Institutional Cross-Ownership of Peer Firms and Revelatory Price Efficiency

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Abstract

We argue that cross-ownership increases the amount of private information in stock price, enhancing the ability of stock price to provide feedback to managers. Consistent with this argument, we find greater cross-ownership heightens a firm's investment-*q* sensitivity. This effect is stronger for firms with a lower propensity for voluntary disclosure and for firms whose managers hold less private information. Furthermore, we find that cross-ownership is negatively associated with the sensitivity of a firm's investment to its peers' stock prices. Additionally, cross-ownership has a stronger impact on the investment-*q* sensitivity when measured among investors who trade more actively the firm's shares. By using financial institution mergers as an identification strategy, we strengthen the causal inference. Overall, our results suggest that cross-ownership helps increase revelatory price efficiency (RPE), potentially leading to more efficient corporate decisions.

JEL Classification: G10; G20; G23

Keywords: cross-ownership, institutional investors, managerial learning, feedback effect of prices

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1. Introduction

We examine the effect of institutional cross-ownership of industry peers on revelatory price efficiency (RPE), the extent to which stock price provides feedback to managers for real efficiency.[1] Investors in a firm use not only information about the firm itself but also data about its industry peers in valuing the focal firm. Hence, we argue that cross-ownership plays a critical role in market feedback. We predict that a focal firm whose investors blockhold the firm's industry peers can benefit from enhanced price informativeness because these investors can leverage information privately acquired from the peers to derive insights into the focal firm's relative position within the industry and, consequently, its growth opportunities. To the extent that these insights are incorporated into the stock price through trading, it can increase the ability of the stock price to provide feedback. To our knowledge, our study is the first to document the effect of cross-ownership on a firm's real decisions through the channel of managerial learning.

Investors in a focal firm may generate the best estimate of its growth opportunities if they hold a significant block of the firm's shares. In such cases, however, blockholders can directly communicate any private information they possess to the firm's management. Managers would then learn directly from these investors through private communication rather than relying on insights from the stock price. While the extant literature on cross-ownership focuses mainly on blockholders and their influence on firm policies (e.g., He and Huang 2017; Park et al. 2019), our focus is on market feedback. Therefore, we restrict our attention to institutional investors who hold but do not blockhold the shares of a focal firm while blockholding the shares of its industry peers. To the extent that such investors actively trade the shares of a focal firm, leveraging information

[1] We refer to firm managers as "managers" and institutional investors (or portfolio managers) as "investors" throughout the paper.

on the firm's industry peers privately obtained through its blockholding ownership, the firm's managers would have a higher chance to learn from the stock price.

Based on 178,345 firm-years ranging from 1981 to 2022, we examine the following two dimensions of cross-ownership: (1) the total number of cross-owners holding both the focal and peer firms and (2) the total number of peer firms held by cross-owners (based on 3-digit SIC). If a focal firm is actively traded by more cross-owners, its stock price is likely to reflect more information privately generated by the cross-owners. Additionally, when cross-owners blockhold more peer firms, the private insights they generate about the focal firm are likely to be more precise, making the focal firm's stock price even more informative. Consistent with our prediction, we find that both measures of cross-ownership are significantly positively associated with the investment-*q* sensitivity, suggesting that managerial learning from price increases with a higher number of institutions commonly holding the firm and its peer firms and with a higher number of peer firms blockheld by the same institutions. This effect is economically significant: an increase in cross-ownership from the bottom to the top decile increases the investment-*q* sensitivity by 15% to 26% across our specifications. We also find that cross-ownership enhances the ability of stock prices to predict future earnings, validating our premise that cross-ownership increases price informativeness.

Park et al. (2019) find that cross-ownership reduces a firm's concern for competition and proprietary information leakage, increasing voluntary disclosures, which raises a possibility that the finding of our study is at least partly due to information flows from the firm to the market, and hence forecasting price efficiency (FPE).[2] To mitigate the possibility that our result is explained

[2] FPE refers to the extent to which the price of a given security accurately reflects its fundamental value. Price can be efficient in the sense of FPE, but not in RPE (Bond et al. 2012).

solely by FPE, we conduct two cross-sectional tests. First, we split the sample into two groups: firms that issue earnings guidance and those that do not. We find that the effect of cross-ownership on investment-*q* sensitivity is significantly positive only for firms without earnings guidance, and the impact is notably greater for these firms. This finding alleviates the concern that the increase in investment-*q* sensitivity associated with cross-ownership is mainly due to enhanced disclosures facilitating information flow from the firm to the market.

Second, we examine whether our result varies with the amount of private information held by managers. While managers do not always trade on private information, insider trading can still reveal some, though not all, of corporate information held by managers (e.g., Seyhun 1992; Meulbroek 1992; Damodaran and Liu 1993; Ke et al. 2003; Piotroski and Roulstone 2005). We thus split the sample into two groups based on insider trading profitability. If our results were driven by cross-owners facilitating information flow from the firm to the market, we would expect the effect to be stronger in firms where managers hold more private information. However, we find the effect of cross-ownership on investment-*q* sensitivity is significantly positive only for firms with lower insider trading profitability (i.e., where managers hold less private information and have a greater need to learn from outsiders). Furthermore, the impact of cross-ownership, especially when measured by the number of cross-owners, is significantly greater for these firms. Overall, this result is not consistent with FPE driving our results.

Studies suggest that managers can acquire private information from institutional investors or financial analysts through direct interactions (e.g., Bottazzi et al. 2008; Brav et al. 2008; Guo and Zhong 2022). Then the effect of cross-ownership could stem from interactions between cross-owners and firm managers. To strengthen the learning mechanism via the RPE channel, we conduct the following analyses. First, since a firm's stock price and that of its peers serve as

substitutable investment signals, if cross-ownership makes the focal firm's stock price more informative, managers would rely less on the stock prices of their peers (Foucault and Fresard 2014). Indeed, we find that cross-ownership is significantly negatively associated with the sensitivity of a firm's investment to the stock prices of its industry peers, while significantly positively associated with the sensitivity to the firm's own stock price. This result would not be expected if managers learned directly from cross-owners or if cross-ownership merely reflected correlated information between managers and cross-owners (Foucault and Fresard 2014).

Second, managerial learning from stock price occurs when investors' private information is transmitted to stock price through trading. Hence, the potential for stock prices to reflect such information is greater when cross-owners are active rather than passive traders. Consistent with this expectation, when we re-construct cross-ownership using active and passive investors separately, we find a significant effect of cross-ownership only when it is based on active investors.[3] Additionally, direct communication is likely to be a more feasible channel for investors holding a larger stake, as they typically have greater access to firm management. However, when we re-construct cross-ownership after excluding institutions more likely to engage in direct communication with firm management, (i.e., those whose ownership stake in the focal firm exceeds 1%), we still find a significantly positive effect of cross-ownership, mitigating the possibility that our findings are solely attributable to direct communication with cross-owners.

To reinforce causal inferences, we conduct a difference-in-differences analysis using financial institution mergers as an identification strategy (e.g., He and Huang 2017; He et al. 2019;

[3] Bushee and Noe (2000) and Bushee (2001) classify institutional investors as transient, dedicated, and quasi-index institutions based on portfolio diversity and turnover. Following Kacperczyk et al. (2021), we use transient and dedicated institutions as active investors and quasi-index institutions as passive investors. We download institutional investor classification data from https://accounting-faculty.wharton.upenn.edu/bushee/.

Park et al. 2019). We define a firm as a treatment firm if the firm is held, but not blockheld, by one of the merging institutions during the quarter immediately before the merger announcement while the other merging institution does not blockhold the firm but does blockhold at least one of the firm's industry peer firms during the same quarter. For a firm to be a control firm, we require it to be held, but not blockheld, by the same institution holding the treatment firm while the other merging institution blockholds none of the firm's industry peer firms. We first verify that financial institution mergers lead to an increase in cross-ownership for treatment firms compared to control firms. In addition, we find a significant increase in the investment-*q* sensitivity for treatment firms relative to control firms after the mergers. This result is more pronounced for firms that experience a greater increase in cross-ownership from the pre-merger to the post-merger period.

We conduct several additional analyses for further insights. First, if cross-ownership facilitates managerial learning, firms with higher cross-ownership should make more value-enhancing investments. Consistent with this idea, we find a more positive stock market reaction to investment-related news from these firms. Second, while cross-ownership has increased over time, passive funds have also grown. Then a mere increase in cross-ownership may not lead to greater private information (Kacperczyk et al. 2022). To account for changing market structures, we rank cross-ownership annually by deciles and find consistent results. Third, we use the measures of cross-ownership similar to those employed in other studies, such as He and Huang (2017), Park et al. (2017), and He et al. (2019), and find robust results.

Our study contributes to the growing literature on institutional cross-ownership. This literature has primarily focused on the impact of cross-ownership on intra-industry competition (e.g., He and Huang 2017; Azar et al. 2018; Park et al. 2019; Lewellen and Lowry 2021) and monitoring (e.g., He et al. 2018; Kang et al. 2018). In contrast to these studies, we expand the

literature by focusing on how cross-owners incorporate private information in stock prices. Although typical cross-ownership is too small to affect a firm's investment decision through a governance mechanism (Harford et al. 2011), we suggest that cross-ownership can help firms improve real efficiency by facilitating managerial learning from stock prices. In particular, while investors and regulators are concerned with the negative externalities of cross-ownership, such as anti-competitive incentives, we document evidence more consistent with positive externalities.

We also contribute to the literature on the real effects of financial markets, which suggests that managers learn information from stock prices and use it when they make investment decisions (e.g., Luo 2005; Chen et al. 2007; Foucault and Gehrig 2008; Bakke and Whited 2010; Foucault and Fresard 2012; Bond et al. 2012; Edmans et al. 2017; Jayaraman and Wu 2019). While it is not feasible to provide direct evidence of enhanced RPE associated with cross-ownership due to the absence of a natural proxy for RPE, our cross-sectional analyses suggest that the increase in investment-*q* sensitivity we document is more likely attributable to RPE than FPE. Although existing studies generally agree that investors hold private information unknown to managers, the source of this information advantage has not been clearly identified. By focusing on the cross-ownership of peer firms, we contribute to this literature by demonstrating how a firm's ownership structure influences its ability to learn incremental information from the stock market.

The remainder of this paper proceeds as follows. Section 2 discusses our conceptual framework, Section 3 describes data and research designs, Section 4 presents the results of our main analyses, and Section 5 discusses additional tests. Section 6 concludes.

2. Conceptual Framework

Our study is based on the theory of financial markets, which suggests that managers can glean information from stock prices about their firms as stock prices, in aggregate, contain

information from traders that managers do not have (e.g., Dow and Gorton (1997); Subrahmanyam and Titman (1999); Dye and Sridhar (2002); Dow and Rahi (2003); Goldstein and Guembel (2008); Kau et al. (2008)). Unlike the traditional view of price informativeness, where information flows from the firm to the market, this theory posits that information can also flow from the market to the firm through price formation, increasing price informativeness in the sense of RPE. When traders generate private information beyond what managers know, stock prices reflecting that information can guide managers' investment decisions (e.g., Bond et al. (2012)). Consistent with this theory, empirical research finds evidence that managers learn and glean private information embedded in stock prices (e.g., Luo (2005); Chen et al. (2007); Bakke and Whited (2010)) and use voluntary disclosure as a means to elicit greater market feedback for their investment decisions (e.g., Chen et al. (2019); Jayaraman and Wu (2020); Fox et al. (2022)).

We focus on the role of cross-ownership in market feedback because investors value a firm based on not only its own information but also data about its industry peers. Since both the focal firm and its peers are subject to common demand shocks, incorporating peer information helps investors reduce noise and improve forecast accuracy for the focal firm's future performance. Access to information from peer firms, whose product demands are highly correlated with the focal firm, can allow investors to derive more precise insights, including those regarding the focal firm's growth opportunities. Investors are thus incentivized to use peer firm information, alongside that of the focal firm, to better understand its relative position within the industry, such as strengths, weaknesses, and growth potential. We, therefore, argue that cross-ownership enhances market feedback, as investors with significant stakes in peer firms are better positioned to leverage this information in generating private insights into the focal firm.

While financial information about publicly traded peer firms is generally available to all investors, certain frictions in disclosure, such as strategic reporting and information processing costs, can complicate the use of public information. For example, firms can withhold information or aggregate information to avoid potential loss of competitive advantage in product markets (e.g., Verrecchia (1983); Hayes and Lundholm (1996)). This opacity makes it challenging for investors to infer industry trends, such as technological developments, from public information. Additionally, investors face capacity constraints in analyzing information (Blankespoor et al. (2020)). Even though disclosures are publicly accessible, processing the information, integrating it with the focal firm's financial data, and generating valuable private insights incur non-trivial costs.[4] These information processing costs can affect the precision of private information that investors can derive from public data.

However, blockholders possess an information advantage due to their privileged access to firm management (e.g., Edmans (2009); Edmans and Manso (2010)). While publicly available information often includes noise stemming from strategic disclosure or its aggregated nature, direct access to firm management can help investors clarify issues and filter out noise, decreasing the costs associated with searching for and obtaining further information, including nuanced details and soft information. In addition, blockholders can gain an insider-like perspective on industry dynamics, such as market trends, regulatory developments, and competitive positioning. This insight can be leveraged to better understand the disclosures of other firms in the industry, enhancing the efficiency in processing industry-wide information. With more precise information

[4] Blankespoor et al. (2020) suggest that disclosure processing costs consist of costs incurred in searching for, acquiring, and analyzing firm disclosure.

on the industry and peer firms, they are better equipped to evaluate the focal firm's standing within the industry, providing a clearer signal of its relative position and growth opportunities.

To illustrate, consider a scenario where an investor is valuing shares of firm A. To improve the valuation, the investor uses publicly available information not only about firm A but also about its industry peers, such as firms B, C, and D. Valuation should be more accurate when incorporating information from firms B, C, and D rather than relying solely on data about firm A. Now, suppose the investor holds a significant block of shares in firm B. This position grants the investor privileged access to firm B's management, allowing the investor to clarify uncertainties in public disclosures and gain a deeper understanding of firm B. This advantage can also enhance the investor's industry analysis when integrating publicly obtained information from other peer firms. The improved industry insights then increase the precision of the investor's assessment of firm A's growth opportunities. As a result, when the investor makes trading decisions based on these informed, firm-specific insights, the stock price of firm A becomes more informative.

Investors in the focal firm may generate the most accurate estimate of the firm's growth opportunities if blockholding its shares. However, in this scenario, managers would learn directly from these investors through private communication rather than through the stock price. To align with our framework, we define a cross-owner as an institutional investor holding less than 5% of a focal firm's outstanding shares while blockholding shares of at least one peer firm in the same industry. We measure a focal firm's cross-ownership by (1) the number of cross-owners and (2) the number of peer firms commonly held by these cross-owners. If a focal firm is actively traded by more cross-owners, its stock price is likely to reflect more information privately generated by them. Additionally, when cross-owners blockhold more peer firms, the private insights they gain about the focal firm are likely to be more precise, also making the focal firm's stock price more

informative. Consequently, we expect to find a significantly positive relationship between a firm's cross-ownership and its investment-*q* sensitivity.

