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Two Essays on Investment

by

Bin Wang

A dissertation submitted in partial fulfillment
of the requirements for the degree of
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Abstract

In the first essay titled "Shareholder Coordination, Information Diffusion and Stock Returns", we show that the quality of information sharing networks linking firms' institutional investors has stock return predictability implications. First, we demonstrate that firms with high shareholder coordination experience less local comovement and less post earnings announcement drift, consistent with the notion that coordination improves firms' information environment. We then document that the stock return performance of firms with high shareholder coordination leads that of firms with low shareholder coordination, supporting the view that coordination acts as an information diffusion channel. Finally, we provide evidence consistent with the notion that the market does not readily recognize the superior quality of high shareholder coordination firms and prices it gradually through the trading of sophisticated institutional investors, thereby causing future returns to be positively associated with shareholder coordination.

In the second essay titled "Shareholder Coordination and Stock Price Informativeness", we find that stock prices of firms with better information sharing networks linking institutional shareholders exhibit higher levels of idiosyncratic volatility. This positive relation between shareholder coordination and stock price informativeness is mainly driven by coordination among dedicated and independent institutions and exists even after accounting for endogeneity. We further show that institutional trading serves as an information diffusion channel that strengthens the relationship of shareholder coordination with price informativeness. Overall, our

results indicate that a higher degree of shareholder coordination leads to more informative stock prices by encouraging the collection of and trading on private information.

Shareholder Coordination, Information Diffusion and Stock Returns

1. Introduction

Firms with good corporate governance are less prone to information asymmetries and should be less difficult for outside investors to analyze. Institutional investors are instrumental in shaping corporate governance and are generally regarded as important promoters of sound corporate policies, transparency (Ajinkya, Bhojraj and Sengupta (2005)), and stock price informativeness (Piotroski and Roulstone (2004)). However, since institutional investors are not a homogeneous group, but rather a collection of clusters of institutions with different investment orientations and horizons, their ability to improve corporate governance and firms' information environment relies not just on their mere size and resources, but also on their capacity to share information with other institutional shareholder.[1] The transmission of value relevant information across the set of a firm's institutional investors can be greatly facilitated by the strength of professional and social networks that may exist among institutions. There is recent evidence (Huang (2011, 2012), Kim, Kim, Pantzalis and Wang (2013)) suggesting that coordination among institutions improves corporate governance. What remains an unexplored question, and the core emphasis of this paper, is whether the strength of information sharing networks facilitating coordination among institutional investors has return predictability implications. The

[1] The alignment in institutions' monitoring practices is catching practitioners' and researchers' attention. For example, McCahery, Sautner, and Starks (2010) provide survey evidence that 59% of institutional investors among respondents consider coordination with other institutional investors to improve monitoring their managers. Huang (2011, 2012) find that shareholder coordination has a positive and significant impact on the market for corporate control and corporate governance. Kim, Kim, Pantzalis and Wang (2013) find that firms with high shareholder coordination have better earnings quality and stronger stock price informativeness.

notion that coordination among institutional investors can help predict returns relies on the premise that institutional investors' information sharing network can be viewed as an information flow channel that allows market value relevant information to be transmitted to stock prices of firms lacking shareholder coordination after it has been impounded in stock prices of peer firms enjoying shareholder coordination.[2]

We begin our investigation by demonstrating that institutional shareholder coordination improves investors' information environment. Specifically, we show that firms with high (low) shareholder coordination experience weak (strong) local comovement and post-earnings announcement drift, consistent with the notion that coordination reduces frictions in public information processing and encourages the collection of and trading on private information.[3]

Having established that the degree of institutional shareholder coordination is associated with the quality of information environment, we proceed to examine whether shareholder coordination serves as an information diffusion channel. We posit that firms with high levels of institutional shareholder coordination have stronger information sharing networks that accelerate the diffusion of information relative to the case of firms with low levels of coordination. If higher (lower) shareholder coordination proxies for less (more) frictions in the process of information incorporation, then value relevant information would be impounded first in prices of firms with higher shareholder coordination and then with delay in prices of firms with lower shareholder coordination.[4] Therefore, we hypothesize that shareholder coordination effectively

[2] Throughout this paper we use the terms "institutional shareholder coordination", "shareholder coordination", and "coordination" interchangeably.

