

# Motivating Collusion\*

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October 2020

## Abstract

We examine how some features of executive compensation can be designed to motivate product market collusion. While relative performance evaluation typically encourages executives to outperform industry rivals, it can be altered strategically to soften competition. Meanwhile, higher share of equity compensation establishes long-term incentives that foster collusive arrangements. Our identification comes from the 2013 decision to close the regional offices of the Department of Justice, which oversees antitrust enforcement. We find that firms located nearby the closed regional offices increased their gross margins. At the same time, we observe that the sensitivity of executive pay to local rival performance became more positive for these firms and they also granted more equity compensation to the CEOs. Our results imply that in the absence of antitrust enforcement certain features of executive compensation can motivate collusion and reduce consumer welfare.

**Keywords:** Product Market Collusion; Corporate Governance; Managerial Compensation

**JEL Classification:** G34, G38, L22

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# 1 Introduction

Firm shareholders adopt various corporate governance mechanisms to motivate the management to pursue strategies that increase firm value. As posited by the industrial organization literature, entering into the collusive arrangements with product market peers might be profitable to the firm’s shareholders, depending on their discount factors, market conditions, and antitrust enforcement.<sup>1</sup> However, even when shareholders prefer the firm to cooperate with other firms, the management likely has different intrinsic incentives. In this case, a compensation contract can be used to align incentives and motivate collusion.

Several factors can drive a wedge between the management and the shareholders in their preference over whether the firm should engage in product market collusion. For instance, the executives in the U.S. are exposed to the criminal charges if the firm is convicted of the explicit horizontal agreement conspiracies such as price fixing, the bid rigging, or the geographic market allocation.<sup>2</sup> Moreover, even absent antitrust enforcement, managers have career considerations and reputational concerns that further discourage the collusion with other market participants. Both of these factors suggest that managers have larger critical discount factors above which they prefer to enter into collusion than anonymous marginal investors do.

In this paper, we study how CEO<sup>3</sup> compensation structures adapt to the changes of antitrust enforcement. After antitrust enforcement weakens, shareholders may find the profits from engaging in collusion larger than the expected costs of legal sanctions. On the other

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<sup>1</sup>Recent and ongoing U.S. antitrust investigations span different industries. For instance, the top executives of U.S. poultry firms were indicted for conspiracy to fix prices for the chicken sold to grocers and restaurants from 2012 to 2017; the former CEO of Bumble Bee Foods LLC was sentenced to three years in jail for conspiring to fix canned tuna prices; civil suits accused the four largest U.S. rail carriers of price-fixing conspiracy; Florida Cancer Specialists Research Institute paid a maximum statutory fine of \$100m for agreeing not to compete with an oncology group in Collier, Lee, and Charlotte counties in Florida.

<sup>2</sup>Such criminal antitrust enforcement against individuals has been rising over time, see, e.g., [Kades \(2019\)](#). Although firms often indemnify their employees for the monetary fines, the financial reimbursement may not be as effective in the case of imprisonment, which imposes a large personal cost.

<sup>3</sup>We focus on the compensation of CEOs. As discussed by [Harrington \(2006\)](#), cartel decisions are typically taken by the top management to ensure the coordination at different layers of the organization (e.g., avoid “overzealous sales representatives” who might share information about the cartel with the firm’s customers). Moreover, top executives’ incentives are likely to trickle down to the incentives of middle management.

hand, managers might still prefer not to engage in collusion, given reputational concerns and the remaining threats of criminal enforcement. In this case, the shareholders can choose to adopt certain features of compensation packages that discourage competition and implicitly encourage the pursuit of collusive strategies. We thus argue that antitrust enforcement can influence the structures of managerial compensation.

We focus on the U.S. firms over 2008-2017 and look at a recent regulatory change that weakened competition law enforcement for some firms in the U.S. The particular event that we study is the decision in 2013 to close down four regional offices of Department of Justice (DoJ) Antitrust Division: Cleveland, Dallas, Atlanta, and Philadelphia. Among other responsibilities, these regional offices were in charge of sourcing information on potential conspiracies in the local product markets. In 2013, the decision was made to save costs and focus on larger firms in the economy by transferring the casework of these offices to the DoJ main headquarters in Washington, DC and the remaining regional offices.

We argue that this regulatory decision has contributed to a decrease in the monitoring of collusion in those local markets that were nearby closed DoJ offices but further away from the remaining DoJ offices. In turn, firms that were operating in these markets experienced a sudden decrease in the probability of being detected if they engaged in collusive arrangement with the local rivals. We study whether this has led to changes in executive compensation schemes towards the features that incentivize less aggressive competition.

Drawing from the contracting theory, two types of incentive schemes stand out as likely to have an influence on the managerial incentives to enter collusive arrangements. First, CEO compensation is often linked to the performance of product market peers. When a CEO is rewarded based on outperforming these peers, the CEO's pay is negatively associated with their performance. However, when it benefits the shareholders to soften product market competition, the need to disincentivize competition tilts the optimal contract toward more positive loading on the peer performance ([Aggarwal and Samwick, 1999a](#)). As weaker antitrust enforcement makes collusion more appealing, shareholders can encourage softer

competition through establishing a positive link between CEO pay and peer performance.

We find strong evidence supporting this prediction by testing CEO pay sensitivity to the stock returns of own firm and local peer firms. Firms located nearby the closed regional DoJ offices started having more positive CEO pay sensitivity to the performance of local industry rivals. CEO pay sensitivity to local peers' performance increased by 0.02% for a firm whose distance to the covering field office increased by 100 miles. This effect is driven by the changes in cash bonus, which is the most flexible component of compensation that could quickly adapt to sudden changes in the contracting environment.<sup>4</sup>

The second aspect of CEO incentives we look at is the level of equity compensation. Awarding managers with stocks and options might not only align them with the shareholders but also lengthen their incentive horizon and stabilize collusive arrangements. As argued by [Spagnolo \(2000\)](#), although cartel is unstable in nature, a stock-holding manager may have low incentives to deviate from the cartel agreement, since stock prices reflect the future losses from a punishment phase, thus limiting the gains from the deviation.

Consistent with this prediction, we find that the percentage of equity and option compensation increased significantly for the affected firms after 2013. The stock awards to CEO increased by 0.53 basis points of the market capitalization for a firm with local peers when the distance to new field office increased by 100 miles compared to the firms for which the covering field offices did not change or which did not have any local peers.

We further explore the heterogeneous impact on CEO compensation induced by the regulatory reform. We first show that our results are stronger among the firms that have better board governance. This suggests that the observed compensation changes are likely to be motivated by shareholder value maximization rather than influenced by manager entrenchment. We further find that the effects are stronger for the firms with more concentrated local operations, which arguably are more affected by the drop in local market monitoring

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<sup>4</sup>Boards of directors have the discretion to implement and quickly adjust CEO pay according to the realizations of own firm and peer firm performance, which is often referred to as *implicit* relative performance evaluation. They can also make *explicit* changes in the performance evaluation provisions listed in the incentive plans. We primarily find changes in implicit rather than explicit relative performance evaluation.

from the antitrust authorities. Moreover, our results are more profound for firms in the concentrated industries, where collusion is more likely to take place since it is more feasible to coordinate and monitor a limited number of players. In addition, we show that the results are stronger among the CEOs approaching retirement age, who absent equity incentives are likely to have a shorter-term focus and thus different preferences from shareholders. Finally, we find the effects are stronger for the firms in more flexible executive labor markets, where CEOs presumably have higher reputation concerns.

Importantly, managerial compensation arrangements at the time of the policy reform are related to the changes in firms' operating performance that we capture by the gross profit margins. We find that the margins improved for the firms that had granted their managers stocks and options, and for the firms that had not rewarded managers based on the explicit relative performance evaluation. In addition, these firms saw a rise in Tobin's Q and their stock returns started comoving more with the returns of their local product market peers, which is indicative of correlated operating performance. These trends are consistent with anti-competitive effects.

In this paper, we paint a grim view that shareholders might be interested in setting up the incentives to induce managers to pursue collusive strategies with their peers, and thus hurt consumer welfare. When doing so, shareholders as a group, or board members who represent them, are not giving direct instructions to collude and thus have plausible deniability that the incentive schemes do not reflect this particular product market strategy to maximize profits. In this way, they are not subject to the personal antitrust liability.<sup>5</sup> Our findings raise a public policy dilemma. On the one hand, corporate governance standards require the alignment between the incentives of investors and managers. On the other hand, if long-term investor behavior facilitates collusion, policies that care about consumer welfare might

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<sup>5</sup>Note that major shareholders might be criminally liable in the antitrust probes if they explicitly instruct CEOs to engage in the collusive schemes. A well-known case is an investigation into the alleged price-fixing between Sotheby's and Christie's where Sotheby's CEO Diana Brooks implicated Sotheby's shareholder A. Alfred Taubman. He was fined \$7.5m and imprisoned for ten months. As cited by [Bloomfield et al. \(2020\)](#), the data from the European Commission suggests that in 35% of cases large shareholders know about their firms' cartel membership.

choose to encourage manager short-termism and exacerbate the principal-agent problem if that has competitive effects.

Our paper contributes to the literature on how incentive structures affect the strategic interaction of firms in the product market. Theory literature has discussed that the optimal incentive contract depends on both the assumptions on competition environment and the restrictions on contracting space. For instance, [Fershtman and Judd \(1987\)](#) and [Sklivas \(1987\)](#) show that providing powerful incentives with a bonus scheme is optimal to achieve strategic advantages, while [Reitman \(1993\)](#) argues that stock options provide threats to rivals and thus can lead a higher profit for shareholders. In a dynamic setting, [Spagnolo \(2000\)](#) shows that stock-based compensation helps to sustain collusion while deferred compensation even further increases the regions of collusive equilibria. Moreover, [Spagnolo \(2005\)](#) argues that compensation schemes with income-smoothing and capped bonus plans facilitate product market collusion. Abstracting from the incentive issues, [Bernhardt and Chambers \(2006\)](#) suggest that collusion is more likely when under uncertain demand firms choose to share profits with employees rather than pay fixed wages.

We contribute by providing empirical evidence on how compensation design adapts to changing incentives in product markets. In particular, our paper makes a contribution by establishing empirical evidence on the evolution of compensation structures in response to an exogenous shock on antitrust enforcement. In this, our paper complements [Anton et al. \(2020\)](#) who show that incentives facilitated through CEOs' wealth-performance-sensitivity are weakened by common ownership that arguably favors less aggressive competition in the product markets.

In the studies on the convicted cartels, [González et al. \(2019\)](#) and [Bloomfield et al. \(2020\)](#) find that the compensation structures of executives differ for the convicted cartel firms as compared to the other firms. We instead focus on the changes in compensation structure around antitrust policy reforms that lower the costs of collusion.

Our paper is also closely related to the literature on relative performance evaluation.

The principal-agent theories (e.g., [Holmström \(1979\)](#), [Holmström \(1982\)](#), and [Nalebuff and Stiglitz \(1983\)](#)) suggest that managers should be rewarded based on their performance relative to that of their industry peers, which contains information on common shocks to performance that are outside of managers' control.<sup>6</sup> While relative performance evaluation has been shown to be an efficient and powerful form of incentives, it might also encourage over-aggressive competition. [Aggarwal and Samwick \(1999a\)](#) propose that when outputs are strategic complements, the need to soften product market competition generates the optimal contract that has a positive weight on both own and peers' performance. They also empirically find that sensitivity of pay to peer performance is increasing in the degree of industry competition. In light of these arguments, [Joh \(1999\)](#) shows that executive pay became positively related to the peer performance in Japan when the government discouraged excessive competition.

Our paper contributes to this literature by showing that motivating collusion, a specific form of weakening competition, shapes relative performance evaluation. By relying on a shock to antitrust enforcement, we are able to identify the impact of the strategic weakening of competition on the sensitivity of CEO pay to own-firm and peer-firm performance.

More broadly, we also relate to the literature on the corporate misconduct such as money laundering, bribery, or breach of environmental standards (e.g., [Agrawal et al. \(1999\)](#); [Zeume \(2017\)](#)). Most of such misconduct likely benefits shareholders as firm's profits, at least in the short term, are higher.<sup>7</sup> While some corporate governance implications of these types of corporate misconduct are similar to antitrust infringement, the features of executive compensation contracts that we study (i.e., relative performance compensation and equity compensation) particularly relate to the trade-offs in the product markets.

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<sup>6</sup>Despite the compelling theoretical prediction, empirical evidence that managerial pay is negatively correlated with peer performance is rather mixed, e.g., [Jensen and Murphy \(1990\)](#), [Gibbons and Murphy \(1990\)](#), [Antle and Smith \(1986\)](#), [Barro and Barro \(1990\)](#), [Janakiraman et al. \(1992\)](#), [Aggarwal and Samwick \(1999b\)](#), [Jayaraman et al. \(2018\)](#).

<sup>7</sup>That contrasts insider trading, disclosure irregularities and other managerial misconduct that executives perform at the expense of shareholders.

## 2 Data

We look at U.S. publicly listed firms over 2008-2017. Our main data source for CEO compensation is Execucomp. We extract information such as total compensation, the value of stock and option compensation awards, and CEO ownership. We obtain performance benchmarking data from Incentive Lab. We complement the compensation data with stock returns from CRSP and financial data from Compustat. We extract board characteristics from Boardex and define the product market peers based on [Hoberg and Phillips \(2016\)](#) database. The data of convicted cartel cases are obtained from [Connor \(2014\)](#).

The information on the field offices comes from the DoJ Antitrust Division. In particular, we get the case coverage of all field offices before and after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia).

[Table 1](#) reports descriptive statistics of our main variables that we discuss later after introducing our identification strategy.

## 3 Descriptive analysis

We start by looking at the convicted cartel cases. As argued before, the optimal contract for maintaining collusive arrangement is to reward managers not only for better performance of their own firms but also for that of the peer firms. We first examine whether CEO compensation becomes more positively related to the performance of cartel peers since the start of collusion. We obtain the information on U.S. cartel members and starting time from [Connor \(2014\)](#), and manually match them with stock return and CEO compensation data. We pair up the member firms in each cartel and construct a panel of cartel-pair-year observations. As shown in Panel A of [Table 2](#), we find that although CEO pay is negatively associated with cartel-peers' performance before collusion, the sensitivity has changed positively since the starting year of the cartels. The result is consistent after we control for the peer-firm or pair fixed effects. We also aggregate the stock returns of all the



cartel peers for every firm in each year and find a consistent result.

The negative sensitivity of CEO pay to peer performance before collusion could reflect the existence of relative performance evaluation, i.e., awarding managers for outperforming peer firms. Such negative sensitivity disappears after collusion starts, suggesting the removal of cartel peers from the compensation benchmark groups. We further investigate whether this is the case using the information on compensation peer groups in Incentive Lab data.

Panel B of [Table 2](#) shows the overlap between the peers who were convicted in the same collusion case and the peers in the compensation scheme. General compensation benchmark refers to the peer group companies that are picked to benchmark the overall compensation level for CEO and the other executives. [Faulkender and Yang \(2010\)](#) find that this compensation benchmark group appears to be comprised of highly paid peers that can be used to justify the general level of the CEO compensation. [Bizjak et al. \(2008\)](#) show that the general compensation group provides a benchmark for the overall pay level, which plays an important role in retaining valuable human capital. Accordingly, if collusion is expected to be profitable, firms may include those cartel peers as general compensation peers.

On the other hand, the relative performance evaluation benchmark refers to the peer firms whom the firm needs to outperform for the executives to be eligible for the relative performance awards. If the firm intends to collude in the product markets with the peer firms, such peer firms should not be included in the relative performance group, so that the executives do not have incentives to outperform them.

We manually name-match 416 firm-cartel-year observations from [Connor \(2014\)](#) to Incentive Lab database. By manual name matching, we also capture private firms and non-U.S. firms that might be included in the benchmark peer sets. [Table 2](#) shows that in 86 cases, i.e. 20.67%, at least one cartel peer is included in the compensation peer benchmark but in terms of relative performance benchmark, only 42 cartel cases, i.e. 10.1%, have at least one peer. This suggests that cartel peers overlap more with the benchmark firms in general compensation scheme than in relative performance evaluation scheme. If we consider the

fraction of the cartel peers appearing in the benchmark sets, the respective averages are 7.8% for general compensation benchmark and 3.7% for relative performance benchmark. The difference between the compensation benchmark and relative performance evaluation benchmark is statistically significant.

