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Do Institutional Directors Matter?



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Abstract

The large increase in common institutional ownership raises significant antitrust concerns, even if the precise channel of any potential influence on market outcomes is unclear. Using a novel dataset on shareholders' board representation, we examine the role of common institutional directors (i.e., joint board representation by institutional shareholders) as one such potential channel with three main findings. First, institutional board representation is extremely low relative to extensive institutional ownership. Second, common institutional directors on rival firm boards are rare. Third, common institutional directors show no incremental effect on market outcomes amidst the positive relationship between common ownership and firm profitability.

Keywords: Common ownership, institutional board representation, competition policy

JEL Classification: G32, G34, L4

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1. Introduction

Over the last two decades, the dramatic increase in ownership of institutional investors has raised questions about the implications for corporate policies when ownership stakes become substantial in rival firms.¹ In particular, a heated debate centers on whether common ownership raises antitrust concerns (e.g., Azar, Schmalz, and Tecu, 2018; Antón, Ederer, Giné, and Schmalz, 2022; Lewellen and Lowry, 2021). However, it is less clear how common shareholders engage with and exert influence on corporate decision-making. When it comes to antitrust issues, judges and legal scholars generally agree that the underlying channel through which the effect of common ownership manifests is unclear (Ginsburg and Klovers, 2018; Scott Morton and Hovenkamp, 2017; Hemphill and Kahan, 2019).² Given the importance of the common ownership issue and its implications on competition policies, understanding possible channels is of first-order importance.

This paper focuses on board representation as a potential channel of influence. Although shareholders are the de facto owners, they have virtually no power to exercise control over the company's day-to-day operations. The shareholders' power of managing a company is vested in their duly elected board representatives (Clark 1986). As Bebchuk (2005) states, "A central and well-settled principle of U.S. corporate law is that all major corporate decisions must be initiated by the board [...]. The only way in which shareholders can attempt to introduce a new corporate decision is by replacing incumbent directors with a new team that is expected to make such a change." Therefore, board representation is the most direct and obvious channel

¹ These corporate policies include acquisitions (Matvos and Ostrovsky, 2008; Harford, Jenter, and Li, 2011); executive compensations (Anton, Ederer, Gine, and Schmalz, 2022); disclosure incentives (Park, Sani, Shroff, and White, 2019); corporate governance (He, Huang and Zhao, 2019); and the reduction of patent holdup (Geng, Hau, and Lai, 2021), among numerous other outcomes (He and Huang, 2017).

² For example, Judge Douglas Ginsburg and his colleague at the U.S. Court of Appeals for the District of Columbia Circuit states "Most proponents of antitrust enforcement against common ownership ... simply assume a causal relationship. This is particularly problematic because, as even proponents acknowledge, the mechanism of harm is unknown." Scott Morton and Hovenkamp (2017, p. 2031) claim, "The theoretical literature to date does not identify what mechanism funds may use to soften competition."

through which shareholders can influence corporate decision-making. Following this logic, several recent studies (Azar, 2021; Eldar, Grennan, and Waldock, 2020; and Geng, Hau, Michaely, and Binh, 2022) conjecture that *joint* board representation constitutes a mechanism through which common shareholders engage in corporate coordination or even collusion. Yet, despite the salience of this channel, without data on shareholders' board representation, economics and finance literature fails to provide any direct evidence to verify this channel.

Our paper fills this gap. The analyses in this study are organized around four important and related questions. First, to what extent do large shareholdings of institutional investors translate into board representation by institutional directors? Second, do institutional directors frequently sit jointly on the boards of rival firms? Third, is overlapping institutional board representation associated with higher price markups indicative of anti-competitive coordination? Fourth, do non-institutional shareholders show any difference in the propensity of being represented on rival firms' boards?

We define an institutional investor's board representative, or an institutional director, in a firm as any board member working simultaneously for any institutional shareholder of that firm. For example, such a board member can be a partner, an officer, a director, or just an employee in the institutional investment company. To identify institutional directors on firm boards, we combine several datasets. First, from BoardEx we retrieve information on the board directors of all U.S. public firms together with data on their *other* employers. Second, we match names between directors' other employers and institutional investors which have ever made regulatory filings (13F form).³ This procedure identifies all company directors who simultaneously work for (and represent) institutional investors.

³ We use 13F ownership data directly collected from EDGARS by Backus, Conlon, and Sinkinson (2021). They note that the commercial dataset on institutional ownership compiled by Thomson Reuters contains errors.

Prior to the name matching, we address the issue raised by Backus, Conlon, and Sinkinson (2021) that multiple 13F reporting entities are actually subsidiaries of one large entity.⁴ We carefully identify subsidiary entities using various information (i.e., telephone numbers, locations, and names) and consolidate their equity ownership with the parent entity. Doing so ensures that our measurement of common ownership is not understated.

Four Main Results

First, we find that institutional investors are strongly under-represented on the boards of U.S. public firms relative to their enormous collective ownership. Out of 81,463 Compustat firm-years during 1999-2016, only 6,203 (7.61%) firm-years feature at least one institutional director representing an institutional shareholder owning at least 1% of outstanding shares. When we examine institutional shareholders owning more than 5% of outstanding shares, their board representatives only appear on the boards of 3,206 (3.94%) firm-years.⁵ Interestingly, institutional board representation is more likely to be found in firms with a greater institutional ownership share and large and mature firms facing *less* competitive pressure, as implied by higher profitability, lower sales growth, and less R&D investments.

To provide more insights into institutional board representation, we ask what investor type obtains board seats? We find a predominance of bank directors and directors representing sophisticated investors (i.e., hedge funds, venture capital, or private equity) with a share of 41% and 35%, respectively. Directors representing independent investment companies, which comprise large mutual fund companies like Blackrock and Vanguard, account for a relatively

⁴ As noted by Backus, Conlon, and Sinkinson (2021), Blackrock has multiple reporting entities in the 13F database. They include “Blackrock Inc.,” “Blackrock advisors, LLC,” “Blackrock Asset Mgmt Ireland, Blackrock Japan Co., LTD”, etc., each marked by a different reporting ID in EDGAR and Thomson Reuters’ dataset. See a more detailed description of this problem in Backus, Conlon, and Sinkinson (2021).

⁵ Requiring an ownership threshold (1% or 5%) for institutional shareholders corresponds to the notion that block shareholders are more likely to exert real influences on firm decision-making.

moderate share of only 16%. Moreover, institutional investors with board seats are often those engaged in shareholder activism.

In sum, institutional board representation occurs only infrequently for U.S. public firms. This finding can have a variety of explanations ranging from statutory barriers of obtaining board control (e.g., dual-class stocks, elimination of cumulative voting, etc.) to institutional investors' indifference towards governance issues (Heath, Macciocchi, Michaely, and Ringgenberg, 2022).

Our second main finding is that common institutional shareholders between rival firms *rarely* establish joint board representation in both firms. We distinguish two types of joint institutional board representation, which are illustrated in Figure 1. Type I in the left panel refers to the case in which one *single* institutional director represents the common shareholder on the boards of both firms. This definition aligns with the notion of common directors used in Azar (2021) and Eldar, Grennan, and Waldock (2021). Under Type II joint institutional board representation, we allow separate individuals to hold board seats in both firms as long as these individuals represent the same common institutional shareholder. Type II representation was omitted in prior studies. For semantic convenience, we also refer to joint board representation by common institutional shareholders simply as *common institutional directors*.

As the antitrust issue is only concerned with common ownership of industry rivals, we primarily focus on intra-industry firm pairs based on the four-digit NAICS industry classification. Out of 2,736,451 intra-industry firm pairs with at least one common institutional shareholder owning more than 1% of outstanding shares in both firms, only 278 (0.01%) firm pairs feature a Type I common institutional director, and 823 (0.03%) firm pairs a Type II

common institutional director, respectively. The findings suggest that common institutional directors between rival firms are *extremely rare*.⁶

In contrast to firms with institutional directors discussed earlier, firms with *common* institutional directors appear to operate in very dynamic and structurally unstable economic environments characterized by high sales growth, low and often negative profitability, and high R&D investment. We contend that such strongly contested corporate environments can provide exceptional incentives for cross-firm coordination, consistent with the findings of Geng *et al.* (2022).

Again, we ask what is unique about these common institutional shareholders that obtain joint board representation. We find that banks and sophisticated investors (i.e., hedge funds, venture capital, and private equity) send 34% and 51% of common institutional directors (Type I or II), respectively, whereas independent investment companies account for only 9% of such cases. In particular, the so-called “Big Three” asset management companies (i.e., Vanguard, Blackrock, and State Street) show joint board representation in only 37 intra-industry firm pairs. Moreover, a significant share of common institutional directors represents potentially activist shareholders, as indicated by their historical Schedule 13D filings and activist campaigns in other firms.

Our third finding is that additional joint board representation does *not* correlate significantly with higher firm profitability after controlling for common institutional ownership. We distinguish between common institutional shareholders with joint board representation in rival firms and common institutional shareholders without such joint board representation. The former effect on firm profitability is *not* significantly different from the latter across all

⁶ Recognizing that the NAICS industry classification might not perfectly characterize the relevant product markets in which firms compete, we alternatively define rival firms based on the product market similarity measure developed by Hoberg and Phillips (2010, 2016) and reach a similar conclusion.

specifications we examine. This result is consistent with the infrequent occurrences of joint board representation by common institutional shareholders.

Our fourth finding concerns the contrast in board representation between institutional and non-institutional shareholders. Although institutional shareholders (i.e., those who are required to file 13F Forms) are at the center of the debate on the anticompetitive effect of common ownership, it is also important to account for the common ownership by non-institutional shareholders (e.g., Elon Musk) as these shareholders may also pose an anticompetitive threat through common ownership (Amel-Zadeh, Kasperk, and Schmalz, 2022). We show that, unlike institutional counterparts, non-institutional shareholders do *not* often establish common ownership in rival firms. Only 37,348 intra-industry firm pairs show common ownership by non-institutional shareholders, amounting to a tiny fraction of almost three million intra-industry firm pairs with common institutional ownership.⁷ This is consistent with the finding of Amel-Zadeh *et al.* (2022) that non-institutional shareholders usually hold a single large stake in one firm. Next, while infrequent among U.S. public firms, common non-institutional shareholders are more likely to obtain board representation. 4.75% of 37,348 firm pairs show common directors by non-institutional shareholders, roughly 100 times more frequent than common institutional directors. Despite the relatively high propensity to be represented on rival firms' boards, such board representation does not significantly increase the profitability for firms with common non-institutional ownership. Figure 3 visualizes the contrast in common ownership and joint board representation between institutional shareholders and non-institutional shareholders.

⁷ Like in our analysis for common institutional shareholders, we only consider common non-institutional shareholders owning at least 1% of shares in both firms in a pair.

Contribution and Related Literature

To the best of our knowledge, our paper is the first to document the extent to which institutional and non-institutional shareholders are represented on the boards of U.S. public firms. Prior studies usually examine a specific subset of institutional directors, whereas a systematic analysis is lacking. For example, Güer, Malmendier, and Tate (2008) investigate "bank directors," identified as board directors with a banking background and find no evidence that bank directors increase firm value. Bebchuk, Brav, and Jiang (2015) and Hamdani and Hannes (2019) find that shareholder activism campaigns usually lead to the appointment of directors nominated by the activists. Our paper differs from these studies by covering a broader set of institutional and non-institutional investors and examining competitive issues related to their board representation in rival firms.

Second, our finding contributes to the debate about common ownership and its potential anti-competitive effect. The debate so far has focused on three broad areas, namely (i) the robustness of the statistical evidence,⁸ (ii) the managerial incentives to engage,⁹ and (iii) identifiable mechanisms through which common shareholders coordinate.¹⁰ Our paper mostly contributes to the third area of debate and indicates that joint board representation is unlikely to be the main influencing channel of common institutional shareholders due to its rare occurrences.

⁸ See critiques in Lewellen and Lowry (2021); Dennis, Gerardi, and Schenone (2021); and Koch, Panayides, and Thomas (2021). See response in Azar, Schmalz, and Tecu (2021) and Azar, Schmalz, and Tecu (2022). A most recent working paper by Amel-Zadeh, Kasperk, and Schmalz (2022) shows that properly measuring common ownership needs to account for non-financial blockholders, which are missing in most common ownership studies.

⁹ Gilje, Gormley, and Levit (2020), based on a new measure of common ownership, argue that common ownership can diminish managerial incentives to internalize externalities. However, Anton, Ederer, Gine, and Schmalz (2022) and Backus, Conlon, and Sinkinson (2021) claim that Gilje, Gormley, and Levit (2020)'s measure does not account for the strategic interactions between either managers or investors, which are important for examining the managerial incentives in the presence of common shareholders.

¹⁰ Ginsburg and Klovers (2018) and Scott Morton and Hovenkamp (2017) question a lack of identifiable casual channels through which the effect of common ownership manifests. In response, Azar (2021), Schmalz (2021), Shekita (2020), and Elhauge (2021) discuss various such channels.