[3] Jin and Myers (2006) find that opaque stocks are associated with high stock price synchronicity. Zhang (2006) argues that investors underreact more to public information when there is more information uncertainty.

[4] Information processing frictions arise due to the cost of gathering and analyzing information and vary with the type of information (qualitative vs. quantitative, or soft vs. hard) as well as with the degree of information complexity. There is a long list of studies documenting how information processing frictions affect the way prices

plays the role of cross-firm information flow channel and, accordingly, the returns of high coordination firms can predict the next period's returns of otherwise similar, low-coordination firms. Consistent with this hypothesis' prediction, we show that there is a substantial lead-lag relation in the cross-section of asset prices between firms with high and low shareholder coordination levels.

To measure the degree of coordination among institutional shareholders, we follow Huang (2011, 2012) and devise two proxies that rely on the premise that the likelihood and strength of social connections increases with geographic proximity and similarity of values, attitudes, and beliefs comprising institutional shareholders' corporate investment philosophy.[5] Social network literature suggests that social ties and relationships are more likely to develop when there is homophily, i.e., the tendency of individuals to associate and bond with others driven by familiarity, often rooted in geographic proximity or sharing of common values (McPherson, Smith-Lovin and Cook (2001)). Geographic proximity has been shown to be influential in the development of close relationships, such as friendship and marriage (Bossard (1932)), in the frequency of communications within firms (Allen (1984)), in the forming of interlocked corporate boards (Kono, Palmer, Friedland, and Zafonte (1998)), in dealings among floor traders (Baker (1984)), and in investment patterns of venture capital firms (Sorenson and Stuart (2001)). In addition to propinquity, studies have shown that social connections are more

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are updated. For example, Engelberg (2008) and Demers and Vega (2008) show that higher processing costs of qualitative information may be responsible for the wedge between quantitative and qualitative information leading to more pronounced post-earnings-announcement drift (PEAD). Their findings are in line with the predictions of Hong and Stein (1999) who model the slow diffusion of information. Engelberg, Reed, and Ringgenberg (2012) show that profitable short sellers are more proficient in processing public information than other less-informed traders. Their evidence is consistent with the notion that news interpretation is related to traders' skill (see also Rubinstein (1993), and Kandel and Pearson (1995)).

[5] The first proxy is the inverse of the weighted average of the geographic distance among institutional shareholders (hereafter *COORD_PROX*) and the second one is the weighted average correlation among institutions' portfolios of stock holdings (hereafter *COORD_PORT*).

likely when individuals share similar backgrounds, demographic characteristics and values (Marsden (1988); McPherson, Smith-Lovin and Cook (2001) among others).

To generate clean tests of the hypothesis that institutional shareholder coordination acts as an information flow channel, we develop our coordination measures by accounting for the fact that the degree of institutional shareholder coordination can be strongly correlated with firm characteristics, such as firm size and headquarters' location. Accordingly, we first estimate coordination in a regression model that includes several firm characteristics as independent variables and extract the residual. These residual shareholder coordination measures (*RES_COORD_PROX* and *RES_COORD_PORT*) capture the unobservable part of coordination and serve as our main variables of interest in the return predictability tests.

The slow information diffusion hypothesis tests are first performed as they pertain to industry-specific information. In this case, the appropriate test assets are industry based portfolios. Specifically, at the end of June in each year, we first sort all firms in each of the Fama-French 48 industries into 3 size terciles. We then separate each of these industry-size portfolios into three shareholder coordination terciles and define firms in the top (bottom) tercile as high (low) coordination firms. This sorting technique generates the two sets of our test assets (144 high shareholder coordination and 144 low shareholder coordination portfolios) and ensures that our results will not be contaminated by the previously documented lead-lag effects in stock returns between big and small firms within an industry (Lo and MacKinlay (1990)). After having matched each low shareholder coordination portfolio with its corresponding high coordination "clone" within each industry-size portfolio, we proceed to calculate clones' one-month-lagged return performance, and rank them into month t-1 return quintiles. Following Cohen and Lou (2012), we assign each of the low coordination portfolios to the quintile where its high coordination clone is located. We then calculate the equally and value weighted returns in month t of the quintile portfolios consisting of low coordination test assets. We find evidence of strong return predictability, consistent with the notion that shareholder coordination serves as an information diffusion channel.