We consider two situations in which we may not find the expected result. First, unlike the typical setting in managerial learning studies, where an informed investor trades a single firm, cross-owners hold multiple firms and thus are concerned with the effect of their trading on other firms in their portfolio. If revealing information through trading hurts the firm they blockhold (even if it benefits the focal firm), cross-owners would have no incentives to willingly reveal this information to the focal firm. Instead, they would attempt to conceal their trades involving the focal firm's shares. If cross-owners successfully conceal this information, managerial learning would be hindered. Nevertheless, if the information is leaked and reflected in the stock price, the focal firm's management can still learn from the stock price.

Second, the opposite outcome is possible. Concerned about the increased information advantage of common owners, other investors might choose to avoid commonly owned stocks and produce less private information. Massa et al. (2021) find that institutional investors avoid holding stocks commonly held by BlackRock and Barclays Global Investors following their merger announcement, leading to a decline in stock price and liquidity. If an increase in cross-ownership reduces the likelihood of other investors reflecting private information in the stock price, we would expect to find a negative relationship between cross-ownership and investment-*q* sensitivity. Given this possibility, we present H1 in null form as follows:

H1: Cross-ownership is not associated with investment-q sensitivity.

3. Sample and Research Design

3.1 Data and Sample

We collect institutional holdings data from Thomson Reuters Institutional (13f) Holdings, financial data from Compustat, share price and returns data from CRSP, earnings guidance and analyst forecast data from I/B/E/S, and insider trading data from Thomson Reuters Insider Filing Data. Our sample consists of 178,345 firm-years from 1981 to 2022 after excluding observations with missing values in variables required in our main specification. As reported in Table 1, the number of observations is lower in the first few years but remains relatively steady throughout the remaining sample period. Consistent with cross-ownership becoming more prevalent in recent years (Azar et al. 2018), we find that cross-ownership has increased over time in our sample period in both measures of cross-ownership, *NumCross* (i.e., the total number of cross-owners holding the focal firm and blockholding its peer firms) and *NumConncected* (i.e., the total number of peer firms blockheld by the focal firm's cross-owners).[5]

[Insert Table 1]

Our measures of cross-ownership are similar to those used by He and Huang (2017), with the key difference being that we require a cross-owner to hold, but not blockhold, shares of a focal firm (i.e., holding less than 5% of the firm's outstanding shares) while simultaneously blockholding shares of the firm's industry peers (based on the 3-digit SIC code). While our framework relies on the idea that managers learn private information in the stock price, transmitted by investors through trading, blockholders can directly communicate private information, if any, to firm management. Therefore, unlike He and Huang (2017), who identify cross-owners as institutions that blockhold both the focal and peer firms, we exclude blockholders of the focal firm in identifying cross-owners. This approach helps mitigate the possibility that any increase in

[5] Following He and Huang (2017), we first measure each variable at the end of each quarter and then calculate the average of the variable across the four quarters for each firm-year. We keep firm-years with zero cross-ownership in our sample as long as its total institutional ownership is non-missing (i.e., greater than zero).

investment-*q* sensitivity associated with cross-ownership is due to direct communication or monitoring by cross-owners. However, like He and Huang (2017), we require a cross-owner to be a blockholder of a peer firm, where private information is more likely to be discovered through their ownership. The construction of this variable is illustrated in Appendix A.

Variations in these measures of cross-ownership can arise from the following sources. First, cross-ownership can change when a firm is added to or removed from the portfolio of an institution that blockholds its industry peers. Second, changes in cross-ownership can also occur when an institution holding the firm crosses the blockholding threshold for the firm's industry peer. For example, in Appendix A, if firm b1 is added to institution 2's portfolio with less than 5% ownership, both *NumCross* and *NumConnected* for firm b1 will increase from zero to one. Also, if institution 1 increases its ownership in firm b2 from 0% to 10%, both measures for firm b1 will increase from zero to one. A higher *NumCross* indicates that more informed investors are trading the firm's shares, while a higher *NumConnected* suggests that these investors can access more of the firm's peers to acquire private information. Consequently, a firm's stock price can become more informative with higher values of *NumCross* and *NumConnected*.

Panel A of Table 2 provides the descriptive statistics. The means of *NumCross* and *NumConnected* are 6.795 and 26.551, respectively, suggesting that an average firm in our sample has 27 unique peer firms held by 7 cross-owners. Compared to He and Huang (2017) who report means of 0.604 and 2.285 for *NumCross* and *NumConnected*, respectively, in their sample, our sample firms have higher cross-ownership. This is because we do not require cross-owners to blockhold a focal firm, allowing more institutions with smaller holdings to be identified as cross-owners. The average firm in our sample is also characterized by annual investment (*Inv*) being 34% of fixed assets, while its *q* is 2.015. The average firm also has operating cash flows (*CFO*)

equal to 1.5% of total assets, firm size (*Size*) of 5.527 (i.e., the market value of equity of $251 million), and institutional ownership (*InstOwn*) of 38%. Panel B of Table 2 presents the Pearson correlation coefficients between the variables used in our main specification. Not surprisingly, the two measures of cross-ownership are positively correlated with each other.

[Insert Table 2]

3.2 Research Design

We estimate the following OLS model for our main analysis:

$$\begin{aligned} Inv \;&= \beta_0 + \beta_1 q + \beta_2 CrossOwn + \beta_3 q \times CrossOwn + \beta_4 CFO + \beta_5 Size \\ &+ \beta_6 InstOwn + \beta_7 q \times CFO + \beta_8 q \times Size + \beta_9 q \times InstOwn \\ &+ Fixed\ Effects + \varepsilon \end{aligned} \tag{1}$$

Inv is investment measured at the end of the firm's fiscal year, defined as capital expenditures scaled by lagged fixed assets. *q* is Tobin's *q* measured at the beginning of the fiscal year, defined as the market value of equity plus the book value of debt scaled by the book value of assets. *CrossOwn* refers to cross-ownership, either *NumCross* or *NumConnected*, as described above, measured at the beginning of the fiscal year. In our regression analyses, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation. *q* × *CrossOwn* is the variable of interest in our study. To the extent that cross-ownership increases RPE, the coefficient on this variable is expected to be significantly positive.[6]

We include *CFO*, *Size*, *InstOwn*, and their interactions with *q* as control variables in equation (1) to account for both the level and sensitivity. While *q* is a price-based measure of

[6] Note that we measure a firm's *q* and its investment at the beginning and at the end of the fiscal year, respectively, consistent with managers learning from price in period *t-1* and subsequently making investments in period *t*. To the extent that information held by managers is already reflected in past investment, institutional investors' discovery of information known to managers (i.e., public information) is unlikely to cause a stronger sensitivity of investment (as of *t*) to beginning stock price (as of *t-1*) (Jayaraman and Wu (2019)). As such, the positive coefficient on *q* × *CrossOwn* if any, is unlikely to be due to information flows from the firm to the market.

investment opportunities, prior studies include *CFO* as a benchmark (e.g., Edmans et al. (2017); Jayaraman and Wu (2019)). Institutional investors favor large stocks. Hence, we control for *Size* as it is highly correlated with *CrossOwn* and also affects investments. We also control for *InstOwn* to directly distinguish the effect of cross-ownership from that of institutional monitoring. Similar to *CrossOwn*, we assign decile rankings to *InstOwn* and standardize this variable to range from 0 to 1 in regression analyses. All these control variables are measured at the beginning of the fiscal year. Finally, we add firm and year fixed effects and cluster standard errors by firms. Appendix B provides definitions of all these variables.

4. Empirical Results

4.1 Main Analysis: Institutional Cross-Ownership and Investment-Q Sensitivity

Table 3 presents the results of our main analysis estimating equation (1), where *CrossOwn* refers to *NumCross* in columns (1) and (2) and *NumConnected* in columns (3) and (4). We find that the coefficient on *q* is significantly positive at the 1% level in all columns (coefficient of 0.071, 0.106, 0.071, and 0.103 in columns (1), (2), (3), and (4), respectively). The coefficient on *q* × *CrossOwn* is also significantly positive at the 1% level in all columns (coefficient of 0.013, 0.028, 0.011, and 0.018 in columns (1), (2), (3) and (4), respectively), suggesting that the investment-*q* sensitivity is higher for firms with higher cross-ownership. This effect is economically significant since an increase in cross-ownership from the bottom to the top decile increases the investment-*q* sensitivity by 15% to 26% across the four columns. Overall, these results are consistent with cross-ownership increasing the ability of stock price to guide managers in investment decisions.

Table 3 also reveals that the coefficient on *CrossOwn* is significantly negative at the 1% level in all columns (coefficient of -0.083, -0.156, -0.037, and -0.101 in columns (1), (2), (3) and (4), respectively). Hence, for a sample firm with an average *q* (i.e., 2.015), the effect of cross-

ownership on investment is all negative. These results mitigate the possibility that cross-ownership increases the investment-q sensitivity by helping firms make more investments (e.g., through a reduction in the cost of capital). When it comes to control variables, we find that the coefficients on *CFO* and *Size* are both significantly positive in columns (2) and (4), consistent with firms with higher profitability and larger size tending to make more investments. In addition, we find that the coefficient on $q \times$ *Size is* significantly negative, suggesting that larger firms are likely to make less q-sensitive investments. We also find that the coefficient on $q \times$ *InstOwn* is insignificant, suggesting that a mere increase in institutional ownership does not appear to facilitate managerial learning from the stock price.[7]

[Insert Table 3]

4.2 Validation Test: Institutional Cross-Ownership and Price Informativeness

Our study relies on the premise that cross-ownership increases price informativeness. To validate this premise, we follow Kacperczyk et al. (2021) and examine whether the ability of stock price to predict future earnings increases with cross-ownership. More specifically, we estimate the following equation:

$$\begin{aligned} FutureEarn \quad &= \beta_0 + \beta_1 MV + \beta_2 CrossOwn + \beta_3 MV \times CossOwn + \beta_4 Earn \\ &+ \beta_5 AT + \beta_6 Lev + \beta_7 TGB + \beta_8 Sale + \beta_9 Cash + \beta_{10} MV \times Earn \\ &+ \beta_{11} MV \times AT + \beta_{12} MV \times Lev + \beta_{13} MV \times TGB + \beta_{14} MV \times Sale \\ &+ \beta_{15} MV \times Cash + Fixed\ Effects + \varepsilon \end{aligned} \tag{2}$$

FutureEarn is defined as one- or two-year-ahead earnings before interest and tax divided by lagged total assets. *MV* is the natural logarithm of the firm's market value of equity scaled by total assets. The variable of interest is *MV* × *CrossOwn*. If cross-ownership increases the informativeness of

[7] Our inferences remain the same when using 4-digit SICs or the Hoberg and Phillips (2016) TNIC3 industry classification to identify peer firms for measuring cross-ownership (results reported in Tables OA1 and OA2 in the Online Appendix).

stock price for future earnings, we expect to find a positive coefficient on *MV* × *CrossOwn*. Control variables include *Earn* (earnings before interest and tax divided by total assets), *AT* (the natural logarithm of total assets), *Lev* (leverage defined as the ratio of total liabilities to total assets), *TGB* (tangibility defined as the ratio of the net value of the property, plant, and equipment to total assets), *Sale* (the natural logarithm of sales), *Cash* (the sum of cash and cash equivalents divided by total assets), and their interactions with *MV*. We also include firm and year fixed effects and cluster standard errors by firm.

Table 4 reports the results of estimating equation (2). Columns (1) and (2) report the results when we measure *FutureEarn* with one-year-ahead earnings performance. In both columns (1) and (2), using *NumCross* and *NumConnected*, respectively, the coefficient on *MV* × *CrossOwn* is significantly positive at the 1% level, suggesting that cross-ownership increases the ability of stock price to predict future earnings. We continue to find similar results in columns (3) and (4), where we measure *FutureEarn* with two-year-ahead earnings performance. Additionally, following Choi et al. (2019), we split a firm's earnings into firm-specific and industry-wide components.[8] We find that the coefficient on *MV* × *CrossOwn* is significantly positive when using the firm-specific component of future earnings as the dependent variable (as reported in Table OA3 in the Online Appendix) but not when using the industry component. This result provides further evidence that cross-ownership increases the amount of firm-specific information reflected in stock prices.

[Insert Table 4]

We also employ several alternative approaches to infer the impact of cross-ownership on

[8] More specifically, we measure the industry component of earnings as the market cap-weighted average earnings of firms within the same 3-digt SIC industry, minus the market-cap weighted earnings of all firms in the market. We measure the firm-specific component of earnings as the firm's earnings, minus the industry component, minus the market-cap weighted earnings of all firms in the market.

price informativeness. First, we measure price synchronicity for each firm-year using the R^2 from a market model. Prior research indicates that prices incorporating more firm-specific information are less synchronous with market returns (e.g., Roll (1998); Morck et al. (2000)). When we regress price synchronicity on *CrossOwn* and a set of control variables similar to those used in equation (2), we find a significantly negative coefficient on *NumCross* and *NumConnected*. Second, we measure the variance ratio, calculated as the ratio of weekly return variance to daily return variance, scaled by five (with a week defined as any consecutive five trading days). Under a random walk hypothesis, this variance ratio would be closer to one as prices are more informative (e.g., Lo and MacKinlay 1988). When we regress the absolute value of the difference between this ratio and one, we find a significantly negative coefficient on *NumCross* and *NumConnected*. Third, following the approach in Lee and Zhu (2022), we measure the speed of price adjustment as the proportion of market-adjusted three-month returns (i.e., buy-and-hold returns from day 0 to +63) that is realized within the first five trading days, where day 0 is the earnings announcement date. We find a significantly positive association between both *NumCross* and *NumConnected* and the speed of price adjustment. Overall, the results of these analyses are consistent with the notion that price informativeness increases with cross-ownership, further validating the premise we rely on. We report the results of these analyses in Tables OA4, OA5, and OA6 in the Online Appendix.

4.3 Revelatory Vs. Forecasting Price Efficiency

If cross-ownership facilitates information flows from the firm to the market, the increase in the investment-*q* sensitivity associated with cross-ownership can be explained by FPE, not RPE. Park et al. (2019) find that cross-ownership reduces a firm's concern for competition and proprietary information leakage, increasing voluntary disclosures, which raises a possibility that our finding is at least partly due to information flows from the firm to the market. Therefore, to

mitigate the possibility that our result is explained solely by FPE, we conduct a cross-sectional test based on voluntary disclosure. Given that information flows from the firm to the market would likely be greater for firms with a greater propensity of voluntary disclosure, if the effect of cross-ownership is observed in firms with lower, but not higher, voluntary disclosure, the increase in the investment-*q* sensitivity would not be attributable to FPE.