This finding is also consistent when instead of matching the firms in the actual period when cartel was active, we match in the entire period of sample. In this way we are able to match 497 cases, suggesting that in 81 cases ( $=497-416$ ) the relative performance evaluation benchmarks are not available during the years when cartel is active but they are available in the other years, which is consistent with firms having less explicit performance evaluation during the active cartel years.

When we check if the cartel peers as benchmark peers are mentioned including the years when the cartel was not active according to the antitrust cases, we see that in over half of the cases (252) at least one cartel peer is included in the compensation peer benchmark and 20.25% of peers are mentioned at least in some year. In terms of relative performance benchmark the numbers are lower and a quarter of cartel members (117) mention at least one of their peers and just 8.09% of peers are mentioned at least once.

## 4 Identification

Focusing only on the convicted cartel cases might be misleading as convicted cases might not be a representative sample of all collusive arrangements. In particular, firms might put more effort into retaining the most profitable collusive arrangements. Such cases might have fewer whistleblowers or leniency applicants who are often crucial in providing evidence for legal prosecution. Moreover, the starting time of cartel is unlikely to be exogenous to business environment, making it unclear whether the contracting changes are driven by motivating collusion or these correlated factors. We thus turn to describe our identification strategy that exploits a regulatory change that presumably made the collusion in some local markets

less costly.

In particular, we rely on the 2013 decision of DoJ that reduced firms' expected costs from antitrust investigation and thus changed their trade-off whether to engage in collusive arrangements. In 2013, DoJ closed down four of its seven regional offices (Atlanta, Cleveland, Dallas, and Philadelphia) that dealt with the antitrust enforcement. Some of the regional coverage was relocated to the other three offices (Chicago, New York, and San Francisco) but most of it was moved to Washington, DC. We argue that this event came purely from the budget cuts however, analysts considered that this made it harder for DoJ to police regional cases<sup>8</sup> and instead DoJ started focusing more on the big nation-wide cases.

The change in coverage affected 23 states and territories.<sup>9</sup> After the closure, three remaining field offices (Chicago, New York, and San Francisco) and two additional central offices (Washington Criminal I and II) took over the coverage of these states. [Figure 1](#) shows the number of antitrust case filings in the state courts where the original field offices were closed and the number of antitrust case filings in the unaffected states. We find that antitrust filings decreased sharply in the affected states since 2013, while there is no such trend in the unaffected states.<sup>10</sup> Moreover, we find that drop in antitrust filings is driven by the local cases where the defendants are concentrated in certain geographic area rather than distributed across the nation. In [Table 4](#), we present the average number and proportion of local antitrust cases filed in the affected and unaffected states. We find that in the affected states the ratio of local cases over non-local cases decreased from 0.4 before 2013 to 0.12 after 2013. On the contrary, in the unaffected states, the ratio remained at 0.3 both before

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<sup>8</sup>See, e.g., [https://www.cleveland.com/open/2012/01/cleveland\\_antitrust\\_office\\_sho.html](https://www.cleveland.com/open/2012/01/cleveland_antitrust_office_sho.html), where Cleveland mayor Frank Jackson is quoted saying that "Closing Cleveland's field office will (...) impair the Department of Justice's ability to pursue effective criminal enforcement of antitrust laws" while Assistant Attorney General Ronald Weich responded that DoJ "wants larger concentrations of lawyers in fewer locations so it can investigate more sophisticated bid-rigging and price fixing crimes."

<sup>9</sup>The change affected all cases from Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, New Mexico, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, West Virginia, and U.S. Virgin Islands. The change has also affected Eastern judicial district of Michigan and Southern New Jersey. See [Table 3](#) for the list of states covered by the field offices.

<sup>10</sup>This observation is in line with the call in [Bork \(1978\)](#), a seminal work in antitrust economics, to introduce more field offices.

and after 2013.

This event created a sudden decrease in antitrust enforcement in the local product markets. Since one of the duties for regional DoJ field offices is to source information on local market conspiracies, this regulatory change decreased the probability of detecting local market collusion among the firms for which the distance to their covering field office increased.<sup>11</sup> Our identification strategy is to examine the changes in CEO compensation practices around the event in a difference-in-differences setting.

We capture the exposure of a firm to this event by the change in distance ( $\Delta Distance$ ) from the firm's headquarters to the covering DoJ field office, using the geographic coordinates based on zip codes. The average change in distance is 188.6 miles for our sample firms, and 522.6 miles conditional on positive values.

In addition, we focus on the firms with local peers, since the regional DoJ offices mainly monitor competition in the local market, unlike interstate collusion that is less likely to be covered by the regional offices. We define local peers as the close rivals in the product market (with product similarity score within top 30% based on [Hoberg and Phillips \(2016\)](#)) and headquartered within 200 mile radius.<sup>12</sup> As shown in [Table 1](#), the mean (median) of number of local peers is 3 (1), while the mean (median) of the number of non-local peers is 16 (7). Panel B of [Table 1](#) shows the average number of local and non-local peers for firms in each industry.

Our *treated* group of firms is thus comprised of those firms that experienced an increase in distance<sup>13</sup> to the covering antitrust office and had local peer firms. The *control* group of firms is then comprised of those firms that did not experience an increase in distance or did not have local peer firms. [Figure 2](#) shows that the treated firms had higher gross margin after

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<sup>11</sup>In a similar context, banking literature has looked at whether the distance from the banks to the regulator, in particular, the change in distance to the regulator's closest field office, is related to the costs of monitoring and information frictions between regulators and banks. See, e.g., [Wilson and Veuger \(2017\)](#), [Lim et al. \(2017\)](#), [Ganduri \(2019\)](#), and [Gopalan et al. \(2019\)](#).

<sup>12</sup>Non-local peers are defined as the close rivals in product market (with product similarity score within top 30% based on [Hoberg and Phillips \(2016\)](#)) and headquartered outside 200 mile radius.

<sup>13</sup>In unreported tests we consider an increase of at least 100 miles as the cut-off to consider the firm as treated. The qualitative results do not change.

2013 relative to their comparable control firms, supporting our argument that the regional office closures likely encouraged less aggressive competition.

Before moving to the main analysis, we compare treated and control firms. [Table 5](#) shows that the differences between firms in treated and untreated groups. We also estimate a regression where the treated dummy is regressed on the firm characteristics such as total executive compensation, firm return, peer firm return, size, sales growth, tenure, shares owned by CEO, net stock acquired by CEO, percentage of options granted, and the ratio of realized and intrinsic value of options. We find that none of the variables significantly explain the treated dummy.

## 5 Empirical results

Our empirical analysis focuses on whether the DoJ policy change of closing regional offices has had an effect on the CEO compensation arrangements. Even with low antitrust enforcement, shareholder and managerial incentives could differ, among other reasons because managers have strong career and reputation concerns as well as shorter horizons because of eventual retirement. In such cases, managers may focus on shorter-term performance and prefer aggressive competition.

However, when shareholders' and managers' preferences differ, shareholders can tilt managerial incentives through certain types compensation. First, they could tie the CEO compensation more positively to the peer firm performance ([Aggarwal and Samwick, 1999a](#)). Second, they could increase the alignment of incentives by raising equity compensation ([Spagnolo, 2000](#)). In addition, firms might want to increase profit sharing to signal to peer firms their commitment to collusion ([Bernhardt and Chambers, 2006](#)).

We separately provide the results on the peer performance sensitivity and on equity compensation.

## 5.1 Peer-firm performance sensitivity

We first investigate whether the sensitivity of CEO pay to own-firm and peer-firm performance changes after the DoJ closed its regional offices in 2013. Theory literature discusses that rewarding CEOs based on their performance relative to that of peers can provide powerful incentives, since relative performance benchmarking filters out the common shocks to performance that are out of CEOs' control (e.g., [Holmström \(1982\)](#)). Empirical studies also provide supporting evidence that CEO pay is on average positively associated with own performance and negatively related to peer performance (e.g., [Jayaraman et al. \(2018\)](#)). On the other hand, some other studies point out that relative performance evaluation can encourage over-aggressive strategies in the product market competition, which may reduce profitability and shareholder value (e.g., [Aggarwal and Samwick \(1999a\)](#)).

After the closure of the regional DoJ offices, the expected profits of collusion have increased for the shareholders. If shareholders were interested to weaken product market competition, the firms should have reduced the use of relative performance evaluation, or even paid managers for better performance of the rival firms. In other words, CEO compensation should have become more positively related to peer-firm performance and relatively less positively related to own-firm performance. This should have been particularly relevant for local peers given that an important responsibility of the regional DoJ offices was to source information on the local market conspiracies and thus their closure could have increased collusion among the local firms.

One way to explore this would be to examine the benchmark peer groups, as we did in [Table 2](#), Panel B. However, the peer groups are not always completely and explicitly mentioned in firms' proxy statements. Only less than half of the firms report explicit relative performance evaluation provision at the beginning of 2013. If the treated firms do not report explicit relative benchmarking group, we would not be able to observe whether the firms remove the local peers from the benchmark group. Since a large part of the CEO compensation is in the form of discretionary awards ([De Angelis and Grinstein, 2015](#); [Ma,](#)

2020), firms can implement the strategic incentive schemes based on the subjective discretion of the board rather than commit to an explicit contract. We thus look at whether CEO pay of the treated firms became more positively sensitive to the performance of all local peer firms, irrespective of whether they were mentioned explicitly in the benchmark groups.

### 5.1.1 Baseline effect

We follow the empirical specification which has been widely used in studies on relative performance evaluation (e.g., Jayaraman et al. (2018), Albuquerque (2009), Gibbons and Murphy (1990)). We check whether CEO compensation is sensitive to the performance of own-firm stock returns and local peer-firm stock returns. Following the literature, we focus on the stock returns as the measure of the firm performance, not least since stock returns take into account all future returns to the shareholders from the collusive schemes.

In particular, we are interested if the sensitivity to the stock price performance has changed after the closure of DoJ offices. We thus estimate the following difference-in-differences specification:

$$\begin{aligned}
 \text{Ln}(\text{Compensation}) = & \beta_1 \times \Delta \text{Distance} \times \text{Post}_t \times \text{Ln}(\text{Return}_{i,t}) + \\
 & \beta_2 \times \Delta \text{Distance} \times \text{Post}_t \times \text{Ln}(\text{Local Peer Return}_{i,t}) + \\
 & \beta_3 \times \Delta \text{Distance}_i \times \text{Post}_t + \beta_4 \times \text{Ln}(\text{Return}_{i,t}) + \\
 & \beta_5 \times \text{Ln}(\text{Local Peer Return}_{i,t}) + X_{i,t} + \tau_t + \gamma_i + \epsilon_{i,t}
 \end{aligned} \tag{1}$$

$\text{Ln}(\text{Compensation})$  refers to the natural logarithm of total compensation or certain component of CEO compensation.  $\text{Post}_t$  refers to the post dummy which is equal to one for years on or after 2013.  $\Delta \text{Distance}_i$  refers to the increase in geographical distance between headquarter of a firm and a governing antitrust field office after the event in 100-mile unit.<sup>14</sup>

This variable is zero for the firms for which covering field offices does not change or the

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<sup>14</sup>All our results are consistent if we use log transformation for the  $\Delta \text{Distance}_i$  variable.

distance to new field office is shorter than before.<sup>15</sup>

Following the literature (e.g., Jayaraman et al. (2018)), we measure firm stock performance using the natural logarithm of one plus annual stock return.  $Return_{i,t}$  refers to firm  $i$ 's own stock market return in year  $t$ , and  $Local Peer Return_{i,t}$  refers to average stock market return of local peers, i.e., the firms with Hoberg-Phillips product similarity score within top 30% of firm  $i$  and headquartered within 200 miles from firm  $i$ .<sup>16</sup>  $X_{i,t}$  refers to the control variables, including all individual components of interaction terms, the indicator variable of having local peers ( $Local Market_{i,t}$ ), its interaction terms with  $Post_t$  and  $\Delta Distance_i$ , and the firm and CEO characteristics including firm size, sales growth, and CEO tenure.  $\tau_t$  and  $\gamma_i$  refer to the year- and firm-fixed effects. Standard errors are clustered at the state level.

In this specification, the estimates of  $\beta_1$  and  $\beta_2$  reflect the treatment effects on the sensitivity of CEO pay to own-firm performance and that to peer-firm performance, and are of our main interest. The closure of regional offices makes it more appealing to collude with local peer firms. Since it benefits shareholders to discourage managers from outperforming the colluding peers, we expect CEO pay to become less negatively (or more positively) sensitive to peer performance. In the relative terms, their pay should become less positively sensitive to own performance. In other words,  $\beta_2$  is expected to be positive while  $\beta_1$  to be negative.

Table 6 shows the estimation results. We start with total compensation in columns (1)-(2). As expected, the coefficient of  $\beta_1$  is negative and significant at 1% level. In economic terms, the treatment effect on the pay-to-own-return sensitivity is -0.02%, namely the sensitivity of pay to own-firm performance decreased by 0.02% for a firm that had the distance to the covering DoJ field office increased by 100 miles. This effect is economically significant, given that the baseline sensitivity of pay to own-firm return ( $\beta_4$ ) is 0.09%.

More importantly, the coefficient of  $\beta_2$  is positive and significant at 1% level. In economic

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<sup>15</sup>Our sample has very few firms that became closer to a new field office.

<sup>16</sup>For firms with no local peers,  $Local Peer Return_{i,t}$  is zero. We further include a dummy indicator for having any local peers in the regression.



terms, the sensitivity of CEO pay to local peers' performance rose by 0.02% for a firm that had the distance to covering field office increased by 100 miles. That is, as the collusion in local market became more feasible, the sensitivity of CEO compensation to local peers' performance became relatively more positive. Notably, the baseline sensitivity of pay to local peer performance is not different from zero, suggesting that unconditionally, in our sample, local peers' performance did not have significant impact on CEO compensation.

While in column (1) of [Table 6](#) we control for the firm and year fixed effects, column (2) includes the year  $\times$  SIC 2-digit industry fixed effects. In the latter specification, we are thus comparing treated and control firms in the same year and in the same industry, thus we take into account any common industry trends that could be related to the disincentives of competition. The coefficient of  $\beta_1$  remains negative and statistically significant and the coefficient of  $\beta_2$  remains positive and statistically significant. Additional fixed effects only slightly change the magnitude of the coefficients of interest.

Overall, this evidence supports the argument that firms adjust managerial compensation scheme to reflect shareholders' preference for softer competition. Lower expected antitrust enforcement against collusion reduced the incentives for the firms to outperform peer firms with whom they have a possibility of colluding in the product markets.

### 5.1.2 Discretionary compensation

We further examine whether the changes in pay-to-performance sensitivities can be attributed to the board's compensation decisions. An alternative explanation for the results in [Table 6](#) is that the board did not adjust compensation in response to the event, while the CEOs of treated firms found collusion more attractive under their original compensation contracts. Reflecting higher profits, firms' equity value rose and stock grants became more valuable. Since stock prices co-move more in collusive equilibrium, we might mechanically observe greater sensitivity of equity compensation value to peer-performance even without boards actively adjusting compensation.

To rule out this possibility, we look at which component of compensation – cash or equity – drives the changes in pay-to-performance sensitivity. If the relationship appears mechanically, we expect to observe a greater increase in pay-to-performance sensitivity for the equity component of CEO pay.

Moreover, the value of cash compensation is subject to higher discretion from the board. Although discretionary compensation can be paid both in cash and equity (De Angelis and Grinstein, 2015), the cash component is generally more flexible to adjust as it often involves the board’s judgment (Ma, 2020). For instance, incentives plans often include qualitative performance measures, such as “strategic goals” and the board has the discretion to determine whether the outcomes of such goals are reached. In our sample, we find that 89.8% of the “strategic goals” appear as a performance measure in the cash incentive plans as opposed to equity plans.<sup>17</sup> If the board of directors actively adapts contract design in response to the policy reform, we should expect a larger effect on the cash component of CEO compensation.

