (3.295) | | (3.124) |
| Import Penetration | | 0.384 | | 1.060 |
| | | (0.406) | | (0.910) |
| | | | | |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.589 | 0.618 | 0.654 | 0.677 |
| Observations | 16,648 | 16,648 | 8,954 | 8,954 |

## Table 8: Foreign Leniency Law and Competition Disclosure

This table presents results from the OLS regressions relating discussion on competition to the exposure to foreign leniency laws and to the probability of being investigated by antitrust authorities for U.S. Compustat firms over 1994-2012. The dependent variable is *%Competition* in columns (1) and (2) and *Competition Noise* in columns (3) and (4). All columns report results controlling for firm- and year-fixed effects. Variable definitions appear in Appendix A. 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.

| | *%Competition* | | *Competition Noise* | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Foreign Leniency | -0.361** | -0.367** | -0.607*** | -0.566** |
| | (0.128) | (0.135) | (0.194) | (0.203) |
| Lagged ROA | | 0.027* | | -0.005 |
| | | (0.015) | | (0.007) |
| Lagged Size | | 0.000 | | 0.021*** |
| | | (0.009) | | (0.005) |
| HHI | | 0.078 | | -0.240 |
| | | (0.231) | | (0.339) |
| Import Penetration | | 0.052 | | -0.059 |
| | | (0.057) | | (0.097) |
| | | | | |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.501 | 0.501 | 0.308 | 0.309 |
| Observations | 23,981 | 23,981 | 20,139 | 20,139 |

**Figure 1:** *Redacted Contracts* across Years

We plot *Foreign Leniency* across industries for the sample period.
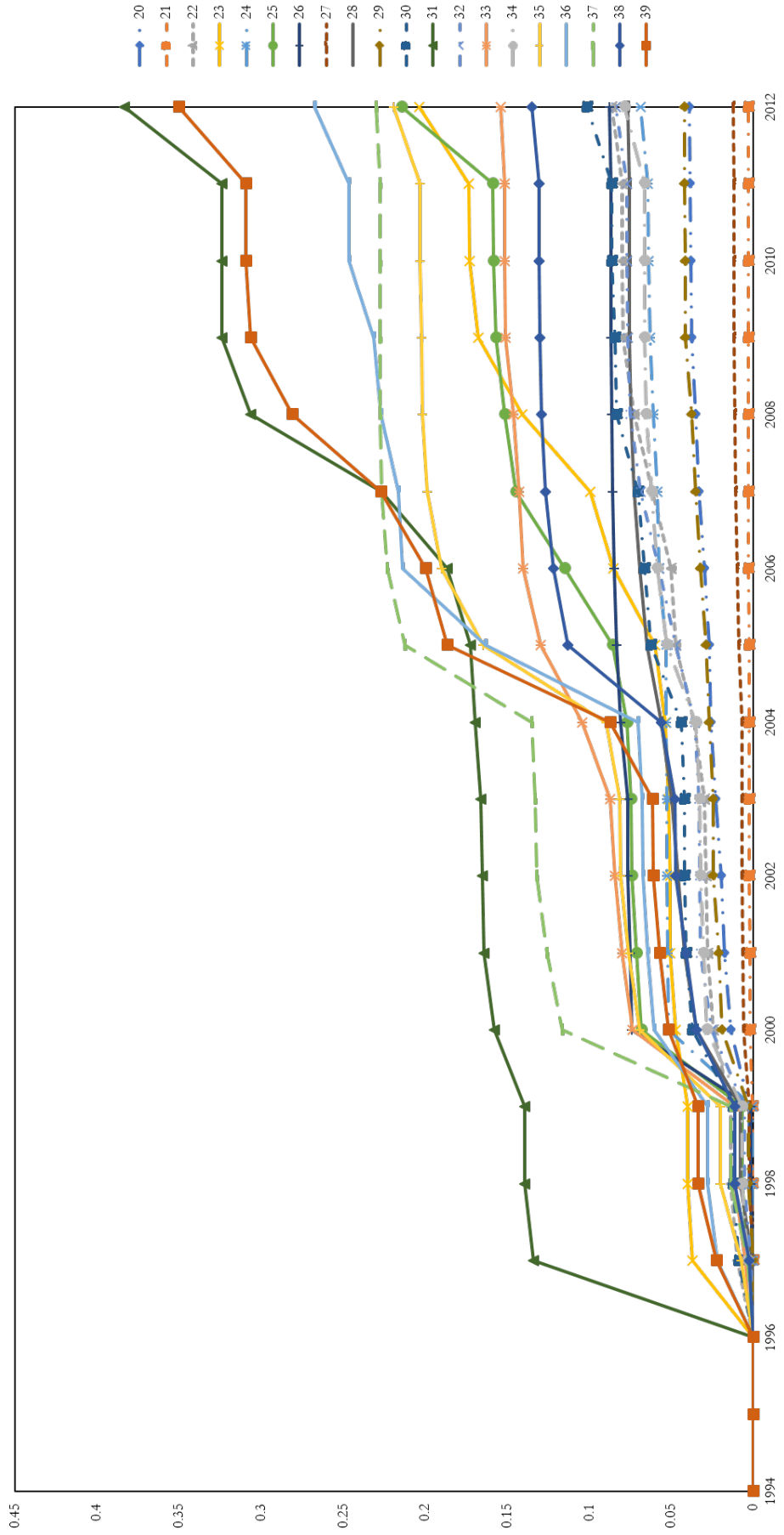
**Figure 2: Conference Call Disclosure and Profit Margins Around Leniency Laws**