We use a firm's issuance of earnings guidance as a proxy for voluntary disclosures. We split the sample into two groups based on whether the firm issued earnings guidance at least once during the year. We thus construct an indicator, *Disclosure*, that equals one for firms with disclosure, and zero for firms without disclosure. We then modify equation (1) by including *Disclosure* and its interactions with q and *CrossOwn*, while retaining the same set of control variables and fixed effects. More specifically, we estimate the following regression model.

$$\begin{aligned} Inv \;=\; & \beta_0 + \beta_1 q + \beta_2 CrossOwn + \beta_3 q \times CrossOwn + \beta_4 Disclosure \\ & + \beta_5 Disclosure \times q + \beta_6 Disclosure \times CrossOwn \\ & + \beta_7 Disclosure \times q \times CrossOwn + Controls + Fixed\ Effects + \varepsilon \end{aligned} \tag{3}$$

Table 5 reports the results of this analysis estimating equation (3). In column (1), when we use *NumCross*, the estimated change in the investment-*q* sensitivity resulting from an increase in cross-ownership from the bottom to the top decile is significantly positive at 0.033 for firms with no disclosure (as captured by the coefficient on $q \times$ *CrossOwn*). However, for firms with disclosure, the effect is insignificant at -0.006 (as captured by the sum of the coefficient on $q \times$ *CrossOwn* and the coefficient on *Disclosure* $\times q \times$ *CrossOwn*). This result suggests that cross-ownership increases the investment-*q* sensitivity only for firms with no disclosure. Additionally, the coefficient on *Disclosure* $\times q \times$ *CrossOwn* is significantly negative at the 1% level, indicating that the change in the investment-*q* sensitivity associated with cross-ownership is significantly smaller for firms with disclosure than for those with no disclosure. In column (2), when using *NumConnected*, we find

similar results. That is, cross-ownership, as measured by *NumConnected*, significantly increases the investment-*q* sensitivity for firms with no disclosure, but not for those with disclosure, with a significant difference between the two groups. Overall, these results mitigate the possibility that the increase in the investment-*q* sensitivity is attributable to FPE.[9]

[Insert Table 5]

We also examine whether our result varies with the amount of private information held by managers. Since information flows from the firm to the market are likely greater when managers are more informed about their firms, if the effect of cross-ownership is observed in firms where managers hold less private information (i.e., when managers have a greater need to learn), the increase in the investment-*q* sensitivity would be less likely attributable to FPE. We use insider trading profitability as a proxy for managers' private information. While managers do not always trade on private information, prior research suggests that insider trading can still reveal some of the corporate information held by managers (e.g., Seyhun 1992; Meulbroek 1992; Damodaran and Liu 1993; Ke et al. 2003; Piotroski and Roulstone 2005).

To split the sample into two groups, we construct an indicator variable, *Insider*, that equals one for firms with insider trading profitability higher than the sample median each year, and zero otherwise. We calculate insider trading profitability using the three-month returns of shares purchased minus those sold based on transactions made by the firm's top executives. We then modify equation (1) by including *Insider* and its interactions with *q* and *CrossOwn*, while retaining the same set of control variables and fixed effects. More specifically, we estimate the following regression model.

$$Inv = \beta_0 + \beta_1 q + \beta_2 CrossOwn + \beta_3 q \times CrossOwn + \beta_4 Insider \quad (4)$$

[9] The number of observations used in this analysis is smaller than that in Table 3 because guidance data on I/B/E/S is only available from 1995.

$$+ \beta_5 Insider \times q + \beta_6 Insider \times CrossOwn$$
$$+ \beta_7 Insider \times q \times CrossOwn + Controls + Fixed\ Effects + \varepsilon$$

Table 6 reports the results of this analysis estimating equation (4). In column (1), when we use *NumCross*, the estimated change in the investment-*q* sensitivity resulting from a rise in cross-ownership from the bottom to the top decile is significantly positive at 0.035 for firms with lower insider trading profitability (as captured by the coefficient on *q* × *CrossOwn*). However, for firms with higher profitability, it is insignificant at 0.012 (as captured by the sum of the coefficient on *q* × *CrossOwn* and the coefficient on *Insider* × *q* × *CrossOwn*). This result suggests that cross-ownership significantly increases the investment-*q* sensitivity for firms with lower insider trading profitability, but not for those with higher profitability. We also find that the coefficient on *Insider* × *q* × *CrossOwn* is significantly negative at the l% level, indicating that the change in the investment-*q* sensitivity is significantly smaller for firms with higher insider trading profitability than for those with lower profitability. In column (2), when using *NumConnected*, we find similar results. That is, cross-ownership, as measured by *NumConnected*, significantly increases the investment-*q* sensitivity for firms with lower insider trading profitability, but not for those with higher profitability. However, the negative coefficient on *Insider* × *q* × *CrossOwn* does not reach conventional significance levels. Overall, similar to Table 5, the results in Table 6 are unlikely to be attributable to information flows from the firm to the market. These results alleviate concerns that the increase in investment-*q* sensitivity is primarily due to cross-ownership enhancing FPE.

[Insert Table 6]

4.4 Learning from Stock Price Vs. Direct Communication

Managers may acquire private information from investors or financial analysts through direct interactions (e.g., Bottazzi et al. (2008); Brav et al. (2008); Guo and Zhong (2022)). If cross-

owners directly share private information with firm managers, the positive impact of cross-ownership on investment-*q* sensitivity could alternatively be attributed to correlated information between cross-owners and firm managers. To address this possibility, we first rely on the framework provided by Foucault and Fresard (2014), which suggests that a firm's stock price and the stock prices of its peers act as substitutable investment signals. Under this framework, if managers learn from stock prices, an increase in the informativeness of their firm's stock price should lead to a decrease in the sensitivity of their investments to the stock prices of peer firms. However, this relationship would not be expected if managers disregarded the information in stock prices and instead learned directly from cross-owners.

To test this idea, we measure *Peerq*, which is defined as the market cap-weighted average *q* of firms operating in the same 3-digit SIC industry as the focal firm. Table 7 reports the results when we re-estimate equation (1) after including *Peerq* and *Peerq* × *CrossOwn* as additional variables. In both columns (1) and (2), using *NumCross* and *NumConnected*, respectively, the coefficient on *Peerq* is significantly positive at the 1% level. However, while the coefficient on *q* × *CrossOwn* is significantly positive at the 1% level (as consistent with our main finding), the coefficient on *Peerq* × *CrossOwn* is significantly negative at the 1% level. This result suggests that an increase in the informativeness of a firm's stock price due to higher cross-ownership reduces the sensitivity of the firm's investment to the stock prices of peer firms. This result would not be expected if managers did not rely on stock price as a source of information for learning.

[Insert Table 7]

To strengthen the learning mechanism through stock prices, we also construct measures of cross-ownership using active and passive investors separately. The managerial learning literature suggests that managers can learn from stock prices when investors' private information is

conveyed through trading activities. Consequently, the ability of stock prices to reflect this information is heightened when cross-owners are active traders rather than passive ones. Bushee and Noe (2000) and Bushee (2001) characterize institutional investors as transient institutions if they have diverse portfolios with high turnover, dedicated investors if they have focused portfolios with low turnover, and quasi-index institutions if they have diverse portfolios with low turnover. Kacperczyk et al. (2021) classify transient and dedicated institutions as active investors and quasi-index institutions as passive investors. Following this classification, we re-construct the cross-ownership variables separately for active investors (labeled as *CrossOwnActive*) and passive investors (labeled as *CrossOwnPassive*).[10]

Table 8 reports the results when we re-estimate equation (1) after replacing *CrossOwn* with the above variables. Columns (1) and (2) report the results when the active and passive cross-ownership variables are measured based on *NumCross*. We find that the coefficient on $q \times$ *CrossOwnActive* is significantly positive at the 1% level in column (1) but the coefficient on $q \times$ *CrossOwnPassive* is insignificant in column (2). This result suggests that the investment-*q* sensitivity increases with higher cross-ownership by active traders but not by passive investors. Additionally, we find that the difference in the coefficients between $q \times$ *CrossOwnActive* and $q \times$ *CrossOwnPassive* is significant at the 1% level. In columns (3) and (4), where the active and passive cross-ownership variables are measured based on *NumConnected*, we find similar results. Overall, these results are consistent with cross-owners enhancing the informativeness of stock price through active trading, strengthening the mechanism of learning from stock price.

[Insert Table 8]

[10] As reported in Table OA7 in the Online Appendix, our inferences remain the same when we only use transient institutions to construct *CrossOwnActive* We download institutional investor classification data from https://accounting-faculty.wharton.upenn.edu/bushee.

Information transfer through direct communication may be more feasible for institutional investors with larger stakes in firms, as they are likely to have greater access to firm management. To ensure that our findings are not driven solely by direct communication, we further construct *CrossOwnSmall*, a cross-ownership variable measured after excluding institutions with ownership stakes greater than 1% in a focal firm, as these institutions are more likely to engage in direct communication with management (though they are not typically considered blockholders) compared to those with smaller holdings. Table 9 reports the results when we re-estimate equation (1) after replacing *CrossOwn* with *CrossOwnSmall*. Columns (1) and (2) report the results based on *NumCross* and *NumConnected*, respectively. We find that the coefficient on $q \times$ *CrossOwnSmall* is significantly positive in both columns, mitigating the possibility that our findings are solely attributable to direct learning from cross-owners.

[Insert Table 9]

5. Additional Analyses

5.1 Identification Using Financial Institution Mergers

To strengthen causal inferences, we follow prior work and use financial institution mergers as a quasi-exogenous shock to cross-ownership (e.g., He and Huang 2017; He et al. 2019; Park et al. 2019). Specifically, using the mergers listed in Table A1 of the Appendix in He and Huang (2017), we define a firm as a treatment firm if (1) the firm is held, but not blockheld, by one of the merging institutions during the quarter immediately before the merger announcement and (2) the other merging institution does not hold the firm but blockholds at least one of the firm's industry peer firms during the same quarter. Hence, following the merger, the treatment firm is likely to experience an increase in cross-ownership that is not driven by a firm's choice to attract cross-owners. In contrast, we define a firm as a control firm if the firm is held, but not blockheld, by the

same institution holding the treatment firm while the other merging institution blockholds none of the firm's industry peer firms. To illustrate, in Appendix A, if institutions 1 and 2 merge, firm b1 is classified as a treatment firm, while firm c1 is classified as a control firm.[11] As noted by He and Huang (2017), since we do not use the post-merger holding information, the treatment vs. control classification is not influenced by private information about the firms held by merged institutions.

To perform a difference-in-differences analysis, we define the pre-merger (post-merger) period as a firm's last (first) fiscal year both starting and ending before (after) the merger announcement. We then estimate the following equation:

$$\begin{aligned} Inv \;\; &= \beta_0 + \beta_1 Treat + \beta_2 Post + \beta_3 Treat \times Post + \beta_4 q + \beta_5 q \times Treat \\ &+ \beta_6 q \times Post + \beta_7 q \times Treat \times Post \; + Controls + Fixed\ Effects + \; \varepsilon \end{aligned} \tag{5}$$

Inv and q are the firm's investment and Tobin's q as defined previously. *Treat* is an indicator variable that equals one for treatment firms, and zero for control firms. *Post* is an indicator variable that equals one for the post-merger period, and zero for the pre-merger period. The variable of interest is $q \times Treat \times Post$. We expect to find a significantly positive coefficient on this variable if an increase in cross-ownership resulting from the merger increases the investment-q sensitivity for treatment firms relative to control firms. We include the same set of control variables in equation (1) and apply either merger, firm, and year fixed effects, or merger × firm and merger × year fixed effects. We cluster standard errors by merger × firm.

In Table 10, Panel A reports the change in *NumCross* and *NumConnected* experienced by our sample firms following financial institution mergers. For treatment firms, *NumCross* and *NumConnected* increased by 1.65 and 8.88, respectively, while the increase in those variables is

[11] If Institutions 1 and 2 merge, *NumCross* and *NumConnected* for firm b1 increases from zero to one, whereas these variables remain at zero for firm c1. Firms a1, a2, and b2 do not meet the criteria for treatment and control firms and therefore are excluded from the sample for the analysis using financial institution mergers.

smaller for control firms. More importantly, the difference-in-differences estimates are significantly positive at the 1% level for both *NumCross* and *NumConnected*, validating the use of financial institution mergers as a shock to cross-ownership. Panel B reports the results estimating equation (5). In column (1), when we do not include controls, the coefficient on $q \times Treat \times Post$ is 0.016, significantly positive at the 1% level. In column (2), when we use merger, firm, and year fixed effects, the coefficient on this variable is 0.014, also significantly positive at the 1% level. Lastly, in column (3), when we use merger × firm and merger × year fixed effects, the coefficient on this variable is 0.010, significantly positive at the 10% level. Overall, these results suggest that treatment firms experienced an increase in investment-*q* sensitivity after financial institution mergers relative to control firms.

To ensure that the above result is attributable to changes in cross-ownership resulting from the mergers, we re-estimate equation (5) by replacing *Treat* with *CrossOwnChg*, defined as the change in *CrossOwn* (i.e., *CrossOwn* in the post-merger period minus *CrossOwn* in the pre-merger period, with the difference converted into a decile ranking) for treatment firms, and zero for control firms. Panel C reports the results of this analysis. When we use *NumCross* to define *CrossOwnChg*, the coefficient on $q \times CrossOwnChg \times Post$ is significantly positive in columns (1) and (2), while the significance of the result in column (3) is marginal. Also, when using *NumConnected*, the coefficient on $q \times CrossOwnChg \times Post$ is significantly positive in columns (4) and (5). Overall, these results reinforce our inference that treatment firms experienced an increase in investment-*q* sensitivity after financial institution mergers due to an increase in their cross-ownership.

[Insert Table 10]

5.2 Institutional Cross-Ownership and Market Reaction to Investment News

Given that firms with higher cross-ownership are better guided by stock prices, we further

examine how the stock market reacts to a firm's investment news released on the earnings announcement date. If the market perceives firms with higher cross-ownership as making more value-enhancing investments, we would find a more positive reaction to the investment news. Specifically, we estimate the following regression equation:

$$\begin{aligned} CAR \quad &= \beta_0 + \beta_1 CapxNews + \beta_2 CrossOwn + \beta_3 CapxNews \times CossOwn \\ &+ \beta_4 EarnNews + \beta_5 q \; + \; \beta_6 CFO \; + \; \beta_7 Size \; + \; \beta_8 InstOwn \\ &+ \beta_9 Lev + \beta_{10} TGB + \beta_{11} Cash \; + \; \beta_{12} Loss \; + Fixed\ Effects + \varepsilon \end{aligned} \tag{6}$$

CAR is the cumulative abnormal stock returns measured over the three days surrounding the earnings announcement date. *CapxNews* is investment news, calculated as the difference between the capital expenditures released on the earnings announcement date and those reported for the prior fiscal year, scaled by lagged fixed assets. The variable of interest is *CapxNews* × *CrossOwn*. We include *EarnNews*, *q*, *CFO*, *Size*, *InstOwn*, *Lev*, *TGB*, *Cash*, and *Loss* as controls. Appendix B provides definitions of all these variables. Since this is an event study based on a short window, we do not include firm fixed effects. Instead, we use industry (based on the 3-digit SIC) and year fixed effects and cluster standard errors by firms.