Yet, our findings are certainly consistent with the anti-competitive effect of common ownership as long as this operates through channels other than direct board representation. Board representation is far from being the only channel through which institutional shareholders can influence firm behavior. Plenty of behind-the-scenes intervention measures are summarized in McCahery, Sautner, and Starks (2016). Solomon and Soltes (2015) document surprisingly frequent direct meetings between institutional investors and corporate executives for an undisclosed U.S. listed company. But few studies systematically examine these mechanisms in the context of common ownership. Shekita (2020) collects anecdotes concerning mechanisms by which common shareholders exercise influence. Yet, systematic empirical analysis is still required to validate these mechanisms.

Third, we confirm and address the understatement of common institutional ownership in previous studies. These studies generally neglect to account for the parent-subsidiary relationship among 13F institutional investors (Backus, Conlon, and Sinkinson, 2021). Our study shows that correcting the error increases the average common institutional ownership of U.S. listed firms by 33.6%.

Several studies are closely related to our paper, and it is useful to point out differences. Our findings are at odds with those of Azar (2021), who argues that board overlap represents an influence channel for common institutional ownership. This claim is based on the observed positive correlation between board overlap and common institutional ownership. But our analysis of the connections between board directors and institutional investors reveals that the board overlap identified in Azar's sample is almost always unrelated (in terms of actual "representation") to common institutional ownership and thus represents a distinct governance phenomenon.

Eldar, Grennan, and Waldock (2020) examine a sample of startup firms and emphasize the role of venture capital firms and their board representatives in coordinating firm conduct among private startup firms. Although the joint board representation by sophisticated investors like venture capital and private equity firms extends to public firms, as argued above, it constitutes an extremely rare practice for almost all investment companies. Therefore, we consider our findings complementing those of Eldar, Grennan, and Waldock (2020).

Recent work by Geng *et al.* (2022) and Gopalan, Li, and Zaldocas (2022) document that board overlap itself can be a powerful mechanism for firm coordination. Moreover, intra-industry board overlap has doubled among the 25% most R&D-intensive US firms in the last two decades, as documented by Geng *et al.* (2022, see Figure 1). The caveat is that this development bears no relationship to board "representation" by institutional investors. In short, while both increasing common institutional ownership and increasing board overlap pose independently potentially serious policy concerns, overlapping board representation by institutional investors is mostly a "red herring."

2. Sample Selection

2.1. Institutional Investor Data

SEC requires all institutional organizations managing over \$100 million to report their portfolio equity ownership on a quarterly basis (13F form). The reported institutional ownership data can be found in the EDGAR system maintained by the SEC. We use institutional equity ownership information reported during the period 1999–2016, which is directly extracted from EDGAR by Backus, Conlon, and Sinkinson (2021). Previous studies on institutional investors usually rely on a commercial dataset of institutional ownership collected by Thomson Reuters.

However, Backus, Conlon, and Sinkinson (2021) find that Thomson Reuters' data contain reporting errors, so they directly extract ownership data from EDGAR.¹¹

Not all reporting entities filing the 13F form are independent, as indicated in Backus, Conlon, and Sinkinson (2021). In many cases, subsidiaries of a large asset manager report directly to the SEC separately from their parent company. For example, various Blackrock subsidiaries report ownership under the names of "Blackrock Inc," "Blackrock advisors, LLC," "Blackrock Asset Mgmt Ireland," "Blackrock Japan Co., LTD," etc. This issue occurs across different sources for institutional ownership data (i.e., Thomson Reuters or Backus, Conlon, and Sinkinson (2021)). In failing to consolidate the ownership of subsidiaries, previous studies could have underestimated the scale of common ownership at the parent company level.

We use two approaches to consolidate related 13F filings under a single parent entity. First, we extract the addresses and telephone numbers of all reporting companies and regard those companies sharing the same telephone number or business address as potentially related companies. We manually check all matched companies and remove falsely matched ones.

Our second matching approach identifies related investment companies based on their names. Specifically, we pair each investment company with the remaining investment companies and apply a bigram string-matching algorithm to keep those pairs with a high string similarity. To improve the matching quality, before the matching, we remove from firm names punctuation marks (e.g., "?", ":", etc.) and legal-entity-type identifiers (e.g., LLC, Inc, Corp, etc.). We also standardize cases, common acronyms and abbreviations (e.g., US vs. USA; Advisor vs. Advr.), and variations in word spelling (e.g., 1st vs. First). After the name matching, each matched subsidiary-parent link is again checked manually. We combine all linked firms obtained from

¹¹ The 13F ownership data collected by Backus, Conlon, and Sinkinson (2021). We thank Professor Michael Sinkinson for making the data available at <https://sites.google.com/view/msinkinson/research/common-ownership-data>.

the above two matching processes. As a result, the number of distinct investment companies drops by almost 20%, from 7,549 to 6,056.

Figure 2 compares pairwise common ownership between rival firms calculated based on ownership data before and after consolidating subsidiaries' ownership. The rival firm-pair sample is constructed by matching each firm to its top ten closest rival firms based on the product similarity score developed by Hoberg and Phillips (2010, 2016). More detail on the construction of the pairwise common ownership measure is provided in subsection 3.4. Depicted in red (blue) is common ownership calculated after (before) the consolidation of subsidiaries' ownership. We find that consolidating ownership in subsidiaries leads to an increase in common ownership of 33.6%. The increasing wedge between red and blue lines after 2008 appears to be driven by mergers and acquisitions between institutional investors. Many acquired institutional investment firms still use old CIKs for 13-F Forms instead of acquirers' CIKs, leading them to be treated as separate entities from acquirers.

2.2. Board and Corporate Data

We draw board director information from the BoardEx database, which gathers such information for U.S. public firms from 1998 to 2021. Notably, BoardEx also collects information on a director's historical and concurrent employers other than the firm on the board of which he or she serves as a director. To understand the comprehensiveness of the information covered by BoardEx, we compare it to the LinkedIn profiles of 100 randomly selected board directors. We find that the BoardEx information is generally more comprehensive than what is provided on directors' LinkedIn profiles.

Next, we match directors' employer files retrieved from BoardEx to the institutional investor file (13F form). This procedure identifies board directors who work concurrently for an institutional investment company. To improve the algorithm matching quality, we standardize

employer names in the same way as the names of institutional investors. Again, we apply a bigram string-matching algorithm and keep potential matching pairs with a matching score above 0.8. We manually check (imperfectly) matched pairs and remove those for which the matching validity is unclear. In total, we identify 41,771 director-year observations for which a director sits on the board of a public firm and is concurrently employed by an institutional investment company. Yet, the director might not be the board representative of the investment company if the investment company has no equity ownership in the public firm for which the affiliated director is a board director. We call a board director an institutional director only if his/her employer holds a positive equity stake in the respective firm. This institutional equity ownership requirement ($>0\%$) reduces the sample to 18,214 director-years. Alternatively, we can apply a higher threshold of equity ownership percentage (1%, 2%, or 5%) to restrict the sample of institutional directors to those whose affiliating institutional investors have a substantial stake in the public firms. Finally, we match the institutional director data to the firm-level financial information from Compustat, resulting in 18,027 institutional director-years comprising 14,404 distinct firm-years for the period 1999–2016.

A few examples might be helpful to illustrate who institutional directors are. Michael Sirignano, the principal of MHR fund management LLC, was appointed as a board director of Navistar (an Illinois-headquartered corporation) in 2014, when MHR owned 17.81% of the firm's outstanding shares. As another example, Sue Wagner, founding partner and co-founder of Blackrock, was elected to Apple's board of directors in 2014 when Blackrock held a 6.08% equity ownership share in Apple.

3. Main Results

3.1. *Institutional Directors in U.S. Public Firms*

Table 1 tabulates the incidences and shares of firms with institutional directors by year. As the financial interests represented by these directors are different, we further distinguish institutional directors by the equity ownership share of the affiliating institutional investors in the firm. For example, the ownership share of more than 1% in Columns (4a)-(4b) means that we only consider institutional directors representing investors owning at least a 1% ownership share.

Two interesting observations emerge from Table 1. First, the number of firms with institutional directors grows over time against the background of a reduced overall sample of publicly listed firms. For example, when we require institutional ownership share greater than 1% in Columns (4a)-(4b), the number of firms with institutional directors grows from 222 (3.4%) in 1999 to 442 (12%) in 2016. The growth rate becomes particularly stark if we focus on institutional investors owning a greater share of equity ownership. For example, conditioning on a 5% ownership of outstanding shares results in an increase in institutional board representation by over five times, from 1.4% to 8.1% of all corporate boards over the period 1999-2016.

Second, institutional investors appear to be underrepresented in the boardrooms of U.S. public firms in light of their enormous collective equity ownership. For example, even after we apply the loosest ownership threshold ($> 0\%$) to identify the greatest number of institutional directors possible, the share of firms with institutional board representation of 23.5% in 2016 significantly falls short of the overall institutional ownership in Compustat firms, which exceeds 60% for this same year. We, therefore, consider institutional directors as strongly underrepresented on the corporate board of U.S. public firms when benchmarked against their equity ownership. For example, the simple assumption that board representation is proportional

(in probability terms) to an investor's ownership share would imply that institutional directors should appear on 99.994% of all firm boards rather than the 23.5% we observe.¹²

To provide more insights about firms with institutional board representation, we focus on 6,203 firm-years with at least one institutional director (*i.e.*, the sample in Column (4a) of Table 1). As shown in Columns (5)-(6) of Table 2, Panel A, relative to an average Compustat firm-year, firm-years with institutional directors are associated with higher institutional ownership share and tend to be large and mature firms facing less competitive pressure, as implied by low sales growth, high profitability, and low R&D investments. A portion of these features can be explained by cross-industry variations, as the inclusion of industry fixed effects in Columns (7) and (8) attenuates the magnitude and statistical significance for the differences revealed in Columns (5)-(6), thus motivating us to pursue an analysis at the industry level.

Panel B of Table 2 tabulates the top 20 four-digit NAICS industries in which firms with institutional directors are most overrepresented. Most of the industries are conventional industries, and none of them appears to relate to today's new economy firms (e.g., information technology, biotech, etc.). These industries are generally profitable. 13 out of 20 industries are with above 10% industry average ROA. But the high profitability cannot be justified by investments in R&D, as only two industries' R&D expenditures exceed 1% of asset size. In sum, institutional board representation is more likely to occur in conventional and less competitive industries characterized by high profitability and low R&D investments.

We also explore what is unique about the institutional investors that obtain board seats. Panel C tabulates 9,675 institutional-director-years by the type of institutional shareholders

¹² Consider a firm i with an institutional ownership share $O(i)$. The probability of *not* having at least one institutional director among the $b(i)$ board directors follows as $P(i) = [1 - O(i)]^{b(i)}$. In 2016, the average value of $P(i)$ of 0.006% is based on an average institutional ownership share $O(i) = 67\%$ and average number of board directors $b(i) = 8.8$. This implies that 99.994% ($= 1 - 0.006\%$) of all firms should feature at least one institutional director on their board.

represented by these directors.¹³ Information on institutional shareholder type is drawn from Crunchbase and Whalewisdom. Bank directors account for the highest share of 41.3%. The high proportion of bank directors might be explained by the fact that lenders usually send directors to the boards of borrowers. Our data do not allow us to distinguish whether these directors represent the lending division of the bank or the asset management division, or both. But, acting as shareholders, banks do not appear to actively engage with portfolio firms, as only 17.7% of banks with board representation have filed Schedule 13D, which is far less than the filing rate of 41% for all investors with board representation. Thus, we contend that most of the bank directors in our sample are established to supervise the borrowers' use of credit rather than represent banks' interests from shareholders' perspectives.

Directors representing sophisticated investors (*i.e.*, hedge funds, venture capital, and private equity) feature the second highest share of 35.8% in our sample. Most of these investors are rather active in their engagement with firms because 66% have filed Schedule 13D, and 31.4% are activists, as defined by Whalewisdom. Surprisingly, only 16.2% of institutional directors represent independent investment companies that encompass large mutual fund companies such as Blackrock and Vanguard. Although these independent institutional investors are equally likely to engage with portfolio firms as sophisticated investors, few of them have engaged in any activist campaign.

3.2. Common Institutional Directors Across Firm Pairs

Next, we investigate whether common institutional directors can act as a channel for common shareholders to coordinate firm behaviors. Existing studies (Azar, 2021; Eldar, Grennan, and Waldo, 2021) suggest that this is the case by showing a positive correlation between board overlap and common ownership. However, such a correlation can be spurious without verifying

¹³ Some firms show more than one institutional director in a year. That's why the number of institutional-director-years is greater than the number of firm-years with institutional directors discussed earlier.

if the board overlap indeed represents common shareholders. In this subsection, based on institutional director information identified earlier, we attempt to verify the relation between board overlap and common shareholders.

We distinguish two types of common institutional directors, as illustrated in Figure 1. Type I refers to the case in which one *single* institutional director represents the common shareholder on the boards of industry rivals. This type of board representation is investigated in Azar (2021) and Eldar, Grennan, and Waldock (2021). Type II common institutional directors refer to *separate* individuals representing a common shareholder on the boards of jointly held industry rivals, as opposed to a single individual in Type I. Unlike Type I common institutional directors, Type II directors have not been examined in any previous study.