We plot the average *Profit Margins* for the period of 2 years before to 3 years after the leniency law passed in the country that is a major trading partner of the industry. The solid line presents the firms with increasing of product-market-related disclosure during conference calls, whereas the dashed line presents the firms with non-increasing product-market-related disclosure during conference calls over the period of one years after the leniency law passed in the country that is a major trading partner of the industry. The table presents the averages and the 10% confidence intervals.
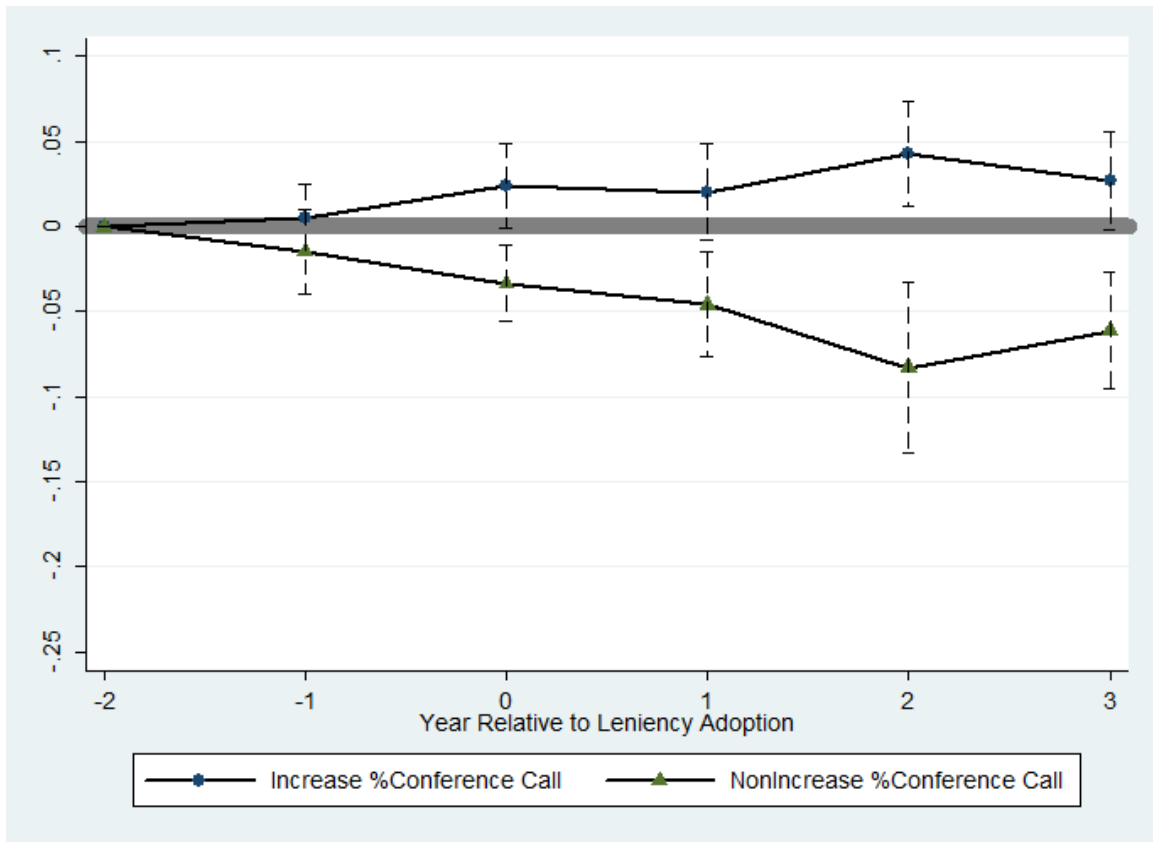
**Appendix A: Variable Definitions**