Table 11 reports the results of estimating equation (6). Columns (1) and (2) report the results when *CAR* is calculated by subtracting the expected returns based on the CAPM model. In both columns (1) and (2), using *NumCross* and *NumConnected*, respectively, the coefficient on *CapxNews* × *CrossOwn* is significantly positive at the 1% level. This suggests that, after accounting for earnings news (*EarnNews*), the stock market reacts more positively to investment news released on the earnings announcement date for firms with higher cross-ownership. We continue to find similar results in columns (3) and (4), where *CAR* is calculated using the Fama-French 3-factor model. Overall, these findings support the notion that the stock market perceives investments made by firms with higher cross-ownership as more value-enhancing.

[Insert Table 11]

5.3 Other Analyses

Despite the increase in cross-ownership over time (as shown in Table 1), the concurrent growth of passive funds suggests that a mere rise in cross-ownership does not necessarily lead to a greater amount of private information (Kacperczyk et al. (2022)). While the increase in cross-ownership by passive funds could potentially counteract our findings, we account for temporal changes in market structures by converting each measure of cross-ownership into decile rankings redefined annually based on its distribution, further standardized to range from 0 to 1. As reported in Table OA8 in the Online Appendix, when *CrossOwn* is redefined based on its within-year decile rankings, we continue to find that the coefficient on $q \times CrossOwn$ is positive and significant. This suggests that our findings are robust to using cross-ownership measures that account for temporal changes in market structures.

We also use the measures of cross-ownership employed in other studies, such as *AvgNum*, *Common Dummy*, $HoldingPeers^{EW}$, and $HoldingPeers^{VW}$.[12] He and Huang (2017) define *AvgNum* as the number of peer firms held by cross-owners divided by the number of cross-owners. Both He and Huang (2017) and Park et al. (2017) use *Common Dummy*, an indicator variable that equals one if *NumCross* is at least one, and zero otherwise. He et al. (2019) construct $HoldingPeers^{EW}$, calculated as the product of an institution's ownership in the focal firm and its aggregate ownership in the peer firms, summed across all institutions holding shares in the focal firm. He et al. (2019) also construct $HoldingPeers^{VW}$, constructed similar to $HoldingPeers^{EW}$ except that the institution's ownership in peer firms is weighted by the firms' market cap. As reported in Table OA9 in the

[12] In constructing these variables following prior work, we continue to require cross-owners to hold, but not blockhold, the shares of a focal firm while blockholding the shares of its peer firms in the same industry to suit our study.

Online Appendix, when using these measures of cross-ownership, we continue to find a significantly positive coefficient on $q \times CrossOwn$.

Prior research suggests several alternative channels that could potentially explain our results. First, firms facing fewer financing constraints can make investments that are more sensitive to stock price (Baker et al. (2003)). Therefore, if cross-ownership mitigates information asymmetry and, hence, underinvestment, it would enable firms to raise capital at a lower cost in response to an increase in growth opportunities, likely leading to higher investment-q sensitivity. However, this channel is unlikely to explain our findings, as the effect of cross-ownership on investment is consistently negative for our sample firms with an average q. Furthermore, if our results were due to cross-ownership reducing information asymmetry and financing costs, we would expect a greater effect of cross-ownership for firms facing higher financing constraints. However, when we split the sample into two groups based on several proxies for financing constraints (such as leverage and size), we do not observe a stronger effect of cross-ownership on firms with higher financing constraints (results reported in Table OA10 in the Online Appendix).

The agency literature also suggests that managers, if not properly monitored, tend to make self-serving investments at the expense of shareholder value. Therefore, if cross-ownership improves monitoring, our results could be due to cross-ownership reducing agency conflicts. However, we control for institutional ownership and our results remain robust when excluding large shareholders, who are among the most effective corporate monitors, in measuring cross-ownership. Furthermore, as reported in Table OA11 in the Online Appendix, we do not find evidence that the effect of cross-ownership is more pronounced for firms with higher agency conflicts (e.g., firms with higher Gompers et al.'s (2003) G index, or higher free cash flows). This reduces the likelihood that our results are driven by a monitoring channel of cross-ownership.

Lastly, Polk and Sapienza (2008) find a positive association between discretionary accruals (a proxy for mispricing) and abnormal investment, suggesting that managers increase investment to cater to investor demand when stocks are overvalued. Therefore, if industry-wide overpricing attracts institutional investors and increases cross-ownership, our results could be attributable to firms catering to investor demand for investment to exploit overvaluation. However, this explanation is unlikely, as our results remain robust when using industry-year fixed effects (results reported in Table OA12 in the Online Appendix).[13] Moreover, if cross-ownership triggers mispricing and leads firms to cater to investor demand, we would expect a stronger effect of cross-ownership for firms with higher levels of mispricing. However, when we split the sample into two groups based on discretionary accruals (a proxy for mispricing as in Polk and Sapienza (2008)), we do not observe a differential effect of cross-ownership between the two groups (results reported in Table OA14 in the Online Appendix).

6. Conclusion

We argue that cross-ownership of industry peers helps increase revelatory price efficiency, the potential for managers to learn private information embedded in stock price. Consistent with this argument, we find that cross-ownership is significantly positively associated with investment-*q* sensitivity. Moreover, this effect is significantly stronger for firms where information flows from the firm to the market are less likely, such as those with a lower propensity of voluntary disclosure or those whose managers hold less private information. Additionally, we find that cross-ownership

[13] To further address a potential concern of industry common shocks, for each industry-year, we measure industry returns (i.e., the equal-weighted or value-weighted average of annual returns of all firms operating in the same 3-digit SIC industry) and include its interaction with *q* as an additional control variable. With industry factors controlled for, we continue to find a positive effect of cross-ownership on the investment-*q* sensitivity, alleviating the possibility that our results are driven by industry common shocks (results reported in Table OA13 in the Online Appendix).

is negatively associated with the sensitivity of a firm's investment to the firm's peers' stock prices. Using financial institution mergers as an identification strategy, we further demonstrate a significant increase in the investment-*q* sensitivity for treatment firms (those receiving a positive shock to cross-ownership) relative to control firms during the post-merger period.

Despite its widespread use in prior research, the regression model we use to test investment-*q* sensitivity may be mis-specified if there is measurement error in our proxy for *q* (e.g., Erickson and Whited (2000)). While investment is a function of marginal *q*, we also recognize the relationship between investment and *q* may not always be linear, which can also complicate our inferences. Additionally, this model is less applicable to firms that rely heavily on intangible assets, as it primarily focuses on capital expenditures or investment in fixed assets. As such, our results should be interpreted with caution, keeping this caveat in mind.

Our study contributes to the growing body of literature on institutional cross-ownership. While previous research has largely concentrated on the impact of blockholders' cross-ownership on intra-industry competition or monitoring, we extend this literature by exploring how cross-owners, excluding blockholders, influence the incorporation of private information into stock prices. Additionally, we contribute to the literature on managerial learning and investment-*q* sensitivity. While prior studies generally acknowledge that investors possess private information that managers do not, the source of this informational advantage remains unclear. By focusing on the institutional cross-ownership of peer firms, we illustrate how a firm's ownership structure shapes its ability to extract incremental information from the stock market.

References

Azar, J.; M. Schmalz; and I. Tecu. "Anticompetitive Effects of Common Ownership." *Journal of Finance*, 73 (2018), 1513–1565.

Baker, M.; J. Stein; and J. Wurgler. " When Does the Market Matter? Stock Prices and Investment of Equity-Dependent Firms." *Quarterly Journal of Economics*, 118 (2003), 969–1005.

Bakke, T., and T. Whited. "Which Firms Follow the Market? An Analysis of Corporate Investment Decisions." *Review of Financial Studies*, 23 (2010), 1941–1980.

Blankespoor, E.; E. deHann; and I. Marinovic. "Disclosure Processing Costs, Investors' Information Choice, and Equity Market Outcomes: A Review." *Journal of Accounting and Economics*, 70 (2020), 101344.

Bond, P.; A. Edmans; and I. Goldstein. "The Real Effects of Financial Markets." *Annual Review of Financial Economics*, 4 (2012), 339–360.

Bottazzi, L.; M. Da Rin; and T. Hellmann. "Who Are the Active Investors? Evidence from Venture Capital." *Journal of Financial Economics*, 89 (2008), 488–512.

Brav, A.; W. Jiang; F. Partnoy; and R. Thomas. "Hedge Fund Activism, Corporate Governance, and Firm Performance." *Journal of Finance*, 63 (2008), 1729–1775.

Bushee, B. "Do Institutional Investors Prefer Near-Term Earnings over Long-Run Value?" *Contemporary Accounting Research*, 18 (2001), 207–246.

Bushee, B., and C. Noe. "Corporate Disclosure Practices, Institutional Investors, and Stock Return Volatility." *Journal of Accounting Research*, 38 (2000), 171–202.

Chen, Q.; I. Goldstein; and W. Jiang. "Price Informativeness and Investment Sensitivity to Stock Price." *Review of Financial Studies*, 20 (2007), 619–650.

Chen, Z.; J Shen; and Y. Zhang. "Corporate Disclosure and Revelatory Price Efficiency: The Case of Capital Investment Guidance." Working Paper (2019).

Choi, J.; S. Choi; L. Myers; and D. Ziebart. "Financial Statement Comparability and the Informativeness of Stock Prices About Future Earnings." *Contemporary Accounting Research*, 36 (2019), 389–417.

Damodaran, A., and C. Liu. "Insider Trading as a Signal of Private Information." *Review of Financial Studies*, 6 (1993), 79–119.

Dow, J., and G. Gorton. "Stock Market Efficiency and Economic Efficiency: Is There a Connection?" *Journal of Finance*, 52 (1997), 1087–1129.

Dow, J., and R. Rahi. "Informed Trading, Investment, and Welfare." *Journal of Business*, 76 (2003), 439–454.

Dye, R., and S. Sridhar. "Resource Allocation Effects of Price Reactions to Disclosures." *Contemporary Accounting Research*, 19 (2002), 385–410.

Edmans, A. "Blockholder Trading, Market Efficiency, and Managerial Myopia." *Journal of Finance*, 64 (2009), 2481–2513.

Edmans, A., and G. Manso. "Governance Through Trading and Intervention: A Theory of Multiple Blockholders." *Review of Financial Studies*, 24 (2010): 2395–2428.

Edmans, A.; S. Jayaraman; and J. Schneemeier. "The Source of Information in Prices and Investment-Price Sensitivity." *Journal of Financial Economics*, 126 (2017), 74–96.

Erickson, T., and T. Whited. "Measurement Error and the Relationship Between Investment and *q*." *Journal of Political Economy*, 108 (2000), 1027–1057.

Foucault, T., and L. Fresard. "Cross-Listing, Investment Sensitivity to Stock Price, and the Learning Hypothesis." *Review of Financial Studies*, 25 (2012), 3305–3350.

Foucault, T., and L. Fresard. "Learning from Peers' Stock Prices and Corporate Investment." *Journal of Financial Economics*, 111 (2014), 554–577.

Foucault, T., and T. Gehrig. "Stock Price Informativeness, Cross-Listings, and Investment Decisions." *Journal of Financial Economics*, 88 (2008), 146–168.

Fox, Z.; J. Kim; and B. Schonberger. "To Teach or to Learn? Disclosure Incentives in the Face of Investment Opportunities." Working Paper (2022).

Goldstein, I., and A. Guembel. "Manipulation and the Allocational Role of Prices." *Review of Economic Studies*, 75 (2008), 133–164.

Gompers, P.; J. Ishii; and A. Metrick. "Corporate Governance and Equity Prices." *Quarterly Journal of Economics*, 118 (2003), 107–156.

Guo, R., and I. Zhong. "Do Managers Learn from Analysts About Investing? Evidence from Internal Capital Allocation." *The Accounting Review*, 98 (2022), 215–246.

Harford, J.; D. Jenter; and K. Li. "Institutional Cross-Holdings and Their Effect on Acquisition Decisions." *Journal of Financial Economics*, 99 (2011), 27–39.

Hayes, R., and R. Lundholm. “Segment Reporting to the Capital Market in the Presence of a Competitor.” *Journal of Accounting Research*, 34 (1996), 261–279.

He, J., and J. Huang. “Product Market Competition in a World of Cross-Ownership: Evidence from Institutional Blockholdings.” *Review of Financial Studies*, 30 (2017), 2674–2718.

He, J.; J. Huang; and S. Zhao. “Internalizing Governance Externalities: The Role of Institutional Cross-Ownership.” *Journal of Financial Economics*, 134 (2019), 400–418.

He, J.; L. Li; and P. Yeung. “Two Tales of Monitoring: Effects of Institutional Cross-Blockholding on Accruals.” Working paper (2018).

Hoberg, G., and G. Phillips. “Text-Based Network Industries and Endogenous Product Differentiation.” *Journal of Political Economy*, 124 (2016), 1423–1465.

Jayaraman, S., and J. Wu. “Is Silence Golden? Real Effects of Mandatory Disclosure.” *Review of Financial Studies*, 32 (2019), 2225–2259.

Jayaraman, S., and J. Wu. “Should I Stay or Should I Grow? Using Voluntary Disclosure to Elicit Market Feedback.” *Review of Financial Studies*, 33 (2020), 3854–3888.

Kacperczyk, M.; J. Nosal; and S. Sundaresan. “Market Power and Price Informativeness.” Working paper (2022).

Kacperczyk, M.; S. Sundaresan; and T. Wang. “Do Foreign Institutional Investors Improve Price Efficiency?” *Review of Financial Studies*, 34 (2021), 1317–1367.

Kang, J.; J. Luo; and H. Na. “Are Institutional Investors with Multiple Blockholdings Effective Monitors?” *Journal of Financial Economics*, 128 (2018), 576–602.

Kau, J.; J. Linck; and P. Rubin. “Do Managers Listen to the Market?” *Journal of Corporate Finance*, 14 (2008), 347–362.

Ke, B.; S. Huddart; and K. Petroni. “What Insiders Know About Future Earnings and How They Use It: Evidence from Insider Trades.” *Journal of Accounting and Economics*, 35 (2003), 315–346.

Lee, C., and C. Zhu. “Active Funds and Bundled News.” *The Accounting Review*, 97 (2022), 315–339.

Lewellen, K., and M. Lowry. “Does Common Ownership Really Increase Firm Coordination?” *Journal of Financial Economics*, 141 (2021), 322–344.

Lo, A., and A. MacKinlay. "Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test." *Review of Financial Studies*, 1 (1988), 41–66.

Luo, Y. "Do Insiders Learn from Outsiders? Evidence from Mergers and Acquisitions." *Journal of Finance*, 60 (2005), 1951–1982.

Massa, M.; D. Schumacher; and Y. Wang. "Who is Afraid of Blackrock?" *Review of Financial Studies*, 34 (2021), 1987–2044.

Meulbroek, L. "An Empirical Analysis of Illegal Insider Trading." *Journal of Finance*, 47 (1992), 1661–1699.

Morck, R.; B. Yeung; and W. Yu. "The Information Content of Stock Markets: Why Do Emerging Markets Have Synchronous Stock Price Movements?" *Journal of Financial Economics*, 58 (2000), 215–260.

Park, J.; J. Sani; N. Shroff; and H. White. "Disclosure Incentives When Competing Firms Have Common Ownership." *Journal of Accounting and Economics*, 67 (2019), 387–415.

Piotroski, J., and D. Roulstone. "Do Insider Trades Reflect Both Contrarian Belief and Superior Knowledge About Future Cash-Flow Realization?" *Journal of Accounting and Economics*, 39 (2005), 55–81.