We collect all intra-industry and inter-industry firm pairs with at least one common institutional shareholder owning over 1% of the outstanding shares in both firms. Although inter-industry firms are unlikely to be concerned about antitrust issues, they are used as a benchmark against which we evaluate the magnitude of common ownership or common institutional directors between intra-industry firms. Industry classification is based on the four-digit NAICS code.¹⁴ Our procedure produces approximately 3 million yearly intra-industry firm pairs and 100 million yearly inter-industry firm pairs. They form the samples in which we search for common institutional directors.

Table 3, Panel A tabulates the distribution of Type I and Type II common institutional directors between intra- and inter-industry firm pairs. Pooled over all years, we find that Type I common institutional directors exist for only 0.009% of intra-industry firm pairs with a common institutional shareholder holding at least 1% of outstanding stocks in both firms. Type II common institutional directors, while appearing at a slightly higher rate than Type I common

¹⁴ Alternative industry definition based on three-digit SIC does not change our finding.

institutional directors, are found for 0.028% of intra-industry firm pairs. The highest share of intra-industry common institutional directors of Type I and II is found for the year 2014 at 0.026% and 0.073%, respectively. Yet, even for this year, less than one in one thousand intra-industry firm pairs pose a potential anti-competitive challenge based on common institutional directors. Therefore, our analysis suggests that common institutional directors, in general, are an economically insignificant phenomenon.

The analysis above treats firms assigned with the same fixed industry classification code (i.e., NAICS) as competing firms. But this can be problematic if the industry classification is dated and thus fails to correctly capture intra-industry firm rivalry. As a robustness check, we draw on a bilateral product similarity measure developed by Hoberg and Phillips (2016) as an alternative proxy for firm rivalry. Based on the textual analysis technique, this measure gauges the overlap between any two public firms using product-related keywords extracted from 10-K filings. As a firm's self-reported product offering is regularly updated, this measure can better capture the time-varying structure of the competitive landscape. We construct a firm-pair sample where each firm is matched to its *top ten* competitors each year based on the product similarity measure. Duplicate pairs (of reciprocal competitors) are discarded from the sample.

Table 3, Panel B, reports the results based on the product similarity measure. During the period 1999–2016, we observe 428,340 rival firm-pair-years, of which 298,309 feature at least one common shareholder owning at least 1% of the outstanding shares in both stocks. Common institutional ownership in rival firm pairs has clearly increased over time and exists for 82.6% of all rival firm pairs in 2016, relative to only 55.4% in 1999. Across the entire sample period, only 220 rival firm-pair-years feature common institutional directors (Types I & II), representing 0.074% (i.e., 220/298,309) of all rival firm-pair-years with a common institutional shareholder. Overall, we, again, find infrequent occurrences of common institutional directors, suggesting our findings are robust to alternative ways of defining rival firms.

Although the overall frequency of common institutional directors between intra-industry or rival firms is minuscule, *inter-industry* common institutional directors appear at a much lower frequency. As shown in Panel A of Table 3, common institutional directors (Types I & II) only appear in 0.018% of inter-industry firm pairs, less than half of the rate (0.037%) for intra-industry firm pairs. Two interpretations might prevail: Directors might generally have specific industry knowledge, so inter-industry board overlap is rare. But it might also reflect the fact that intra-industry board overlap has larger benefits if it facilitates (possibly anti-competitive) coordination between industry rivals. To investigate which interpretation fits, we perform the following analysis to understand more about the firms with (intra-industry) common institutional directors.

We analyze 949 firm-years forming the 1,098 intra-industry firm-pair-years with common institutional directors (Types I and II) obtained in Table 3, Panel A. For comparison purposes, we construct a benchmark sample comprising other Compustat firm-years which share at least one common institutional shareholder with another industry rival. Requiring common shareholders ensures that the comparison between those firms in question and the benchmark firms is not distorted by the stockholding preferences of common shareholders.

Table 4, Panel A, reports the results. Firms with common institutional directors, in general, operate in an unstable and competitive environment characterized by a higher growth rate, lower profitability, weaker free cash flows, and greater R&D investments. This competitive environment is in pronounced contrast with the stable and less competitive environment faced by firms with non-overlapping institutional directors (see Table 2, Panel A).

The concentration of common institutional directors in high R&D firms operating in a competitive environment is puzzling. These firms usually have ample business secrets to protect, and the information leakage risk is particularly acute when competition is intense. Then

why would these firms adopt common institutional directors, which, on the contrary, worsen the leakage risk? We contend that this phenomenon might be rationalized by the need to attenuate firm rivalry through common institutional shareholders and their board representation. As shown by Geng et al. (2022), board overlap can mitigate firm rivalry by means of scaling down capital and R&D expenditures. By contrast, obtaining a specialist director, who usually sits on the boards of several firms, is a less compelling explanation as the proprietary costs (i.e., business secret leakage) can well outweigh the benefits (i.e., industry-specific knowledge). Also, it is unclear why firms facing intense competition should have a greater demand for specialist directors than firms facing less competition.

Interestingly, the inclusion of industry fixed effects in Columns (7)-(8) shows a strong attenuation of the difference in characteristics, indicative of the importance of industry characteristics in explaining the difference in the firm-level comparison. This leads us to explore the industries in which common institutional investors are most prevalent. In Panel B of Table 4, we tabulate the top 20 industries with the highest share of firms with common institutional directors in an industry. Pharmaceutical & Medicine Manufacturing (NAICS code: 3254) is the most overrepresented industry in terms of the number and the share of firm-years in the industry that have common institutional directors. 7% of firm-years in this industry account for 34% (=323/949) of all firm-years with common institutional directors. It appears that most of the differences in Panel A are caused by the concentration of common institutional investors in the Pharmaceutical & Medicine Manufacturing industry.

Lastly, we examine what is unique about those institutional shareholders represented by common institutional directors. Table 4, Panel C, suggests that the sample is predominantly occupied by sophisticated investors, namely hedge funds, venture capital, and private equity, with a share of 51.6%. Bank directors feature the second highest share of 33.9%. Independent investment companies are only represented by 9.3% of common institutional directors.

Surprisingly, the so-called “Big Three” asset management companies (i.e., Vanguard, Blackrock, and State Street) show joint board representation in only 37 out of 3 million intra-industry firm pairs. In sum, common institutional investors appear to be a more plausible influencing channel for sophisticated investors but *not* for those large and passive institutional investors, which contribute most to the high overall share of common institutional ownership.

3.3. Non-Institutional Shareholders and Board Representation

Although institutional investors have received a lot of attention in the discussion of common ownership studies, it is natural to conceive that the same concerns can extend to non-institutional shareholders. In this subsection, we analyze the extent to which non-institutional shareholders are jointly represented on the boards of industry rivals.

To this end, we collect the ownership information of non-institutional shareholders from insiders’ filings of Forms 4, 5, and 6 and shareholders’ filings of Schedules 13D/13G Forms. We describe details about the data cleaning process in Appendix. Essentially, our non-institutional shareholders include corporate insiders (e.g., CEO) and blockholders that own over 5% of outstanding shares but are not required to file 13F Forms. Next, we need to determine if a non-institutional shareholder is represented on the board of a firm. Our first source is the disclosures of such information on insiders’ filings. The second source we rely on is the directors’ employment information recorded on BoardEx, which indicates if a director concurrently works for a non-institutional shareholder. Our final data for non-institutional shareholders spans from 2003 to 2016 because electronic insider filing data are only available from 2003.

Table 5 tabulates (by year) firm pairs with common ownership and joint board representation by non-institutional shareholders. Again, we only consider non-institutional shareholders owning more than 1% of outstanding shares in both firms. Unlike institutional shareholders,

non-institutional shareholders seldomly hold joint equity ownership of industry rivals. Only 37,348 intra-industry firm pairs are found to have common non-institutional ownership, amounting to a tiny fraction of about three million firm pairs with common institutional ownership. However, 1,775 or 4.75% of firm pairs show joint board representation of Type I & II by the non-institutional shareholders. This is in stark contrast to 0.04% of common institutional shareholders being represented on the boards of rival firms. Overall, despite the rarity of common non-institutional ownership, the relatively high propensity of board representation makes joint board representation a slightly more plausible influencing channel conditional on the existence of common ownership of industry rivals by non-institutional shareholders.

3.4. The Effect of common directors on Price Markups

Previous sections have already established the infrequency of common board directors (Type I & II) representing shareholders. But it is still unclear whether these directors can significantly change the influence of common shareholders in firm policy making. In this section, we examine whether the effect of common shareholders on firm profitability is greater when the common shareholders are jointly represented on rival firms' boards. We focus on firm profitability because its increase has been considered indicative evidence of firm coordination or collusion (Koch, Panayides, and Thomas, 2021; He and Huang, 2017; Azar, Schmalz, and Tecu, 2018).

We perform a firm-pair analysis using the firm pair sample constructed in Table 3, Panel B, where we pair a firm with each of its top ten closest firms in terms of the product similarity measure developed by Hoberg and Phillips (2010, 2016). We follow Azar (2021) and define the pair-level common ownership as follows. Let $O_i(s)$ denotes the ownership share of investor i in firm s . An investor i 's overlapping ownership between firm pair $P = [S_1, S_2]$ is defined as

$\min[O_i(s_1), O_i(s_2)]$, which is the minimum of i 's shares in both firms.¹⁵ The pairwise common institutional ownership between firms S_1 and S_2 is the total overlapping ownership between the two firms across all common institutional investors. Formally,

$$Pair_Inst_ComShr_p = \sum_i \min[O_i(s_1), O_i(s_2)].$$

We then decompose $Pair_Inst_ComShr_p$ into a component representing common shareholders with additional joint board representation in both firms ($Pair_Inst_ComShr_p^{Brd}$) and a residual component without joint board representation ($Pair_Inst_ComShr_p^{NoBrd}$). The firm-pair regression model takes the following form:

$$Pair\ Markup_{p,t} = Pair_Inst_ComShr_p^{Brd} + Pair_Inst_ComShr_p^{NoBrd} + Controls + FEs, \quad (1)$$

where $Pair\ Markup_{p,t}$ denotes the equal- or size-weighted average markup for the two firms of pair p . Control variables include the log of the aggregated total assets of two firms in a pair. We also control for the size-weighted averages of capital intensity, sales growth, R&D intensity, and leverage. Firm-pair fixed effects and year fixed effects are also included.

Panel A of Table 6 reports the summary statistics of variables used, and Panel B reports the regression results. We first run baseline regressions relating common institutional ownership to pair markup. Regression results in Panel B, Columns (1) and (5) indicate that common institutional ownership emerges as a highly significant explanatory variable for firm pair profitability for both size- and equal-weighted markup measures. The coefficient estimate of 0.136 in Column (1) suggests that a one-standard-deviation increase in $Pair_Inst_ComShr_p$ is associated with an increase of equal-weighted pair markup by 3.13% of the standard deviation.

¹⁵Our finding is robust to alternatively defining overlapping ownership as $\sqrt{O_i(s_1) \times O_i(s_2)}$, which is the square root of the product of i 's shares in both firms. See Table A2 in Internet Appendix.

Next, we explore whether the strong positive relationship between common shareholders and firm profitability is reinforced by joint board representation. Though insignificant, the coefficient estimates for $Pair_Inst_ComShr_p^{Brd}$ are consistently greater than those for $Pair_Inst_ComShr_p^{NoBrd}$ in both specifications examined in Columns (2) and (6). However, the equality of the two coefficients cannot be rejected by an F -test reported in the last row, which is inconsistent with the hypothesis that joint board representation represents a privileged influence channel for common institutional shareholders.

Lastly, we also perform the firm-pair analysis on common ownership by non-institutional shareholders. Using a similar approach, we create the common non-institutional ownership measure $Pair_NonInst_ComShr_p$ and decompose it into $Pair_NonInst_ComShr_p^{Brd}$ and $Pair_NonInst_ComShr_p^{NoBrd}$ based on whether the common non-institutional shareholders are represented on the boards of the two firms in the pair. Common non-institutional ownership $Pair_NoInst_ComShr_p$ exhibits a significant and positive relationship with firm pair markup measures, as shown in Table 6, Panel B, Columns (3) and (7). Interestingly, the point estimates in Columns (4) and (8) for $Pair_NonInst_ComShr_p^{Brd}$ are larger in magnitude and statistically more significant than the coefficients for $Pair_NonInst_ComShr_p^{NoBrd}$. However, an F -test still cannot reject the equality for the coefficients of the two variables, suggesting that joint board representation beyond common ownership is not a major determinant of firm profitability.

As a robustness check, we also perform an industry-level analysis following the specification used in Koch, Panayides, and Thomas (2021) and find results consistent with the pair-level analysis. The detail of the industry analysis is described in Section A2 of the Internet Appendix, and the results are tabulated in Table A2.