| 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* |
| Adj. Foreign Leniency | The weighted average of the passage of laws in all other countries, where the weight is equal to the share of the three-digit SIC industry's imports from a particular country, minus 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* |
| $\sum_k (w_{SIC3} - w_{SIC2}) L_{kt}$ | The weighted average of the passage of laws in all other countries, where the weight is equal to the share of the three-digit SIC industry's imports (exports) from a country minus the share of the two-digit SIC industry's imports (exports) from (to) the 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 judicial system is larger than the sample median. | *Cartel Regulation 2013*, *Schott's Data Library* La Porta et al. (1998) |
| 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) |
| %Competition | The ratio of competition-related words (*competition, competitor, competitive, compete, competing*) to the total number of words in the 10-K. | *SEC Edgar* |
| Competition Noise | A binary variable that equals one if the maximum value of the proportion of competition-related words in each paragraph of the MD&A section of 10-K filing is more than 3%. | *SEC Edgar* |
| 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 Contracts | The ratio of sales contracts that redact information to the total number of sales contracts the firm files with the SEC during the year. | *SEC Edgar* |
| %Product | The ratio of product-market-related words divided to the total number of words in the CEO / CFO presentation during earnings conference calls. The list of words includes *price, pricing, priced, discount, product, service, offering, offer, customers* and *client*. | *StreetEvents* |
| Conference Calls | | |
| Comparability | The mean value of accounting comparability score between the firm and all of its industry peers. | De Franco et al. 2011 |
| 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* |

| Variable | Definition | Data Source |
|---|---|---|
| Redacted Price | A binary variable that equals one if the firm files a material sales contract that explicitly specifies product price but request 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 Duration | A binary variable that equals one if the firm files a material sales contract that explicitly specifies contract duration but requests confidential treatment of the contract duration in the contract. | SEC Edgar |
| Redacted Purchase Contracts | A binary variable that equals one if the firm files a material purchase contracts (the firm is the customer of the agreement) during the year and requests confidential treatment upon the contract duration in the contract. | SEC Edgar |
| New Clients | The logarithm of one plus the number of new customer announcements in corporate press releases during the year. | CapitalIQ Key Development Data |
| 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 |
| NAICS PPI | The producer price index at the NAICS industry level, scaled by 100. | Bureau of Labor Statistics |
| Bid-Ask Spread | The value-weighted average of all firms' annual average bid-ask spread in the same two-digit SIC industry, with weight relative to the market capitalization at the beginning of the year. A firm's bid-ask spread is defined as the absolute value of spread between bid and ask. | CRSP |
| Turnover | The value-weighted average of all firms' turnover in the same two-digit SIC industry, with weight relative to the market capitalization at the beginning of the year. A firm's turnover is defined as the trading volume scaled by the total number of shares outstanding. | CRSP |
| ROA | Operating earnings before extraordinary items scaled by lagged total assets. | Compustat |
| Size | The logarithm of total assets. | Compustat |
| Growth Industry | A binary variable that equals one if the sales growth at the industry level falls in the highest quartile of the sample distribution. | Compustat |
| Heterogeneity | 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) |
| HHI Census | The four-digit NAICS census HHI ratio. | U.S. Census Bureau |
| Large Firm | A binary variable that equals one if the firm size falls in the highest quartile of the sample distribution. | Compustat |
| High %Private | 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. | U.S. Census Bureau |
| High Exposure to Foreign Leniency | A binary variable that equals one if the collusion costs are higher than the sample median. | Cartel Regulation 2013, Schott's Data Library |
| 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 |