The zero-cost investment portfolio that buys low-shareholder-coordination firms, whose corresponding high coordination clones performed best in the prior month, and sells low-shareholder-coordination test assets, whose corresponding high coordination clones performed worst in the prior month, has a value-weighted return that is above 85 basis points per month. We repeat the test using alternate test assets that would be more appropriate in a more general setting where the value-relevant information has market-wide rather than industry-specific implications. Specifically, we construct two sets (i.e. high and low coordination) of 125 portfolios based on the method outlined in Daniel, Grinblatt, Titman, and Wermers (1997) (hereafter DGTW) which entails combinations of size, book-to-market and momentum quintiles. This procedure of building test assets allows us to purge out the effect of common factors on stock prices and provides a clean testing ground to investigate how shareholder coordination serves as a market-wide information diffusion channel. We document consistent evidence that the zero-cost investment portfolio delivers on average an equally-weighted (value-weighted) return ranging between 50 and 66 basis points per month, which is an economically sizeable effect. Our results also hold in a cross-sectional test setting where we control for other factors, such as size, book-to-market, past return and liquidity.

We also investigate asset pricing implications of shareholder coordination. Gompers, Ishii, and Metrick (2003) documented that firms with stronger corporate governance significantly outperform firms with weaker corporate governance. Since firms with high shareholder coordination exhibit better corporate governance (Huang (2012)), we conjecture that shareholder coordination should be positively related with future stock performance. Consistent with this prediction, we find that a zero-cost investment portfolio that is long stocks with high levels of coordination and short stocks with low levels of coordination generates significant abnormal performance.

Gompers, Ishii, and Metrick (2003) point out that one plausible reason for the superior return performance of firms with good corporate governance is that investors do not know the outcome of high-quality corporate governance and hence cannot price in such information immediately. Hou and Moskowitz (2005) document that the lack of investor recognition is the main reason for the slow stock prices' response to information. Giroud and Mueller (2011) provide indirect evidence in support of the hypothesis that investors do not recognize the agency costs caused by weak corporate governance. To test whether the positive impact of shareholder coordination on stock prices is caused by gradual information incorporation, we follow Choi and Sias (2012) and use institutional investor demand as a proxy for updates in sophisticated investors' expectations. Our tests reveal that shareholder coordination is positively related with subsequent institutional investor demand, supporting the notion that the outcome of improved corporate governance is first recognized by sophisticated investors and then only gradually incorporated into prices by the rest of the market.

The rest of the paper is organized as follows. Section 2 presents related literature, section 3 describes the sample and variables construction, section 4 contains the empirical results, and section 5 provides concluding remarks.

2. Relation to the Existing Literature

Our paper contributes to two strands of finance literature. The first strand of literature studies return predictability arising from slow information diffusion that results from different sources. For example, Lo and MacKinlay (1990) document that returns of small firms are correlated with past returns of large firms, but not vice versa. Badrinath, Kale and Noe (1995) find that past returns of stocks held by informed institutional traders are positively correlated with returns of stocks held by uninformed retail traders. Hou (2007) finds that industry-level information diffuses from big firms to small firms within the industry, and confirms that the lead-lag effect between large and small firms documented in Lo and MacKinlay (1990) is predominantly an intra-industry phenomenon. Brennan, Jegadeesh and Swaminathan (1993) provide evidence that returns on portfolios of stocks followed by many analysts tend to lead returns on portfolios of stocks followed by few analysts. Chordia and Swaminathan (2002) find that returns on portfolios of stocks with high trading volume lead returns on portfolios of stocks with low trading volume. Recently, Cohen and Lou (2012) document strong return predictability from "pseudo-conglomerate" portfolios of easy-to-analyze focused firms to their conglomerate peers due to the complexity in processing information related to the latter. Menzly and Ozbas (2010) find that stocks that are in economically related supplier and customer industries cross-predict each other's returns. Gao, Moulton and Ng (2013) find lead-lag return predictability exists in stocks with common sets of institutional investors and attribute the phenomenon to the portfolio reallocations of institutional investors.