Polk, C., and P. Sapienza. "The Stock Market and Corporate Investment: A Test of Catering Theory." *Review of Financial Studies*, 22 (2009), 187–217.

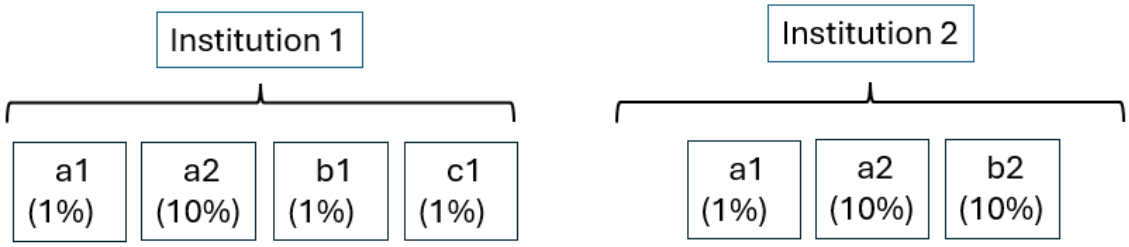
Roll, R. "R^2." *Journal of Finance*, 43 (1988), 541–566.

Seyhun, H. "Why Does Aggregate Insider Trading Predict Future Stock Returns?" *Quarterly Journal of Economics*, 107 (1992), 1303–1331.

Subrahmanyam, A., and S. Titman. "The Going-Public Decision and the Development of Financial Markets." *Journal of Finance*, 54 (1999), 1045–1082.

Verrecchia, R. "Discretionary Disclosure." *Journal of Accounting and Economics*, 5 (1983), 365–380.

Appendix A – Illustration of Cross-Ownership Measurement



Cross-owners are defined as institutional investors that hold less than 5% of the shares of the focal firm, while simultaneously blockholding (i.e., holding 5% or more of the shares of) at least one of the focal firm's industry peer firms. *NumCross* is measured as the total number of cross-owners and *NumConnected* is measured as the total number of connected peer firms that operate in the focal firm's industry and, at the same time, are blockheld by the focal firm's cross-owners. To be more specific, consider the following scenario: Firms a1 and a2 operate in industry A, firms b1 and b2 operate in industry B, and firm c1 operates in industry C. Institution 1 holds 1%, 10%, 1%, and 1% of the shares in firms a1, a2, b1, and c1, respectively. Institution 2 holds 1%, 10%, and 10% of the shares in firms a1, a2, and b2, respectively. For firm a1, both institutions 1 and 2 are considered cross-owners because they each blockhold shares in the firm's industry peer, firm a2. Therefore, for firm a1, *NumCross* equals two (as it has institutions 1 and 2 as its cross-owners), and *NumConnected* equals one (as it has firm a2 as its connected industry peer). *NumCross* and *NumConnected* would be zero for all other firms.

Appendix B – Variable Definitions

Variables in Main Analysis (Table 3)	
NumCross	The total number of cross-owners defined as institutional investors that hold less than 5% of the shares of the focal firm, while simultaneously blockholding (i.e., holding 5% or more of the shares of) at least one of the focal firm's 3-digit SIC peer firms. The number of cross-owners is first calculated at the end of each calendar quarter and then averaged across four quarters during the year. For the regression analysis, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation.
NumConnected	The total number of connected peer firms defined as firms operating in the focal firm's 3-digit SIC industry that are blockheld by the focal firm's cross-owners. The number of connected peer firms is first calculated at the end of each calendar quarter and then averaged across four quarters during the year. For the regression analysis, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation.
Inv	Investment defined as capital expenditures scaled by lagged fixed assets.
q	Tobin's *q* defined as the market value of equity plus the book value of debt, scaled by the book value of total assets.
CFO	Cash flows from operations defined as earnings before extraordinary items plus depreciation and amortization, scaled by lagged total assets.
Size	Firm size defined as the log of the market value of equity (in millions).
InstOwn	Institutional ownership defined as the percentage of a firm's shares held by institutional investors. For the regression analysis, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation.
Additional Variables in Validation Test for Price Informativeness (Table 4)	
FutureEarn	One- or two-year-ahead earnings before interest and tax, divided by lagged total assets.
MV	Natural logarithm of the market value of equity scaled by total assets.

Earn	Earnings before interest and tax, divided by total assets.
AT	Natural logarithm of total assets.
Lev	Leverage defined as the ratio of total liabilities to total assets.
TGB	Tangibility defined as the ratio of the net value of the property, plant, and equipment to total assets.
Sale	Natural logarithm of sales.
Cash	The sum of cash and cash equivalents divided by total assets.
Additional Variables in Cross-Sectional Analyses (Tables 5 and 6)	
Disclosure	Indicator variable that equals one if the firm issued earnings guidance at least once during the year, and zero otherwise.
Insider	Indicator variable that equals one if the firm's insider trading profitability, calculated as the 3-month returns of shares purchased minus those sold following transactions made by the firm's top executives, is higher than the sample median each year, and zero otherwise.
Additional Variables in Further Analyses for Learning Mechanism (Tables 7, 8 and 9)	
Peerq	Tobin's *q* of peer firms, calculated as the market cap-weighted average *q* of firms operating in the same 3-digit SIC industry as the focal firm.
CrossOwnActive	Either *NumCross* or *NumConnected* as defined above with the exception that cross-owners are restricted to active investors, namely transient and dedicated institutions, as classified by Bushee and Noe (2000) and Bushee (2001). For the regression analysis, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation.
CrossOwnPassive	Either *NumCross* or *NumConnected* as defined above with the exception that cross-owners are restricted to passive investors, namely quasi-index institutions, as classified by Bushee and Noe (2000) and Bushee (2001). For the regression analysis, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation.
CrossOwnSmall	Either *NumCross* or *NumConnected* as defined above with the exception that cross-owners are restricted to investors whose ownership in a focal firm does not exceed 1% of its outstanding shares. For the regression analysis, we assign decile rankings to this variable and

	standardize them to range from 0 to 1 for ease of interpretation.
Additional Variables in Analysis Using Financial Institution Mergers (Table 10)	
Treat	Indicator variable that equals one for treatment firms, and zero for control firms. A firm is defined as a treatment firm if (1) the firm is held, but not blockheld, by one of the merging institutions during the quarter immediately before the merger announcement and (2) the other merging institution does not hold the firm but blockholds at least one of the firm's industry peer firms during the same quarter. A firm is defined as a control firm if the firm is held, but not blockheld, by the same institution holding the treatment firm while the other merging institution blockholds none of the firm's industry peer firms.
Post	Indicator variable that equals one for the post-merger period, and zero for the pre-merger period. The pre-merger is the firm's last fiscal year both starting and ending before the merger announcement. The post-merger is the firm's first fiscal year both starting and ending after the merger announcement.
CrossOwnChange	Change in either *NumCross* or *NumConnected*, as defined above, around financial institution mergers, calculated as the cross-ownership variable in the post-merger period minus that in the pre-merger period. For the regression analysis, we assign decile rankings to this variable and standardize them to range from 0 to 1 for ease of interpretation.
Additional Variables in Analysis of Market Reaction to Investment News (Table 11)	
CAR	Cumulative abnormal stock returns measured over the three days surrounding the firm's earnings announcement date. The abnormal stock returns are calculated by subtracting the market returns (*CAR1*), or the returns expected based on the CAPM model or the French-Fama 3-factor model (*CAR2*).
CapexNews	Capital expenditures news measured as the difference between the capital expenditures announced on the earnings release date and those reported for the prior fiscal year, scaled by lagged fixed assets.
EarnNews	Earnings news measured as the difference between annual earnings per share announced on the earnings release date and the prevailing median analyst forecast

	for annual earnings per share, scaled by the beginning stock price.
Loss	Indicator that equals one if earnings before extraordinary items is negative, and zero otherwise.

Table 1 Sample Distribution by Year

This table reports the yearly sample distribution and mean (median) of *NumCross* and *NumConnected*. See Appendix B for the variable definitions. These variables are winsorized at the 1% and 99% levels.

Year	No. Obs.	*NumCross*		*NumConnected*	
		Mean	Median	Mean	Median
1981	2,666	1.22	0.00	1.37	0.00
1982	2,917	1.20	0.00	1.32	0.00
1983	3,129	1.34	0.00	1.55	0.00
1984	3,454	1.76	1.00	2.30	1.00
1985	3,535	1.82	1.00	2.78	1.00
1986	3,595	2.16	1.00	3.76	1.25
1987	3,848	2.48	1.25	4.85	2.00
1988	3,978	2.44	1.25	5.05	2.00
1989	3,944	2.40	1.00	5.10	2.00
1990	3,955	2.54	1.25	5.61	2.00
1991	3,991	2.88	1.50	6.19	2.50
1992	4,153	3.16	1.67	6.84	2.75
1993	4,470	3.53	1.75	8.02	3.00
1994	4,891	3.70	2.00	8.68	3.25
1995	5,151	4.26	2.25	9.65	4.00
1996	5,410	4.75	2.50	11.33	4.50
1997	5,730	5.28	2.75	13.61	5.25
1998	5,653	5.77	3.25	15.48	6.25
1999	5,333	5.89	3.00	16.39	6.00
2000	5,208	6.75	3.50	20.68	7.00
2001	5,093	7.83	4.00	25.00	8.00
2002	4,838	8.18	4.25	25.69	8.25
2003	4,570	8.48	4.75	26.48	9.25
2004	4,938	8.90	5.25	28.48	11.00
2005	4,879	9.65	6.00	31.81	12.00
2006	4,783	9.73	6.25	32.16	12.50
2007	4,628	10.79	7.25	35.83	14.00
2008	4,572	11.96	8.50	38.69	15.25
2009	4,346	11.38	8.00	40.67	15.88
2010	4,114	9.82	6.75	37.86	14.00
2011	4,032	9.59	6.50	33.44	12.50
2012	3,903	8.33	5.50	31.94	10.00
2013	3,813	8.54	5.50	34.49	9.75
2014	3,890	8.85	5.63	38.39	11.25
2015	4,003	9.25	6.25	44.30	12.00
2016	3,901	9.63	6.50	51.88	13.67
2017	3,825	9.40	6.25	56.86	15.25
2018	3,853	9.49	6.50	60.04	16.00
2019	3,387	10.68	7.00	62.96	15.75
2020	3,630	10.93	7.25	70.85	17.75
2021	3,916	11.34	7.25	77.11	19.25
2022	4,420	11.45	7.50	83.44	21.25

Table 2 Descriptive Statistics

This table reports the descriptive statistics of the variables used in our main analysis. Panel A provides summary statistics and Panel B displays the Pearson correlation coefficients. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. In Panel B, significance levels are in parentheses.

Panel A Summary Statistics

	N	Mean	Std. Dev.	P25	Median	P75
NumCross	178,345	6.795	8.791	1.000	3.500	8.750
NumConnected	178,345	26.551	48.965	1.500	6.250	23.500
Inv	178,345	0.336	0.432	0.108	0.204	0.383
q	178,345	2.015	1.756	1.056	1.395	2.195
CFO	178,345	0.015	0.284	0.007	0.073	0.133
Size	178,345	5.527	2.275	3.829	5.391	7.095
InstOwn	178,345	0.380	0.313	0.092	0.313	0.634

Panel B Pearson Correlation Coefficients

	NumCross	*NumConnected*	*Inv*	*q*	*CFO*	*Size*
NumConnected	0.736					
	(p<0.01)					
Inv	0.034	0.062				
	(p<0.01)	(p<0.01)				
q	0.2	0.195	0.314			
	(p<0.01)	(p<0.01)	(p<0.01)			
CFO	0.013	-0.172	-0.099	-0.266		
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)		
Size	0.538	0.243	-0.048	0.152	0.192	
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	
InstOwn	0.486	0.24	-0.052	0.029	0.159	0.586
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)

Table 3 Main Analysis: Institutional Cross-Ownership and Investment-q Sensitivity

This table reports the results from the regression of investment (*Inv*) estimating equation (1). *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
q	0.071***	0.106***	0.071***	0.103***
	(25.66)	(19.96)	(25.68)	(19.27)
CrossOwn	-0.083***	-0.156***	-0.037***	-0.101***
	(-10.39)	(-12.27)	(-4.66)	(-8.30)
q × *CrossOwn*	0.013***	0.028***	0.011***	0.018***
	(3.26)	(4.55)	(2.93)	(3.43)
CFO		0.059***		0.060***
		(3.54)		(3.60)
Size		0.034***		0.030***
		(14.56)		(12.84)
InstOwn		-0.021		-0.050***
		(-1.53)		(-3.85)
q × *CFO*		0.002		0.002
		(0.64)		(0.57)
q × *Size*		-0.007***		-0.007***
		(-7.95)		(-7.33)
q × *InstOwn*		-0.009		-0.004
		(-1.42)		(-0.57)
Fixed Effects	No	Firm, Year	No	Firm, Year
No. Obs.	178,345	178,345	178,345	178,345
Adj. R^2	0.101	0.319	0.099	0.319

Table 4 Validation Test: Institutional Cross-Ownership and Price Informativeness

This table reports the results from the regression of future earnings (*FutureEarn*) estimating equation (2). Columns (1) and (2) present the results when the dependent variable is one-year-ahead future earnings, while using *NumCross* and *NumConnected* as measures of cross-ownership (*CrossOwn*), respectively. Columns (3) and (4) present the results when the dependent variable is two-year-ahead future earnings, while using *NumCross* and *NumConnected* as measures of cross-ownership (*CrossOwn*), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 4 Institutional Cross-Ownership and Price Informativeness, Continued

	(1)	(2)	(3)	(4)
	Using FutureEarn1		*Using FutureEarn2*	
	NumCross	*NumConnected.*	*NumCross*	*NumConnected.*
MV	0.160***	0.152***	-0.023	-0.026
	(5.59)	(5.16)	(-0.71)	(-0.78)
CrossOwn	-0.014	0.012	0.094***	0.115***
	(-0.50)	(0.37)	(2.81)	(3.06)
MV × CrossOwn	0.115***	0.090***	0.115***	0.075***
	(4.95)	(3.87)	(4.49)	(2.88)
Earn	0.421***	0.421***	0.224***	0.224***
	(53.74)	(53.84)	(27.74)	(27.80)
AT	-0.271***	-0.272***	-0.335***	-0.333***
	(-18.71)	(-18.86)	(-20.98)	(-20.85)
Lev	0.826***	0.830***	0.645***	0.648***
	(21.07)	(21.16)	(14.79)	(14.86)
TGB	-0.153***	-0.152***	-0.062	-0.059
	(-2.62)	(-2.58)	(-0.97)	(-0.92)
Sale	0.249***	0.248***	0.226***	0.225***
	(17.13)	(17.07)	(14.50)	(14.49)
Cash	-0.289***	-0.290***	-0.383***	-0.384***
	(-5.42)	(-5.43)	(-6.51)	(-6.50)
MV × Earn	0.039***	0.038***	0.065***	0.065***
	(7.75)	(7.68)	(13.33)	(13.25)
MV × AT	-0.030***	-0.028***	-0.030***	-0.026***
	(-4.19)	(-3.86)	(-3.92)	(-3.49)
MV × Lev	-0.144***	-0.154***	-0.088***	-0.099***
	(-5.02)	(-5.40)	(-3.03)	(-3.45)
MV × TGB	0.115***	0.117***	-0.017	-0.017
	(3.97)	(4.04)	(-0.59)	(-0.59)
MV × Sale	0.045***	0.047***	0.063***	0.065***
	(5.85)	(6.11)	(8.20)	(8.42)
MV × Cash	0.012	0.021	0.044	0.057
	(0.29)	(0.52)	(1.03)	(1.34)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	175,293	175,293	161,246	161,246
Adj. R^2	0.725	0.725	0.692	0.692