# Internet Appendix (Not for Publication)

## Table A1: Types of Redacted Information

This table presents results from the OLS regression 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), *Redacted Quantity* in columns (3) and (4), and *Redacted Duration* in columns (5) and (6). 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. Columns (5) and (6) are based on contracts that explicitly specify the contract duration and either disclose or redact the contract duration. Variable definitions appear in Appendix A. 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.

|  | Redacted Price | | Redacted Quantity | | Redacted Duration | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Foreign Leniency | -4.787*** | -4.419*** | -2.920** | -2.274* | -2.201** | -1.753* |
|  | (1.132) | (0.903) | (1.186) | (1.034) | (0.814) | (0.871) |
| Lagged ROA |  | -0.196*** |  | -0.011 |  | 0.034 |
|  |  | (0.035) |  | (0.087) |  | (0.031) |
| Lagged Size |  | 0.009 |  | -0.000 |  | 0.085*** |
|  |  | (0.035) |  | (0.125) |  | (0.027) |
| HHI |  | -3.564** |  | 3.361 |  | -2.830 |
|  |  | (1.450) |  | (1.972) |  | (1.746) |
| Import Penetration |  | -0.551 |  | 1.854** |  | 0.846 |
|  |  | (0.844) |  | (0.686) |  | (0.643) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.59 | 0.609 | 0.623 | 0.621 | 0.087 | 0.092 |
| Observations | 320 | 320 | 307 | 307 | 414 | 414 |

## Table A2: 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 it is *%Redacted Purchase Contracts* 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 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 R2 | 0.515 | 0.513 | 0.516 | 0.506 |
| Number of observations | 302 | 302 | 302 | 302 |

## Table A3: 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 cases and VALASSIS Cases. In columns (5) and (6), we construct a binary variable (*Quote Competitor*) that equals one if the firm mention any of its competitors during conference calls, and zero otherwise. The list of competitors is obtained from Factset Revere relationships databse over 2003 to 2012. Since the Revere relationships database starts from April 2003, we exclude conference calls that were initiated in or before 2003. In Panel B, the dependent variable is *%Product Conference Calls*. *New Clients* is the logarithm of the number of clients announced by the firm during the year, and *Lagged New Clients* is the logarithm of the number of clients announced by the firm during the previous year. Variable definitions appear in Appendix A. 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 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Foreign Leniency | 9.396* | 10.274* | 13.439*** | 10.977** | 0.479** | 0.336** |
|  | (5.042) | (5.459) | (4.597) | (4.504) | (0.178) | (0.139) |
| Lagged ROA |  | 0.068 |  | -0.245 |  | 0.056*** |
|  |  | (0.124) |  | (0.217) |  | (0.015) |
| Lagged Size |  | 0.001 |  | 0.281 |  | -0.005 |
|  |  | (0.358) |  | (0.173) |  | (0.016) |
| HHI |  | -4.696 |  | 14.660** |  | 0.625*** |
|  |  | (3.369) |  | (5.699) |  | (0.176) |
| Import Penetration |  | 0.181 |  | -3.270** |  | 0.550 |
|  |  | (0.806) |  | (1.542) |  | (0.364) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R2 | 0.659 | 0.659 | 0.500 | 0.501 | 0.446 | 0.448 |
| Number of observations | 9,713 | 9,713 | 9,713 | 9,713 | 7,795 | 7,795 |