In Table 6, columns (3)-(4), we report the same specification as in columns (1)-(2) but here we have cash compensation as the outcome variable. Instead, in columns (5)-(6), we report these specifications where equity compensation is the outcome variable. We find that the effect is indeed driven by the cash compensation, while the effect on equity compensation is not statistically significant. The result highlights that boards’ discretionary practice plays an important role in adapting compensation to motivate collusion.

### 5.1.3 Active contract changes

To confirm that there have been active changes of compensation designs in response to the DoJ office closures, we further examine the choice of performance measures in CEOs’ incentive plans. We focus on the metric of “*profit margin*,” which has a close relationship with the outcomes of competition strategies undertaken by firms. We study whether such

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<sup>17</sup>Appendix 1 lists a few examples of such “strategic goals” from firms’ DEF14A filings.

performance metric was mentioned more often in the CEO compensation contracts of the treated firms, as opposed to those of the control firms, i.e., whether more treated firms' CEOs were formally provided with a new "profit margin" performance metric. As shown in [Table IA1](#), we find that the tendency of using "profit margin" in the CEO compensation design increased significantly for the treated firms.

The changes in pay-to-performance sensitivity could also be driven by the removal of explicit relative performance benchmarks, which are usually embedded in equity-based incentive plans. However, in the unreported tests, we do not find significant changes in the tendency of using explicit relative performance benchmarks (contrary to our cartel analysis in [Table 2](#)). This is possibly because equity plans are usually multi-year based, which makes them more sticky to change.

Instead, we find that pay-to-performance sensitivity results in [Table 6](#) are in fact much stronger among the group of firms that did not adopt explicit relative performance provisions in 2013, as shown in [Table IA2](#). This suggests that it is the same set of firms that did not report explicit relative performance provisions and increased the sensitivity of CEO pay to local peers' performance. This evidence implies that implicit pay-to-performance sensitivity, which is largely under the board discretion, complements the lack of explicit relative performance provision as the incentive scheme that discourages competition.

#### **5.1.4 Robustness**

The previous analyses link CEO compensation to the average performance of peer firms, controlling for the industry trends. We further perform the analysis at the firm-pair level and aim to control for the richer set of fixed effects and estimate the effects separately for the local and non-local peers.

In particular, at the firm level, we are able to control for the pair-fixed effects, thus taking into account any non-time-varying relationship between the focal and the peer firms. With this set of fixed effects we are thus also controlling for non-time-varying geographic

conditions such as local product and labor market effects. For instance, one might imagine that there could be differences in the relationships to peer performance sensitivity in rural areas and city locations.

In addition, we can control for the peer firm  $\times$  year fixed effects and thus remove any particular time trends at the peer firm level. We adopt the following specification:

$$\begin{aligned} \ln(\text{Compensation}_{i,t}) = & \beta_1 \times \Delta \text{Distance}_i \times \text{Post}_t \times \ln(\text{Peer Return}_{i,j,t}) \times \text{Local Dummy}_{i,j,t} + \\ & \beta_2 \times \Delta \text{Distance}_i \times \text{Post}_t \times \ln(\text{Peer Return}_{i,j,t}) + \\ & X_{i,j,t} + \tau_t + \gamma_i + \eta_j + \epsilon_{i,t} \end{aligned} \tag{2}$$

We regress the natural logarithm of CEO compensation of firm  $i$  on the natural logarithm of firm  $i$ 's stock returns and that of  $i$ 's peer firm  $j$ , i.e., where firm  $j$  is defined as having the Hoberg-Phillips product similarity score within top 30%.  $\text{Local Dummy}_{i,j,t}$  indicates that peer firm  $j$  is headquartered within 200 miles of focal firm  $i$ .<sup>18</sup>

$\beta_2$  captures the changes in sensitivity of pay to peer performance induced by the event for both local and non-local peer firms.  $\beta_1$  is of our most interest and reflects whether pay to peer performance became more sensitive to local peers as compared to peers in general.  $X_{i,j,t}$  is the set of control variables including an extensive set of interaction terms, and firm and manager characteristics.

We report the specifications in [Table 7](#). In column (1), we report the specification with year  $\times$  SIC 2-digit industry ( $\tau_t$ ), focal firm ( $\gamma_i$ ), and peer firm ( $\eta_j$ ) fixed effects. In column (2), we report the specification with year  $\times$  SIC 2-digit industry, focal firm, peer firm, and year  $\times$  SIC 2-digit industry of peer firm ( $\eta_{j,t}$ ) fixed effects. In column (3), we instead have pair ( $\lambda_{i,j}$ ) fixed effects.

Across all specifications, we find  $\beta_2$  to be negative and  $\beta_1$  to be positive and of larger

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<sup>18</sup>Note that here  $\text{Local Dummy}_{i,j,t}$  is defined at a firm-pair level based on whether the firms are local to each other, while  $\text{Local Market}_{i,t}$  in the previous sections referred to whether the firm has any local peers.

magnitude than  $\beta_2$ . This suggests that while CEO pay became even more negatively sensitive to the performance of non-local peers, the opposite holds for local peers. In other words, the increasing pay-to-peer-performance-sensitivity is concentrated with respect to the local peer firms where the incentives of collusion following DoJ changes became stronger than before these changes.

In [Table IA3](#), we split the CEO compensation into the cash compensation and equity compensation and across all specifications, we see that the effect is driven by the cash compensation which is more likely to be an outcome of adjusting compensation schemes. This further confirms that the change in peer performance sensitivity is not mechanical and is rather driven by discretionary change in compensation scheme by the boards.

We perform several additional robustness checks for [Table 6](#) where we define the peer groups differently. We report them in [Table IA4](#). We separately look at the cases where we define peers as being classified in the same SIC 2-digit industry rather than according to Hoberg-Phillips classification. We also apply alternative definitions for the local peers, such as the firms headquartered in the same state, within 100 miles, and within 400 miles from the focal firms.

Finally, as a robustness check, when defining our local peers, we remove those peers that have an overlap with focal firms in terms of top five blockholders, where blockholders are defined as having more than 5% of stakes in firm's equity. Our results, available at request, are consistent with [Table 6](#), suggesting that we identify a different channel than common ownership which has also been shown to shape managerial incentives ([Anton et al., 2020](#)).

## 5.2 Equity compensation

We next examine equity compensation. As argued before, if the managers do not have the same preferences for collusion as the shareholders after the decrease in antitrust enforcement, their incentives can be aligned through stock and option awards. Moreover, since stock and option compensations are usually associated with restrictive periods that tie managerial

payoff to firm’s long-term stock returns, they effectively decrease managers’ discount rate in their strategic interactions with competitors. Thus, as argued by Spagnolo (2000), equity compensation decreases managers’ short-term incentives of deviating from collusive arrangement, making collusion more stable and sustainable. Also, equity compensation, as a profit sharing scheme, can signal firm’s commitment to collusion to the peer firms (Bernhardt and Chambers, 2006). In sum, we expect that it is in shareholders’ best interest to grant more equity compensation to CEOs in response to the reduction of local monitoring from DoJ.

We explore the changes in value of CEO equity grants scaled by market capitalization.<sup>19</sup> We estimate regressions with the following specification:

$$Equity\ Compensation_{i,t} = \beta \times Treat_i \times Post_t + X_{i,t} + \tau_t + \gamma_i + \epsilon_{i,t} \quad (3)$$

In this specification,  $Treat_i$  captures the exposure to DoJ antitrust field office closures of firms that had local peers. Specifically,  $Treat_i = \Delta Distance_i$  if firm  $i$  had local peers in 2012 and  $Treat_i = 0$  if it had no local peers or experienced a non-positive change in distance to the covering DoJ office.  $\Delta Distance_i$  and local peers have the same definitions as in the previous section. We further control for firm and manager characteristics and the firm and year fixed effects. If firms grant more equity compensation to encourage collusion, we expect the treatment effect  $\beta$  to be positive.

In Table 8, we report the regression results of equity compensation. In column (1), we regress the value of stock grants to CEOs scaled by market capitalization (and multiplying by 10,000, reported in basis points). We find that  $\beta$  is positive and significant. In economic terms, stock awards to CEO increased by 0.53 basis points of the market capitalization for the treated firms with local peers when the distance to the new field office increased by 100 miles, as compared to the firms for which the field offices did not change or which did not have local peers. Column (2) controls for the firm and SIC 2-digit industry  $\times$  year fixed

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<sup>19</sup>The ratio of equity grant value and market capitalization proxies the incremental ownership shared with the manager.

effects. In column (3) and (4), the dependent variable is the total value of stock and option grants (as basis points in market capitalization). We find that  $\beta$  is significantly positive across all specifications.

Our evidence suggests that the value of equity compensation increased for the firms exposed to regional DoJ office closures. This confirms that when collusion became more attractive to shareholders, they started paying CEOs with more equity compensation to improve the alignment of incentives. These findings are consistent with the predictions in [Spagnolo \(2000\)](#) that equity compensation is an important component in stabilizing collusive arrangements. A stock-holding manager has lower incentives to deviate from the cartel agreement, since stock prices can reflect the future losses from a punishment phases, thus limiting gains from deviation. In other words, equity compensation effectively lengthens CEOs' incentive horizon.

Consistently, we further find that the vesting period of equity grants also increased for the treated firms after 2013. As shown in [Table IA5](#), we find that the treated firms are more likely to grant equity incentive plans with vesting periods of more than five years.<sup>20</sup> Therefore, after DoJ regulatory change shareholders not only grant more equity compensation but also set the vesting terms to be longer. That is consistent with extending managerial discount factor to fit shareholder interests.

### 5.3 Heterogeneous effects

We next explore the heterogeneous impact of the DoJ regional office closures on compensation practices according to several firm characteristics and market conditions: geographical concentration of firm operations, market concentration of industry, board diligence, CEO age, and executive labor market mobility. We present the summary of the sample splits for our main coefficients of interest in [Table 9](#), and report the full tables in [Table IA6](#), [Table IA7](#), [Table IA8](#), and [Table IA9](#). Panel A of [Table 9](#) corresponds to [Table 6](#), column (2), and Panel

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<sup>20</sup>A median cartel lasts for five years ([Connor, 2014](#)).

B corresponds to [Table 8](#), column (2).

First, we expect the effect to be stronger for firms that have their operations more concentrated geographically, i.e., firms that operate primarily in the local markets. For such firms, the closures of the field offices should be more relevant as compared to the firms with operations that are spread across the U.S. In particular, since the antitrust field offices are monitoring with the help of local knowledge, the closure of field offices should be more relevant for the local-level collusion. Therefore, the firms with significant local operations would be more responsive by the change in the antitrust field offices.

We use two sources of data to estimate proxies for local operations. The first source is the Lexis Nexis Corporate Affiliations dataset on firm subsidiary locations, from which we estimate the geographic distribution of the firm’s sales among the states where the subsidiaries and headquarters are located. In particular, for each firm we calculate the overall distribution of the firms’ operations and estimate the sales concentration index (HHI) within firm. In this case, the firms are assigned as “concentrated” (“dispersed”) if such an HHI index falls into the top (bottom) 30 percentile across all firms’ HHI indices.

Given that subsidiaries might not fully represent firm operations, our second source is the number of states mentioned in 10Ks in 2007 or 2008 ([Garcia and Norli, 2012](#)).<sup>21</sup> Again, for each firm, we estimate the concentration index (HHI) of state mentions and assign firms as “concentrated” (“dispersed”) if such HHI index falls into top (bottom) 30 percentile across all firms’ HHI indices. Across both data sources, we see that our effects both on the peer-performance sensitivity and the equity compensation are larger for the firms with more concentrated operations.<sup>22</sup>

Second, we investigate the industry concentration. Since the coordination among a limited number of cartel members might be easier, firms in the concentrated industries are more likely to form collusive arrangements. We expect that these firms are more likely to change

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<sup>21</sup>We take the last year of available data provided by [Garcia and Norli \(2012\)](#), which for different firms is either 2007 or 2008.

<sup>22</sup>Our results are robust to measuring concentration by whether a firm has a large fraction of operations, either in terms of subsidiaries or 10K mentions, in a single state.



CEO compensation scheme in response to the antitrust enforcement reform. To study this, we measure industry concentration by the revenue percentage of the 8 largest firms in each NAICS industry, as reported by U.S. Census Bureau in 2012. Our sample is divided based on whether a firm is in an industry with the 8-firms' revenue percentage in the top or bottom quartile. We find that in the case of peer-performance sensitivity tests, our results are stronger for the firms in the top quartile, which are the more concentrated industries. That said, in the case of equity compensation, we do not find significant differences between the two subsamples.

Third, we investigate the board characteristics. One assumption of our argument is that the board of directors actively adjusts CEO compensation to maximize shareholder profits. We investigate this assumption by exploring whether our identified effect differs across firms with different degrees of board diligence. We proxy board diligence by how busy the directors are based on the total number of the board positions in the other firms. Following [Fich and Shivdasani \(2006\)](#), the firms with busy boards are associated with weak monitoring. Therefore, we expect that firms with busy boards would be less likely to modify compensation scheme to motivate collusion. We use Boardex dataset and split the sample based on each board's total directorships in other firms in 2012, and denote the firm as having a "busy board" ("less-busy board") if this number is higher (lower) than the median value of each firm-size tertile. We see that compensation changes are much more responsive to the event among the firms whose board consists of less busy directors.

Fourth, we examine whether the changes in contract structure are more profound among the CEOs approaching retirement age. The retiring CEOs are likely to be more short-term oriented and less willing to participate in collusion at personal legal risks.<sup>23</sup> To provide incentives for collusion, the board of directors needs to adjust their compensation contracts. We split the sample by whether the firm's CEO had more or less than ten years to the retirement age, which we consider to be at the age of 70, in 2012. We document that our

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<sup>23</sup>The maximum imprisonment sentence has been raised from three to up to ten years by Antitrust Criminal Penalty Enhancement and Reform Act (ACPERA), which was adopted in 2004.

earlier findings on incremental peer performance sensitivity and equity compensation grants are concentrated in the subsample of CEOs closer to retirement.

Fifth, we study whether the adjustments in the compensation scheme are stronger for the firms that face more flexible executive labor markets. We posit that more flexible executive labor markets create higher reputational concerns for the CEOs since they might be poached by other corporations. As such reputation concerns could generate a larger wedge between managerial and shareholders' intrinsic incentives, we expect that compensation designs of CEOs in more flexible labor markets are more sensitive to the shareholders' expected payoff of motivating collusion. As a source of variation in the labor market flexibility, we look at whether the firms are located in the states with Inevitable Disclosure Doctrine (IDD). IDD prevents the firm's workers who have knowledge of its trade secrets from working for a rival firm (Klasa *et al.*, 2018). As IDD limits the outside job opportunities of CEOs, we expect CEOs in the firms headquartered in the IDD states to have fewer reputational concerns in the external labor market, which should reduce the intention of the shareholders to adjust compensation scheme to motivate collusive behavior. To test this, we split the sample based on the whether the courts of the state of firms' headquarter location recognized IDD or not in 2012. We find that the antitrust reform had a larger impact on CEO compensation schemes for the firms that are located in the states without IDD in 2012.<sup>24</sup>

## 6 Discussion

In this section, we provide a discussion on the implications of our findings and their robustness. First, we show evidence that the changes in the managerial compensation in response to the antitrust legal changes are associated with the changes in gross profit margins, suggesting that the same firms which adapted managerial compensation also experienced better profitability. Second, we provide a brief discussion of our underlying identifying assumptions.

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<sup>24</sup>Similarly, in the tests available on request we find that the effect is larger for the externally hired CEOs who are more likely to require extrinsic incentives to engage in product market collusion.

Finally, we show that other economic trends unlikely confound our estimates.

## 6.1 Incentive alignment and firm outcomes

Successful collusion should be associated with larger markups and higher comovement of firms' product prices. We now examine whether firms experiencing weakening in antitrust enforcement indeed ended up having higher markups that we proxy by gross profit margins. We are particularly interested in whether changes in profitability differed for firms that increased the alignment between CEO and shareholders or not. As argued before, we expect that incentives for collusion are higher for the CEOs receiving a larger value of equity compensation grants.

In Section 4, we have discussed the evidence in Figure 2, where we match treated firms with the control firms in the same industry and firm size quintile and show that treated firms had a significantly larger gross margin than their matched control firms in the post-2013 period but not in the pre-2013 period.