4. Conclusion

In this paper, we investigate the prevalence of institutional board directors in U.S. public firms with a particular focus on overlapping board representation between rival firms. Although previous studies highlight that board representation is an important mechanism through which institutional investors can influence firm conduct, little is known about the direct representation of institutional investors on U.S. corporate boards. The policy debate on whether common institutional ownership is anti-competitive further adds to the urgency to understand the empirical relevance of this particular channel of influence.

Our paper systematically investigates institutional shareholders' board representation by combining board director employment data with institutional investment companies that file 13F forms to SEC. We find that board representation by institutional investors is relatively rare in U.S. public firms compared to the high institutional ownership in U.S. public firms. Moreover, rival firms sharing institutional investors rarely feature joint board representation by the same institutional investor. More importantly, in the rare cases of joint board representation, we do not find evidence that such overlapping board representation is related to higher profit margins than what is already predicted by common institutional ownership in a firm pair. This evidence contradicts the hypothesis that overlapping board representation constitutes a relevant influence channel for institutional shareholders that can account for the positive nexus between common ownership and firm profitability.

Our analysis also extends to non-institutional shareholders and their (joint) board representation. Compared with institutional counterparts, non-institutional shareholders show a greater tendency to obtain board seats. But, due to the relatively less frequent common ownership of industry rivals by non-institutional shareholders, the cases for joint board representation by non-institutional shareholders are still rare. Moreover, such joint board

representation again does not significantly correlate with higher firm profitability than what is already predicted by the existence of common non-institutional ownership in a firm pair.

We highlight that the findings in this study do not preclude that common ownership has anticompetitive effects through mechanisms other than board representation, or that board overlap unrelated to common ownership represents an important determinant of firm conduct (Geng *et al.*, 2022). At the current state, corporate research has settled neither of these two issues. However, the policy concern about board overlap as a consequence and “representation” of common institutional ownership is largely a “red herring” in the light of its empirical insignificance.

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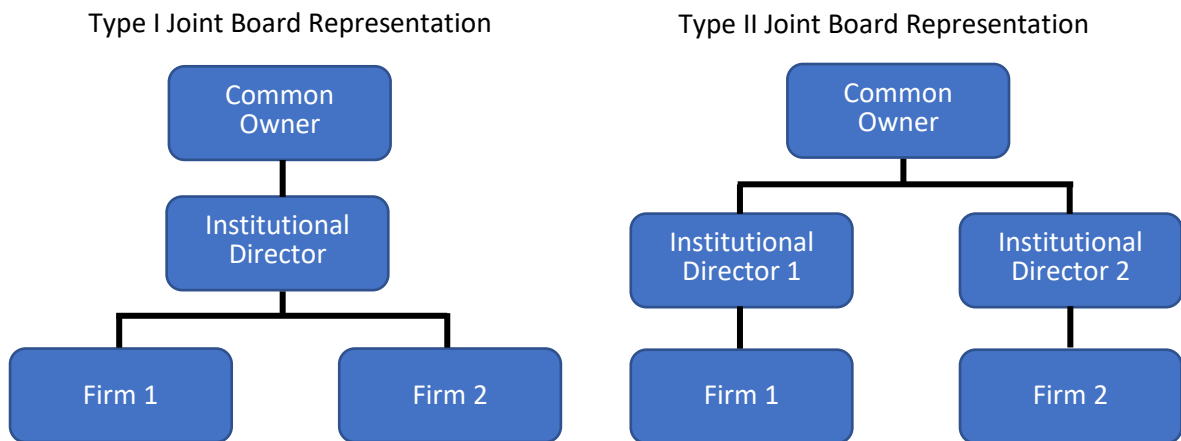


Figure 1: Two types of joint board representation by a common owner

This figure characterizes the two types of joint board representation. Type I refers to the case in which one single institutional director represents the common shareholder on the boards of both firms. Type II refers to the case that two separate individuals to hold positions on the two firm boards as long as these individuals represent the same common shareholder.

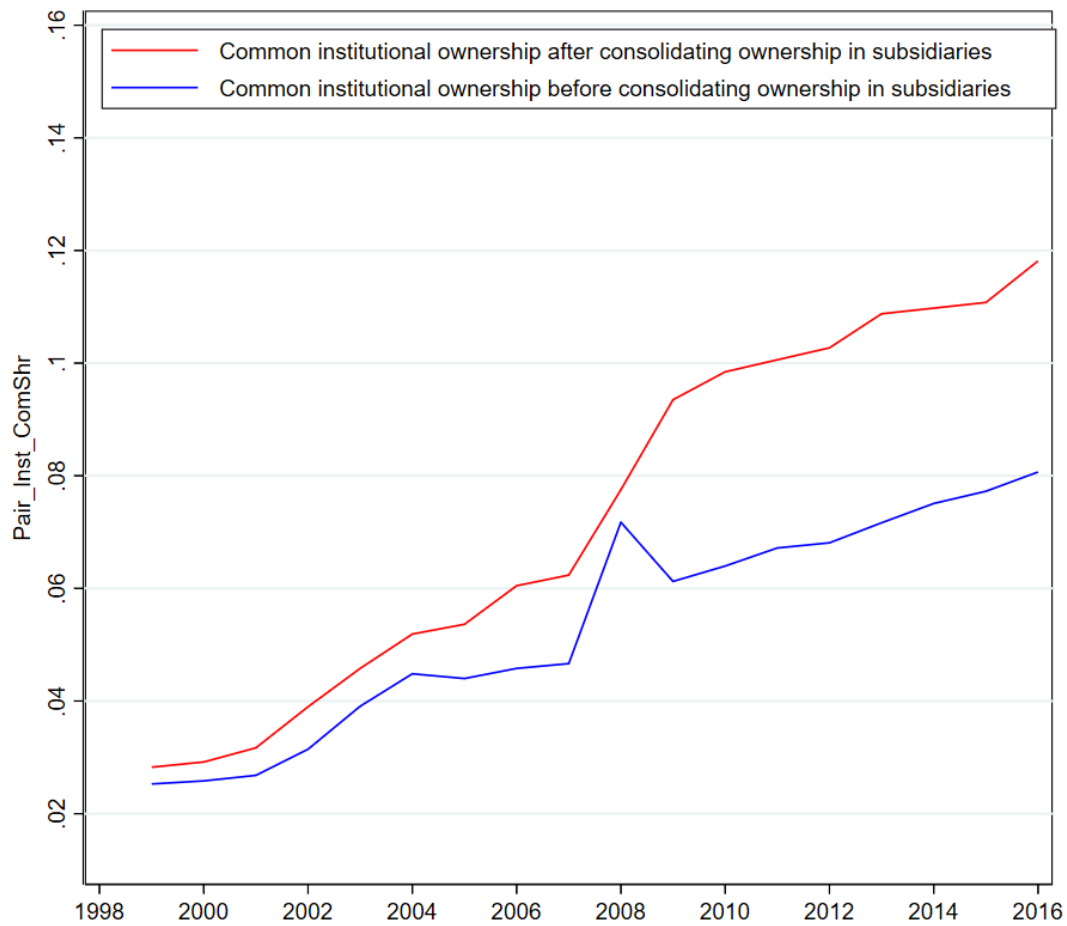


Figure 2: Common institutional ownership before and after consolidating subsidiaries' ownership

This figure depicts the evolution of common institutional ownership (*Pair_Inst_ComShr*) that is respectively based on institutional ownership data before and after consolidating ownership in subsidiaries.

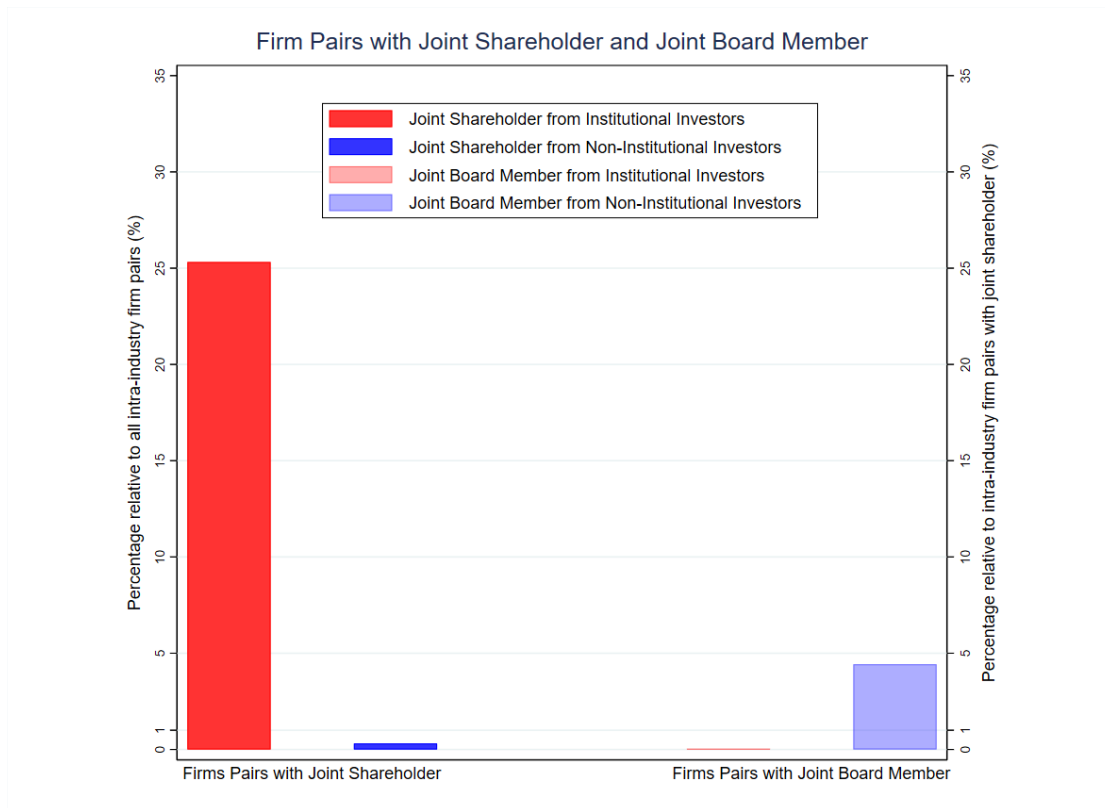


Figure 3: Firm Pairs with Common Shareholders and Common Board Directors

The left two bars, plotted on the left y axis, respectively represent the share of firm pairs with common institutional shareholders (in dark red) and the share of firm pairs with common non-institutional shareholders (in dark blue) relative to all intra-industry firm pairs. The right two bars are plotted on the right y axis. Depicted in light red is the share of firm pairs in which the common shareholders are jointly represented on the boards of both firms relative to intra-industry firm pairs with common institutional shareholders and depicted in light blue is the share of firms with common non-institutional directors relative to intra-industry firm pairs with common non-institutional shareholders.

Table 1: Firms with Institutional Directors by Year and Institutional Ownership Share

This table tabulates by year the frequency (#) and shares of Compustat firms with at least one institutional director. Column (2) tabulates the number of Compustat firms each year. Columns (3a)-(3b) to (6a)-(6b), respectively, require various ownership share thresholds for institutional shareholders that are represented by these directors.

Year	Firms (#)	Firms with institutional directors							
		$\geq 0\%$		$> 1\%$		$> 2\%$		$> 5\%$	
		# (3a)	% (3b)	# (4a)	% (4b)	# (5a)	% (5b)	# (6a)	% (6b)
1999	6,519	631	9.7%	222	3.4%	149	2.3%	89	1.4%
2000	6,255	734	11.7%	264	4.2%	184	2.9%	110	1.8%
2001	5,617	802	14.3%	289	5.1%	191	3.4%	113	2%
2002	5,204	828	15.9%	297	5.7%	192	3.7%	107	2.1%
2003	4,884	814	16.7%	307	6.3%	197	4%	104	2.1%
2004	4,810	823	17.1%	321	6.7%	220	4.6%	131	2.7%
2005	4,715	799	16.9%	323	6.9%	223	4.7%	133	2.8%
2006	4,632	834	18%	320	6.9%	236	5.1%	147	3.2%
2007	4,526	820	18.1%	340	7.5%	242	5.3%	152	3.4%
2008	4,249	791	18.6%	356	8.4%	268	6.3%	172	4%
2009	3,977	763	19.2%	340	8.5%	253	6.4%	167	4.2%
2010	3,814	750	19.7%	355	9.3%	282	7.4%	195	5.1%
2011	3,693	794	21.5%	375	10.2%	305	8.3%	215	5.8%
2012	3,637	794	21.8%	360	9.9%	290	8%	216	5.9%
2013	3,681	809	22%	380	10.3%	305	8.3%	237	6.4%
2014	3,808	866	22.7%	445	11.7%	374	9.8%	302	7.9%
2015	3,773	888	23.5%	467	12.4%	395	10.5%	319	8.5%
2016	3,669	864	23.5%	442	12%	375	10.2%	297	8.1%
All	81,463	14,404	17.7%	6,203	7.6%	4,681	5.7%	3,206	3.9%

Table 2: Firms, Institutional Shareholders, and Institutional Directors

Panel A compares the characteristics of Compustat firms with and without institutional directors. Panel B tabulates the top 20 industries with the highest share of firm-years with institutional directors. Only industries with more than 50 firm-years during the sample period 1999-2016 are considered. Panel C tabulates institutional director-years by the type of institutional investors they represent. An institutional director-year is counted multiple times if the director concurrently serves on the boards of several firms in a year.