However, existing studies have largely ignored the role played by the internal mechanism of information flow that is the information-sharing network that links institutional shareholders of a firm. Our paper contributes to this line of research by documenting how institutional shareholders' information sharing networks serving as information diffusion channels can become drivers of return predictability. Our approach is different from that of Gao, Moulton and Ng (2013) in that their paper focuses on return predictability driven by institutional investors' common portfolio reallocations (i.e. an external mechanism), whereas we emphasize the internal mechanism of institutional shareholder coordination.

The second strand of the finance literature that our paper contributes to examines the equity pricing implications of corporate governance. Gompers, Ishii, and Metrick (2003) document that firms with better corporate governance (shareholder rights) have higher firm value and better operating performance. An investment strategy that buys firms with strong corporate governance and sells firms with weak corporate governance can generate abnormal returns of 8.5% per year during their sample period. Cremers and Nair (2005) point out that the internal and external governance mechanisms are strong complements in terms of being associated with future abnormal returns and firm profitability. Both aforementioned papers propose two potential reasons for the positive relation between corporate governance and future firm performance: (1) omitted variables bias; and (2) unrecognized agency costs caused by weak governance. Giroud and Mueller (2011) rule out the omitted variables bias explanation and provide limited support to the second explanation. Our paper, to our knowledge, is the first paper providing direct evidence supporting the gradual information incorporation hypothesis in explaining the relation between corporate governance and asset prices.

3. Sample and Variables Construction

3.1 Sample Selection

Our analysis uses stock return data from the Center for Research in Security Prices (CRSP), accounting data from Compustat, analyst forecast data from Institutional Brokers' Estimate System (I/B/E/S) and the institutional holding data from Thomson Reuters F13. Our sample period is from January 1994 to December 2010. We apply the following screens to create the sample. First, we restrict the sample to institutional shareholders located in the U.S. Second, we exclude closed-end funds, Real Estate Investment Trusts, American Depository Receipts, and foreign stocks, only retaining stocks with CRSP share code 10 or 11. Third, to ensure that accounting information is publicly available before we conduct stock return predictability tests, we impose at least a six-month gap between the firm's fiscal-year ends and the beginning of stock return intervals. Last, to further alleviate market microstructure-related concerns, we require that the stock price must be greater or equal to five dollars per share at the beginning of the holding period.

3.2 Variables

3.2.1 Shareholder coordination. Following Huang (2011, 2012), we construct two measures of institutional shareholder coordination: *COORD_PROX* and *COORD_PORT*. The first measure, *COORD_PROX*, is constructed as the weighted average geographical distance among institutional shareholders of a firm. The rationale behind this measure is that the likelihood of casual social interactions and networking increases with geographic proximity (see

McPherson *et al* (2001)). To measure the distance between two institutions, we first identify the location of institutions by collecting their headquarter address zip code information from the Securities and Exchange Commission (SEC) documents (SEC Edgar) and the Nelson's Directory of Investment Managers. We then obtain the latitude and longitude for each of the zip codes from the U.S. Census Bureau's Gazetteer Place and Zip Code Database. Following prior research (e.g. Coval and Moskowitz (2001)), we calculate the distance between institution i and j using the following standard formula:

$$DIST_{i,j}=r\times arccos\{cos(lat_i)cos(lon_i)cos(lat_j)cos(lon_j)+cos(lat_i)sin(lon_i)cos(lat_j)sin(lon_j)+sin(lat_i)sin(lat_j)\}$$

where $DIST_{i,j}$ is distance in statutory miles, r denotes the radius of the Earth (approximately 3,963 statutory miles), and lat and lon are institution latitudes and longitudes.