Panel B: New Clients and Disclosure during Conference Calls

| | %Product Conference Calls | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Foreign Leniency | 10.693** | 11.878** | 10.557** | 11.722** |
| | (4.822) | (5.128) | (4.808) | (5.127) |
| New Clients | 0.060 | 0.066 | | |
| | (0.152) | (0.144) | | |
| Lagged New Clients | | | 0.160* | 0.164* |
| | | | (0.092) | (0.083) |
| Lagged ROA | | 0.075 | | 0.069 |
| | | (0.120) | | (0.119) |
| Lagged Size | | -0.058 | | -0.070 |
| | | (0.374) | | (0.376) |
| HHI | | -6.700* | | -6.700* |
| | | (3.343) | | (3.329) |
| Import Penetration | | 0.182 | | 0.010 |
| | | (1.136) | | (1.154) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R2 | 0.674 | 0.674 | 0.674 | 0.675 |
| Number of observations | 9,713 | 9,713 | 9,713 | 9,713 |

## Table A4: Further Robustness Tests

This table presents results from the OLS regression 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 Contracts* across all panels. In Panel A, we repeat the analysis in Table 3 using various alternative weights to estimate industry-level exposures to foreign leniency laws. *Foreign Leniency* in columns (1) to (4) 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 Panel B, we repeat the analysis in Table 3 using various refinements of *Foreign Leniency* to control for industry-level trends. *Adj. Foreign Leniency* is calculated using *Foreign Leniency* estimated based on three-digit weights minus *Foreign Leniency* estimated based on two-digit weights. $\sum_k (w_{SIC3} - w_{SIC2}) L_{kt}$ is an alternative finer industry-adjusted measure, estimated by replacing two-digit SIC industry weights in section 3.2 with three-digit SIC weights minus two-digit SIC weights. The weights are based on the imports from any other countries in columns (1) and (2), and are based on the exports to any other countries in columns (3) and (4). In Panel C, 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 (La Porta et al., 1998) 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. Variable definitions appear in Appendix A. 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: Alternative Weighting Schemes of Foreign Leniency

| | Redacted Contracts | | | |
|---|---|---|---|---|
| | 3-digit SIC, Import (1) | 2-digit SIC, Export (2) | 3-digit SIC, Export (3) | Final Goods (4) |
| Foreign Leniency | -3.134*** | -7.086** | -3.590*** | -2.936* |
| | (0.575) | (3.102) | (1.130) | (1.383) |
| Lagged ROA | -0.200*** | -0.207*** | -0.205*** | -0.213*** |
| | (0.054) | (0.060) | (0.053) | (0.055) |
| Lagged Size | 0.033 | 0.044 | 0.038 | 0.031 |
| | (0.034) | (0.039) | (0.032) | (0.047) |
| HHI | -3.132 | -4.811** | -3.948* | -4.698** |
| | (2.456) | (2.040) | (2.124) | (1.967) |
| Import Penetration | 0.142 | 0.280 | 0.425 | -0.068 |
| | (0.689) | (0.777) | (0.767) | (0.944) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.622 | 0.600 | 0.605 | 0.602 |
| Observations | 414 | 414 | 414 | 414 |