In Figure 3, we further separate the graphs for firms that increased their stock compensation grants since 2013 (Panel A) and the firms that did not (Panel B). The trend that treated firms having a significantly larger gross margins than control firms after 2013 is more evident for the firms that increased their stock compensation grants since 2013. The other firms show no significant difference in gross margin after 2013. This figure presents suggestive evidence that the firms that improved their incentive alignment are associated with higher profitability after DoJ office closures.

We next test the differentiated treatment effects on gross margins for firms with different levels of incentive alignment in a regression with the following specification:

$$\begin{aligned}
 Profit\ Margin_{i,t+1} = & \beta_1 \times Equity\ Comp_{.i,t} \times Treat_i \times Post_t + \beta_2 \times Treat_i \times Post_t + \\
 & X_{i,t} + \tau_t + \gamma_i + \epsilon_{i,t}
 \end{aligned}
 \tag{4}$$

$Profit\ Margin_{i,t}$  is constructed as the gross profit over revenue. The other variables have the same definitions as in the previous section. The estimate of  $\beta_2$  captures the treatment effect on profit margin if the CEO receives zero equity compensation grant. The estimate of  $\beta_1$  reflects the incremental treatment effect for CEOs receiving a higher value of equity compensation. We expect the profit margin to be more positive when the CEO receives more equity compensation to encourage collusion, namely  $\beta_1$  to be positive.

As shown in Table 10, columns (1)-(2),  $\beta_1$  is positive and significant for both stock compensation and the total value of stock and option compensation.<sup>25</sup> This suggests that the treated firms that paid higher equity compensation experienced relatively higher profit margin changes in response to DoJ office closures, consistent with the outcomes of collusive equilibrium. To see the economic magnitude, we compare  $\beta_1$  with  $\beta_2$ . We find that  $\beta_2$  is -0.002, which means that if a CEO received zero equity compensation, the profit margin decreased by 0.002 when the distance to the new field office increased by 100 miles. On the other hand,  $\beta_1$  is 0.486, which suggests that when stock awards increased by 1% of the market capitalization, the treatment effect on profit margin increased by 0.0048. This evidence suggests that equity grants are associated with improving firm operating performance.

Furthermore, we examine whether market values of the affected firms also changes. If the collusion is successful, outside investors would positively update their view on the firm value, given the improving operating performance. We expect the market value of firms to increase when the equity compensation of CEO increases to encourage collusive arrangement. To measure the market value of firms, we use Tobin's Q.<sup>26</sup> As reported in column (3)-(4) of Table 10, we show that after the change in antitrust enforcement, Tobin's Q increased for the treated firms that adjusted their equity compensation to provide incentive to collude.

In addition, we study whether affected firms' performance started comoving more with

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<sup>25</sup>In Table 10, equity grants are measured as the ratio between equity compensation value and firms' market capitalization, ranging from zero to one.

<sup>26</sup>Tobin's Q is measured as the ratio of the market value of assets and the book value of assets. The market value of assets is defined as the market value of equity plus the book value of assets minus the book value of equity and minus balance sheet deferred taxes.

the performance of their peers. Coordinated actions are likely to result in product prices changing in tandem. As we do not have access to the product price data across different firms and industries, and so we do not have a way to capture high-frequency comovement of firm operating performance, we consider stock return comovement to be a proxy for such comovement in firm operating performance. We estimate annual correlation of the firm's weekly stock price returns with each of its local peers, and take an average across the local peers. We then estimate the same specification as equation (4) and we use such stock return comovement as the outcome variable. As stock return comovement is only defined for firms that have local peers, the sample size is smaller.

We report results in Table 10, columns (5)-(6), where we show that after the shock such stock return comovement increased for the firms whose CEOs receive more equity compensation, which is consistent with the lower cost of collusion leading to more coordinated performance with the local product market peers.

Finally, since ex ante we do not know which firms employ implicit relative valuation in their executive remuneration, we are not able to perform the corresponding tests that would map to our Table 6. However, in Table IA10, we show the results on whether the gross profit margins differ after 2013 based on explicit performance evaluation provisions. Indeed, we find that the effect is stronger for firms that did not adopt explicit performance evaluation in 2012, i.e., they do not explicitly remunerate executives based on whether they outperform their peers. However, we do not find that Tobins' Q and return comovement results are statistically significant, possibly due to the weaker test power in a smaller sample.

## 6.2 Identifying assumptions and treated observations

Two underlying assumptions in our identification strategy are that (a) there exists a wedge in the shareholders' and managerial intrinsic incentives to engage in product market collusion, and that (b) even if lower antitrust enforcement significantly increases the collusive incentives for the shareholders, such wedge with respect to managers' incentives still remains positive

at least for some firms. We argue that such wedge is expected since given the personal liability, reputation concerns, and career considerations, managers are likely to have lower *intrinsic* incentives to engage in product market collusion, as compared to the atomistic shareholders or even their corporate boards. Moreover, closures of DoJ regional offices are likely to have shifted shareholder preference to engage in collusion rather than competition. However, at least some managers are likely to have remained cautious due to personal risks if no additional incentives were provided.<sup>27</sup>

More broadly, one could imagine industry and legal environment that make all four scenarios of discrete preferences for competition versus collusion to be possible: (A) both shareholders and managers prefer competition; (B) shareholders prefer collusion while managers prefer competition; (C) managers prefer collusion while shareholders prefer competition; and (D) both managers and shareholders prefer collusion. We argue that (C) is the least likely scenario both before and after the antitrust reform since personal risks make collusion more costly for managers than shareholders.

Our identification thus captures those firms that were in the parameter region (A) before the antitrust change and that moved to the parameter region (B) because of antitrust enforcement changes (but before any changes to compensation contracts). This subset of firms ends up comprising our treated observations that respond to the treatment. As shareholders would be better off in region (D) compared with region (B),<sup>28</sup> it is optimal for them to change executive compensation contract and provide *extrinsic* motivation for collusion.

However, some treated firms might move from parameter region (A) directly to region (D) even without the need to change executive compensation contract. This could happen if the probability of collusion detection has dropped to close to zero after the reform. In other words, when the wedge between shareholders' and managers' preference becomes non-

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<sup>27</sup>We do not need to assume the wedge itself remained unchanged or got larger after the antitrust reform. Our argument holds even if the wedge shrank, as long as it remained positive. In other words, as long as the managers bore more personal risks than shareholders, additional incentives would be required to shift managerial preference from competition to collusion.

<sup>28</sup>Since managers are the decision makers, they would undertake competitive strategy in region (B) but collusive strategy in region (D).

material, there is no need to provide additional managerial incentives for collusion. These would be our treated firms that did not respond to the treatment in terms of changing their compensation contracts but nevertheless had higher gross margins. Since our [Table 10](#) shows that gross margin increase was primarily concentrated among firms that changed compensation, this subsample of firms should be a small fraction of our overall sample.

Another possibility is that some firms might already be in the parameter region (D) before the antitrust enforcement change, i.e., the shareholders of these firms prefer collusion even with higher antitrust enforcement and they had their managers aligned through extrinsic incentives. For these firms, weaker antitrust enforcement has lowered managerial personal costs and increased intrinsic incentives to engage in collusion, and so extrinsic incentives coming from adapted compensation contracts may no longer be necessary. In such a context, our findings might be interpreted as that we find more treated firms in the parameter region (A) than in the region (D) before the antitrust enforcement changes, i.e., that pre-2013 local antitrust regional offices were in fact effective in constraining the collusion.

### **6.3 Confounding economic trends**

One concern with our difference-in-differences setting is that the results may be driven by diverging trends that started in the pre-shock period. If this is the case, we should find similar results in the pre-shock period. To address this concern, we conduct placebo tests by defining the post-shock period as the years after 2008, and adjusting sample period to 2003-2012, accordingly. We then perform the same estimations as in [Table 6](#), [Table 8](#), and [Table 10](#). In [Table IA11](#), [Table IA12](#), and [Table IA13](#), respectively, we report these placebo test results. We do not find that the results are statistically significant if we consider a placebo year instead of the actual year when the antitrust field office reform was implemented.

Another concern might be that some other economic or policy changes occurred in 2013 and if our treatment variable is correlated with the exposure to such alternative shocks in 2013, we might be capturing that event instead of the DoJ field office closures. For instance,

in [Table 5](#) we see that our treated firms are on average larger, and one could be concerned that larger firms are disproportionately affected by some other event in 2013. For all our specifications we perform robustness tests where in addition to our treatment variables, we add interaction terms with all our control variables. Adding such interacted controls does not affect our coefficients of interest. These results are available at request.

## 7 Conclusion

In this paper we study the relationship between managerial incentives schemes and collusion in the product markets. We explore the decision by the DoJ to close down its four regional offices in 2013, which affected antitrust enforcement of regional collusion cases and thus made collusion a more attractive strategic choice to the affected firms' shareholders.

We study whether executive compensation contracts changed accordingly. First, we look at the relative performance evaluation, which is typically used to provide incentives for executives to outperform industry rivals. We find that affected firms reduced such incentives by tying CEO pay more positively to peer firm performance after this regulatory change. Second, we argue that decision makers with shorter horizons might deviate from collusive arrangements, making them unstable. We find that after the closure of regional offices, the affected firms provided more equity awards to the CEOs, which effectively extended the horizon of managerial contracts. Firms with higher equity awards experienced better product market outcomes in terms of profitability and Tobin's Q, and also higher stock return comovement with the local product market peers.

Our results raise cautionary corporate governance implications. In the absence of antitrust enforcement, aligning investor and manager incentives might reduce consumer welfare. In addition, our results contribute to the debate on the optimal enforcement of competition law. The practice of sanctioning individuals rather than corporations exacerbates the principal-agency problem and acts a way of deterring collusion ([Kaplow, 2011](#)).



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**Table 1:** Summary statistics

Panel A: Summary statistics

	N	Mean	S.D.	Q1	Median	Q3
$\Delta$ Distance	11,126	1.886	3.525	0.000	0.000	1.590
Ln(Return)	11,187	0.064	0.434	-0.109	0.111	0.300
Ln(Local peer return)	11,187	0.046	0.268	0.000	0.000	0.152
Ln(Total compensation)	11,187	8.218	1.042	7.578	8.315	8.931
Ln(Cash compensation)	11,187	7.327	1.089	6.854	7.403	7.933
Ln(Equity compensation)	11,187	6.559	2.961	6.328	7.587	8.412
Stock grants	11,186	9.77	19.60	0.00	3.62	10.5
Stock and option grants	11,186	14.00	24.7	2.05	6.56	15.7
Gross profit margin	12,662	0.427	0.235	0.245	0.381	0.595
Tobin's Q	11,990	1.805	1.189	1.068	1.403	2.057
Return comovement	7,246	0.439	0.203	0.293	0.447	0.594
Size	11,186	7.991	1.786	6.701	7.898	9.102
Sales growth	11,183	0.075	0.253	-0.028	0.05	0.138
Ln(Tenure)	11,187	1.797	0.896	1.099	1.946	2.485
Number of local peers	11,187	2.884	4.621	0	1	4
Number of non-local peers	11,187	16.03	21.190	2	7	21

Panel B: Industry average number of local and non-local peers

SIC (first digit)	Local peers	Non-local peers	% Local peers
0. Agriculture, Forestry and Fishing	0.205	0.051	0.875
1. Mining and Construction	3.613	12.746	0.233
2. Manufacturing	1.603	5.444	0.194
3. Manufacturing	1.729	5.475	0.239
4. Transportation, Communications, etc.	1.683	13.709	0.130
5. Wholesale and Retail	0.891	7.953	0.124
6. Finance, Insurance and Real Estate	4.213	27.791	0.167
7. Services	1.372	5.810	0.206
8. Services	1.560	10.334	0.180
9. Public Administration	1.200	6.220	0.159

Notes:  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Return refers to the annual stock market return of own firm, which is measured as combination of 12 monthly returns minus one. Local peer return refers to the average of annual stock return of local peer firms that are headquartered in 200 mile radius and have product similarity score within top 30% based on [Hoberg and Phillips \(2016\)](#). It is filled as zero if the firm had no local peers. Total compensation is the total of salary, bonus, non-equity incentive plan compensation, grant-date fair value of option awards, grant-date fair value of stock awards, deferred compensation earnings reported as compensation, and other compensation from Execucomp. Cash compensation is comprised of salary, bonus and non-equity incentive compensation. Equity compensation is comprised of grant-date fair value of option awards, grant-date fair value of stock awards. Stock (and option) grants refers to the fair value of stock (and option) grants scaled by the firm's market capitalization and multiplied by 10,000. The unit of compensation variables is thousand U.S. dollars. Gross profit margin refers to the gross profit divided by sales. Size is natural logarithm of one plus total assets (in million U.S. dollars). Sales growth is the annual percentage change in sales. Tenure is the number of years since the executive assumes their CEO position. Number of local (non-local) peers refer to the number of firms that are headquartered within (further than) 200 miles from the focal firm and have product similarity score within top 30% according to [Hoberg and Phillips \(2016\)](#). Percentage of local peers refers to the ratio of number of local peers and total number of peers. In all cases, "Ln" refers to natural logarithm of one plus the variable in parentheses. All the variables are winsorized at the 0.5% and 99.5% levels. Data spans from 2008 to 2017.

**Table 2:** Convicted cartel peers and compensation schemes

Panel A: Sensitivity of CEO Pay to cartel-Peer performance				
	Ln(Total compensation)			
Post x Ln(Own return)	-0.856*** (-9.782)	-0.851*** (-9.651)	-0.209 (-0.814)	-0.032 (-0.146)
Post x Ln(Cartel peer return)	1.524*** (6.803)	1.472*** (6.534)		
Post x Ln(Average cartel peer return)			1.003*** (2.854)	0.807*** (2.724)
Post	0.366*** (5.858)	0.336*** (5.250)	-0.350*** (-3.033)	-0.298*** (-2.737)
Ln(Own return)	1.124*** (14.268)	1.108*** (13.948)	0.324 (1.480)	0.029 (0.155)
Ln(Cartel peer return)	-1.757*** (-7.627)	-1.731*** (-7.458)		
Ln(Average cartel peer return)			-0.962*** (-3.411)	-0.833*** (-3.457)
Size	-0.043** (-2.043)	-0.034 (-1.559)	0.254*** (16.090)	-0.064 (-1.197)
Constant	9.203*** (36.781)	9.124*** (35.180)	6.442*** (34.279)	9.676*** (17.379)
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	NO	YES
Peer x Year FE	YES	YES	NO	NO
Pair FE	NO	YES	NO	NO
Adjusted R <sup>2</sup>	0.504	0.500	0.238	0.479
Observations	10,250	10,250	1,222	1,222
Panel B: Overlap of cartel peers with compensation peers				
	At least one peer		Fraction peers	N
	Overlap at the time of cartel			
General compensation benchmark	86	20.67%	7.81%	416
Relative performance evaluation benchmark	42	10.09%	3.67%	416
Difference		10.58%*** (5.803)	4.13%*** (4.838)	
	Overlap over the entire sample period			
General compensation benchmark	252	50.70%	20.25%	497
Relative performance evaluation benchmark	117	23.54%	8.09%	497
Difference		27.16%*** (12.095)	12.26%*** (10.317)	

Notes: Panel A shows the sensitivity of CEO compensation to the performance of own firm and peer firms in the convicted cartels in Connor (2014). The left two columns show pairwise regression results, where the sample contains matched pairs of cartel members in each year. Post is a dummy indicator that equals one since the start year of each cartel. The right two columns show regression results in a panel constructed at a firm-year level, where we aggregate the stock returns of a firm's cartel peers in each year. Post dummy equals one since the starting year of first collusion for a given firm. Our sample spans from 1996 to 2017. Ln(Total compensation) refers to natural logarithm of one plus the total compensation from Execucomp (tdc1). Ln(Own return) refers to natural logarithm of one plus the annual stock market return of own firm. Ln(Cartel peer return) refers to natural logarithm of one plus the annual stock market return of cartel peer. Ln(Average cartel peer return) refers to natural logarithm of one plus the average of annual stock market return of all cartel peers for a given firm. Size is natural logarithm of one plus total assets (in million U.S. dollars). All variables are winsorized in 0.5%. t-statistics are reported in the parentheses. Panel B shows the overlapping number of cartel peers and peer firms in compensation benchmark groups (for general compensation practice and for relative performance evaluation).