For each firm-quarter, we calculate the distance of each institutional shareholder and all institutional shareholders of the firm, weighted by their respective fractional holdings of the total institutional ownership in the firm. We then take the inverse of logarithm-transformed fractional holdings weighted-average of these distances across all institutional shareholders of the firm to obtain the geographic-proximity-based institutional shareholder coordination measure for each firm-quarter. The weighting scheme aims at delivering a more accurate gauge of coordination than the simple average of the distances among institutions, because it accounts for the fact that institutions with large shareholdings typically have a more substantial impact on corporate behavior. Specifically, the geographical-proximity-based institutional shareholder coordination measure is designed as follows:

$$COORD\_PROX = (-1)LOG(1 + \sum_{i \varepsilon a} w_i \sum_{j \varepsilon a} w_j DIST_{i,j})$$

where α is the set of institutional investors, w_i is the ownership weight of institution i in the total ownership held by all institutions in a firm at the end of each quarter, and $DIST_{i,j}$ is the geographical distance between institution i and j. The logarithm transformation, log (1 + weighted-average of geographical distance among institutions) serves the purpose of reducing the skewness of distribution for this measure.

The second measure, *COORD_PORT*, is the weighted average correlation between institutions' portfolios of stock holdings. The intuition behind this measure is based on the premise that institutions with similar portfolio allocations are more likely to share common investment philosophies and therefore also more likely to have developed social links that lead to better coordination.[6] Additionally, stronger connectedness among institutions based on similarities in their portfolio allocations may also motivate them to coordinate their monitoring efforts and corporate governance roles. To calculate the portfolio correlation between two institutional shareholders for each firm-quarter, we first identify the stocks held by each institutional investor at the end of each quarter, and then calculate the correlation of the excess portfolio weights[7] on the stocks held by both institutions. For each institutional shareholder of the firm, we then calculate the correlation of its portfolio with that of all other institutions, weighted by their respective fractional holdings of the total institutional ownership in the firm. As in the geographical-proximity-based institutional shareholder coordination measure, we then take the fractional holdings weighted-average of these portfolio correlations across all

[6] Hong, Kubik and Stein (2005) and Stein (2008) argue that communications among institutional managers facilitate the information transmission and affect their investment decisions. Cohen, Frazzini and Malloy (2008) find that education ties improve the information sharing among mutual fund managers and then their investment.

[7] The excess portfolio weight allocated to stock i in quarter t is given by: $EW_{ipt} = \frac{W_{ipt} - W_{imt}}{W_{imt}} \times 100$, where W_{ipt} is the actual weight assigned to stock i in the institution's portfolio p in quarter t and W_{imt} is the weight of stock i in the aggregate market portfolio in quarter t.

institutional shareholders of the firm to obtain the portfolio-correlation-based institutional shareholder coordination measure for each firm-quarter. Specifically,

$$COORD\_PORT = \sum_{i \varepsilon a} w_i \sum_{i \varepsilon a} w_j CORR_{i,j}$$

where α is the set of institutional investors, w_i is the ownership weight of institution *i* in the total ownership held by all institutions in a firm at the end of each quarter, and $CORR_{i,j}$ is the correlation coefficient of the excess portfolio weight (measured as the actual weight relative to the weight in the market portfolio) allocated to common holdings between institutions i and j at quarter t.

3.2.2 Unobservable shareholder coordination. To derive a more causal link between institutional shareholder coordination and other variables of interest, we need to first design a prediction model that captures the effect of firm characteristics on institutional shareholder coordination. The rationale is that the predicted shareholder coordination is a linear combination of firm characteristics and as such it could be endogenously determined. Thus, if firm characteristics used to predict shareholder coordination also explain most of the variation in return performance, shareholder coordination's relation to return performance could be explained by the notion that coordination simply acts as an aggregate proxy for those firm characteristics. Conversely, if the part of shareholder coordination that cannot be explained by firm characteristics, i.e. the residual from a prediction model explains most of the variation in the variables of interest, it is more likely that we have established a causal relation between them. Moreover, the residual measure represents the unobservable part of coordination, i.e. the part that the outside investors cannot easily recognize, and from their perspective, a complicated information absorption mechanism. Therefore, intuitively it is more appropriate to conduct the analysis based on residual institutional shareholder coordination.