## Panel B: Industry Trends

| | Redacted Contracts | | | |
|---|---|---|---|---|
| | Import-based Weighting | | Export-based Weighting | |
| | (1) | (2) | (3) | (4) |
| Adj. Foreign Leniency | -5.218*** | | -4.773** | |
| | (0.915) | | (1.823) | |
| $\Sigma_k(\omega_{SIC3} - \omega_{SIC2})L_{kt}$ | | -5.218*** | | -4.773** |
| | | (0.915) | | (1.823) |
| Lagged ROA | -0.201*** | -0.201*** | -0.206*** | -0.206*** |
| | (0.054) | (0.054) | (0.052) | (0.052) |
| Lagged Size | 0.035 | 0.035 | 0.038 | 0.038 |
| | (0.036) | (0.036) | (0.033) | (0.033) |
| HHI | -3.471 | -3.471 | -3.970* | -3.970* |
| | (2.103) | (2.103) | (2.139) | (2.139) |
| Import Penetration | 0.558 | 0.558 | 0.370 | 0.370 |
| | (1.047) | (1.047) | (0.768) | (0.768) |
| | | | | |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.613 | 0.613 | 0.604 | 0.604 |
| Observations | 414 | 414 | 414 | 414 |

## Panel C: Enforcement and Rule of Law

|  | Enforcement | | Rule of Law | |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
| 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) |
| Lagged ROA |  | -0.205*** | 0.039 | 0.039 |
|  |  | (0.058) | (0.040) | (0.036) |
| Lagged Size |  | 0.039 | -0.200*** | -0.204*** |
|  |  | (0.040) | (0.058) | (0.055) |
| HHI |  | -4.456** | -5.458** | -4.265* |
|  |  | (1.932) | (2.400) | (2.098) |
| Import Penetration |  | -0.102 | -0.023 | -0.234 |
|  |  | (0.758) | (1.029) | (0.779) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.586 | 0.612 | 0.594 | 0.609 |
| Observations | 414 | 414 | 414 | 414 |

## Table A5: Stock Liquidity

This table presents results from the OLS regressions relating industry-level stock market liquidity measures to the exposure to foreign leniency laws over 1994-2012. The tests are based on a two-digit SIC industry-year panel data. The dependent variable is industry-level *Bid-Ask Spread* or *Turnover* as indicated in the first row of the table. 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- and year-fixed effects. Robust standard errors are displayed in parentheses. *, ** and *** indicate significance levels of 10%, 5%, and 1%, respectively.

| | Bid-Ask Spread | Turnover | Bid-Ask Spread | Turnover |
| | (At time t) | | (At time t+1) | |
| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Foreign Leniency | -1.214*** | 0.089** | -1.069*** | 0.044 |
| | (0.382) | (0.042) | (0.402) | (0.047) |
| | | | | |
| Industry FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.846 | 0.852 | 0.844 | 0.847 |
| Observations | 380 | 380 | 360 | 360 |

## Table A6: 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 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.

| | 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 R2 | 0.238 | 0.240 | 0.284 | 0.287 | 0.153 | 0.154 |
| Number of observations | 11,670 | 11,670 | 11,670 | 11,670 | 11,670 | 11,670 |

**Table A7: Competition Disclosure and Investigation by Antitrust Authorities**

This table presents results from the OLS regressions relating discussion on competition to the exposure to foreign leniency laws and to the probability of being investigated by antitrust authorities for U.S. Compustat firms over 1994-2012. 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 %Competition* is the lagged-one-period of the median of *%Competition* for each industry-year. The control variables include industry-level *Size*, *ROA* and *Leverage*. All the columns report results controlling for industry- and year-fixed effects. Variable definitions appear in Appendix A. 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 %Competition    | 0.175*   | 0.266**  | 0.450*   | 0.636**  |
|                        | (0.091)  | (0.098)  | (0.220)  | (0.238)  |
| Foreign Leniency       |          | 2.220*** |          | 4.580*** |
|                        |          | (0.662)  |          | (1.337)  |
| Industry FE            | Yes      | Yes      | Yes      | Yes      |
| Year FE                | Yes      | Yes      | Yes      | Yes      |
| Adjusted R-squared     | 0.232    | 0.264    | 0.182    | 0.208    |
| Observations           | 339      | 339      | 339      | 339      |