Table 5 Cross-Sectional Analysis Based on Voluntary Disclosure

This table reports the results of the cross-sectional analysis based on voluntary disclosure estimating equation (3). *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
q	0.092***	0.093***
	(12.97)	(12.47)
CrossOwn	-0.157***	-0.074***
	(-9.36)	(-4.54)
q × *CrossOwn*	0.033***	0.018**
	(4.25)	(2.53)
Disclosure	-0.058***	-0.025
	(-3.61)	(-1.61)
Disclosure × *q*	0.037***	0.029***
	(4.20)	(3.53)
Disclosure × *CrossOwn*	0.050**	-0.002
	(2.36)	(-0.08)
Disclosure × *q* × *CrossOwn*	-0.039***	-0.027***
	(-3.58)	(-2.62)
CFO	0.016	0.017
	(0.88)	(0.94)
Size	0.035***	0.031***
	(12.47)	(11.06)
InstOwn	0.012	-0.024
	(0.75)	(-1.56)
q × *CFO*	-0.002	-0.002
	(-0.62)	(-0.67)
q × *Size*	-0.006***	-0.005***
	(-5.51)	(-4.87)
q × *InstOwn*	-0.021***	-0.014**
	(-2.93)	(-2.06)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	125,819	125,819
Adj. R^2	0.339	0.338

Table 6 Cross-Sectional Analysis Based on Insider Trading Profitability

This table reports the results of the cross-sectional analysis based on insider trading profitability estimating equation (4). *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
q	0.098***	0.098***
	(17.16)	(16.70)
CrossOwn	-0.165***	-0.099***
	(-11.67)	(-7.30)
q × *CrossOwn*	0.035***	0.021***
	(5.21)	(3.60)
Insider	-0.002	0.005
	(-0.18)	(0.37)
Insider × *q*	0.014**	0.007
	(2.07)	(1.11)
Insider × *CrossOwn*	0.014	0.004
	(0.88)	(0.22)
Insider × *q* × *CrossOwn*	-0.023***	-0.013
	(-2.71)	(-1.57)
CFO	0.040**	0.042**
	(2.37)	(2.45)
Size	0.034***	0.029***
	(13.71)	(11.97)
InstOwn	-0.018	-0.051***
	(-1.29)	(-3.74)
q × *CFO*	0.001	0.001
	(0.39)	(0.33)
q × *Size*	-0.007***	-0.006***
	(-7.34)	(-6.65)
q × *InstOwn*	-0.009	-0.003
	(-1.42)	(-0.52)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	162,644	16,2644
Adj. R^2	0.324	0.323

Table 7 Institutional Cross-Ownership and Investment Sensitivity to Peer Q

This table reports the results from the regression of investment (*Inv*) re-estimating equation (1) after including *Peerq* and *Peerq* × *CrossOwn* as additional variables. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
q	0.104***	0.102***
	(19.52)	(18.88)
CrossOwn	-0.112***	-0.054***
	(-7.74)	(-3.77)
q × *CrossOwn*	0.031***	0.021***
	(5.10)	(3.99)
CFO	0.060***	0.061***
	(3.63)	(3.66)
Size	0.034***	0.029***
	(14.58)	(12.78)
InstOwn	-0.019	-0.050***
	(-1.40)	(-3.79)
q × *CFO*	0.002	0.002
	(0.62)	(0.59)
q × *Size*	-0.008***	-0.007***
	(-8.07)	(-7.46)
q × *InstOwn*	-0.009	-0.003
	(-1.43)	(-0.56)
Peerq	0.021***	0.021***
	(6.85)	(6.78)
Peerq × *CrossOwn*	-0.022***	-0.022***
	(-5.13)	(-4.86)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	178,345	178,345
Adj. R^2	0.320	0.319

Table 8 Cross-Ownership by Actively Versus Passively Trading Investors

This table reports the results from the regression of investment (*Inv*) re-estimating equation (1) after replacing *CrossOwn* with *CrossOwnActive* in columns (1) and (3) and with *CrossOwnPassive* in columns (2) and (4). *NumCross* and *NumConnected* are used to construct the respective cross-ownership variables in columns (1) and (2), and in columns (3) and (4), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwnActive & CrossOwnPassive		*Using NumConnected for CrossOwnActive & CrossOwnPassive*	
q	0.107***	0.103***	0.104***	0.105***
	(20.24)	(19.41)	(19.63)	(19.57)
CrossOwnActive	-0.091***		-0.067***	
	(-9.74)		(-7.47)	
q × *CrossOwnActive*	0.029***		0.022***	
	(5.95)		(4.77)	
CrossOwnPassive		-0.123***		-0.098***
		(-10.97)		(-9.05)
q × *CrossOwnPassive*		-0.004		0.000
		(-0.64)		(0.08)
CFO	0.060***	0.063***	0.059***	0.064***
	(3.61)	(3.83)	(3.57)	(3.84)
Size	0.032***	0.031***	0.029***	0.029***
	(13.87)	(13.20)	(12.88)	(12.46)
InstOwn	-0.048***	-0.039***	-0.060***	-0.053***
	(-3.75)	(-2.90)	(-4.64)	(-3.98)
q × *CFO*	0.002	0.000	0.002	0.000
	(0.61)	(0.09)	(0.63)	(0.14)
q × *Size*	-0.008***	-0.005***	-0.007***	-0.006***
	(-8.36)	(-5.71)	(-7.72)	(-6.22)
q × *InstOwn*	-0.009	0.005	-0.005	0.003
	(-1.46)	(0.81)	(-0.80)	(0.50)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	178,345	178,345	178,345	178,345
Adj. R^2	0.319	0.320	0.319	0.319
Test of Coefficient Difference				
q × *CrossOwnActive vs.* *q* × *CrossOwnPassive*	0.033*** (6.42)		0.021*** (4.38)	

Table 9 Cross-Ownership by Investors Holding Small Stakes

This table reports the results from the regression of investment (*Inv*) re-estimating equation (1) after replacing *CrossOwn* with *CrossOwnSmall*. *NumCross* and *NumConnected* are used to construct this alternative cross-ownership variable in columns (1) and (2), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwnSmall*	(2) *Using NumConnected for CrossOwnSmall*
q	0.105***	0.104***
	(19.76)	(19.53)
CrossOwnSmall	-0.138***	-0.087***
	(-11.95)	(-7.94)
q × *CrossOwnSmall*	0.017***	0.014***
	(2.95)	(2.70)
CFO	0.060***	0.061***
	(3.61)	(3.64)
Size	0.034***	0.030***
	(14.34)	(12.96)
InstOwn	-0.043***	-0.061***
	(-3.29)	(-4.74)
q × *CFO*	0.002	0.002
	(0.49)	(0.49)
q × *Size*	-0.007***	-0.007***
	(-7.22)	(-7.17)
q × *InstOwn*	-0.002	-0.001
	(-0.34)	(-0.13)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	178,345	178,345
Adj. R^2	0.320	0.319

Table 10 Analysis Using Financial Institution Mergers

This table reports the results of the analysis using financial institution mergers. Panel A reports the means of *NumCross* and *NumConnected* for both the pre-merger and the post-merger periods. Panel B reports the results from the difference-in-differences analysis for the investment-*q* sensitivity estimating equation (5). Panel C reports the results from the analysis re-estimating equation (5) after replacing *Treat* with *CrossOwnChange*. In Panel C, *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) through (3) and in columns (4) through (6), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Panel A Means of *NumCross* and *NumConnected*

	Treatment Group		
	Pre-Period (N=6,834)	Post-Period (N=7,417)	Difference (Post – Pre)
NumCross	14.46	16.11	1.65
NumConnected	53.73	62.61	8.88
	Control Group		
	Pre-Period (N=58,989)	Post-Period (N=58,150)	Difference (Post – Pre)
NumCross	9.64	10.26	0.62
NumConnected	21.02	22.97	1.94
	Difference-in-Differences		
NumCross	1.03*** (5.32)		
NumConnected	6.94*** (10.69)		

Table 10 Analysis Using Financial Institution Mergers, Continued

Panel B: Difference-in-Differences Analysis

	(1)	(2)	(3)
Treat	0.084***	0.019**	
	(8.92)	(2.32)	
Post	0.012***	0.011	
	(2.87)	(1.18)	
Treat × *Post*	-0.028**	-0.040***	-0.034***
	(-2.42)	(-3.65)	(-2.74)
q	0.096***	0.135***	0.124***
	(53.09)	(19.36)	(10.33)
q × *Treat*	-0.017***	-0.014***	-0.023***
	(-3.94)	(-3.92)	(-3.33)
q × *Post*	-0.020***	-0.010***	-0.016***
	(-8.79)	(-4.78)	(-6.76)
q × *Treat* × *Post*	0.016***	0.014***	0.010*
	(3.07)	(2.84)	(1.83)
CFO		0.197***	0.199***
		(9.22)	(6.44)
Size		0.014***	0.040***
		(5.88)	(9.18)
InstOwn		-0.062***	-0.036
		(-4.48)	(-1.53)
q × *CFO*		-0.009**	-0.014**
		(-1.98)	(-2.20)
q × *Size*		-0.009***	-0.007***
		(-10.02)	(-4.53)
q × *InstOwn*		0.018***	0.012
		(2.91)	(1.26)
Fixed Effects	No	Merger, Firm, Year	Merger×Firm, Merger×Year
No. Obs.	131,390	131,390	131,390
Adj. R^2	0.150	0.475	0.455

Table 10 Analysis Using Financial Institution Mergers, Continued

Panel C: Analysis Using the Change in Cross-Ownership around Mergers

	(1)	(2)	(3)	(4)	(5)	(6)
	Using NumCross for CrossOwnChg			*Using NumConnected for CrossOwnChg*		
CrossOwnChg	0.145***	0.055***	0.140***	0.142***	0.042***	0.103***
	(9.08)	(3.91)	(5.18)	(8.72)	(2.86)	(3.62)
Post	0.011***	0.011		0.010**	0.010	
	(2.85)	(1.25)		(2.52)	(1.13)	
CrossOwnChg × *Post*	-0.037*	-0.072***	-0.061***	-0.033	-0.061***	-0.064***
	(-1.81)	(-3.85)	(-2.69)	(-1.62)	(-3.18)	(-2.72)
q	0.094***	0.133***	0.120***	0.094***	0.133***	0.120***
	(53.20)	(19.31)	(10.23)	(53.37)	(19.26)	(10.23)
q × *CrossOwnChg*	-0.019***	-0.018***	-0.027***	-0.020***	-0.016***	-0.025***
	(-3.14)	(-3.38)	(-3.05)	(-3.21)	(-3.07)	(-2.81)
q × *Post*	-0.020***	-0.010***	-0.015***	-0.019***	-0.010***	-0.015***
	(-8.95)	(-4.98)	(-6.69)	(-8.63)	(-4.69)	(-6.62)
q × *CrossOwnChg* × *Post*	0.022***	0.023***	0.015	0.019**	0.019***	0.014
	(2.84)	(3.31)	(1.64)	(2.39)	(2.68)	(1.54)
CFO		0.197***	0.196***		0.197***	0.197***
		(9.19)	(6.35)		(9.18)	(6.38)
Size		0.014***	0.039***		0.014***	0.040***
		(5.90)	(8.85)		(5.90)	(9.06)
InstOwn		-0.063***	-0.040*		-0.063***	-0.037
		(-4.54)	(-1.73)		(-4.52)	(-1.59)
q × *CFO*		-0.009*	-0.013**		-0.009*	-0.013**
		(-1.95)	(-2.13)		(-1.94)	(-2.13)
q × *Size*		-0.009***	-0.006***		-0.009***	-0.006***
		(-9.95)	(-4.36)		(-9.95)	(-4.37)
q × *InstOwn*		0.018***	0.012		0.018***	0.012
		(2.93)	(1.27)		(2.93)	(1.24)
Fixed Effects	No	Merger, Firm, Year	Merger×Firm Merger×Year	No	Merger, Firm, Year	Merger×Firm Merger×Year
No. Obs.	131,390	131,390	131,390	131,390	131,390	131,390
Adj. R^2	0.151	0.475	0.455	0.151	0.475	0.455

Table 11 Institutional Cross-Ownership and Market Reaction to Investment News

This table reports the results from the regression of cumulative abnormal stock returns measured over the three days surrounding the earnings announcement date (*CAR*) estimating equation (6). Columns (1) and (2) present the results when the abnormal stock returns are measured by subtracting the expected returns estimated based on the CAPM model, while using *NumCross* and *NumConnected* as measures of cross-ownership (*CrossOwn*), respectively. Columns (3) and (4) present the results when the abnormal stock returns are measured by subtracting the expected returns estimated based on the Fama-French 3-factor model, while using *NumCross* and *NumConnected* as measures of cross-ownership (*CrossOwn*), respectively. See Appendix B for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using CAR1		*Using CAR2*	
	NumCross	*NumConnected*	*NumCross*	*NumConnected.*
CapxNews	-0.010***	-0.011***	-0.010***	-0.010***
	(-5.41)	(-5.40)	(-5.33)	(-5.15)
CrossOwn	-0.003**	-0.003	-0.003*	-0.002
	(-2.02)	(-1.52)	(-1.70)	(-1.22)
CapxNews × *CrossOwn*	0.009***	0.009***	0.009***	0.009***
	(3.16)	(3.23)	(3.29)	(3.15)
EarnNews	0.073***	0.072***	0.073***	0.073***
	(13.10)	(13.09)	(13.30)	(13.28)
Q	-0.001***	-0.001***	-0.001***	-0.001***
	(-3.01)	(-2.91)	(-3.41)	(-3.30)
CFO	-0.000	-0.000	-0.000	0.000
	(-0.09)	(-0.03)	(-0.03)	(0.02)
Size	-0.001***	-0.001***	-0.001***	-0.001***
	(-4.11)	(-5.07)	(-4.73)	(-5.64)
InstOwn	0.006***	0.005***	0.005***	0.005***
	(4.41)	(4.29)	(3.92)	(3.85)
Lev	0.007***	0.007***	0.006***	0.006***
	(4.77)	(4.77)	(4.51)	(4.51)
TGB	-0.001	-0.001	-0.002	-0.002
	(-0.66)	(-0.72)	(-0.77)	(-0.82)
Cash	-0.001	-0.001	-0.001	-0.001
	(-0.58)	(-0.60)	(-0.67)	(-0.68)
Loss	-0.008***	-0.008***	-0.008***	-0.008***
	(-10.23)	(-10.28)	(-10.68)	(-10.71)
Fixed Effects	SIC3, Year	SIC3, Year	SIC3, Year	SIC3, Year
No. Obs.	116,029	116,029	116,029	116,029
Adj. R^2	0.009	0.009	0.009	0.009