Panel A: Firms with and without institutional directors								
	Firm has institutional director?				(2)-(4)		(2)-(4)	
	Yes		No		No industry and year FEs		With industry and year FEs	
	Obs.	Mean	Obs.	Mean	Diff.	S.D.	Diff.	S.D.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>ln(Assets)</i>	6,040	7.438	72,359	6.029	1.4094***	(0.0283)	1.0764***	(0.0608)
<i>Sale growth</i>	5,701	0.13	68,253	0.147	-0.0161***	(0.0062)	-0.0032	(0.0067)
<i>Profitability</i>	6,040	0.058	72,359	0.03	0.0285***	(0.0027)	0.0182***	(0.0045)
<i>Free cash flow</i>	5,945	-0.007	69,059	-0.029	0.0222***	(0.0024)	0.0130***	(0.0038)
<i>Markup</i>	6,040	1.104	72,359	1.076	0.0284***	(0.0048)	0.0270***	(0.0078)
<i>R&D/Assets</i>	6,040	0.044	72,359	0.051	-0.0064***	(0.0015)	-0.0026	(0.0021)
<i>Capex/Asset</i>	6,040	0.044	72,359	0.044	-0.0003	(0.0007)	-0.0006	(0.0009)
<i>Leverage</i>	6,040	0.25	72,359	0.21	0.0407***	(0.0030)	0.0216***	(0.0052)
<i>Tangibility</i>	6,040	0.23	72,359	0.216	0.0139***	(0.0032)	-0.0031	(0.0037)
<i>Inst. Ownership</i>	6,040	0.683	69,127	0.477	0.2061***	(0.0032)	0.1436***	(0.0067)

Panel B: Top 20 industries with highest share of firms with institutional directors							
NAICS	Sector Description	# Firm years with institutional director	# Compustat firm years	Firm share = (2)/(3)	Industry average		
					ROA	R&D/Assets	
(1)		(2)	(3)	(4)	(5)	(6)	
4231	Motor Vehicle & Motor Vehicle Parts & Supplies Merchant Wholesalers	20	62	32.26%	0.1073	0	
5232	Securities & Commodity Exchanges	22	69	31.88%	0.1467	0	
5152	Cable & Other Subscription Programming	40	156	25.64%	0.1483	0.0007	
4242	Drugs & Druggists' Sundries Merchant Wholesalers	38	149	25.5%	0.0901	0.0087	
3379	Other Furniture Related Product Mfg.	13	57	22.81%	0.2038	0.0096	
2372	Land Subdivision	20	89	22.47%	-0.0005	0.0001	
3241	Petroleum & Coal Products Mfg.	90	403	22.33%	0.1134	0.0089	
3141	Textile Furnishings Mills	17	80	21.25%	0.0822	0.003	
3113	Sugar & Confectionery Product Mfg.	16	80	20%	0.1921	0.0021	
7225	Restaurants & Other Eating Places	50	253	19.76%	0.1549	0.0003	
3118	Bakeries & Tortilla Mfg.	20	103	19.42%	0.1448	0.0006	
4831	Deep Sea, Coastal, & Great Lakes Water Transportation	39	220	17.73%	0.0975	0	
5321	Auto. Equip. Rental & Leasing	15	85	17.65%	0.1617	0.0003	
3221	Pulp, Paper, & Paperboard Mills	49	281	17.44%	0.1214	0.0043	
3364	Aerospace Product & Parts Mfg.	66	395	16.71%	0.118	0.0235	
5259	Other Investment Pools & Funds	11	67	16.42%	0.024	0	
4521	Department Stores	24	149	16.11%	0.1157	0	
4422	Home Furnishings Stores	14	89	15.73%	0.1674	0	
3259	Other Chemical Product Mfg.	36	230	15.65%	0.0133	0.0476	
5241	Insurance Carriers	297	1,924	15.44%	0.0447	0.0002	

Table 2 continued

Panel C: Institutional directors by institutional shareholder type

Shareholder Type	# of director years (1)	% of director years (2)	Activist?		Form 13D filing?	
			Yes (3)	No (4)	Yes (5)	No (6)
Venture capital or private equity	2,012	20.8%	329	1,683	1,095	917
Investment company	1,566	16.2%	5	1,561	801	765
Investment company (bank-affiliated)	3,992	41.3%	–	3,992	708	3,284
Investment company (insurance-affiliated)	359	3.7%	–	359	84	275
Hedge fund	1,451	15%	759	692	1,190	261
Diversified financial	190	2%	4	186	134	56
Pension	102	1.1%	–	102	11	91
Foundation	2	0%	–	2	–	2
University endowment	1	0%	–	1	–	1
All	9,675	100%	1,097	8,578	4,023	5,652

Table 3: Firm Pairs with Common Shareholders and Joint Board Representation

This table reports common shareholders and their joint board representation between rival firm pairs. Panel A defines rival firms based on the four-digit NAICS industry classification and Panel B relies on the product similarity score developed by Hoberg and Phillips (2010, 2016) to define rival firms. In Panel A, Columns (2) and (3) report the number of intra-industry and inter-industry firm-pair observations with at least one common institutional shareholder, respectively. We restrict common institutional shareholders to those owning at least 1% of outstanding shares in both firms. Within the firm pairs in Columns (2) and (3), we tabulate firm pairs for which the common shareholders concurrently have board representation in both firms. We distinguish two types of such joint board representation: Type I refers to the situation where a single institutional director represents a (common) shareholder on the boards of both firms; Type II refers to the situation where two separate institutional directors represent a common shareholder on both boards. Columns (4a) and (5a) state the number (#) of *intra-industry* and *inter-industry* firm pairs with additional Type I joint board representation, respectively, and Columns (4b) and (5b) the corresponding percentage shares relative to the numbers in Column (2) and (3), respectively. Likewise, we report the share and frequency of firm pairs with Type II joint board representation in Columns (6a)-(6b) and Columns (7a)-(7b), respectively. In Panel B, for a firm, we pair it with each of its top ten (five) closest firms in terms of product similarity developed by Hoberg and Phillips (2010, 2016). Among the created rival firm pairs (as reported in Column (2)), Columns (3a) and (3b) report, respectively, the number and percentage of firm pairs with common shareholders owning at least 1% of outstanding shares in both firms of a pair. For firm pairs with common shareholders, we further identify those pairs for which the common shareholders concurrently have board representation in both firms. Columns (4a)-(4b) report the number and percentage of firm pairs with additional Type I joint board representation, and Columns (5a)-(5b) do the same for additional Type II joint board representation, respectively.

Panel A: Intra- and inter-industry firm pairs based on the four-digit NAICS industry classification										
Year	Firm pairs with common institutional shareholders		Firm pairs with additional Type I joint board representation				Firm pairs with additional Type II joint board representation			
	Intra-industry Obs.	Inter-industry Obs.	Intra-industry		Inter-industry		Intra-industry		Inter-industry	
(1)	(2)	(3)	# (4a)	% (4b)	# (5a)	% (5b)	# (6a)	% (6b)	# (7a)	% (7b)
1999	198,079	8,127,406	4	0.002%	51	0.001%	13	0.007%	854	0.011%
2000	182,919	7,229,177	12	0.007%	79	0.001%	39	0.021%	1,176	0.016%
2001	165,621	6,429,988	3	0.002%	96	0.001%	45	0.027%	1,340	0.021%
2002	160,466	5,910,650	3	0.002%	104	0.002%	30	0.019%	1,223	0.021%
2003	185,777	6,191,569	3	0.002%	102	0.002%	23	0.012%	1,010	0.016%
2004	173,428	6,158,748	8	0.005%	113	0.002%	31	0.018%	1,099	0.018%
2005	178,125	6,234,759	9	0.005%	86	0.001%	27	0.015%	902	0.014%
2006	175,325	6,292,573	9	0.005%	85	0.001%	34	0.019%	556	0.009%
2007	168,076	6,030,614	11	0.007%	83	0.001%	39	0.023%	690	0.011%
2008	159,725	5,765,253	7	0.004%	89	0.002%	38	0.024%	776	0.013%
2009	154,389	5,448,307	9	0.006%	82	0.002%	23	0.015%	899	0.017%
2010	138,971	5,014,770	9	0.006%	90	0.002%	20	0.014%	849	0.017%
2011	133,844	4,728,723	19	0.014%	94	0.002%	42	0.031%	974	0.021%
2012	134,132	4,617,307	15	0.011%	81	0.002%	39	0.029%	873	0.019%
2013	148,427	4,835,094	19	0.013%	85	0.002%	57	0.038%	760	0.016%
2014	171,477	5,193,777	44	0.026%	100	0.002%	126	0.073%	831	0.016%
2015	181,413	5,138,395	42	0.023%	124	0.002%	116	0.064%	875	0.017%
2016	176,144	4,856,545	40	0.023%	97	0.002%	90	0.051%	770	0.016%
All	2,986,338	104,203,655	266	0.009%	1,641	0.002%	832	0.028%	16,457	0.016%

Table 3 Continued

Panel B: Firm pairs based on ten closed firms in terms of product similarity

Year	Rival	Firm pairs with		Firm pairs with additional		Firm pairs with additional	
	firm pairs	common shareholders		Type I joint board representation		Type II joint board representation	
(1)	Obs.	#	%	#	%	#	%
	(2)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)
1999	31,345	17,364	55.4	1	0.003	4	0.013
2000	30,991	16,474	53.2	0	0	11	0.035
2001	31,753	17,343	54.6	0	0	17	0.054
2002	29,440	16,762	56.9	1	0.003	19	0.065
2003	27,172	17,837	65.6	1	0.004	5	0.018
2004	24,697	16,879	68.3	2	0.008	6	0.024
2005	24,456	17,215	70.4	4	0.016	11	0.045
2006	24,235	17,627	72.7	2	0.008	8	0.033
2007	23,436	16,989	72.5	3	0.013	11	0.047
2008	23,978	17,693	73.8	1	0.004	7	0.029
2009	22,141	17,245	77.9	2	0.009	7	0.032
2010	20,365	15,973	78.4	3	0.015	7	0.034
2011	19,848	15,717	79.2	2	0.01	11	0.055
2012	19,289	15,234	79	1	0.005	10	0.052
2013	18,535	15,103	81.5	0	0	11	0.059
2014	18,397	15,263	83	2	0.011	14	0.076
2015	19,425	16,030	82.5	5	0.026	14	0.072
2016	18,837	15,561	82.6	4	0.021	13	0.069
All	428,340	298,309	69.6	34	0.011	186	0.062

Table 4: Firms, Common Institutional Shareholders, and Common Institutional Directors

Panel A compares a set of firm characteristics between firms with common institutional directors (those comprising Columns (4a) and (6a) of Table 3, Panel A) and firms with common shareholders (those comprising Column 2 of Table 3, Panel A). Panel B lists the top 20 industries with the highest share of firms with common institutional directors. Only industries with more than 50 firm-year observations are considered. Panel C tabulates common institutional directors by the type of institutional shareholders they represent.