**Figure A1: *Redacted Contracts* across Years**

We plot the average *Redacted Contracts* across years for the sample period.
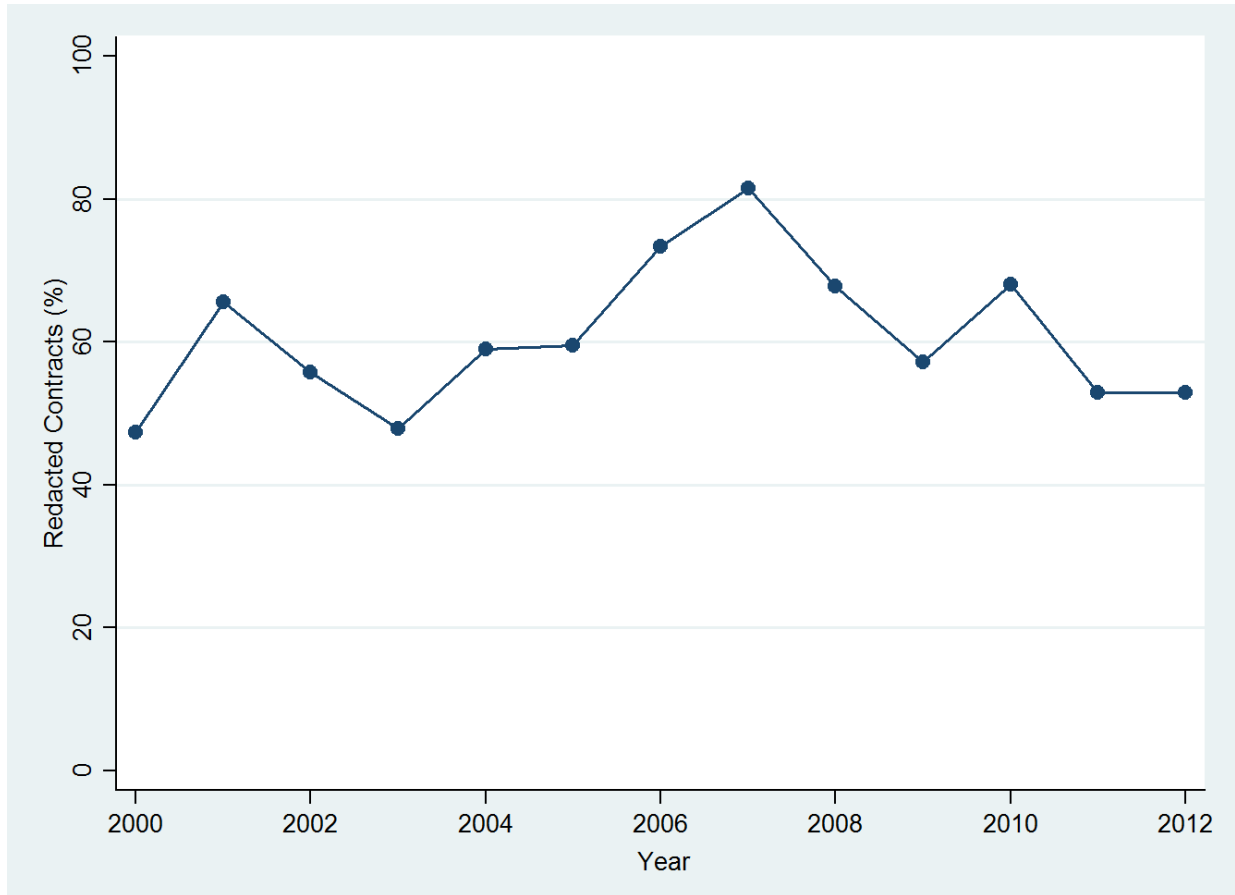
## Appendix A1: Examples of Sales Contracts with Redacted and Non-redacted Information

**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.

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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 *

70

**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.

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

<div align="right">

**Exhibit 10.ii.oo**

</div>

## 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:

$< Document >$
$< TYPE > EX - 10(.)XXX$
$\ldots$
$< TITLE >$ 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 10-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 agreement, and transactions that contain only a trans-

fer of license, properties, notes or account 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 |