Supplementary Material

Institutional Cross-Ownership of Peer Firms and Revelatory Price Efficiency

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Table OA1 Main Regression Results Using 4-digit SICs to Identify Industry Peers for Cross-Ownership Variable Measurement

This table reports the results from the regression of investment (*Inv*) estimating equation (1) in the manuscript. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. In measuring these cross-ownership variables, we use the 4-digit SIC to identify industry peer firms. We find a significantly positive coefficient on *q* × *CrossOwn* across all columns, indicating that our results are robust to using 4-digit SICs to identify peer firms for measuring cross-ownership. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
q	0.071***	0.106***	0.070***	0.105***
	(26.02)	(20.11)	(25.69)	(19.65)
CrossOwn	-0.087***	-0.123***	-0.055***	-0.094***
	(-11.24)	(-10.34)	(-7.17)	(-8.23)
q × *CrossOwn*	0.014***	0.022***	0.014***	0.016***
	(3.45)	(3.68)	(3.58)	(3.02)
CFO		0.060***		0.061***
		(3.61)		(3.66)
Size		0.032***		0.029***
		(13.82)		(12.75)
InstOwn		-0.033**		-0.051***
		(-2.49)		(-3.92)
q × *CFO*		0.002		0.002
		(0.55)		(0.49)
q × *Size*		-0.007***		-0.007***
		(-7.52)		(-7.18)
q × *InstOwn*		-0.007		-0.003
		(-1.08)		(-0.51)
Fixed Effects	No	Firm, Year	No	Firm, Year
No. Obs.	178,345	178,345	178,345	178,345
Adj. R^2	0.101	0.319	0.100	0.319

Table OA2 Main Regression Results Using Hoberg and Phillips's (2016) TNIC3 to Identify Industry Peers for Cross-Ownership Variable Measurement

This table reports the results from the regression of investment (*Inv*) estimating equation (1) in the manuscript. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. In measuring these cross-ownership variables, we use Hoberg and Philips's (2016) TNIC3 to identify industry peer firms. We find a significantly positive coefficient on *q* × *CrossOwn* across all columns, indicating that our results are robust to using TNIC3 to identify peer firms for measuring cross-ownership. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
q	0.066***	0.098***	0.064***	0.096***
	(23.54)	(16.80)	(22.96)	(16.26)
CrossOwn	-0.070***	-0.142***	-0.051***	-0.121***
	(-8.31)	(-12.06)	(-6.18)	(-10.29)
q × *CrossOwn*	0.021***	0.024***	0.023***	0.022***
	(4.96)	(4.69)	(5.56)	(4.49)
CFO		0.013		0.012
		(0.80)		(0.73)
Size		0.033***		0.031***
		(13.09)		(12.33)
InstOwn		-0.013		-0.028**
		(-0.86)		(-1.97)
q × *CFO*		0.002		0.002
		(0.63)		(0.76)
q × *Size*		-0.005***		-0.005***
		(-6.08)		(-5.74)
q × *InstOwn*		-0.015**		-0.012*
		(-2.20)		(-1.91)
Fixed Effects	No	Firm & Year	No	Firm & Year
No. Obs.	151,223	151,223	151,223	151,223
Adj. R^2	0.103	0.328	0.103	0.328

Table OA3 Validation Test Results of Price Informativeness Using Firm-Specific Component of Future Earnings

This table reports the results from the regression analysis estimating equation (2) in the manuscript, where the dependent variable is the firm-specific component of future earnings. The firm-specific component of earnings is calculated as the firm's earnings, minus the value-weighted average earnings of firms within the same 3-digit SIC industry. Columns (1) and (2) present the results when the dependent variable is the firm-specific component of one-year-ahead future earnings, while using *NumCross* and *NumConnected* as measures of cross-ownership (*CrossOwn*), respectively. Columns (3) and (4) present the results when the dependent variable is the firm-specific component of two-year-ahead future earnings, while using *NumCross* and *NumConnected* as measures of cross-ownership (*CrossOwn*), respectively. We find a significantly positive coefficient on *MV* × *CrossOwn* across all columns, indicating that cross-ownership increases the ability of stock price to predict the firm-specific component of future earnings. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table OA3 Validation Test Results of Price Informativeness Using Firm-Specific Component of Future Earnings

	(1)	(2)	(3)	(4)
	Using Firm-Specific FutureEarn1		*Using Firm-Specific FutureEarn2*	
	NumCross	*NumConnected*	*NumCross*	*NumConnected*
MV	0.173***	0.158***	-0.006	-0.017
	(5.74)	(5.12)	(-0.19)	(-0.51)
CrossOwn	0.064**	0.069**	0.160***	0.165***
	(2.06)	(1.97)	(4.40)	(4.15)
MV × *CrossOwn*	0.144***	0.136***	0.154***	0.132***
	(5.80)	(5.52)	(5.63)	(4.88)
Earn	0.401***	0.401***	0.215***	0.215***
	(49.90)	(49.95)	(26.20)	(26.21)
AT	-0.242***	-0.240***	-0.289***	-0.284***
	(-15.82)	(-15.75)	(-17.16)	(-16.88)
Lev	0.831***	0.832***	0.679***	0.680***
	(20.06)	(20.08)	(14.67)	(14.68)
TGB	-0.138**	-0.134**	-0.054	-0.048
	(-2.10)	(-2.04)	(-0.74)	(-0.66)
Sale	0.238***	0.237***	0.214***	0.213***
	(15.53)	(15.45)	(13.03)	(12.99)
Cash	-0.265***	-0.263***	-0.373***	-0.370***
	(-4.73)	(-4.69)	(-5.95)	(-5.91)
MV × *Earn*	0.047***	0.047***	0.068***	0.068***
	(9.19)	(9.19)	(13.67)	(13.67)
MV × *AT*	-0.039***	-0.037***	-0.038***	-0.035***
	(-5.20)	(-4.98)	(-4.75)	(-4.44)
MV × *Lev*	-0.128***	-0.137***	-0.091***	-0.101***
	(-4.29)	(-4.63)	(-2.94)	(-3.32)
MV × *TGB*	0.070**	0.076**	-0.003	0.002
	(2.29)	(2.49)	(-0.08)	(0.06)
MV × *Sale*	0.045***	0.048***	0.066***	0.068***
	(5.73)	(6.04)	(8.17)	(8.47)
MV × *Cash*	0.019	0.024	0.043	0.053
	(0.44)	(0.56)	(0.96)	(1.17)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	175,011	175,011	160,984	160,984
Adj. R^2	0.718	0.718	0.682	0.682

Table OA4 Cross-Ownership and Price Synchronicity

This table reports the results from the regression of price synchronicity estimating the following equation:

$$Sync = \beta_0 + \beta_1 CrossOwn + \beta_5 AT + \beta_6 Lev + \beta_7 TGB + \beta_8 Sale + \beta_9 Cash + Illiquidity\ Percentile,\ Firm,\ and\ Year\ Fixed\ Effects + \varepsilon \quad \text{(A1)}$$

Sync is price synchronicity measured as a ratio of R^2 to $(1-R^2)$ for each firm-year, where R^2 is obtained from a firm-year-specific regression of weekly firm returns on weekly market returns and their lags. We require at least 30 weekly return observations for each firm-year. The market return is the market cap-weighted average returns of firms calculated after excluding the firm of interest. In estimating equation (A1), we following Gassen et al. (2020) and include illiquidity percentile fixed effects, along with firm and year fixed effects. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. We find a significantly negative coefficient on *CrossOwn* in both columns, consistent with cross-ownership increasing the amount of firm-specific information embedded in stock prices. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
CrossOwn	-0.016***	-0.029***
	(-2.74)	(-5.78)
AT	0.012***	0.012***
	(5.54)	(5.68)
Lev	-0.033***	-0.034***
	(-6.36)	(-6.46)
TGB	-0.008	-0.008
	(-0.78)	(-0.78)
Sale	-0.006***	-0.006***
	(-3.80)	(-3.68)
Cash	-0.007	-0.007
	(-0.99)	(-0.99)
Fixed Effects	Illiquidity Percentile, Firm, Year	Illiquidity Percentile, Firm, Year
No. Obs.	170,380	170,380
Adj. R^2	0.484	0.484

Table OA5 Cross-Ownership and Variance Ratio

This table reports the results from the regression of |*1-VR*| estimating the following equation:

$$|1\text{-}VR| = \beta_0 + \beta_1 CrossOwn + \beta_5 AT + \beta_6 Lev + \beta_7 TGB + \beta_8 Sale + \beta_9 Cash + Firm\ and\ Year\ Fixed\ Effects + \varepsilon \quad \text{(A2)}$$

|*1-VR*| is the absolute value of *VR* (variance ratio) minus one, where *VR* is calculated for each firm-year as the ratio of weekly return variance to daily return variance, scaled by five (with a week being defined as any consecutive five trading days). *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. We find a significantly negative coefficient on *CrossOwn* in both columns, indicating that cross-ownership reduces the deviation of the variance ratio from one, a result consistent with more informative stock price (e.g., Lo and MacKinlay 1988). See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
CrossOwn	-1.174***	-0.752***
	(-17.29)	(-10.40)
AT	-0.259***	-0.307***
	(-10.54)	(-12.46)
Lev	0.383***	0.449***
	(5.56)	(6.48)
TGB	0.230*	0.206
	(1.66)	(1.48)
Sale	-0.093***	-0.101***
	(-4.31)	(-4.67)
Cash	-0.490***	-0.532***
	(-5.10)	(-5.51)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	172,370	172,370
Adj. R^2	0.348	0.347

Table OA6 Cross-Ownership and Price Adjustment Speed

This table reports the results from the regression of price adjustment speed estimating the following equation:

$$PAS = \beta_0 + \beta_1 CrossOwn + \beta_5 AT + \beta_6 Lev + \beta_7 TGB + \beta_8 Sale + \beta_9 Cash + Firm\ and\ Year\ Fixed\ Effects + \varepsilon \quad \text{(A3)}$$

PAS is price adjustment speed, measured as the proportion of market-adjusted three-month returns (i.e., buy-and-hold returns from day 0 to +63) that is realized within the first five trading days, where day zero refers to the earnings announcement date. To avoid small denominator issues, we require the adjusted three-month returns to be at least 0.02. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. We find a significantly positive coefficient on *CrossOwn* in both columns, indicating that cross-ownership increases the speed at which firm-specific information released at earnings announcements is incorporated into stock prices, a result consistent with more informative stock prices (e.g., Lee and Zhu 2022). See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
CrossOwn	0.063***	0.052**
	(2.61)	(2.01)
AT	-0.005	-0.003
	(-0.55)	(-0.33)
Lev	-0.035	-0.038
	(-1.33)	(-1.46)
TGB	0.001	0.003
	(0.02)	(0.05)
Sale	0.006	0.007
	(0.73)	(0.79)
Cash	0.009	0.012
	(0.24)	(0.30)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	104,786	104,786
Adj. R^2	0.012	0.012

Table OA7 Alternatively Defined *CrossOwnActive*

This table reports the results from the regression of investment (*Inv*) re-estimating equation (1) after replacing *CrossOwn* with *CrossOwnActive* in columns (1) and (3) and with *CrossOwnPassive* in columns (2) and (4). In measuring *CrossOwnActive*, we consider only transient institutions as active investors, excluding dedicated institutions. *CrossOwnPassive* remains unchanged and continues to be based on quasi-index institutions. *NumCross* and *NumConnected* are used to construct the respective cross-ownership variables in columns (1) and (2), and in columns (3) and (4), respectively. We find that the coefficient on *CrossOwnActive* is significantly positive at the 1% level in columns (1) and (3), while the coefficient on *CrossOwnPassive* is insignificant in columns (2) and (4). Moreover, the difference between the coefficients on *CrossOwnActive* and *CrossOwnPassive* is significant at the 1% level, suggesting that our results are robust to alternative definitions of *CrossOwnActive*. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
q	0.107***	0.103***	0.106***	0.105***
	(20.25)	(19.41)	(19.97)	(19.57)
CrossOwnActive	-0.063***		-0.045***	
	(-7.79)		(-5.74)	
q × *CrossOwnActive*	0.023***		0.016***	
	(5.43)		(3.91)	
CrossOwnPassive		-0.123***		-0.098***
		(-10.97)		(-9.05)
q × *CrossOwnPassive*		-0.004		0.000
		(-0.64)		(0.08)
CFO	0.060***	0.063***	0.061***	0.064***
	(3.64)	(3.83)	(3.65)	(3.84)
Size	0.030***	0.031***	0.029***	0.029***
	(13.28)	(13.20)	(12.64)	(12.46)
InstOwn	-0.058***	-0.039***	-0.066***	-0.053***
	(-4.47)	(-2.90)	(-5.08)	(-3.98)
q × *CFO*	0.002	0.000	0.002	0.000
	(0.57)	(0.09)	(0.52)	(0.14)
q × *Size*	-0.007***	-0.005***	-0.007***	-0.006***
	(-7.99)	(-5.71)	(-7.45)	(-6.22)
q × *InstOwn*	-0.007	0.005	-0.003	0.003
	(-1.09)	(0.81)	(-0.51)	(0.50)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	178,345	178,345	178,345	178,345
Adj. R^2	0.319	0.320	0.318	0.319
Test of Coefficient Difference				
q × *CrossOwnActive vs.* *q* × *CrossOwnPassive*	0.027*** (5.77)		0.016*** (3.48)	

Table OA8 Main Regression Results Using Cross-Ownership Measures Based on Within-Year Decile Rankings

This table reports the results from the regression of investment (*Inv*) estimating equation (1) in the manuscript. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. We assign decile rankings to this variable based on its within-year distribution and standardize them to range from 0 to 1 for ease of interpretation. We find a significantly positive coefficient on *q* × *CrossOwn* across all columns, indicating that our results are robust to using cross-ownership measures that account for temporal changes in market structures. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
q	0.065***	0.103***	0.061***	0.098***
	(24.29)	(19.47)	(23.37)	(18.16)
CrossOwn	-0.063***	-0.179***	-0.019**	-0.126***
	(-7.77)	(-16.22)	(-2.39)	(-12.37)
q × *CrossOwn*	0.023***	0.045***	0.027***	0.037***
	(5.87)	(8.05)	(6.86)	(7.66)
CFO		0.061***		0.059***
		(3.70)		(3.54)
Size		0.037***		0.031***
		(15.82)		(13.79)
InstOwn		-0.016		-0.046***
		(-1.23)		(-3.57)
q × *CFO*		0.001		0.002
		(0.40)		(0.68)
q × *Size*		-0.008***		-0.007***
		(-8.95)		(-8.05)
q × *InstOwn*		-0.015**		-0.008
		(-2.36)		(-1.40)
Fixed Effects	No	Firm, Year	No	Firm, Year
No. Obs.	178,345	178,345	178,345	178,345
Adj. R^2	0.100	0.320	0.101	0.320