To obtain the residual shareholder coordination measure we use a methodology similar to that used by Hong, Lim, and Stein (2000) and Nagel (2005) in different contexts. Given the fact that there is neither any prior theoretical model nor prior empirical evidence regarding the determinants of institutional shareholder coordination, we include a battery of variables that reflect firm characteristics (e.g., firm size, accounting performance (ROA) and market performance (BM, Beta and BHRET12)) in the prediction model. Considering the way we construct institutional shareholder coordination variables, we also include the percentage of institutional ownership and institutional ownership concentration to control for their potential impact on the degree of shareholder coordination. In addition, we add to the model the location of a firm's headquarters (a city indicator variable[8]) because it may have an impact on institutional shareholder coordination through two possible mechanisms: first, urban firm location provides money managers located in the same city a greater chance to exchange their private information, leading to a better coordination among them[9]; and second, the role of threat of exit that is magnified when stock liquidity is strong, as is the case in urban firms, may intensify the ease of coordination.[10] Finally, our prediction model is as follows:

[8] If a firm's headquarters is located in one of the 21 major cities, the city dummy is equal to 1, otherwise 0. We obtain the list of the major cities by US Census Bureau population surveys of 1990 and 2000. The full list of the cities includes: New York, San Francisco, Boston, Los Angeles, Philadelphia, Chicago, Dallas, Houston, Baltimore, Washington, San Diego, Milwaukee, Detroit, Phoenix, Columbus, Indianapolis, Austin, San Antonio, Jacksonville, Memphis, and San Jose.

[9] Hong, Kubik and Stein (2005) find that a mutual fund manager's investment decision is more likely to be affected by the investment decision of other managers in the same city through the word-of-mouth effects.

[10] Admati and Pfleiderer (2009) argue that through the credible threat of exit, a large shareholder can alleviate the agency problem on the basis of its private information about corporate managers' extraction of private benefits. Bharath, Jayaraman and Nagar (2013) provide empirical evidence that exit threats by blockholders that are

$$COORD\_ = a_0 + a_1 Size + a_2 BM + a_3 Beta + a_4 ROA + a_5 Leverage + a_6 Sale\ growth + a_7 Firm\ age + a_8 IO + a_9 IO\_HHI + a_{10} BHRET12 + a_{11} City\_dummy + \varepsilon \quad (1)$$

We estimate this cross-sectional regression of coordination every quarter with lagged independent variables and obtain coefficient estimations of each controlling variable, which we then use to obtain predicted institutional shareholder coordination for each firm and each quarter according to the following equation:

$$P\_COORD\_^{est} = a_0^{est} + a_1^{est} Size + a_2^{est} BM + a_3^{est} Beta + a_4^{est} ROA + a_5^{est} Leverage + a_6^{est} Sale\ growth + a_7^{est} Firm\ age + a_8^{est} IO + a_9^{est} IO\_HHI + a_{10}^{est} BHRET12 + a_{11}^{est} City\_dummy \quad (2)$$

After obtaining the predicted shareholder coordination, we obtain the unexplained (residual) part for geographical-proximity-based (hereafter *RES_COORD_PROX*) and portfolio-correlation-based (hereafter *RES_COORD_PORT*) institutional shareholder coordination as follows:

$$RES\_COORD\_ = COORD\_ - P\_COORD\_^{est} \quad (3)$$

In this paper, we use *RES_COORD_PROX* and *RES_COORD_PORT* as the main shareholder coordination variables. Table 1.1 presents summary statistics for the main variables as well as other controlling variables used in the regressions (refer to the caption of Table 1.1 for detailed variable definitions). The summary statistics of raw institutional shareholder variables are comparable to that in Huang (2011, 2012).

Table 1.2 Panel A reports the Fama-MacBeth regression results of the coordination prediction model. It is noteworthy that the adjusted R-square for both coordination measures

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strengthened due to the stock liquidity shocks have a substantial impact on firm value. Loughran and Schultz (2005) find that stocks of urban firms are more liquid than those of rural firms.