**Table 3:** States covered by antitrust division field offices

Field office	States covered by the field offices
Atlanta	Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, U.S. Virgin Islands
Chicago	Colorado, Illinois, Indiana, Iowa, Kansas, West District of Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin
Cleveland	Kentucky, Eastern District of Michigan, Ohio, West Virginia
Dallas	Texas, Oklahoma, Louisiana, New Mexico, Arkansas
New York	Connecticut, Maine, Massachusetts, New Hampshire, Northern New Jersey, New York, Rhode Island, Vermont
Philadelphia	Delaware, Maryland, Southern New Jersey, Pennsylvania, Virginia
San Francisco	Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming

Notes: This table shows the state coverage of field offices in the U.S. Department of Justice Antitrust Division before the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 2013. This closure affected 23 states and territories. The data comes from Antitrust Division’s April 2001 Report to the Chairman, Subcommittee on Administrative Oversight and the Courts, Committee on the Judiciary United States Senate, available at <https://www.gao.gov/assets/240/231337.pdf>.

**Table 4:** Trends in local antitrust cases

	Average local cases		Proportion of local cases over non-local cases	
	2008-2012	2013-2017	2008-2012	2013-2017
Treated	1.522	0.565	0.402	0.125
Untreated	1.419	0.839	0.299	0.295

Notes: This table shows the local antitrust case filings and its proportion over the average of non-local cases during five years before and after the closure of four field offices in 2013. Treated refers to 23 states and territories that were covered by closed four field offices: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Michigan (Eastern judicial district), Mississippi, New Jersey (Southern part), New Mexico, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, West Virginia, and U.S. Virgin Islands. Untreated refers to the remaining 31 states and territories. Local cases refer to antitrust case filings of which convicted antitrust activities are limited to a certain U.S. region, i.e. they are neither national, nor international.

**Table 5:** Validity checks

	Untreated	Treated	Difference (t-stat)
Ln(Total compensation)	8.087	8.106	-0.0189 (-0.569)
Ln(Return)	0.023	0.022	0.001 ( 0.076)
Ln(Local peer return)	0.01	0.046	-0.036 ( -3.579)
Stock grants	8.872	8.485	0.386 (0.647)
Stock and option grants	14.297	13.302	0.995 (1.218)
Size	7.856	8.225	-0.370 (-6.638)
Sales growth	0.079	0.081	-0.001 (-0.173)
Ln(Tenure)	1.769	1.844	-0.076 (-2.708)
Gross profit margin	0.423	0.402	0.021 (2.655)
N	4,878	1,269	

Notes: This table shows the mean values for firm characteristics in treated and untreated groups before the field office closures in 2013. Treated group refers to the firms whose distance from the headquarter to the governing antitrust field office increased in 2013 and who had local peer firms in 2012. Untreated group refers to the firms whose distance to the governing antitrust office did not increase in 2013 or who had no local peer firms in 2012. Ln(Total compensation) refers to natural logarithm of one plus the total compensation from Execucomp (tdc1). Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Stock (and option) grants refers to the fair value of stock (and option) grants (in thousand U.S. dollars) scaled by the firm's market capitalization and multiplied by 10,000. Size is natural logarithm of one plus total assets (in million U.S. dollars). Sales growth is the annual percentage change in sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. Gross profit margin refers to the ratio of gross profit and revenue. All the variables are winsorized at the 0.5% and 99.5% levels. Data spans from 2008 to 2012.



**Table 6:** Peer performance sensitivity

	Ln(Total compensation)		Ln(Cash compensation)		Ln(Equity compensation)	
$\Delta$ Distance x Post x Ln(Return)	-0.021*** (-5.577)	-0.020*** (-3.877)	-0.016*** (-3.334)	-0.015*** (-3.073)	-0.049* (-1.718)	-0.032 (-1.053)
$\Delta$ Distance x Post x Ln(Local peer return)	0.016* (1.782)	0.021** (2.255)	0.017** (2.076)	0.018** (2.374)	0.009 (0.255)	0.015 (0.341)
$\Delta$ Distance x Post	0.006** (2.167)	0.005* (1.715)	0.005 (0.960)	0.006 (0.735)	0.019* (1.762)	0.013 (1.005)
Ln(Return)	0.089*** (4.186)	0.081*** (4.242)	0.170*** (7.553)	0.153*** (6.980)	-0.024 (-0.219)	0.016 (0.155)
Ln(Local peer return)	-0.011 (-0.366)	-0.011 (-0.329)	0.039 (1.028)	0.036 (1.115)	-0.133 (-1.411)	-0.152 (-1.343)
Local market	-0.032 (-1.089)	-0.026 (-0.895)	0.019 (0.456)	0.042 (0.970)	-0.137 (-1.511)	-0.126 (-1.343)
$\Delta$ Distance x Ln(Return)	0.001 (0.216)	0.000 (0.046)	0.001 (0.297)	0.000 (0.063)	-0.000 (0.001)	-0.003 (-0.096)
Post x Ln(Return)	0.185*** (7.198)	0.178*** (7.025)	0.252*** (6.726)	0.254*** (7.247)	0.343*** (3.517)	0.246** (2.183)
$\Delta$ Distance x Ln(Local peer return)	-0.003 (-0.529)	-0.002 (-0.453)	-0.017*** (-2.689)	-0.017*** (-2.957)	0.024 (0.945)	0.038 (1.651)
Post x Ln(Local peer return)	-0.026 (-0.504)	-0.060 (-1.155)	-0.004 (-0.076)	0.007 (0.149)	0.020 (0.109)	-0.163 (-0.925)
$\Delta$ Distance x Local market	0.008* (1.726)	0.012*** (2.835)	0.004 (0.587)	0.009 (1.667)	-0.012 (-0.806)	-0.002 (-0.148)
Post x Local market	0.035 (1.077)	0.024 (0.772)	0.076 (1.585)	0.046 (0.980)	0.034 (0.338)	-0.001 (-0.016)
$\Delta$ Distance x Post x Local market	-0.008* (-1.963)	-0.008* (-1.792)	-0.008 (-1.283)	-0.013* (-1.966)	-0.033** (-2.324)	-0.034* (-1.967)
Size <sub>t-1</sub>	0.253*** (11.338)	0.257*** (11.125)	0.098*** (3.426)	0.100*** (3.179)	0.595*** (7.400)	0.613*** (6.788)
Sales growth <sub>t-1</sub>	0.106*** (3.591)	0.088*** (3.364)	0.127*** (4.249)	0.100*** (3.579)	0.137 (1.185)	0.164 (1.443)
Ln(Tenure)	0.040*** (3.741)	0.037*** (3.278)	0.073*** (6.205)	0.070*** (4.846)	-0.142*** (-3.188)	-0.151*** (-3.063)
Constant	6.118*** (33.179)	6.090*** (32.231)	6.339*** (26.267)	6.322*** (23.696)	2.167*** (3.381)	2.046*** (2.823)
Year FE	YES	NO	YES	NO	YES	NO
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	NO	YES	NO	YES	NO	YES
Adjusted R <sup>2</sup>	0.797	0.810	0.748	0.766	0.585	0.608
N	11,079	11,038	11,079	11,038	11,079	11,038

Notes: The dependent variables are natural logarithm of one plus total compensation, cash compensation, and equity compensation. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets (in million U.S. dollars). Sales growth is the annual percentage change in sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table 7:** Pairwise specification

	Ln(Total compensation)		
$\Delta$ Distance x Post x Ln(Peer return) x Local dummy	0.024*** (3.632)	0.023*** (3.664)	0.027*** (3.537)
$\Delta$ Distance x Post x Ln(Peer return)	-0.006 (-1.660)	-0.005 (-1.538)	-0.008* (-1.846)
Ln(Return)	0.104*** (4.721)	0.103*** (4.606)	0.094*** (3.982)
Ln(Peer return)	-0.002 (-0.530)	-0.006 (-1.561)	-0.006 (-1.324)
$\Delta$ Distance x Post	-0.003 (-0.741)	-0.004 (-0.799)	-0.004 (-0.951)
Local dummy	-0.047 (-1.059)	-0.049 (-1.089)	-0.045 (-1.079)
$\Delta$ Distance x Ln(Peer return)	-0.001 (-0.663)	-0.001 (-0.771)	-0.000 (-0.293)
Post x Ln(Peer return)	0.011 (0.999)	0.017 (1.636)	0.017 (1.396)
$\Delta$ Distance x Local dummy	0.005 (1.107)	0.005 (1.177)	0.005 (1.211)
Post x Local dummy	0.011 (0.160)	0.010 (0.139)	-0.006 (-0.087)
Ln(Peer return) x Local dummy	0.091** (2.079)	0.092** (2.155)	0.103** (2.070)
$\Delta$ Distance x Post x Local dummy	-0.001 (-0.144)	-0.001 (-0.143)	0.001 (0.105)
$\Delta$ Distance x Ln(Peer return) x Local dummy	-0.009* (-1.847)	-0.009* (-1.916)	-0.012** (-2.134)
Post x Ln(Peer return) x Local dummy	-0.145*** (-3.002)	-0.146*** (-3.026)	-0.154** (-2.625)
Size <sub>t-1</sub>	0.274*** (7.693)	0.274*** (7.573)	0.275*** (7.260)
Sales growth <sub>t-1</sub>	0.051 (1.595)	0.053 (1.632)	0.042 (1.370)
Ln(Tenure)	0.034** (2.271)	0.034** (2.302)	0.034** (2.282)
Constant	5.712*** (18.095)	5.716*** (17.865)	5.692*** (16.944)
Firm FE	YES	YES	YES
SIC2 x Year FE	YES	YES	YES
Peer FE	YES	YES	YES
Peer SIC2 x Year FE	NO	YES	YES
Pair FE	NO	NO	YES
Adjusted R <sup>2</sup>	0.828	0.829	0.813
N	327,824	327,792	307,697

Notes: The dependent variable is natural logarithm of one plus total compensation. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) divided by a 100. Ln(Return) (Ln(Peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (Peer firms). Local dummy is an indicator for the presence of local peer firms under the definition above. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. (Peer) SIC 2-digit x Year FE is joint fixed effect between year and industry with the SIC 2-digit code of (peer) firm. Pair FE is fixed effect for the pair of focal firm and a particular peer firm. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table 8:** Equity compensation

	Stock grants		Option and stock grants	
Treat x Post	0.531*** (4.471)	0.352** (2.600)	0.641*** (6.836)	0.311*** (2.858)
Size <sub>t-1</sub>	-0.458 (-0.453)	-0.294 (-0.280)	0.938 (0.762)	1.047 (0.835)
Sales growth <sub>t-1</sub>	-1.958* (-1.948)	-1.850* (-1.785)	-1.387 (-1.309)	-1.047 (-0.971)
Ln(Tenure)	-0.960** (-2.203)	-0.934** (-2.137)	-1.585*** (-3.049)	-1.526*** (-2.937)
Constant	15.016* (1.867)	13.746 (1.657)	9.000 (0.907)	8.183 (0.817)
Year FE	YES	NO	YES	NO
Firm FE	YES	YES	YES	YES
SIC2 x Year FE	NO	YES	NO	YES
Adjusted R <sup>2</sup>	0.282	0.297	0.292	0.309
N	12,789	12,753	12,789	12,753

Notes: Stock (and option) compensation refers to the ratio of stock (and option) grants divided by market capitalization multiplied by 10,000. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table 9: Heterogeneity**

Panel A: Peer performance sensitivity		Panel B: Equity compensation	
$\Delta$ Distance x Post x Ln(Local peer return)		Treat x Post	
1. Concentration of sales across the states			
Dispersed	Concentrated	Dispersed	Concentrated
0.029	0.045*	0.136	0.576**
(1.360)	(1.909)	(1.107)	(2.615)
2. Concentration of states mentioned in 10K			
Dispersed	Concentrated	Dispersed	Concentrated
0.003	0.057***	-0.232	0.401
(0.153)	(3.288)	(-0.894)	(1.477)
3. Revenue of largest 8 firms in NAICS			
Low	High	Low	High
-0.003	0.035**	0.391*	0.425**
(-0.139)	(2.388)	(1.756)	(2.075)
4. Board busyness			
Busy board	Less-busy board	Busy board	Less-busy board
0.005	0.035***	0.019	0.575***
(0.35)	(3.71)	(0.099)	(3.244)
5. CEO age			
< 60 years	> 60 years	< 60 years	> 60 years
0.008	0.059***	0.281	0.544***
(0.807)	(4.044)	(1.563)	(3.057)
6. Inevitable Disclosure Doctrine			
IDD	Non-IDD	IDD	Non-IDD
-0.018	0.033***	-0.209	0.510***
(-0.984)	(8.078)	(-0.680)	(4.923)

Notes: This table presents six different heterogeneity tests. First, we split the sample based on the sales among the states where the subsidiaries are located. Firms are assigned as “Concentrated” (“Dispersed”) if the geographic concentration of firms’ sales falls in top (bottom) 30 percentile across all firms. Second, we divide the sample based on the concentration of the states mentioned in annual reports in 2007 or 2008. Firms falling in top (bottom) 30 percentile of concentration are assigned as “Concentrated” (“Dispersed”). Third, we split the sample based on the percentage of the largest 8 firms over total revenue of each NAICS 4-digit in 2012. “High (Low)” group of firms are in NAICS whose percentage of revenue by 8 largest firms is top (bottom) quartile. Fourth, we split the sample based on the total number of directorships held by firm’s directors in other firms in 2012, and denote the firm as having a “Busy board” (“Less-busy board”) if this number is higher (lower) than the median value of each firm-size tertile. Fifth, we divide the sample into firms with CEOs who are 60 years old or younger in 2012 and firms with CEOs who are older than 60 years old in 2012. Sixth, we divide sample into the firms located in states with or without Inevitable Disclosure Doctrine (IDD) recognized by courts in 2012. The dependent variables are the natural logarithm of one plus total compensation (Panel A) and the ratio of stock grants divided by market capitalization multiplied by 10,000 (Panel B). Panel A shows the coefficients on  $\Delta$ Distance x Post x Ln(Local Peer Return) and Panel B shows the coefficients on Treat x Post. All other variables are defined in the same way as the previous tables. Firm fixed effects and joint fixed effect of SIC 2-digit and year are controlled for. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table 10:** Incentive alignment and firm outcomes

	Gross profit margin		Tobin's Q		Return comovement	
Stock grants x Treat x Post	0.486*		0.043*		1.031**	
	(2.007)		(1.986)		(2.427)	
Option and stock grants x Treat x Post		0.380**		0.029*		0.526**
		(2.389)		(1.955)		(2.152)
Treat x Post	-0.002**	-0.002*	-0.012*	-0.013	-0.003**	-0.003**
	(-2.072)	(-2.003)	(-1.737)	(-1.675)	(-2.292)	(-1.951)
Stock grants	-1.373*		-0.156*		-0.613	
	(-1.773)		(-1.999)		(-0.394)	
Stock grants x Treat	-0.169		-0.156*		-0.299	
	(-0.751)		(-0.862)		(-0.646)	
Stock grants x Post	-2.174*		-0.359***		-1.791	
	(-1.834)		(-4.530)		(-1.558)	
Option and stock grants		-1.153**		-0.249***		-1.639
		(-2.230)		(-2.941)		(-1.593)
Option and stock grants x Treat		-0.105		-0.005		0.097
		(-0.754)		(-0.280)		(0.479)
Option and stock grants x Post		-2.045**		-0.199***		0.168
		(-2.213)		(-3.203)		(0.134)
Size <sub>t-1</sub>	-0.012*	-0.012*	-0.407***	-0.400***	0.015***	0.016***
	(-1.911)	(-1.896)	(-10.185)	(-9.972)	(2.975)	(3.056)
Sales growth <sub>t-1</sub>	0.017**	0.017**	0.162***	0.163***	0.014*	0.014*
	(2.647)	(2.641)	(3.839)	(3.697)	(1.982)	(1.980)
Constant	0.529***	0.529***	5.073***	5.027***	0.318***	0.313***
	(10.089)	(10.122)	(15.826)	(15.567)	(7.502)	(7.199)
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.928	0.928	0.764	0.765	0.688	0.688
N	12,627	12,627	11,947	11,947	7,152	7,152