Table OA9 Main Regression Results Using Alternative Cross-Ownership Measures

This table reports the results from the regression of investment (*Inv*) estimating equation (1) in the manuscript. *AvgNum*, *Common Dummy*, $HoldingPeers^{EW}$, and $HoldingPeers^{VW}$ are the measures of cross-ownership (*CrossOwn*) in Columns (1), (2), (3), and (4), respectively. *AvgNum* is the average number of peer firms for each cross-owner. *Common Dummy* is an indicator variable that equals one if the firm has at least one cross-owner during the year, and zero otherwise. $HoldingPeers^{EW}$ is the product of an institution's ownership in the focal firm and the same institution's aggregate ownership in its peer firms, summed over all institutions holding shares of the focal firm each quarter, averaged across the four quarters during the year. $HoldingPeers^{VW}$ is the product of an institution's ownership in the focal firm and the same institution's aggregate market cap-weighted ownership in its peer firms, summed over all institutions holding shares of the focal firm each quarter, averaged across the four quarters during the year. See He et al. (2019) for more details on $HoldingPeers^{EW}$ and $HoldingPeers^{VW}$. We find a significantly positive coefficient on $q \times CrossOwn$ across all columns, indicating that our results are robust to alternative measures of cross-ownership. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	AvgNum	*Common Dummy*	$HoldingPeers^{EW}$	$HoldingPeers^{VW}$
q	0.104***	0.102***	0.104***	0.104***
	(18.79)	(18.42)	(19.39)	(19.38)
CrossOwn	-0.041***	-0.037***	-0.081***	-0.083***
	(-4.19)	(-5.07)	(-7.12)	(-7.31)
q × *CrossOwn*	0.010**	0.009**	0.019***	0.019***
	(2.19)	(2.23)	(3.45)	(3.54)
CFO	0.062***	0.063***	0.061***	0.061***
	(3.70)	(3.77)	(3.63)	(3.63)
Size	0.027***	0.027***	0.028***	0.028***
	(11.87)	(11.96)	(12.43)	(12.45)
InstOwn	-0.071***	-0.068***	-0.044***	-0.043***
	(-5.54)	(-5.24)	(-3.26)	(-3.17)
q × *CFO*	0.001	0.001	0.002	0.002
	(0.40)	(0.26)	(0.52)	(0.52)
q × *Size*	-0.006***	-0.006***	-0.006***	-0.006***
	(-6.89)	(-6.80)	(-7.22)	(-7.23)
q × *InstOwn*	0.000	-0.000	-0.007	-0.008
	(0.02)	(-0.02)	(-1.09)	(-1.15)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	178,345	178,345	178,345	178,345
Adj. R^2	0.318	0.318	0.319	0.319

Table OA10 Cross-Sectional Analysis Based on Leverage and Firm Size

This table reports the results of the cross-sectional analysis estimating the following equation:

$$\begin{aligned} Inv \quad &= \beta_0 + \beta_1 q + \beta_2 CrossOwn + \beta_3 q \times CrossOwn + \beta_4 High + \beta_5 High \times q \\ &+ \beta_6 High \times CrossOwn + \beta_7 Insider \times q \times CrossOwn + Controls + Firm\ and\ Year\ Fixed \\ &Effects + \varepsilon \end{aligned} \tag{A4}$$

NumCross and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. In columns (1) and (3), *High* is an indicator variable that equals one if the ratio of total liabilities to total assets is above the sample median each year, and zero otherwise. We find a significantly negative coefficient on *High* × *q* × *CrossOwn* in both columns, inconsistent with the notion that the effect of cross-ownership would be stronger for firms with higher leverage. In columns (2) and (4), *High* is an indicator variable that equals one if the market value of common equity is above the sample median each year, and zero otherwise. We find an insignificant coefficient on *High* × *q* × *CrossOwn* in both columns, inconsistent with the notion that the effect of cross-ownership would be stronger for smaller firms. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table OA10 Cross-Sectional Analysis Based on Leverage and Firm Size, Continued

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
	Leverage	Firm Size	Leverage	Firm Size
q	0.106***	0.114***	0.103***	0.113***
	(19.13)	(20.04)	(18.64)	(19.77)
CrossOwn	-0.227***	-0.162***	-0.150***	-0.098***
	(-14.79)	(-10.03)	(-9.95)	(-6.81)
q × *CrossOwn*	0.038***	0.031***	0.027***	0.020***
	(5.81)	(3.99)	(4.73)	(3.06)
High	-0.125***	-0.045***	-0.108***	-0.030**
	(-12.19)	(-3.68)	(-10.30)	(-2.42)
High × *q*	-0.007	0.035***	-0.004	0.031***
	(-1.27)	(5.46)	(-0.78)	(4.85)
High × *CrossOwn*	0.145***	0.008	0.109***	-0.025
	(9.16)	(0.45)	(6.49)	(-1.39)
High × *q* × *CrossOwn*	-0.027***	-0.005	-0.029***	0.003
	(-3.54)	(-0.56)	(-3.66)	(0.37)
CFO	0.049***	0.065***	0.051***	0.066***
	(2.99)	(3.93)	(3.08)	(3.98)
Size	0.030***	0.040***	0.025***	0.036***
	(12.77)	(15.10)	(10.94)	(13.83)
InstOwn	-0.033**	-0.017	-0.063***	-0.046***
	(-2.48)	(-1.28)	(-4.84)	(-3.49)
q × *CFO*	0.000	-0.000	-0.000	-0.001
	(0.01)	(-0.14)	(-0.05)	(-0.19)
q × *Size*	-0.008***	-0.012***	-0.007***	-0.011***
	(-8.44)	(-11.39)	(-7.84)	(-11.18)
q × *InstOwn*	-0.005	-0.013**	0.000	-0.008
	(-0.79)	(-2.01)	(0.02)	(-1.30)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	178,042	178,345	178,042	178,345
Adj. R^2	0.327	0.321	0.326	0.321

Table OA11 Cross-Sectional Analysis Based on G-index and Free Cash Flows

This table reports the results of the cross-sectional analysis estimating equation (A4) in the Online Appendix. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. In columns (1) and (3), *High* is an indicator variable that equals one if Gompers et al.'s (2003) G-index is above the sample median each year, and zero otherwise. We find a significantly negative coefficient on *High* × *q* × *CrossOwn* in both columns, inconsistent with the notion that the effect of cross-ownership would be stronger for firms with higher G-index. In columns (2) and (4), *High* is an indicator variable that equals one if the amount of free cash flows (calculated as operating cash flows minus investing cash flows, scaled by lagged total assets) is above the sample median each year, and zero otherwise. We find a significantly negative coefficient on *High* × *q* × *CrossOwn* in both columns, inconsistent with the notion that the effect of cross-ownership would be stronger for firms with higher free cash flows. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table OA11 Cross-Sectional Analysis Based on G-index and Free Cash Flows, Continued

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
	G-index	Free Cash Flows	G-index	Free Cash Flows
q	0.132***	0.081***	0.138***	0.079***
	(4.87)	(13.75)	(5.09)	(13.17)
CrossOwn	-0.030	-0.134***	-0.019	-0.088***
	(-0.68)	(-8.97)	(-0.46)	(-6.16)
q × *CrossOwn*	0.031	0.046***	0.018	0.033***
	(1.19)	(6.31)	(0.74)	(5.20)
High	-0.034	0.087***	0.004	0.073***
	(-0.96)	(8.08)	(0.15)	(6.71)
High × *q*	0.041*	0.048***	0.014	0.047***
	(1.96)	(7.89)	(0.85)	(7.58)
High × *CrossOwn*	0.077*	-0.063***	0.034	-0.038**
	(1.83)	(-4.06)	(0.81)	(-2.41)
High × *q* × *CrossOwn*	-0.066***	-0.026***	-0.039*	-0.024***
	(-2.80)	(-3.26)	(-1.82)	(-2.95)
CFO	0.363***	0.014	0.361***	0.015
	(6.59)	(0.86)	(6.42)	(0.92)
Size	0.015**	0.034***	0.015**	0.030***
	(2.04)	(13.54)	(2.12)	(11.98)
InstOwn	0.134***	0.006	0.128***	-0.026*
	(3.13)	(0.42)	(2.89)	(-1.88)
q × *CFO*	-0.026	-0.006*	-0.026	-0.006*
	(-1.23)	(-1.86)	(-1.19)	(-1.82)
q × *Size*	-0.009***	-0.008***	-0.009***	-0.007***
	(-3.33)	(-8.59)	(-3.27)	(-7.98)
q × *InstOwn*	-0.021	-0.021***	-0.016	-0.015**
	(-0.90)	(-3.31)	(-0.69)	(-2.46)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	17,874	155,368	17,874	155,368
Adj. R^2	0.476	0.342	0.476	0.341

Table OA12 Main Regression Results with Industry-Year Fixed Effects Instead of Year Fixed Effects

This table reports the results from the regression of investment (*Inv*) estimating equation (1) in the manuscript, with year fixed effects replaced by SIC 3-digit industry-year fixed effects. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. We find a significantly positive coefficient on *q* × *CrossOwn* in both columns, suggesting that our results are robust to controlling for industry-year fixed effects. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
q	0.094***	0.092***
	(17.79)	(17.23)
CrossOwn	-0.141***	-0.081***
	(-10.06)	(-6.04)
q × *CrossOwn*	0.023***	0.014**
	(3.65)	(2.57)
CFO	0.052***	0.053***
	(3.07)	(3.11)
Size	0.030***	0.026***
	(12.26)	(10.69)
InstOwn	-0.027**	-0.057***
	(-1.97)	(-4.21)
q × *CFO*	0.001	0.001
	(0.38)	(0.31)
q × *Size*	-0.006***	-0.006***
	(-6.76)	(-6.23)
q × *InstOwn*	-0.004	0.001
	(-0.68)	(0.10)
Fixed Effects	Firm, Industry-Year	Firm, Industry-Year
No. Obs.	178,345	178,345
Adj. R^2	0.324	0.323

Table OA13 Main Regression Results with Industry Returns as Additional Controls

This table reports the results from the regression of investment (*Inv*) estimating equation (1) in the manuscript, with industry returns included as additional controls. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2) and in columns (3) and (4), respectively. In columns (1) and (3), *IndRet* is defined as the value-weighted average returns of firms operating in the same SIC 3-digit industry, with market capitalization used as a weight. In columns (2) and (4), *IndRet* is defined as the equal-weighted average returns of firms operating in the same SIC 3-digit industry. We find a significantly positive coefficient on $q \times CrossOwn$ across all columns, suggesting that our results are robust to controlling for industry returns. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Using NumCross for CrossOwn		*Using NumConnected for CrossOwn*	
	Value-Weighted Ind. Returns	Equal-Weighted Ind. Returns	Value-Weighted Ind. Returns	Equal-Weighted Ind. Returns
q	0.097***	0.098***	0.096***	0.097***
	(18.84)	(18.96)	(18.34)	(18.47)
CrossOwn	-0.102***	-0.102***	-0.055***	-0.056***
	(-8.42)	(-8.40)	(-4.70)	(-4.76)
$q \times CrossOwn$	0.019***	0.019***	0.014***	0.015***
	(3.21)	(3.17)	(2.73)	(2.76)
CFO	0.174***	0.170***	0.175***	0.171***
	(10.31)	(10.04)	(10.29)	(10.02)
Size	0.028***	0.027***	0.024***	0.024***
	(12.28)	(11.77)	(11.13)	(10.63)
InstOwn	-0.037***	-0.034***	-0.060***	-0.056***
	(-2.89)	(-2.58)	(-4.75)	(-4.39)
$q \times CFO$	-0.004	-0.003	-0.004	-0.003
	(-1.26)	(-0.99)	(-1.23)	(-0.96)
$q \times Size$	-0.011***	-0.010***	-0.010***	-0.010***
	(-12.03)	(-11.24)	(-12.01)	(-11.19)
$q \times InstOwn$	0.025***	0.023***	0.029***	0.026***
	(3.88)	(3.51)	(4.59)	(4.16)
IndRet	0.004	0.007**	0.005	0.008**
	(0.81)	(1.98)	(1.03)	(2.24)
$q \times IndRet$	0.016***	0.008***	0.015***	0.008***
	(6.23)	(4.05)	(6.14)	(3.96)
Fixed Effects	Firm, Year	Firm, Year	Firm, Year	Firm, Year
No. Obs.	165,899	165,899	165,899	165,899
Adj. R^2	0.282	0.281	0.282	0.281

Table OA14 Cross-Sectional Analysis Based on Discretionary Accruals

This table reports the results of the cross-sectional analysis estimating equation (A4) in the Online Appendix. *NumCross* and *NumConnected* are used as measures of cross-ownership (*CrossOwn*) in columns (1) and (2), respectively. In both columns, *High* is an indicator variable that equals one if discretionary accruals are above the sample median each year, and zero otherwise. Discretionary accruals are estimated using the approach in McNichols (2002), calculated as the residuals from the regression of the change in working capital on cash flows from operations for the prior year, the current year, and the follow year, as well as the change in sales and the current level of plant, propropenty and equipment. We find an insignificant coefficient on *High* × *q* × *CrossOwn* in both columns, inconsistent with the notion that the effect of cross-ownership would be stronger for firms with higher discretionary accruals. See Appendix B in the manuscript for variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are calculated using standard errors adjusted for firm clustering. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-sided), respectively.

	(1) *Using NumCross for CrossOwn*	(2) *Using NumConnected for CrossOwn*
q	0.102***	0.099***
	(14.93)	(14.14)
CrossOwn	-0.146***	-0.090***
	(-8.95)	(-5.45)
q* × *CrossOwn	0.030***	0.020***
	(3.95)	(2.82)
High	0.031***	0.021**
	(3.17)	(2.06)
High × *q*	-0.002	-0.000
	(-0.32)	(-0.01)
High × *CrossOwn*	-0.028*	-0.009
	(-1.86)	(-0.54)
High × *q* × *CrossOwn*	0.003	-0.000
	(0.42)	(-0.00)
CFO	0.033*	0.035*
	(1.80)	(1.88)
Size	0.032***	0.027***
	(11.69)	(10.16)
InstOwn	-0.008	-0.042***
	(-0.49)	(-2.80)
q × *CFO*	0.002	0.001
	(0.47)	(0.38)
q × *Size*	-0.007***	-0.006***
	(-7.10)	(-6.38)
q × *InstOwn*	-0.011*	-0.005
	(-1.67)	(-0.71)
Fixed Effects	Firm, Year	Firm, Year
No. Obs.	131,291	131,291
Adj. R^2	0.328	0.323

REFERENCES

Gassen, J., H. Skaife, and D. Veenman. 2020. Illiquidity and the measurement of stock price synchronicity. *Contemporary Accounting Research* 37: 419-456.

Hoberg, G., and G. Phillips. 2016. Text-based network industries and endogenous product differentiation. *Journal of Political Economy* 124: 1423-1465.

Lee, C., and C. Zhu. 2022. Active funds and bundled news. *The Accounting Review* 97: 315-339.

Lo, A., and A. MacKinlay. 1988. Stock market prices do not follow random walks: Evidence from a simple specification test. *Review of Financial Studies* 1: 41-66.

McNichols. 2002. Discussion of the quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77: 61-69.