Panel A: Firms with and without common institutional director								
	Firm has common inst. director?				(2)–(4)		(2)–(4)	
	Yes		No		No industry and year FEs		With industry and year FEs	
	Obs.	Mean	Obs.	Mean	Diff.	S.D.	Diff.	S.D.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>ln(Assets)</i>	949	7.304	67,972	6.34	0.9642***	(0.0818)	1.0185***	(0.1576)
<i>Sale growth</i>	867	0.237	64,535	0.139	0.0978***	(0.0223)	0.0258	(0.0339)
<i>Profitability</i>	949	−0.055	67,972	0.045	−0.1005***	(0.0100)	−0.0046	(0.0085)
<i>Free cash flow</i>	941	−0.088	65,202	−0.016	−0.0726***	(0.0085)	0.0015	(0.0084)
<i>Markup</i>	949	0.992	67,972	1.09	−0.0979***	(0.0168)	0.0038	(0.0197)
<i>R&D/Assets</i>	949	0.118	67,972	0.05	0.0675***	(0.0059)	0.0041	(0.0058)
<i>Capex/Asset</i>	949	0.039	67,972	0.044	−0.0043**	(0.0019)	−0.0013	(0.0017)
<i>Leverage</i>	949	0.225	67,972	0.205	0.0192**	(0.0076)	0.0173*	(0.0099)
<i>Tangibility</i>	949	0.185	67,972	0.212	−0.0264***	(0.0077)	−0.0057	(0.0065)
<i>Inst. Ownership</i>	949	0.666	67,972	0.526	0.1398***	(0.0075)	0.1274***	(0.0131)

Panel B: Top 20 industries with the highest share of firms with common institutional directors							
NAICS	Sector Description	# firm years with com. inst. directors	# firm years with com. inst. shareholders	Firm Share = (2)/(3)	Industry average		
					<i>ROA</i>	<i>R&D/Assets</i>	
(1)		(2)	(3)	(4)	(5)	(6)	
3254	Pharmaceutical & Medicine Mfg.	323	4,617	7%	−0.2526	0.2729	
3331	Agricultural, Construction & Mining Machinery Mfg.	27	484	5.58%	0.1304	0.0145	
5222	Non-Depository Credit Intermediation	34	659	5.16%	0.0879	0.0002	
6221	General Medical & Surgical Hospitals	8	156	5.13%	0.1337	0	
5191	Other Information Services	37	749	4.94%	0.036	0.0799	
2211	Electric Power Generation, Transmission & Distribution	51	1,091	4.67%	0.0867	0	
5241	Insurance Carriers	73	1,848	3.95%	0.0454	0.0002	
5132	Pay TV, Specialty TV & Program Distribution	2	51	3.92%	−0.0151	0.0042	
3256	Soap, Cleaning Compound & Toilet Preparation Mfg.	10	292	3.42%	0.1476	0.017	
6216	Home Health Care Services	4	127	3.15%	0.1364	0	
2111	Oil & Gas Extraction	50	1,613	3.1%	0.0645	0.0002	
5232	Securities & Commodity Exchanges	2	66	3.03%	0.1473	0	
5152	Cable & Other Subscription Programming	4	145	2.76%	0.1532	0.0007	
3391	Medical Equipment & Supplies Mfg.	35	1,376	2.54%	−0.0284	0.1035	
7211	Traveller Accommodation	9	382	2.36%	0.0977	0.0001	
5131	Radio & Television Broadcasting	2	94	2.13%	0.0405	0.0009	
3359	Other Electrical Equipment & Component Mfg.	10	471	2.12%	0.0052	0.0546	
4521	Department Stores	3	143	2.1%	0.1156	0	
7225	Restaurants & Other Eating Places	5	244	2.05%	0.1556	0.0003	
5133	Telecommunications	6	299	2.01%	−0.0109	0.0087	
7222	Limited-Service Eating Places	4	214	1.87%	0.1735	0.0004	

Table 4 continued

Panel C: Common institutional directors by institutional shareholder type

Shareholder type	# of director years	Percentage	Activist?		Form 13D filing?	
			Yes	No	Yes	No
Venture capital or private equity	785	37.2%	128	657	328	457
Investment company	197	9.3%	-	197	133	64
Investment company (bank-affiliated)	716	33.9%	-	716	80	636
Investment company (insurance-affiliated)	103	4.9%	-	103	100	3
Hedge fund	301	14.2%	215	86	234	67
Diversified financial	-	0%	-	-	-	-
Pension	11	0.5%	-	11	-	11
Foundation	-	0%	-	-	-	-
University endowment	-	0%	-	-	-	-
All	2,113	100%	343	1,770	875	1,238

Table 5: Non-Institutional Shareholders and Joint Board Representation

This table reports common ownership by non-institutional shareholders and their joint board representation between intra-industry firm pairs and inter-industry firm pairs. Industry is defined based on the four-digit NAICS classification. Columns (2) and (3) report the number of intra-industry and inter-industry firm-pair observations with at least one common non-institutional shareholder, respectively. We restrict non-institutional shareholders to those owning at least 1% of outstanding shares in both firms. Within the firm pairs in Columns (2) and (3), we tabulate firm pairs for which the non-institutional shareholders have joint board representation in both firms. We distinguish two types of such joint board representation by non-institutional shareholders: Type I refers to the situation where a single director represents a (common) non-institutional shareholder on the boards of both firms; Type II refers to the situation where two separate directors represent a common non-institutional shareholder on both boards. Columns (4a) and (5a) state the number (#) of *intra-industry* and *inter-industry* firm pairs with additional Type I joint board representation, respectively, and Columns (4b) and (5b) the corresponding percentage shares relative to the numbers in Column (2) and (3), respectively. Likewise, we report the share and frequency of firm pairs with Type II joint board representation in Columns (6a)-(6b) and Columns (7a)-(7b), respectively.

Year	Firm pairs with common non-institutional shareholders		Firm pairs with additional Type I joint board representation				Firm pairs with additional Type II joint board representation			
	Intra-industry	Inter-industry	Intra-industry		Inter-industry		Intra-industry		Inter-industry	
	Obs.	Obs.	#	%	#	%	#	%	#	%
(1)	(2)	(3)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)
2003	1,697	5,698	14	0.825%	35	0.614%	3	0.177%	27	0.474%
2004	2,442	11,940	32	1.31%	83	0.695%	60	2.457%	120	1.005%
2005	2,770	18,874	35	1.264%	93	0.493%	50	1.805%	166	0.88%
2006	3,429	25,904	50	1.458%	125	0.483%	66	1.925%	279	1.077%
2007	3,833	34,499	68	1.774%	142	0.412%	115	3%	312	0.904%
2008	3,041	29,665	48	1.578%	130	0.438%	50	1.644%	238	0.802%
2009	2,099	23,028	23	1.096%	115	0.499%	32	1.525%	180	0.782%
2010	1,752	16,897	20	1.142%	100	0.592%	21	1.199%	130	0.769%
2011	1,516	7,497	29	1.913%	95	1.267%	53	3.496%	149	1.987%
2012	1,729	5,362	34	1.966%	98	1.828%	71	4.106%	178	3.32%
2013	2,282	6,241	49	2.147%	104	1.666%	105	4.601%	240	3.846%
2014	3,577	7,990	74	2.069%	123	1.539%	150	4.193%	323	4.043%
2015	4,044	9,002	95	2.349%	115	1.277%	183	4.525%	318	3.533%
2016	3,137	6,401	86	2.741%	97	1.515%	159	5.069%	236	3.687%
All	37,348	208,998	657	1.759%	1455	0.696%	1118	2.993%	2896	1.386%

Table 6: Firm Pair Profitability and Joint Board Representation

Panel A reports summary statistics for the rival firm pair sample constructed by matching each firm to its ten closest competitors in terms of the product similarity score (with duplicate pairs discarded). For a firm pair, profitability is measured by the equal or size-weighted average of the markup for the two firms in the pair. *Pair_Inst_ComShr* and *Pair_NonInst_ComShr* respectively represent common institutional ownership and common non-institutional ownership between two firms in a pair. We decompose each common ownership measure into a component representing common ownership associated with joint board representation (*Pair_Inst_ComShr^{Brd}* and *Pair_NonInst_ComShr^{Brd}*) and the residual component without joint board representation (*Pair_Inst_ComShr^{NoBrd}* and *Pair_NonInst_ComShr^{NoBrd}*). *Firm Pair Size* is the log of the aggregated total assets of two firms in a pair. Other variables include the size-weighted average of capital intensity, sales growth, R&D intensity, and leverage. Panel B reports linear regressions relating the *Equal-Weighted Firm Pair Markup* in Columns (1)-(4) and the *Size-Weighted Firm Pair Markup* in Columns (5)-(8) to various common ownership measures. The last rows of Columns (2), (4), (6) and (8) report *F*-statistics and *p*-values for the *F*-test on whether the coefficient for *Pair_Inst_ComShr^{Brd}* (*Pair_NonInst_ComShr^{Brd}*) equals the coefficient for *Pair_Inst_ComShr^{NoBrd}* (*Pair_NonInst_ComShr^{NoBrd}*). All specifications control for firm-pair and year fixed effects. The robust standard errors are clustered at the firm-pair level. ***, **, and * denote the 1%, 5%, and 10% significance level, respectively. Detailed variable definitions are provided in the Internet Appendix.

Panel A: Summary Statistics on Pair Variables						
	Obs. (1)	Mean (2)	S.D. (3)	Median (4)	P25 (5)	P75 (6)
<i>Equal Weighted Firm Pair Markup</i>	420,051	1.076	0.343	1.085	0.976	1.227
<i>Size Weighted Firm Pair Markup</i>	420,051	1.103	0.345	1.099	1.010	1.242
<i>Pair_Inst_ComShr</i>	428,340	0.068	0.079	0.037	0.000	0.111
<i>Pair_Inst_ComShr^{Brd}</i>	428,340	0.000	0.003	0.000	0.000	0.000
<i>Pair_Inst_ComInstShr^{NoBrd}</i>	428,340	0.068	0.079	0.037	0.000	0.111
<i>Pair_NonInst_ComShr</i>	304,811	0.002	0.037	0.000	0.000	0.000
<i>Pair_NonInst_ComShr^{Brd}</i>	304,811	0.000	0.020	0.000	0.000	0.000
<i>Pair_NonInst_ComShr^{NoBrd}</i>	304,811	0.002	0.031	0.000	0.000	0.000
<i>Firm Pair Size</i>	428,340	7.536	1.935	7.466	6.181	8.773
<i>Firm Pair Capital Intensity</i>	428,340	5.379	7.963	1.756	0.969	5.221
<i>Firm Pair Sales Growth</i>	428,340	0.136	0.363	0.076	-0.019	0.202
<i>Firm Pair R&D Intensity</i>	428,340	0.056	0.109	0.000	0.000	0.073
<i>Firm Pair Leverage</i>	428,340	0.217	0.194	0.173	0.059	0.327

Table 6 Continued

Panel B: Firm Pair Regressions								
Dep. Variables:	Equal Weighted Firm Pair Markup				Size Weighted Firm Pair Markup			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Pair_Inst_ComShr</i>	0.136*** (0.009)				0.055*** (0.009)			
<i>Pair_Inst_ComShr^{Brd}</i>		0.181 (0.147)				0.142 (0.198)		
<i>Pair_Inst_ComShr^{NoBrd}</i>		0.136*** (0.009)				0.055*** (0.009)		
<i>Pair_NonInst_ComShr</i>			0.030** (0.015)				0.034** (0.016)	
<i>Pair_NonInst_ComShr^{Brd}</i>				0.035*** (0.012)				0.038*** (0.013)
<i>Pair_NonInst_ComShr^{NoBrd}</i>				0.027 (0.018)				0.032 (0.021)
<i>Firm Pair Size</i>	0.010*** (0.002)	0.010*** (0.002)	0.018*** (0.002)	0.018*** (0.002)	0.013*** (0.002)	0.013*** (0.002)	0.024*** (0.002)	0.024*** (0.002)
<i>Firm Pair Capital Intensity</i>	-0.006*** (0.000)	-0.006*** (0.000)	-0.005*** (0.000)	-0.005*** (0.000)	-0.008*** (0.000)	-0.008*** (0.000)	-0.007*** (0.000)	-0.007*** (0.000)
<i>Firm Pair Sales Growth</i>	0.087*** (0.002)	0.087*** (0.002)	0.104*** (0.002)	0.104*** (0.002)	0.097*** (0.002)	0.097*** (0.002)	0.119*** (0.003)	0.119*** (0.003)
<i>Firm Pair R&D Intensity</i>	-0.372*** (0.013)	-0.372*** (0.013)	-0.283*** (0.017)	-0.283*** (0.017)	-0.495*** (0.015)	-0.495*** (0.015)	-0.402*** (0.020)	-0.402*** (0.020)
<i>Firm Pair Leverage</i>	-0.147*** (0.005)	-0.147*** (0.005)	-0.203*** (0.007)	-0.203*** (0.007)	-0.169*** (0.006)	-0.169*** (0.006)	-0.234*** (0.008)	-0.234*** (0.008)
Firm-pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E. at firm-pair level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.868	0.868	0.870	0.870	0.849	0.849	0.848	0.848
Observations	420,051	420,051	302,413	302,413	420,051	420,051	302,413	302,413
H_0 : Equal coefficients								
F -statistics		0.0965		0.348		0.192		0.129
Two-sided p -value		0.756		0.555		0.661		0.719

Internet Appendix

Not for Journal Publication

Appendix

A1. Data Collection for Non-institutional Ownership and Board Representation

Our primary data source for non-institutional shareholders is the WRDS insider database, which records equity transactions for officers, directors, and large shareholders of more than 10% outstanding shares, collectively labeled insiders. SEC requires insiders to report purchases and sales of equity by filing Forms 3, 4, and 5. Our second data source is shareholders' filings of Schedule 13D and 13G Forms. Shareholders are required to notify SEC if they acquire over 5% of equity ownership within 10 days by filing either 13D or 13G Forms, depending on if the shareholders intend to engage with the company. We use the 13D/13G ownership data collected and cleaned by Professor Ekaterina Volkova and used in Schwartz-Ziv and Volkova (2021).¹ We combine insider data and 13D/13G data using CIK, de-duplicate overlapping records in both databases, and remove any CIKs which also file 13F forms. Our final sample for non-institutional shareholders spans from 2003 to 2016, as insider data are not available before 2003.

To identify non-institutional shareholders' board representatives, we rely on insider data which requires an insider to disclose such information. BoardEx is the second source of data we use for shareholders not covered in insider data. Based on the director employment information recorded on BoardEx, we consider a director the board representative of a non-institutional shareholder if the director concurrently works for the shareholder.

