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Introduction

Product market collusion cases are rampant and span different industries. Recent and ongoing investigations in the U.S. include such cases as civil suits accusing the four largest U.S. rail carriers of a price-fixing conspiracy; Florida Cancer Specialists & Research Institute paying a maximum statutory fine of $100m for agreeing not to compete with a rival oncology group in Southwest Florida; and former CEO of Bumble Bee Foods LLC being sentenced to three years in jail for conspiring to fix canned tuna prices. Yet despite the legal sanctions upon conviction, collusion can be quite attractive to firms when the probability of detection is relatively low.

However, even when it is optimal for a firm to engage in collusive activities, the management in publicly-listed firms might have different intrinsic incentives. Due to career considerations and reputational concerns, executives might be more reluctant to engage in collusive activities than an anonymous marginal investor would be. Moreover, U.S. executives are exposed to criminal charges if the firm is convicted of explicit price-fixing or bid-rigging conspiracies.[2, 3] Although firms sometimes indemnify their employees for monetary fines, such financial reimbursement may not be as effective in the case of imprisonment, which imposes a large personal cost. These considerations suggest that, when intrinsic incentives differ, boards of directors might choose to adopt various corporate governance mechanisms to align managerial incentives with those of shareholders and in this way introduce extrinsic motivation for collusion.

In the ongoing research project, we study how CEO[4, 5] compensation can be used to motivate collusion. We study a case where antitrust enforcement weakens for some firms. When that happens, shareholders may shift their preference from aggressive competition to collusive strategies, as the profits from engaging in collusion might now be larger than the expected costs of legal sanctions. On the other hand, managers might still prefer not to engage in collusion, given reputational concerns and the remaining threat of criminal enforcement. In this case, the shareholders (or the boards of directors representing them) may choose to adopt certain features of compensation packages that implicitly encourage the pursuit of collusive strategies. We thus argue and provide empirical evidence that antitrust enforcement can have an influence on the structures of managerial compensation.

Theoretical Predictions

Drawing from the contracting theory, two types of incentive schemes stand out as likely to have an influence on 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, CEO's pay is negatively associated with peer performance. However, when it benefits shareholders to soften product

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[1] This article is an abridged summary of the research working paper entitled "Motivating Collusion." Sangeun Ha and Alminas Žaldokas are at the Hong Kong University of Science and Technology (HKUST). Fangyuan Ma is at the Peking University HSBC Business School. Emails: shaaa@connect.ust.hk; fangyuanma@phbs.pku.edu.cn; alminas@ust.hk.

[2] Such criminal antitrust enforcement against individuals has been rising over time, see, e.g. Kades (2019).

[3] Kades, Michael, 2019, The state of U.S. federal antitrust enforcement.

[4] 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 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.

[5] Harrington, Joseph E., 2006, How do cartels operate?, *Foundations and Trends in Microeconomics* 2, 1-105.

market competition, the optimal contract has a positive loading on peer performance. As weaker antitrust enforcement makes collusion more appealing, shareholders can encourage softer competition through establishing a positive link between CEO pay and peer performance.

The second aspect of CEO compensation relevant for collusive incentives 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. Although cartels are unstable by nature, a stock-holding manager may have little incentive to deviate from the cartel agreement, since stock prices reflect future losses from a punishment phase, thus limiting the gains from deviation. This suggests that, when shareholders' preference over collusion increases, it is in their best interest to increase equity compensation to CEOs.

Empirical Strategy

We focus on U.S. firms between 2008-2017. One approach to investigate the interaction of compensation policies and collusion would be to study convicted cartel cases. We argue that this might be insufficient, as convicted cases might not be a representative sample of all collusive arrangements. Specifically, firms might put more effort in retaining the most profitable collusive arrangements, which then might have fewer leniency applicants – who are often crucial in providing evidence for legal prosecution.

In our empirical work we thus look at a recent regulatory change that arguably weakened antitrust law enforcement for some firms in the U.S. Namely, we study the decision in 2013 to close down four regional offices of the 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 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's main headquarters in Washington, DC, and the remaining regional offices. The change in coverage affected 23 states and territories.[6]

We argue that this regulatory decision has contributed to the decrease in monitoring of collusion in local markets that were near 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 detection of their collusion with local rivals. We argue that the reduction of firms' expected costs from antitrust investigations thus changed their trade-off on whether to engage in collusive arrangements.

In the following sections we study whether this enforcement change has led to changes in executive compensation schemes towards the features that incentivize less aggressive competition. To do this we adopt a difference-in-differences empirical strategy. We consider the treated firms to be those firms for which the closest antitrust offices have closed and which had local competitors, while the control firms are those for which the corresponding antitrust offices did not close or which had no local competitors. We test whether compensation structures changed significantly in response to the 2013 event for the treated firms as compared to the control firms.

Empirical Findings

We find strong evidence supporting the theoretical predictions. We first test CEO pay

[6] 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.

sensitivity to the stock returns of their own firm and of local peer firms.[7] Firms located nearby the closed regional DOJ offices start showing more positive sensitivity of CEO pay to the performance of local industry rivals. The sensitivity of CEO pay to local peers' performance increases by 0.02 percent for a firm whose distance to the corresponding field office increases by 100 miles. This effect is driven by changes in cash bonuses, which is the most flexible component of compensation that could quickly adapt to sudden changes in the contracting environment. Overall, this evidence supports the argument that the lower expected antitrust enforcement against collusion reduced the incentive for firms to outperform peer firms with whom they have possibilities of colluding in the product markets.

Further, we find that the percentage of stock and option grants increased significantly for the treated firms after 2013. The stock awards to CEO's increase by 0.53 basis points of market capitalization for a firm with local peers when the distance to new field office increases by 100 miles, compared to the firms for which the covering field offices did not change or which did not have any local peers. This confirms that when collusion became more attractive to shareholders, the boards pay CEOs with more equity compensation to improve the alignment of shareholder and manager incentives.

We next explore the heterogeneous impact on CEO compensation induced by the regulatory reform. We first show that our results are stronger for 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 entrenched managers. We further find that the effects are stronger for the firms with more concentrated local operations, which arguably have been more affected by the drop in local market monitoring from the antitrust authorities. Moreover, our results are more profound for firms in concentrated industries, where coordination among limited numbers of players makes collusion more feasible. Finally, we show that the result is stronger among the CEOs approaching retirement age as absent equity incentives these CEOs are likely to have a shorter-term focus and thus different preferences from shareholders.

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 improve for the firms that have been granting their managers stocks and options, and for the firms that have not been rewarding managers based on the explicit relative performance evaluation. These findings are consistent with anti-competitive effects. In addition, the stock returns of these firms started comoving more with the returns of their local product market peers, which is indicative of correlated operating performance.

Conclusion

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

[7] 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.

subject to the personal antitrust liability.[8]

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-termist investor behavior facilitates collusion, policies that care about consumer welfare might choose to encourage manager short-termism and exacerbate the principal-agent problem if that has competitive effects.

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 as a way of deterring collusion.[9]

[8] 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 the 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.

[9] Kaplow, Louis, 2011, An economic approach to price fixing, *Antitrust Law Journal* 77, 343-449.