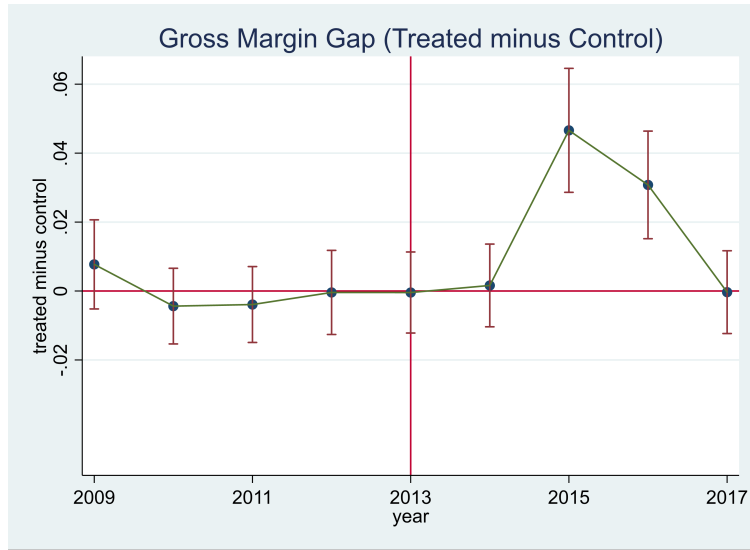
Notes: Gross profit margin refers to the gross profit divided by sales. Tobin's Q is computed as book value of assets minus book value of equity minus balance sheet deferred taxes plus market value of equity divided by book value of assets. Return comovement refers to the average annual correlation of weekly stock market returns between firm and its local peers. Post is a dummy variable which is equal one if the year is on or after 2013 or zero otherwise. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. Stock (and option) compensation refers to the ratio of stock (and option) grants divided by market capitalization (multiplied by 100 for column 3 and 4). We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Figure 1:** Number of antitrust case filings



Notes: This figure shows the number of antitrust case filings separately for the state courts where the field offices were closed over the period from 2008 to 2017 (dark grey line) and the state courts where the field offices were not closed over the same time period (light grey line). In 2013, DoJ closed down four of its seven regional offices (Atlanta, Cleveland, Dallas, and Philadelphia) that dealt with the antitrust enforcement. The change in coverage affected 23 states and territories: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Michigan (Eastern judicial district), Mississippi, New Jersey (Southern part), New Mexico, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, West Virginia, and U.S. Virgin Islands.

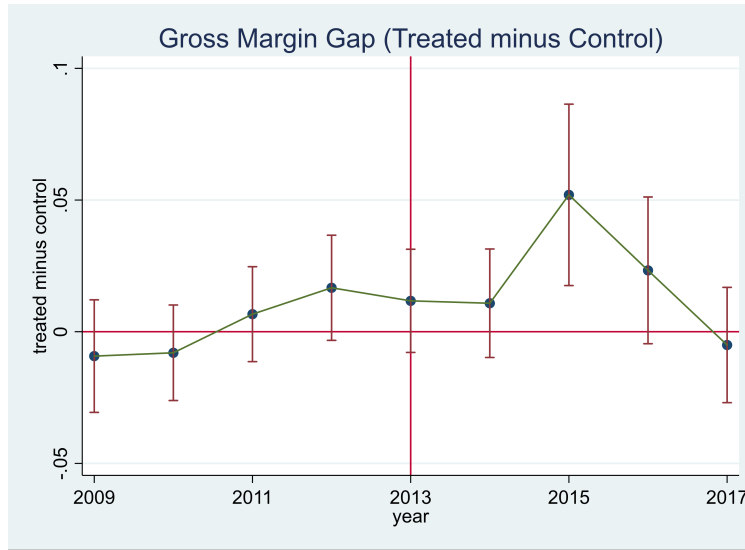
**Figure 2:** Gross margin differences between treated and control firms



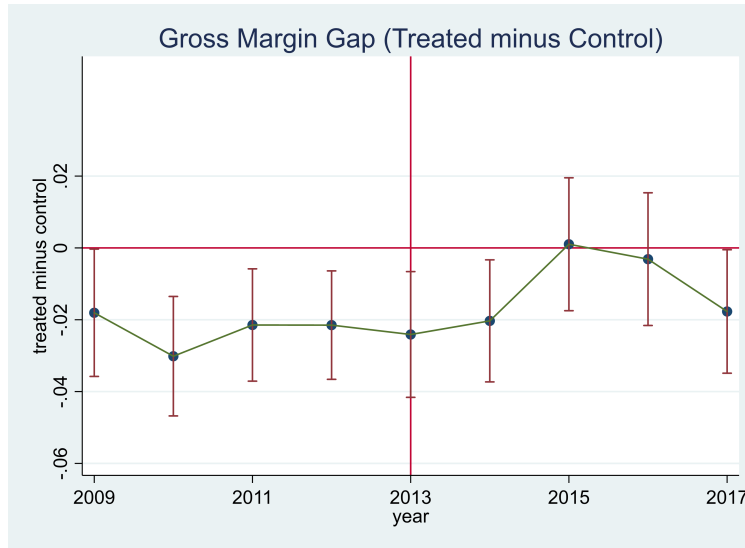
Notes: This figure shows the difference in gross margins between the treated firms and their matched control firms. Treated group refers to the firms whose distance from the headquarter to the governing antitrust field office increased in 2013 and who had local peer firms in 2012. For each treated firm, we match three control firms in the same SIC 2-digit industry, firm size quintile, and closest gross margin from 2007 to 2012. We report the mean values of the difference in gross margin between the treated and matched control firms year by year and the corresponding 90 percentile confidence intervals from t-tests. The sample includes the treated firms with valid gross margin data from 2009 to 2017 and at least one matched control firm. The sample is winsorized at 2.5 percentile on both sides.



**Figure 3:** Gross margin difference in subsamples based on stock compensation grant changes



Panel A: Firms with increased stock compensation grants



Panel B: Firms without increase stock compensation grants

Notes: This figure shows the difference in gross margins between the treated firms and their matched control firms. Treated firms are the firms that experienced an increase in the distance from their headquarter to the governing DoJ field office, and had local peer firms in 2012. For each treated firm, we match three control firms in the same SIC 2-digit industry, firm size quintile, and closest gross margin from 2007 to 2012. We report the mean values of the difference in gross margin between the treated and matched control firms year by year and the corresponding 90 percentile confidence intervals from t-tests. Panel A includes the firms whose stock compensation grants as percentage of market capitalization were higher in 2013-2017 than in 2009-2012. Panel B includes the firms whose stock compensation grants as percentage of market capitalization were not higher in 2013-2017 than in 2009-2012. The sample includes the treated firms with valid gross margin data from 2009 to 2017 and at least one matched control firm. The sample is winsorized at 2.5 percentile on both sides.

## Appendix 1: Examples of “strategic goals”

Firms often specify “strategic goals” as part of the subjective performance metrics. We collect a few examples of such “strategic goals” from firms’ DEF14A filings:

- *strategic initiative goals are primarily related to key planned strategic actions, such as portfolio expansion, key R&D milestones, gross margin expansion, and entry into new markets.*
- *strategic planning to position us for long-term growth.*
- *...enter into long-term contractual arrangements to secure revenue optimizing our balance sheet and capital allocation and managing risk.*
- *18 strategic goals in the following categories: (i) service excellence; (ii) safety and risk management; (iii) value pricing; (iv) profitable growth; (v) resource utilization; (vi) new energy environment; and (vii) employee engagement. // enterprise, legal, compliance and fraud risk assessments. // operating income, operating ratio, return on assets, safety, customer service, operating efficiency and other strategic goals*
- *...(xvi) the formation of joint ventures, research and development collaborations, marketing or customer service collaborations, or the completion of other corporate transactions intended to enhance the Company’s revenue or profitability or expand its customer base.*
- *inventory management, growth in the channel market, gross margin and business velocity.*
- *focus executives on achieving results that contribute to continued long-term growth in stockholder value*
- *capture pricing opportunities and improve financial position and prospects; improve succession planning and employee development; improve financial strength rating; enhance technology platforms.*
- *the Individual Strategic Goals identified for each executive officer included a mix of financial and operational, quantitative and qualitative factors. For fiscal 2015 these included but were not limited to: execution of the strategic plan; cost management, expense and pricing related goals; product development goals.*
- *the strategic objectives included but were not limited to emerging market growth, organic growth, and improving gross margins.*
- *...produce long-term growth in revenue and earnings: A top priority is sustained profitable growth.*
- *...the specific numbers used with regard to these goals (other than NOPAT less a capital charge) involve confidential trade secrets or confidential commercial or financial information, the disclosure of which would result in competitive harm.*
- *our compensation program is designed to align the interest of our executive officers with those of our stockholders through execution in three areas of strategic focus: growth and scale, operational excellence, and high performing organization.*

# Internet Appendix

**Table IA1:** “Profit margin” as a performance measure

	Contracting on “profit margin”	
Treat x Post	0.0022 (1.21)	0.0052** (2.04)
Size <sub>t-1</sub>	-0.014 (-1.46)	-0.018* (-1.77)
Sales growth <sub>t-1</sub>	0.0026 (0.25)	0.011 (0.97)
Ln(Tenure)	-0.0035 (-0.95)	-0.0034 (-0.89)
Constant	0.19** (2.21)	0.23** (2.44)
Year FE	YES	NO
Firm FE	YES	YES
SIC2 x Year FE	NO	YES
Adjusted R <sup>2</sup>	0.582	0.586
N	8638	8630

Notes: This table shows the regression results of a dummy indicator variable that equals one if “profit margin” is included as one of the performance measures in the CEO incentive plans, and zero otherwise. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA2:** Peer performance sensitivity and explicit performance benchmarking

	Ln(Total compensation)		Ln(Cash compensation)		Ln(Equity compensation)	
	Explicit performance benchmarking in 2013					
	Without	With	Without	With	Without	With
$\Delta$ Distance x Post x Ln(Return)	-0.042** (-2.675)	-0.004 (-0.403)	-0.050** (-2.034)	0.016 (0.981)	-0.107 (-1.174)	-0.013 (-0.328)
$\Delta$ Distance x Post x Ln(Local peer return)	0.055** (2.298)	0.027** (2.396)	0.054** (2.073)	0.005 (0.311)	0.275*** (3.682)	0.054 (1.098)
$\Delta$ Distance x Post	0.016 (1.677)	0.025*** (3.329)	0.041 (1.470)	0.020** (2.675)	0.049** (2.023)	0.023 (0.835)
Ln(Return)	0.093* (1.785)	0.025 (0.437)	0.151*** (3.425)	0.196** (2.476)	0.163 (0.764)	-0.035 (-0.172)
Ln(Local peer return)	0.013 (0.230)	0.067 (0.906)	0.120** (2.120)	-0.024 (-0.428)	-0.215 (-0.875)	0.367 (1.640)
Local market	-0.029 (-0.498)	-0.099 (-1.276)	0.084 (0.880)	-0.090 (-1.224)	-0.153 (-0.604)	-0.275 (-1.437)
$\Delta$ Distance x Ln(Return)	-0.011* (-1.717)	0.000 (0.032)	0.010 (1.288)	-0.006 (-0.899)	-0.018 (-0.338)	-0.020 (-0.800)
Post x Ln(Return)	0.237** (2.611)	0.075 (0.839)	0.468*** (3.826)	0.104 (0.943)	0.226 (0.736)	-0.127 (-0.414)
$\Delta$ Distance x Ln(Local peer return)	0.018 (1.436)	-0.013 (-1.444)	-0.001 (-0.105)	-0.007 (-0.789)	0.050 (1.453)	-0.037 (-1.431)
Post x Ln(Local peer return)	-0.184** (-2.082)	-0.183 (-1.657)	-0.157 (-1.131)	0.047 (0.453)	-0.409 (-1.134)	-0.637 (-1.670)
$\Delta$ Distance x Local market	0.007 (0.571)	0.031** (2.089)	0.021 (1.077)	0.036*** (3.601)	-0.048 (-0.907)	0.060 (1.416)
Post x Local market	0.041 (0.809)	0.100* (1.837)	0.074 (0.870)	0.047 (0.915)	0.096 (0.512)	0.275 (1.105)
$\Delta$ Distance x Post x Local market	0.004 (0.432)	-0.037*** (-4.366)	-0.039 (-1.441)	-0.038*** (-4.506)	-0.001 (-0.031)	-0.082** (-2.383)
Size <sub>t-1</sub>	0.232*** (3.323)	0.101** (2.299)	0.172** (2.401)	0.012 (0.127)	0.255 (1.646)	-0.020 (-0.141)
Sales growth <sub>t-1</sub>	0.127* (1.928)	0.058 (1.269)	0.173** (2.227)	0.058 (0.829)	0.346 (1.275)	0.362** (2.277)
Ln(Tenure)	0.035 (1.241)	0.078*** (5.801)	0.069*** (2.928)	0.108*** (3.821)	-0.167 (-1.408)	-0.044 (-0.797)
Constant	6.483*** (10.894)	7.781*** (19.214)	5.761*** (9.065)	7.514*** (7.972)	5.141*** (3.884)	8.294*** (6.351)
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.687	0.663	0.703	0.586	0.430	0.286
N	3,229	2,515	3,229	2,515	3,229	2,515

Notes: The sample is divided by whether the firm awards CEO based on the relative performance evaluation in 2013. The dependent variables are the logarithm of one plus total compensation, cash compensation, and equity compensation. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Controls include lagged value of size, lagged value sales growth and logarithm of CEO tenure. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA3:** Pairwise specification: Decomposition

	Ln(Cash compensation)			Ln(Equity compensation)		
$\Delta$ Distance x Post x Ln(Peer return) x Local dummy	0.016** (2.397)	0.016** (2.308)	0.017** (2.301)	0.023 (0.454)	0.023 (0.457)	0.015 (0.256)
$\Delta$ Distance x Post	-0.004 (-0.951)	-0.004 (-1.028)	-0.003 (-0.742)	-0.049* (-1.776)	-0.050* (-1.803)	-0.059** (-2.042)
Ln(Return)	0.177*** (5.630)	0.176*** (5.478)	0.159*** (4.714)	0.056 (0.561)	0.057 (0.565)	0.048 (0.479)
Ln(Peer return)	-0.006 (-1.481)	-0.006 (-1.496)	-0.006 (-1.364)	0.001 (0.063)	-0.012 (-0.713)	-0.006 (-0.350)
Local dummy	-0.104 (-0.951)	-0.104 (-0.951)	-0.098 (-0.951)	0.167 (1.237)	0.162 (1.200)	0.182 (1.198)
$\Delta$ Distance x Ln(Peer return)	-0.003 (-1.633)	-0.003 (-1.641)	-0.002 (-0.866)	0.002 (0.183)	0.002 (0.235)	0.002 (0.184)
Post x Ln(Peer return)	0.026** (2.057)	0.021* (1.911)	0.018 (1.450)	-0.000 (-0.003)	0.010 (0.194)	-0.001 (-0.009)
$\Delta$ Distance x Local dummy	0.015 (1.248)	0.016 (1.267)	0.015 (1.281)	-0.026* (-1.742)	-0.026* (-1.735)	-0.028 (-1.642)
Post x Local dummy	0.149 (0.951)	0.145 (0.929)	0.142 (0.942)	-0.379** (-2.526)	-0.388** (-2.616)	-0.521*** (-3.505)
Ln(Peer return) x Local dummy	0.105*** (3.039)	0.101*** (3.029)	0.114*** (2.855)	0.108 (0.685)	0.123 (0.789)	0.111 (0.655)
$\Delta$ Distance x Post x Ln(Peer return)	-0.001 (-0.333)	-0.002 (-0.550)	-0.002 (-0.380)	-0.024* (-1.679)	-0.023 (-1.572)	-0.030* (-1.712)
$\Delta$ Distance x Post x Local dummy	-0.017 (-1.017)	-0.017 (-1.009)	-0.017 (-1.049)	0.049 (1.280)	0.050 (1.300)	0.067* (1.709)
$\Delta$ Distance x Ln(Peer return) x Local dummy	-0.007 (-1.662)	-0.007* (-1.678)	-0.010** (-2.072)	-0.022 (-1.063)	-0.023 (-1.172)	-0.022 (-1.008)
Post x Ln(Peer return) x Local dummy	-0.145** (-2.182)	-0.140** (-2.143)	-0.150** (-2.163)	0.204 (0.531)	0.189 (0.491)	0.344 (0.767)
Size <sub>t-1</sub>	0.173*** (2.927)	0.174*** (2.909)	0.177*** (2.912)	0.567*** (3.438)	0.567*** (3.387)	0.571*** (2.922)
Sales growth <sub>t-1</sub>	0.070* (1.939)	0.070* (1.954)	0.061* (1.731)	0.186 (1.373)	0.190 (1.405)	0.163 (1.226)
Ln(Tenure)	0.081*** (4.421)	0.081*** (4.413)	0.077*** (4.099)	-0.201*** (-3.639)	-0.202*** (-3.687)	-0.217*** (-3.922)
Constant	5.634*** (10.766)	5.630*** (10.673)	5.601*** (10.399)	1.866 (1.306)	1.874 (1.293)	1.864 (1.106)
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES	YES	YES
Peer FE	YES	YES	YES	YES	YES	YES
Peer SIC2 x Year FE	NO	YES	YES	NO	YES	YES
Pair FE	NO	NO	YES	NO	NO	YES
Adjusted R <sup>2</sup>	0.777	0.778	0.764	0.618	0.619	0.571
N	328,078	328,046	307,953	327,824	327,792	307,697