One downside for insider data and 13D/13G data is that they only record non-institutional shareholders' equity ownership when there is a change in equity holding (e.g., purchases or sales of shares). To fill up the missing ownership, we carry forward the last reported ownership for a given shareholder in a given firm. The ownership that is carried forward has been adjusted for stock splits happened during the carry-forward period. The filling stops either until the next reported ownership for this shareholder-firm combination or until three years after the last year the shareholder reports ownership in the firm.

We also need to fill in the missing information for shareholders' board representation. We do not directly carry forward the board representation information as we do for ownership. Instead, we rely on BoardEx to determine if the director representing a non-institutional shareholder still holds a board seat in the years with missing ownership records.²

¹We thank Professor Ekaterina Volkova for making the data available at <https://sites.google.com/view/evolkova/data-block-ownership>.

²In case that a shareholder's board representative is identified based on the disclosure in insider data, we name match the representing director to its BoardEx ID so we can trace if the director still holds the board seat in years when the shareholder does not make insider filings.

A2. Industry-level Regression Analysis

To explore whether board representation can increase the impact of common institutional shareholders, we first follow Koch, Panayides, and Thomas (2021) and perform an industry-level analysis in a sample comprising 3,869 industry-years during the period 1999-2016. We use their methodology to construct a measure for common institutional ownership $Ind_Inst_ComShr_{j,t}$, which is essentially a density-based measure and is the proportion of firms in industry j that share a common institutional shareholder with an industry rival. Next, we distinguish whether common institutional shareholders have joint board seats in rival firms or not and divide the common institutional ownership measure accordingly. Specifically, we identify firms whose common institutional shareholders are jointly represented on the boards of the focal firm and an industry rival and denote by $Ind_Inst_ComShr_{j,t}^{Brd}$ the proportion of these firms in an industry. Joint board representation here takes account of Type I and II discussed earlier and characterized in Figure I. The common ownership for the remaining firms without joint board representation by common institutional shareholders is denoted by $Ind_Inst_ComShr_{j,t}^{NoBrd}$ and is calculated as the difference between $Ind_Inst_ComShr_{j,t}$ and $Ind_Inst_ComShr_{j,t}^{NoBrd}$.

The regression specifications take the following form:

$$Ind_Markup_{j,t} = Ind_Inst_ComShr_{j,t}^{Brd} + Ind_Inst_ComShr_{j,t}^{NoBrd} + Controls + FEs,$$

where $Ind_Markup_{j,t}$ denotes the equal- or size-weighted industry markup calculated across all firms in industry j based on the four-digit NAICS industry classification. As in Koch, Panayides, and Thomas (2021), our regression model also includes a range of control variables like the inverse of an industry's firm count ($1 / \#Firms$), the Herfindahl Hirschman Index (HHI), the fraction of firms with block institutional investors owning over 5% equity share ($Firms\ with\ Block$), and industry asset size ($Industry\ Firm\ Size$). Additional control variables are calculated as the firm size weighted averages of the firm characteristics in an industry; these variables include the Industry Capital Intensity, Industry Sales Growth, Industry R&D Intensity, and Industry Leverage. The specification also includes year and industry fixed effects.

Table A3, Panel B, provides the regression results. We first replicate the baseline relationship between common institutional ownership and industry profitability in Koch, Panayides, and Thomas (2021) using our sample. Industry profitability is alternatively measured by equal-weighted industry markup in Columns (1)–(4) and size-weighted industry markup in Columns (5)–(8). Consistent with the findings of Koch, Panayides, and Thomas (2021), we find common institutional ownership is not significantly associated with size-weighted industry markup, as shown in Column (5). However, a significant and positive coefficient of common institutional ownership emerges when we use equal-weighted industry markup to proxy for industry profitability in Columns (1). The stark difference in regression results based on different ways of aggregating industry markup measures (size weight vs. equal weight) suggests that the profitability effect of common institutional ownership is mostly concentrated in smaller firms and hence is more likely to be captured by the equal-weighted measure.

Next, we examine whether the profitability effect is greater when common shareholders are jointly represented on industry rivals's boards. In Column (2) where the equal-weight markup measure is used, a greater coefficient for $Ind_Inst_ComShr_{j,t}^{Brd}$ relative to that for $Ind_Inst_ComShr_{j,t}^{NoBrd}$ suggests that joint representation is associated with an increased impact of common institutional shareholders. However, the relationship between the two variables' coefficients become the opposite when using the size-weighted markup in Column (6). In any case, the difference in the coefficient estimates between $Ind_Inst_ComShr_{j,t}^{Brd}$ and $Ind_Inst_ComShr_{j,t}^{NoBrd}$ is always statistically insignificant, as indicated by an F-test result reported in the last row. Overall, the industry analyses do not lend support to the claim that common institutional shareholders have a greater influence when they are jointly represented on the boards of industry rivals.

We also investigate how joint board representation interacts with common ownership by non-institutional shareholders. Using a similar approach, we construct a density-based common ownership measure for non-institutional shareholders $Ind_NonInst_ComShr_{j,t}$ and separate it into $Ind_NonInst_ComShr_{j,t}^{Brd}$ if the common shareholders are also jointly represented on rival firms' boards and, otherwise, $Ind_NonInst_ComShr_{j,t}^{NoBrd}$. In Columns (3) and (7) of Panel B, the statistically insignificant coefficients for $Ind_NonInst_ComShr_{j,t}$ suggest that common ownership by non-institutional shareholders is not a statistically significant explanatory variable for firm profitability. More importantly, the explanatory power of common non-institutional ownership does not become greater when non-institutional shareholders additionally appoint directors to the boards of industry rivals. The industry analysis suggests that common ownership by non-institutional shareholders pose little anti-competitive pressure.

Table A1: Common Shareholders and Joint Board Representation Based on the SIC Industry Classification

This table repeats the yearly results in Table 2 on the relation between common shareholders and their joint board representation using the SIC industry classification.

Year	Firm pairs with common institutional shareholder		Firm pairs with additional type I joint board representation				Firm pairs with additional type II joint board representation			
	Intra-industry	Inter-industry	Intra-industry		Inter-industry		Intra-industry		Inter-industry	
	Obs.	Obs.	#	%	#	%	#	%	#	%
(1)	(2)	(3)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)
1999	161,247	7,107,779	4	0.002%	51	0.001%	14	0.009%	853	0.012%
2000	162,807	6,432,384	12	0.007%	78	0.001%	44	0.027%	1,168	0.018%
2001	146,791	5,758,083	3	0.002%	96	0.002%	51	0.035%	1,334	0.023%
2002	124,863	5,218,601	5	0.004%	102	0.002%	34	0.027%	1,218	0.023%
2003	131,328	5,376,866	5	0.004%	99	0.002%	24	0.018%	1,008	0.019%
2004	172,630	6,093,501	11	0.006%	110	0.002%	39	0.023%	1,090	0.018%
2005	170,848	6,196,286	10	0.006%	85	0.001%	32	0.019%	897	0.014%
2006	164,604	6,248,961	11	0.007%	83	0.001%	30	0.018%	559	0.009%
2007	158,489	6,022,653	12	0.008%	82	0.001%	34	0.021%	695	0.012%
2008	147,897	5,756,315	7	0.005%	89	0.002%	37	0.025%	776	0.013%
2009	140,283	5,434,018	9	0.006%	81	0.001%	18	0.013%	900	0.017%
2010	127,584	5,019,836	10	0.008%	89	0.002%	18	0.014%	847	0.017%
2011	123,694	4,732,114	18	0.015%	94	0.002%	36	0.029%	976	0.021%
2012	125,367	4,612,986	13	0.01%	80	0.002%	33	0.026%	876	0.019%
2013	142,347	4,823,385	18	0.013%	84	0.002%	50	0.035%	765	0.016%
2014	171,649	5,171,728	45	0.026%	97	0.002%	128	0.075%	826	0.016%
2015	185,548	5,111,137	43	0.023%	121	0.002%	111	0.06%	876	0.017%
2016	178,475	4,850,237	42	0.024%	95	0.002%	90	0.05%	770	0.016%
All	2,736,451	99,966,870	278	0.010%	1,616	0.002%	823	0.030%	16,434	0.016%

Table A2: Joint Board Representation and Firm-Pair Price Markups

This table repeats the regression models in Table 8 using alternative common ownership measures denoted $Pair_Inst_ComShr2$ and $Pair_NonInst_ComShr2$. For each common shareholder between two firms, we define its overlapping ownership by the square root of the product of the two ownership shares in the two firms. We then respectively calculate $Pair_Inst_ComShr2$ and $Pair_NonInst_ComShr2$ as the total of overlapping ownership across all common institutional shareholders and across all common non-institutional shareholders. Each common ownership measure is decomposed into a component generating joint board representation (i.e., $Pair_Inst_ComShr2^{Brd}$ and $Pair_NonInst_ComShr2^{Brd}$) and a residual component without joint board representation (i.e., $Pair_Inst_ComShr2^{NoBrd}$ and $Pair_NonInst_ComShr2^{NoBrd}$). The last rows of Columns (2), (4), (6) and (8) report F -statistics and p -values for the F -test on whether the coefficient of $Pair_Inst_ComShr2^{Brd}$ ($Pair_NonInst_ComShr2^{Brd}$) equals the coefficient of $Pair_Inst_ComShr2^{NoBrd}$ ($Pair_NonInst_ComShr2^{NoBrd}$).

Dep. Variables:	<i>Equal Weighted Firm Pair Markup</i>				<i>Size Weighted Firm Pair Markup</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Pair_Inst_ComShr2$	0.113*** (0.007)				0.052*** (0.007)			
$Pair_Inst_ComShr2^{Brd}$		0.134 (0.114)				0.111 (0.156)		
$Pair_Inst_ComShr2^{NoBrd}$		0.113*** (0.007)				0.052*** (0.007)		
$Pair_NonInst_ComShr2$			0.027** (0.012)				0.030** (0.013)	
$Pair_NonInst_ComShr2^{Brd}$				0.029*** (0.009)				0.031*** (0.010)
$Pair_NonInst_ComShr2^{NoBrd}$				0.025 (0.015)				0.029* (0.017)
<i>Firm Pair Size</i>	0.009*** (0.002)	0.009*** (0.002)	0.018*** (0.002)	0.018*** (0.002)	0.013*** (0.002)	0.013*** (0.002)	0.024*** (0.002)	0.024*** (0.002)
<i>Firm Pair Capital Intensity</i>	-0.006*** (0.000)	-0.006*** (0.000)	-0.005*** (0.000)	-0.005*** (0.000)	-0.008*** (0.000)	-0.008*** (0.000)	-0.007*** (0.000)	-0.007*** (0.000)
<i>Firm Pair Sales Growth</i>	0.087*** (0.002)	0.087*** (0.002)	0.104*** (0.002)	0.104*** (0.002)	0.097*** (0.002)	0.097*** (0.002)	0.119*** (0.003)	0.119*** (0.003)
<i>Firm Pair R&D Intensity</i>	-0.372*** (0.013)	-0.372*** (0.013)	-0.283*** (0.017)	-0.283*** (0.017)	-0.495*** (0.015)	-0.495*** (0.015)	-0.402*** (0.020)	-0.402*** (0.020)
<i>Firm Pair Leverage</i>	-0.147*** (0.005)	-0.147*** (0.005)	-0.203*** (0.007)	-0.203*** (0.007)	-0.169*** (0.006)	-0.169*** (0.006)	-0.234*** (0.008)	-0.234*** (0.008)
Firm-pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E. at firm-pair level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.868	0.868	0.870	0.870	0.849	0.849	0.848	0.848
Observations	420051	420051	302413	302413	420051	420051	302413	302413
H_0 : Equal coefficients								
F -statistics		0.0366		0.170		0.144		0.0141
Two-sided p -value		0.848		0.680		0.704		0.906

Table A3: Joint Board Representation and Industry Price Markups

Panel A reports summary statistics for the industry sample based on the four-digit NAICS. We use two profitability measures at the industry level, namely *Equal-Weighted Industry Markup* and *Size-Weighted Industry Markup*. *Ind_Inst_ComShr* (*Ind_NonInst_ComShr*) is the share of firms in an industry that share at least one institutional common shareholder (non-institutional common shareholder) with another industry rival. Each common ownership measure is split into a component representing common institutional shareholders with joint board representation (*Ind_Inst_ComShr^{Brd}* and *Ind_NonInst_ComShr^{Brd}*) and a residual component without board representation (*Ind_Inst_ComShr^{NoBrd}* and *Ind_NonInst_ComShr^{NoBrd}*). *Ind_Inst_ComShr^{Brd}* and *Ind_NonInst_ComShr^{Brd}* are augmented by a magnitude of 100 for the convenience of tabulation. Control variables include the inverse number of firms in an industry ($1/\#Firms$), the Herfindahl-Hirschman Index of industry concentration (*HHI*), the fraction of firms with block institutional shareholders owning at least 5% of outstanding shares (*%Firms with Blocks*), and industry average firm size. In addition, we control for the size-weighted industry averages of sales growth, capital intensity, R&D intensity, and financial leverage. Panel B reports linear regressions of *Equal-Weighted Industry Markup* in Columns (1)-(4) and the *Size-Weighted Industry Markup* in Columns (5)-(8). The last rows of Columns (2), (4), (6) and (8) report *F*-statistics and *p*-values for the *F*-test on whether the coefficient for *Ind_Inst_ComShr^{Brd}* (*Ind_NonInst_ComShr^{Brd}*) equals the coefficient for *Ind_Inst_ComShr^{NoBrd}* (*Ind_NonInst_ComShr^{NoBrd}*). All specifications control for industry and year fixed effects. The robust standard errors are clustered at the industry level. ***, **, and * denote the 1%, 5%, and 10% significance level, respectively.

Panel A: Summary Statistics						
	Obs.	Mean	S.D.	Median	P25	P75
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Equal-Weighted Industry Markup</i>	3,869	1.079	0.144	1.068	1.027	1.124
<i>Size-Weighted Industry Markup</i>	3,869	1.136	0.279	1.101	1.053	1.165
<i>Ind_Inst_ComShr</i>	3,869	0.685	0.294	0.732	0.500	1.000
<i>Ind_Inst_ComShr^{Brd}(×100)</i>	3,869	0.017	0.192	0.000	0.000	0.000
<i>Ind_Inst_ComShr^{NoBrd}</i>	3,869	0.685	0.294	0.732	0.500	1.000
<i>Ind_NonInst_ComShr</i>	2,952	0.010	0.056	0.000	0.000	0.002
<i>Ind_NonInst_ComShr^{Brd}(×100)</i>	2,952	0.020	0.344	0.000	0.000	0.000
<i>Ind_NonInst_ComShr^{NoBrd}</i>	2,952	0.009	0.056	0.000	0.000	0.001
<i>1/#Firms</i>	3,869	0.164	0.139	0.125	0.056	0.250
<i>HHI</i>	3,869	0.355	0.213	0.305	0.194	0.480
<i>%Firms with Blocks</i>	3,869	0.783	0.208	0.818	0.667	1.000
<i>Industry Firm Size</i>	3,869	9.657	1.929	9.551	8.416	10.901
<i>Industry Sales Growth (SW)</i>	3,869	0.189	1.732	0.075	0.008	0.158
<i>Industry Capital Intensity (SW)</i>	3,869	1.553	2.078	1.018	0.694	1.593
<i>Industry R&D Intensity (SW)</i>	3,869	0.010	0.019	0.000	0.000	0.009
<i>Industry Leverage (SW)</i>	3,869	0.291	0.154	0.278	0.188	0.375

Table A3 Continued

Panel B: Regression Results								
Dep. Variables:	<i>Equal-Weighted Ind. Markup</i>				<i>Size-Weighted Ind. Markup</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Ind_Inst_ComShr</i>	0.042** (0.017)				-0.039 (0.051)			
<i>Ind_Inst_ComShr^{Brd}</i>		0.226 (0.523)				-1.117 (1.003)		
<i>Ind_Inst_ComShr^{NoBrd}</i>		0.042** (0.017)				-0.039 (0.051)		
<i>Ind_NonInst_ComShr</i>			-0.053 (0.037)				-0.033 (0.035)	
<i>Ind_NonInst_ComShr^{Brd}</i>				-0.049 (0.436)				-0.343 (0.366)
<i>Ind_NonInst_ComShr^{NoBrd}</i>				-0.053 (0.037)				-0.032 (0.035)
<i>1/#firms</i>	0.216*** (0.070)	0.216*** (0.070)	0.233** (0.094)	0.233** (0.095)	0.260** (0.120)	0.259** (0.120)	0.184** (0.087)	0.185** (0.087)
<i>HHI</i>	-0.064* (0.034)	-0.064* (0.034)	-0.078** (0.032)	-0.078** (0.032)	0.047 (0.083)	0.047 (0.083)	0.069 (0.121)	0.069 (0.121)
<i>%Firms with Blocks</i>	0.028 (0.021)	0.028 (0.021)	0.023 (0.021)	0.023 (0.021)	-0.054 (0.034)	-0.054 (0.034)	0.045*** (0.011)	0.045*** (0.011)
<i>Industry Firm Size</i>	0.014** (0.007)	0.014** (0.007)	0.025*** (0.006)	0.025*** (0.006)	0.041*** (0.013)	0.041*** (0.013)	-0.120 (0.093)	-0.120 (0.093)
<i>Industry Capital Intensity</i>	-0.008 (0.008)	-0.008 (0.008)	-0.009 (0.009)	-0.009 (0.009)	-0.004 (0.017)	-0.004 (0.017)	-0.004 (0.023)	-0.004 (0.023)
<i>Industry Sales Growth</i>	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
<i>Industry R&D Intensity</i>	-0.694* (0.387)	-0.694* (0.387)	-0.256 (0.344)	-0.256 (0.344)	-0.640 (0.501)	-0.642 (0.500)	-0.085 (0.496)	-0.086 (0.496)
<i>Industry Leverage</i>	-0.004 (0.031)	-0.004 (0.031)	-0.067** (0.034)	-0.067** (0.034)	0.160 (0.174)	0.159 (0.174)	0.108 (0.167)	0.108 (0.168)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered S.E. at industry level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.727	0.727	0.754	0.754	0.359	0.359	0.277	0.277
Observations	3,869	3,869	2,952	2,952	3,869	3,869	2,952	2,952
H_0 : Equal coefficients								
F -statistic		0.126		0.000		1.161		0.744
Two-sided p -value		0.723		0.993		0.282		0.389

Table A4: Variable Definitions

Variable	Description
Industry-level variables:	
<i>Equal-Weighted Markup</i>	<i>Industry</i> The equal-weighted average of price markup of all firms in an industry. A firm's price markup is calculated as sales divided by the difference between sales and EBIT. Source: Compustat
<i>Size-Weighted Industry Markup</i>	The size-weighted average of price markup of all firms in an industry. It is calculated as an industry's total sales divided by the difference between the industry's total sales and industry's total EBIT. Source: Compustat
<i>Ind_Inst_ComShr</i>	The share of firms in an industry that have least one common institutional shareholder with another industry rival. We only consider common institutional shareholders owning at least 1% of outstanding shares in the focal firm and the jointly held industry rival. Source: 13F Institutional Ownership Data by Backus, Conlon, and Sinkinson (2021)
<i>Ind_Inst_ComShr^{Brd}</i>	The share of firms in an industry with at least one common institutional shareholder that is jointly represented (Type I or Type II) on the boards of the focal firm and another industry rival. We only consider common institutional shareholders owning at least 1% of outstanding shares in the focal firm and the jointly held industry rival. Source: BoardEx and 13F Institutional Ownership Data by Backus, Conlon, and Sinkinson (2021)
<i>Ind_Inst_ComShr^{NoBrd}</i>	The share of firms in an industry whose common institutional shareholders do not jointly hold board seats in the focal firm and another industry rival. It is calculated as <i>Ind_Inst_ComShr</i> minus <i>Ind_Inst_ComShr^{Brd}</i> . Source: BoardEx and 13F Institutional Ownership Data by Backus, Conlon, and Sinkinson (2021)
<i>Ind_NonInst_ComShr</i>	The share of firms in an industry that have least one common non-institutional shareholder with another industry rival. We only consider common non-institutional shareholders owning at least 1% of outstanding shares in the focal firm and the jointly held industry rival. Source: BoardEx, WRDS Insider Database, and 13D & 13G ownership data by Schwartz-Ziv and Volkova (2021)
<i>Ind_NonInst_ComShr^{Brd}</i>	The share of firms in an industry with at least one common non-institutional shareholder that is jointly represented (Type I or Type II) on the boards of the focal firm and another industry rival. We only consider common non-institutional shareholders owning at least 1% of outstanding shares in the focal firm and the jointly held industry rival. Source: BoardEx, WRDS Insider Database, and 13D & 13G ownership data by Schwartz-Ziv and Volkova (2021)
<i>Ind_NonInst_ComShr^{NoBrd}</i>	The share of firms in an industry whose common non-institutional shareholders do not jointly hold board seats in the focal firm and another industry rival. It is calculated as <i>Ind_NonInst_ComShr</i> minus <i>Ind_NonInst_ComShr^{Brd}</i> . Source: BoardEx, WRDS Insider Database, and 13D & 13G ownership data by Schwartz-Ziv and Volkova (2021)
<i>1 / # firms</i>	The reciprocal of the number of firms in the industry. Source: Compustat
<i>HHI</i>	Herfindahl-Hirschman Index that is calculated by squaring the market share (in term of sales) of each firm in an industry and then summing the resulting numbers. Source: Compustat
<i>% Firms with blocks</i>	The fraction of firms in the industry that have at least one block institutional shareholder owning more than 5% of outstanding stock in the firm. Source: Compustat
<i>Industry Firm Size</i>	The natural logarithm of the sum of total assets (AT) across all firms in an industry. Source: Compustat
<i>Industry Sales Growth</i>	It is calculated as the growth rate of an industry's total sales (SALES) from year $t - 1$ to year t . Source: Compustat
<i>Industry Capital Intensity</i>	It is calculated as an industry's total assets (AT) divided by the industry's total sales (SALES). Source: Compustat
<i>Industry R&D Intensity</i>	It is calculated as an industry's total industry R&D expenditures (XRD) divided by the industry's total assets (AT). Source: Compustat
<i>Industry Leverage</i>	It is calculated as an industry's total short-term debt (DLC) plus long-term debt (DLTT), then divided by the industry's total assets (AT). Source: Compustat
Pair-level variables:	
<i>Equal-weighted Firm Pair Markup</i>	The equal-weighted average of price markup between two firms in a pair. A firm's price markup is calculated as sales (SALES) divided by the difference between sales (SALES) and earnings before interest and taxes (EBIT). Source: Compustat
<i>Size-weighted Firm Pair Markup</i>	The size-weighted average of price markup between two firms in a pair. A firm's price markup is calculated as sales (SALES) divided by the difference between sales (SALES) and earnings before interest and taxes (EBIT). Source: Compustat
<i>Pair_Inst_ComShr</i>	Pairwise common institutional ownership between two firms. It is calculated as the total overlapping ownership across all common institutional shareholders between the two firms. A common institutional shareholder' overlapping ownership is defined as the minimum of two ownership shares in both firms. We only consider common institutional shareholders owning at least 1% of outstanding shares in both firms. Source: CRSP and 13F Institutional Ownership Data by Backus, Conlon, and Sinkinson (2021)

Variable	Description
<i>Pair_Inst_ComShr^{Brd}</i>	Pairwise common ownership by institutional shareholders that are jointly represented on the boards of both firms. It is calculated as the total overlapping ownership across common institutional shareholders that are jointly represented on both firms' boards. We only consider common institutional shareholders owning at least 1% of outstanding shares in both firms. Source: CRSP and 13F Institutional Ownership
<i>Pair_Inst_ComShr^{NoBrd}</i>	Pairwise common ownership by institutional shareholders that have no joint representation on the boards of both firms. It is calculated as the total overlapping ownership across common institutional shareholders that are not jointly represented on both firms' boards. We only consider common institutional shareholders owning at least 1% of outstanding shares in both firms. Source: CRSP and 13F Institutional Ownership
<i>Pair_NonInst_ComShr</i>	Pairwise common non-institutional ownership between two firms. It is calculated as the total overlapping ownership across all common non-institutional shareholders between the two firms. We only consider common non-institutional shareholders owning at least 1% of outstanding shares in both firms. Source: BoardEx, WRDS Insider Database, and 13D & 13G ownership data by Schwartz-Ziv and Volkova (2021)
<i>Pair_NonInst_ComShr^{Brd}</i>	Pairwise common ownership by non-institutional shareholders that are jointly represented on the boards of both firms. It is calculated as the total overlapping ownership across common non-institutional shareholders that are jointly represented on both firms' boards. We only consider common non-institutional shareholders owning at least 1% of outstanding shares in both firms. Source: BoardEx, WRDS Insider Database, and 13D & 13G ownership data by Schwartz-Ziv and Volkova (2021)
<i>Pair_NonInst_ComShr^{NoBrd}</i>	Pairwise common ownership by non-institutional shareholders that have no joint representation on the boards of both firms. It is calculated as the total overlapping ownership across common non-institutional shareholders that are not jointly represented on both firms' boards. We only consider common non-institutional shareholders owning at least 1% of outstanding shares in both firms. Source: BoardEx, WRDS Insider Database, and 13D & 13G ownership data by Schwartz-Ziv and Volkova (2021)
<i>Firm Pair Size</i>	The natural logarithm of paired firms' total assets (AT). Source: Compustat
<i>Firm Pair Sales growth</i>	The growth rate of paired firms' total sales (SALES) from year $t - 1$ to year t . Source: Compustat
<i>Firm Pair Capital Intensity</i>	It is calculated as paired firms' total assets (AT) divided by their total sales (SALES). Source: Compustat
<i>Firm Pair R&D intensity</i>	It is calculated as paired firms' total R&D expenditures (XRD) divided by their total assets (AT). Source: Compustat
<i>Firm Pair Leverage</i>	It is calculated as paired firms' total short-term debt (DLC) plus total firm-pair long-term debt (DLTT), then divided by their total firm-pair assets (AT). Source: Compustat

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