Notes: The dependent variables are natural logarithm of cash (equity) compensation in first (last) three columns. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (Peer firms). Local dummy is an indicator for the presence of local peer firms under the definition above. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. (Peer) SIC 2-digit x Year FE is joint fixed effect between year and industry with the SIC 2-digit code of (peer) firm. Pair FE is fixed effect for the pair of focal firm and a particular peer firm. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA4:** Robustness tests for peer performance sensitivity

	Ln(Total compensation)					
	Same state & SIC 3-digit		Less than 100 miles & SIC 3-digit		Less than 400 miles & SIC 3-digit	
$\Delta$ Distance x Post x Ln(Return)	-0.019*** (-5.924)	-0.016*** (-3.421)	-0.019*** (-5.957)	-0.017*** (-3.388)	-0.021*** (-5.181)	-0.017*** (-3.301)
$\Delta$ Distance x Post x Ln(Local peer return)	0.021*** (6.069)	0.015* (1.678)	0.023*** (4.295)	0.023*** (2.811)	0.024*** (2.899)	0.021*** (3.075)
$\Delta$ Distance x Post	0.002 (0.681)	0.006 (1.317)	0.001 -0.407	0.004 -0.838	0.003 (0.820)	0.007 (1.070)
Ln(Return)	0.095*** (4.782)	0.106*** (4.945)	0.100*** -5.108	0.106*** -5.018	0.097*** (4.773)	0.104*** (4.912)
Ln(Local peer return)	0.035 (1.286)	0.048 (1.272)	0.009 -0.546	0.014 -0.603	0.025 (1.033)	0.024 (0.982)
Local market	0.011 (0.088)	-0.008 (-0.055)	-0.003 (-0.055)	-0.073 (-0.833)	-0.057 (-0.837)	-0.079 (-1.125)
$\Delta$ Distance x Ln(Return)	0.000 (0.160)	-0.004 (-0.978)	0 -0.034	-0.004 (-1.022)	0.001 (0.266)	-0.003 (-0.889)
Post x Ln(Return)	0.179*** (7.109)	0.139*** (4.644)	0.173*** -7.04	0.142*** -4.879	0.178*** (7.101)	0.144*** (4.978)
$\Delta$ Distance x Ln(Local peer return)	-0.004 (-1.291)	0.002 (0.353)	-0.003 (-1.592)	0.004 -0.937	-0.005** (-2.010)	-0.001 (-0.269)
Post x Ln(Local peer return)	-0.148*** (-6.121)	-0.181*** (-3.924)	-0.088*** (-3.048)	-0.101** (-2.523)	-0.088*** (-3.071)	-0.080* (-1.987)
$\Delta$ Distance x Local market	-0.004 (-0.255)	-0.003 (-0.147)	0.019** -2.616	0.030** -2.181	0.003 (0.308)	0.011 (0.857)
Post x Local market	0.099*** (4.396)	0.086** (2.434)	0.061** -2.266	0.046 -1.006	0.055 (1.603)	0.045 (0.846)
$\Delta$ Distance x Ln(Return) x Local market	-0.006 (-1.199)	-0.011* (-1.914)	-0.005 (-0.773)	-0.01 (-1.412)	-0.006 (-1.081)	-0.012 (-1.409)
Size <sub>t-1</sub>	0.256*** (12.266)	0.287*** (12.243)	0.256*** -12.136	0.284*** -12.172	0.255*** (12.488)	0.284*** (12.246)
Sales growth <sub>t-1</sub>	0.105*** (3.798)	0.073** (2.282)	0.106*** -3.877	0.075** -2.375	0.104*** (3.875)	0.073** (2.360)
Ln(Tenure)	0.045*** (4.269)	0.031*** (2.803)	0.045*** -4.327	0.030*** -2.761	0.045*** (4.266)	0.030*** (2.765)
Constant	6.061*** (33.030)	5.859*** (30.748)	6.063*** -35.767	5.893*** -35.025	6.113*** (38.197)	5.921*** (34.114)
Year FE	YES	NO	YES	NO	YES	NO
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	NO	YES	NO	YES	NO	YES
Adjusted R <sup>2</sup>	0.765	0.770	0.765	0.77	0.765	0.770
N	12,185	11,661	12,185	11,661	12,185	11,661

Notes: The dependent variables are natural logarithm of one plus total compensation. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms in three different ways: 1) the ones in the same state and SIC 3-digit code, 2) the ones located within 100 miles and have the same SIC 3-digit code, and 3) the ones located within 400 miles and have the same SIC 3-digit code with the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the annual percentage change in sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA5:** Time horizon of equity compensation

	Dummy of over 5-year vesting period of			
	Stock grants		Option and stock grants	
Treat x post	0.003** (2.391)	0.003** (2.141)	0.003** (2.671)	0.003*** (2.890)
Size <sub>t-1</sub>	-0.008 (-0.741)	-0.013 (-1.026)	-0.007 (-0.711)	-0.010 (-1.021)
Sales growth <sub>t-1</sub>	-0.012 (-1.082)	-0.004 (-0.345)	-0.007 (-1.055)	-0.006 (-0.810)
Ln(Tenure)	-0.013*** (-3.226)	-0.011*** (-3.179)	-0.012*** (-2.848)	-0.011** (-2.692)
Constant	0.123 (1.183)	0.160 (1.415)	0.109 (1.310)	0.136 (1.570)
Year FE	YES	NO	YES	NO
Firm FE	YES	YES	YES	YES
SIC2 x Year FE	NO	YES	NO	YES
Adjusted R <sup>2</sup>	0.419	0.470	0.378	0.428
N	5,603	5,534	6,509	6,447

Notes: The dependent variable is a dummy variable which is one if the firm grants stock (and option) grants with vesting periods of more than 5 years or zero otherwise. Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.



**Table IA6:** Heterogeneity: Distribution of firm operations

	Ln(Total compensation)			
	Concentration of			
	sales across the states		states mentioned in 10K	
	Dispersed	Concentrated	Dispersed	Concentrated
$\Delta$ Distance x Post x Ln(Return)	-0.017*	-0.059***	-0.027***	-0.010
	(-1.886)	(-4.879)	(-3.221)	(-1.032)
$\Delta$ Distance x Post x Ln(Local peer return)	0.029	0.045*	0.003	0.057***
	(1.36)	(1.909)	(0.153)	(3.288)
$\Delta$ Distance x Post	0.018***	0.003	0.018***	-0.023**
	(4.906)	(0.442)	(3.360)	(-2.644)
Ln(Return)	0.045	0.080*	0.130***	0.104***
	(1.137)	(1.685)	(2.775)	(2.784)
Ln(Local peer return)	-0.08	-0.009	0.038	-0.070
	(-1.055)	(-0.077)	(0.611)	(-0.943)
Local market	0.002	-0.041	-0.059	0.065
	(0.04)	(-0.752)	(-1.394)	(1.111)
$\Delta$ Distance x Ln(Return)	-0.01	0.014*	0.009	0.001
	(-1.685)	(1.689)	(1.003)	(0.187)
Post x Ln(Return)	0.232***	0.306***	0.148**	0.083
	(4.183)	(4.441)	(2.461)	(1.550)
$\Delta$ Distance x Ln(Local peer return)	0.001	-0.024	-0.021*	0.006
	(0.089)	(-1.377)	(-1.794)	(0.630)
Post x Ln(Local peer return)	-0.076	0.022	-0.096	0.008
	(-0.774)	(0.195)	(-0.750)	(0.101)
$\Delta$ Distance x Local market	-0.007	0.002	0.027***	-0.013
	(-0.871)	(0.196)	(3.809)	(-1.145)
Post x Local market	0.01	0.019	0.036	-0.004
	(0.161)	(0.229)	(0.579)	(-0.065)
$\Delta$ Distance x Post x Local market	-0.006	0	-0.024**	0.007
	(-0.61)	(0.017)	(-2.138)	(0.681)
Size <sub>t-1</sub>	0.123**	0.359***	0.044	0.317***
	(2.627)	(9.667)	(0.785)	(7.298)
Sales growth <sub>t-1</sub>	0.221***	0.097**	0.165***	0.101
	(3.619)	(2.211)	(3.577)	(1.650)
Ln(Tenure)	0.036	0.035	0.093***	-0.015
	(1.465)	(1.412)	(4.882)	(-0.624)
Constant	7.456***	5.147***	7.847***	5.582***
	(18.446)	(18.153)	(17.408)	(15.591)
Firm FE	YES	YES	YES	YES
Year x SIC2 FE	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.765	0.714	0.746	0.811
N	2,856	2,619	2,806	2,840

Panel B: Equity compensation

	Stock grants			
	Concentration of			
	sales across the states		states mentioned in 10K	
	Dispersed	Concentrated	Dispersed	Concentrated
Treat x Post	0.136 (1.107)	0.576** (2.615)	-0.232 (-0.894)	0.401 (1.477)
Size <sub>t-1</sub>	-2.537 (-1.308)	0.589 (0.335)	-0.148 (-0.081)	-3.098** (-2.066)
Sales growth <sub>t-1</sub>	-1.293 (-1.042)	-0.880 (-0.414)	-4.071** (-2.652)	1.123 (0.703)
Ln(Tenure)	0.127 (0.303)	-0.670 (-1.317)	-0.166 (-0.316)	-1.417 (-1.451)
Constant	29.518* (1.808)	7.688 (0.631)	11.307 (0.741)	35.722*** (2.822)
Firm FE	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.337	0.329	0.332	0.295
N	3,382	3,074	3,281	3,207

Notes: In both Panels A and B, we provide estimations where we split our original sample based on the sales distribution among the states where the subsidiaries and headquarters are located. In the first two columns, firms are assigned as “Concentrated” (“Dispersed”) if the geographic concentration of firms’ sales falls in top (bottom) 30 percentile across all firms in 2012. In the next two columns, we divide the sample based on the concentration of the states mentioned in annual reports in 2007 or 2008. Firms falling in top (bottom) 30 percentile of concentration are assigned as “Concentrated” (“Dispersed”). Dependent variables are the logarithm of one plus total compensation (Panel A) and the ratio of stock grants divided by market capitalization multiplied by 10,000 (Panel B). Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. Controls include lagged value of size, lagged value sales growth and logarithm of CEO tenure. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA7:** Heterogeneity: Industry concentration

	Ln(Total compensation)	
	Revenue of 8 largest firms in NAICS	
	Low	High
$\Delta$ Distance x Post x Ln(Return)	-0.003 (-0.348)	-0.025*** (-2.786)
$\Delta$ Distance x Post x Ln(Local peer Return)	-0.003 (-0.139)	0.035** (2.388)
$\Delta$ Distance x Post	0.015* (2.021)	0.008 (0.680)
Ln(Return)	0.162*** (2.931)	0.039 (0.920)
Ln(Local peer Return)	-0.047 (-0.716)	0.014 (0.182)
Local market	0.130* (1.834)	-0.008 (-0.180)
$\Delta$ Distance x Ln(Return)	-0.006 (-1.128)	-0.006 (-1.462)
Post x Ln(Return)	0.124** (2.051)	0.270*** (3.376)
$\Delta$ Distance x Ln(Local peer Return)	0.030* (1.957)	0.012 (1.249)
Post x Ln(Local peer Return)	-0.084 (-0.893)	0.010 (0.076)
$\Delta$ Distance x Local market	0.016 (1.009)	-0.009 (-1.106)
Post x Local market	0.015 (0.209)	-0.010 (-0.123)
$\Delta$ Distance x Post x Local market	-0.017 (-1.078)	-0.001 (-0.071)
Size <sub>t-1</sub>	0.236*** (4.577)	0.210*** (5.589)
Sales growth <sub>t-1</sub>	0.179** (2.286)	0.036 (0.457)
Ln(Tenure)	0.028 (1.128)	-0.013 (-0.527)
Constant	6.291*** (16.666)	6.686*** (21.479)
Firm FE	YES	YES
SIC2 x Year FE	YES	YES
Adjusted R <sup>2</sup>	0.762	0.761
N	1,880	2,511

Panel B: Equity compensation

	Stock grants	
	Revenue of 8 largest firms in NAICS	
	Low	High
Treat x post	0.391*	0.425**
	(1.756)	(2.075)
Size <sub>t-1</sub>	0.903	-1.169
	(0.815)	(-0.837)
Sales growth <sub>t-1</sub>	0.670	-6.844***
	(0.489)	(-2.962)
Ln(Tenure)	-1.832***	-1.225
	(-3.113)	(-1.535)
Constant	6.457	21.624*
	(0.749)	(1.904)
Firm FE	YES	YES
SIC2 x Year FE	YES	YES
Adjusted R <sup>2</sup>	0.322	0.273
N	2,833	2,852

Notes: In both Panels A and B, we provide estimations where we split our original sample based on the revenue of 8 largest firms as percentage of total revenue of NAICS in 2012. We denote the firm in “High” (“Low”) group if the revenue of largest 8 firms is in top (bottom) quartile. Dependent variables are the logarithm of one plus total compensation (Panel A) and the ratio of stock grants divided by market capitalization multiplied by 10,000 (Panel B). Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. Controls include lagged value of size, lagged value sales growth and logarithm of CEO tenure. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA8:** Heterogeneity: Board busyness

	Ln(Total compensation)	
	Less-busy board	Busy board
$\Delta$ Distance x Post x Ln(Return)	-0.032*** (-4.994)	-0.015 (-1.604)
$\Delta$ Distance x Post x Ln(Local peer return)	0.035*** (3.706)	0.005 (0.353)
$\Delta$ Distance x Post	0.017*** (3.478)	-0.006 (-1.412)
Ln(Return)	0.037 (1.355)	0.156*** (5.367)
Ln(Local peer return)	0.060 (1.024)	-0.094** (-2.091)
Local market	-0.017 (-0.386)	-0.026 (-0.755)
$\Delta$ Distance x Ln(Return)	0.003 (0.981)	-0.001 (-0.214)
Post x Ln(Return)	0.274*** (5.676)	0.090** (2.358)
$\Delta$ Distance x Ln(Local peer return)	-0.013** (-2.071)	0.005 (0.569)
Post x Ln(Local peer return)	-0.096 (-1.328)	0.017 (0.260)
$\Delta$ Distance x Local market	0.017** (2.228)	0.004 (0.581)
Post x Local market	0.039 (0.979)	-0.009 (-0.181)
$\Delta$ Distance x Post x Local market	-0.027*** (-3.912)	0.011 (1.330)
Size <sub>t-1</sub>	0.323*** (11.178)	0.185*** (6.306)
Sales growth <sub>t-1</sub>	0.131*** (3.886)	0.016 (0.408)
Ln(Tenure)	0.020 (1.355)	0.049*** (2.980)
Constant	5.435*** (23.031)	6.844*** (29.066)
SIC2 x Year FE	YES	YES
Firm FE	YES	YES
Adjusted R <sup>2</sup>	0.750	0.781
N	5,299	5,066

Panel B: Equity compensation

	Stock grants	
	Less-busy board	Busy board
Treat x Post	0.575*** (3.244)	0.019 (0.099)
Size <sub>t-1</sub>	0.853 (0.634)	-0.596 (-0.421)
Sales growth <sub>t-1</sub>	-2.678** (-2.150)	-0.885 (-0.780)
Ln(Tenure)	-1.234* (-1.693)	-0.963*** (-2.978)
Constant	5.433 (0.537)	16.069 (1.391)
Firm FE	YES	YES
SIC2 x Year FE	YES	YES
Adjusted R <sup>2</sup>	0.252	0.363
N	6,493	6,067

Notes: In both Panels A and B, we provide estimations where we split our original sample based on the total number of directorships held by firm’s directors in other firms (busy directors) in 2012. We denote the firm as having a “Busy board” (“Less-busy board”) if total directorships is higher (lower) than the median value of each firm-size tertile. Dependent variables are the logarithm of one plus total compensation (Panel A) and the ratio of stock grants divided by market capitalization multiplied by 10,000 (Panel B). Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. Controls include lagged value of size, lagged value sales growth and logarithm of CEO tenure. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA9:** Heterogeneity: CEO characteristics

Panel A: Peer performance sensitivity

	Ln(Total compensation)			
	CEO age		Inevitable Disclosure Doctrine	
	< 60 years	> 60 years	With	Without
$\Delta$ Distance x Post x Ln(Return)	-0.009* (-1.717)	-0.047** (-2.691)	0.010 (0.798)	-0.024*** (-5.682)
$\Delta$ Distance x Post x Ln(Local peer return)	0.008 (0.807)	0.059*** (4.044)	-0.018 (-0.984)	0.033*** (8.078)
$\Delta$ Distance x Post	0.001 (0.400)	0.009* (1.790)	0.003 (0.470)	0.003 (0.763)
Ln(Return)	0.086*** (2.854)	0.072 (1.580)	0.103** (2.716)	0.055** (2.238)
Ln(Local peer return)	-0.059 (-1.617)	0.144* (1.780)	0.024 (0.351)	-0.033 (-0.675)
Local market	-0.018 (-0.523)	-0.083 (-1.602)	0.053 (0.917)	-0.060 (-1.689)
$\Delta$ Distance x Ln(Return)	-0.003 (-0.790)	0.010 (1.326)	-0.010 (-1.077)	0.002 (0.603)
Post x Ln(Return)	0.158*** (3.999)	0.177** (2.405)	0.134** (2.418)	0.209*** (7.086)
$\Delta$ Distance x Ln(Local peer return)	0.008 (1.240)	-0.026*** (-2.932)	0.004 (0.366)	-0.001 (-0.146)
Post x Ln(Local peer return)	-0.025 (-0.374)	-0.136* (-1.746)	-0.046 (-0.472)	-0.051 (-0.843)
$\Delta$ Distance x Local market	0.012** (2.548)	0.012 (1.197)	-0.003 (-0.155)	0.013** (2.192)
Post x Local market	0.026 (0.759)	0.011 (0.155)	-0.009 (-0.157)	0.013 (0.343)
$\Delta$ Distance x Post x Local market	-0.002 (-0.300)	-0.016 (-1.537)	-0.007 (-0.490)	-0.005 (-1.360)
Size <sub>t-1</sub>	0.247*** (6.852)	0.277*** (4.119)	0.287*** (5.169)	0.230*** (11.406)
Sales growth <sub>t-1</sub>	0.057* (1.912)	0.181*** (3.153)	0.131*** (2.860)	0.066* (2.115)
Ln(Tenure)	0.041** (2.661)	0.036 (1.433)	0.060*** (3.589)	0.026 (1.622)
Constant	6.166*** (20.478)	5.943*** (10.861)	5.743*** (12.975)	6.381*** (36.631)
Firm FE	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.777	0.759	4,297	6,606
N	7,668	3,221	0.769	0.775

Panel B: Equity compensation

	Stock grants			
	CEO age		Inevitable Disclosure Doctrine	
	< 60 years	> 60 years	With	Without
Treat x Post	0.281 (1.563)	0.544*** (3.057)	-0.209 (-0.680)	0.510*** (4.923)
Size <sub>t-1</sub>	0.156 (0.176)	-2.041 (-0.885)	0.780 (0.484)	-1.058 (-0.798)
Sales growth <sub>t-1</sub>	-2.088* (-1.813)	-0.366 (-0.229)	-3.565* (-1.970)	-1.166 (-0.959)
Ln(Tenure)	-0.859 (-1.617)	-1.216* (-1.940)	-0.783 (-1.642)	-1.133 (-1.652)
Constant	10.341 (1.386)	27.516 (1.536)	4.705 (0.363)	20.241* (1.997)
Firm FE	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.303	0.271	4,870	7,768
N	8,722	3,899	0.335	0.282

Notes: In the first two columns of both Panels A and B, we provide estimations where we split our original sample based on the firm's CEO's age in 2012. We refer to firms with CEOs who are 60 years old or younger in 2012 as "< 60 years" and firms with CEOs who are older than 60 years old in 2012 as "> 60 years". In the last two columns of both Panels A and B, we provide estimations where we split our original sample based on whether firm's headquarter state's court recognizes Inevitable Disclosure Doctrine (IDD) or not. Dependent variables are the logarithm of one plus total compensation (Panel A) and the ratio of stock grants divided by market capitalization multiplied by 10,000 (Panel B). Post is a dummy variable which is one if the year is on or after 2013 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. Controls include lagged value of size, lagged value sales growth and logarithm of CEO tenure. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2008 to 2017. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.



**Table IA10:** Explicit performance benchmarking and firm outcomes

	Gross profit margin	Tobin's Q	Return comovement
Non-explicit x Treat x Post	0.0037** (2.28)	-0.011 (-1.225)	0.0029 (1.51)
Treat x Post	-0.0021 (-1.31)	0.001 (0.187)	-0.0032** (-2.05)
Non-explicit x Post	0.0025 (0.40)	0.089 (1.342)	0.0057 (0.47)
Size <sub>t-1</sub>	-0.016* (-1.76)	-0.338*** (-5.128)	0.013 (1.40)
Sales growth <sub>t-1</sub>	0.015 (1.35)	0.142* (1.769)	0.0026 (0.21)
Constant	0.55*** (6.86)	4.835*** (8.285)	0.36*** (4.39)
Firm FE	YES	YES	YES
SIC2 X Year FE	YES	YES	YES
Adjusted R <sup>2</sup>	0.904	0.808	0.712
N	7,499	5,911	4,308

Notes: Gross profit margin refers to the ratio of gross profit and revenue. Return comovement refers to the average annual correlation of weekly stock market returns between firm and its local peers. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not change. Post is a dummy variable which is equal to one if the year is on or after 2013 or zero otherwise. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Non-explicit indicates that the firm did not award CEO based on the relative performance evaluation in 2012. Controls include the lagged value of size, lagged value of sales growth, logarithm of CEO tenure and lagged value of logarithm of firm stock market return. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2007 to 2016. Standard errors are clustered at the firm level. Robust t-statistics are in parentheses.

**Table IA11:** Placebo test for peer performance sensitivity

	Ln(Total Compensation)		Ln(Cash Compensation)		Ln(Equity Compensation)	
$\Delta$ Distance x Post x Ln(Return)	0.000 (1.193)	0.000 (1.442)	-0.000 (-0.518)	-0.000 (-1.017)	-0.000 (-0.112)	-0.000 (-0.208)
$\Delta$ Distance x Post x Ln(Local peer return)	-0.005 (-0.441)	-0.003 (-0.290)	-0.018 (-1.012)	-0.028 (-1.454)	-0.054 (-0.879)	0.002 (0.020)
$\Delta$ Distance x Post	-0.009* (-1.853)	-0.009 (-1.651)	-0.009 (-1.412)	-0.015** (-2.564)	0.000 (0.014)	-0.000 (-0.008)
Ln(Return)	0.173*** (4.133)	0.168*** (3.473)	0.241*** (3.636)	0.239*** (3.469)	-0.230 (-0.809)	-0.192 (-0.584)
Ln(Local peer return)	0.060 (1.305)	0.054 (1.078)	0.096 (1.057)	0.042 (0.338)	-0.309 (-0.929)	-0.181 (-0.539)
Local market	-0.013 (-0.389)	-0.042 (-1.288)	-0.028 (-0.522)	-0.013 (-0.188)	0.141 (0.710)	-0.020 (-0.089)
$\Delta$ Distance x Ln(Return)	-0.000* (-1.974)	-0.000* (-1.898)	0.000 (0.232)	0.000 (0.585)	0.000 (0.397)	0.000 (0.397)
Post x Ln(Return)	-0.029 (-0.660)	-0.036 (-0.744)	-0.037 (-0.505)	-0.045 (-0.541)	0.223 (0.709)	0.223 (0.611)
$\Delta$ Distance x Ln(Local peer return)	0.006 (0.895)	0.008 (1.204)	0.008 (0.499)	0.022 (1.114)	0.068 (1.154)	0.028 (0.364)
Post x Ln(Local peer return)	-0.066 (-1.041)	-0.059 (-0.810)	-0.065 (-0.765)	-0.001 (-0.010)	0.237 (0.735)	0.087 (0.266)
$\Delta$ Distance x Local market	-0.010** (-2.421)	-0.006 (-1.333)	-0.009 (-1.288)	-0.008 (-0.837)	-0.016 (-0.547)	-0.006 (-0.188)
Post x Local market	-0.027 (-0.601)	0.032 (0.926)	0.046 (0.863)	0.058 (1.003)	-0.115 (-0.577)	0.058 (0.272)
$\Delta$ Distance x Post x Local market	0.027*** (4.129)	0.017** (2.057)	0.017* (1.702)	0.013* (1.749)	-0.002 (-0.055)	-0.001 (-0.031)
Size <sub>t-1</sub>	0.207*** (8.309)	0.203*** (7.279)	0.100** (2.418)	0.104** (2.384)	0.351** (2.396)	0.403** (2.482)
Sales growth <sub>t-1</sub>	0.117*** (4.261)	0.088*** (3.614)	0.101*** (3.046)	0.079** (2.177)	0.122 (0.813)	0.173 (1.085)
Ln(Tenure)	0.041* (1.907)	0.042* (1.897)	0.087*** (3.315)	0.086*** (3.023)	-0.097 (-1.473)	-0.084 (-1.174)
Constant	6.379*** (32.218)	6.415*** (30.024)	6.334*** (19.757)	6.298*** (18.707)	3.691*** (3.480)	3.258*** (2.710)
Year FE	YES	NO	YES	NO	YES	NO
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	NO	YES	NO	YES	NO	YES
Adjusted R <sup>2</sup>	0.735	0.743	0.728	0.736	0.557	0.562
N	11917	11893	7224	7201	7220	7197

Notes: The dependent variables are natural logarithm of one plus total compensation, cash compensation, and equity compensation. Post is a dummy variable which is one if the year is on or after 2008 or zero otherwise.  $\Delta$ Distance is the increase in geographical distance between headquarter of a firm and an governing antitrust office after the closure of four field offices (Atlanta, Cleveland, Dallas, and Philadelphia) in 100 miles. Ln(Return) (Ln(Local peer return)) refers to natural logarithm of one plus annual stock market return of focal firm (local peer firms). Local market is an indicator for the presence of local peer firms. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the annual percentage change in sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2003 to 2012. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA12:** Placebo test for equity compensation awards

	Stock grants		Option and stock grants	
Treat x Post	-0.101 (-1.135)	-0.092 (-0.966)	-0.207** (-2.134)	-0.124 (-1.142)
Size <sub>t-1</sub>	0.839 (0.871)	0.326 (0.361)	2.625** (2.237)	1.587 (1.341)
Sales growth <sub>t-1</sub>	-1.160 (-1.527)	-0.946 (-1.280)	0.187 (0.125)	0.641 (0.380)
Ln(Tenure)	-0.337 (-0.579)	-0.288 (-0.457)	-1.278* (-1.770)	-1.062 (-1.406)
Constant	2.491 (0.328)	6.380 (0.904)	-4.487 (-0.489)	3.121 (0.351)
Year FE	YES	NO	YES	NO
Firm FE	YES	YES	YES	YES
SIC2 x Year FE	NO	YES	NO	YES
Adjusted R <sup>2</sup>	0.276	0.296	0.279	0.294
N	8814	8795	8812	8793

Notes: Stock (and option) compensation refers to the ratio of stock (and option) grants divided by market capitalization multiplied by 10,000. Post is a dummy variable which is one if the year is on or after 2008 or zero otherwise. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total assets. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2003 to 2012. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.

**Table IA13:** Placebo test for incentive alignment and firm outcomes

	Gross profit margin		Tobin's Q		Return comovement	
Stock grants x Treat x Post	-1.052 (-1.157)		-4.470 (-0.716)		-0.038 (-0.034)	
Option and stock grants x Treat x Post		0.035 (0.223)		-5.694*** (-3.441)		-0.015 (-0.023)
Treat x Post	0.002* (1.976)	0.001* (1.878)	0.001 (0.202)	0.005 (0.901)	0.003** (2.586)	0.003** (2.224)
Stock grants	-0.142 (-0.107)		-74.018*** (-3.999)		3.212 (0.444)	
Option and stock grants		0.155 (0.183)		-62.652*** (-5.319)		1.555 (0.314)
Stock grants x Treat	0.947 (1.050)		4.141 (0.641)		-0.425 (-0.376)	
Stock grants x Post	-1.182 (-0.925)		62.237*** (3.354)		-4.669 (-0.606)	
Option and stock grants x Treat		-0.147 (-1.077)		5.180** (2.615)		-0.127 (-0.220)
Option and stock grants x Post		-1.258 (-1.481)		41.376*** (4.760)		-3.490 (-0.653)
Size <sub>t-1</sub>	-0.004 (-0.783)	-0.004 (-0.746)	-0.465*** (-6.080)	-0.459*** (-6.085)	0.014 (1.281)	0.015 (1.323)
Sales growth <sub>t-1</sub>	0.003 (0.393)	0.003 (0.380)	0.100 (1.430)	0.102 (1.397)	0.005 (0.453)	0.005 (0.448)
Constant	0.438*** (10.059)	0.438*** (10.052)	5.337*** (9.026)	5.308*** (9.047)	0.347*** (3.823)	0.344*** (3.784)
Firm FE	YES	YES	YES	YES	YES	YES
SIC2 x Year FE	YES	YES	YES	YES	YES	YES
Adjusted R <sup>2</sup>	0.925	0.925	0.785	0.786	0.682	0.682
N	8708	8706	8175	8173	4515	4515

Notes: Gross profit margin refers to the gross profit divided by sales. Tobin's Q is computed as book value of assets minus book value of equity minus balance sheet deferred taxes plus market value of equity divided by book value of assets. Return comovement refers to the average annual correlation of weekly stock market returns between firm and its local peers. Post is a dummy variable which is equal one if the year is on or after 2008 or zero otherwise. Treat is the increase in geographic distance (in 100 miles) between headquarter of a firm and a governing antitrust field office after the closure of four field offices if the firm had local peer firms in 2012. Treat is equal to zero if the firm had no local peer firms in 2012 or the distance to the governing antitrust office did not increase. Stock (and option) compensation refers to the ratio of stock (and option) grants divided by market capitalization (multiplied by 100 for column 3 and 4). We define local peer firms as the ones with Hoberg-Phillips product similarity score within the top 30% and headquartered within 200 miles from the focal firm. Size is natural logarithm of one plus total asset. Sales growth is the ratio of current year sales minus previous year sales and previous year sales. Ln(Tenure) is natural logarithm of the years since the executive assumes their CEO position. SIC2 x Year FE is joint fixed effect between year and industry with the same SIC 2-digit code. All the variables are winsorized at the 0.5% and 99.5% levels. The data spans from 2003 to 2012. Standard errors are clustered at the state level. Robust t-statistics are in parentheses.