(*COORD_PROX*, 0.308; *COORD_PORT*, 0.602) indicates that the controlling variables in the prediction model explain a considerable part of variation in the coordination variables. In other words, after purging out the effects of relevant determinants, we obtain the pure shareholder coordination measures. It is not surprising to see that firm size is significantly and negatively related with shareholder coordination in that the visibility of large firms is more likely to attract a large number of different types of institutional investors. The positive relation between institutional ownership concentration and shareholder coordination indicates that dispersed institutional ownership imposes more barriers on the coordination among institutional investors. It is interesting and somewhat surprising that location in big cities has a negative impact on shareholder coordination. This could be due to a relatively large number of firms located in metropolitan cities. The results further suggest that firms' prior market and accounting performance also have substantial effects on shareholder coordination. Table 1.2 Panel B reports the correlation matrix for the raw and refined shareholder coordination measures. The Pearson (Spearman) correlation between *COORD_PROX* and *RES_COORD_PROX* is 0.7669 (0.4276), indicating that although the two measures are highly correlated, they are not exactly the same, which is in line with the view that our prediction model of shareholder coordination successfully captures the noisy part in the raw coordination measures. The positive correlation between *COORD_PORT* and *RES_COORD_PORT* (Pearson=0.6241 and Spearman=0.2692) further confirms the above argument. The large correlation between *COORD_PROX* and *COORD_PORT* (Pearson=0.6550 and Spearman=0.4637), *RES_COORD_PROX* and *RES_COORD_PORT* (Pearson=0.4498 and Spearman=0.3310) supports the idea that the geographical-proximity-based and portfolio-correlation-based coordination measures capture, to a large extent, different aspects of the same phenomenon.

Finally, if our measures of institutional shareholder coordination are indeed capturing the strength of links between institutions within an information sharing network, they should be positively associated with the degree of synchronization in institutional trading. In other words, if higher coordination leads to greater harmony of institutional investors' information sets about a particular firm's stock performance, we should observe greater synchronization across institutional shareholders' trades leading to lower diversity in changes of institutional shareholders stakes. We test whether this is indeed the case by examining the relationship between our residual coordination measures and the standard deviation of the changes in the quarterly stakes of a firm's different institutional shareholders, controlling for other firm characteristics. The results, presented in Panel C of Table 1.2, show a strong relationship between coordination and synchronization in institutional trading and provide support for the notion that our residual coordination measures are indeed capturing the ability of institutions to share market-value relevant information about the firm.

4. Empirical Results

4.1 Shareholder Coordination and information Environment

As mentioned before, shareholder coordination has been shown to improve corporate governance and disclosure quality. In this section, we build on this recent evidence and examine whether shareholder coordination positively affects firms' information environment from the perspective of outside investors. We conduct this analysis based on local comovement of stock returns and post-earnings announcement drift. Pirinsky and Wang (2006) document that stock returns exhibit strong local comovement and attribute the phenomenon to the trading pattern of local residents whose information sets are effectively segmented from that of outside investors.[11] If more transparent information flows to the market, stock prices will reflect more firm specific information through the trading of active and sophisticated investors and the local comovement of stock returns will be reduced. Therefore, we hypothesize that firms with high shareholder coordination have a low degree of comovement with local stocks. To test this hypothesis, following Pirinsky and Wang (2006), we first construct local stock return indices for each Metropolitan Statistics Area (hereafter MSA) by equally weighting the returns of all stocks within each MSA. To obtain the sensitivity of stock returns to local stock return indices, we estimate time-series regressions of monthly stock returns on the returns of the corresponding local index and the market portfolio for each stock. Specifically, we estimate the following model:

$$R_{i,t} = \alpha_i + \beta_i^{local} R_t^{local} + \beta_i^{market} R_t^{market} + \varepsilon_{i,t} \tag{4}$$

where $R_{i,t}$ is the monthly return of stock i, R_t^{local} is the monthly return of the stock's corresponding MSA local stock returns index, and R_t^{market} is the monthly return of the market portfolio. All returns are in excess of monthly T-bill rates. To avoid spurious correlations, we exclude the return of stock i when we construct the local stock returns indices. After we obtain β_i^{local} for each stock, we then regress it on shareholder coordination and other variables that capture firm and regional characteristics that have been shown to be correlated with local bias. Specifically, we control size (the natural logarithm of market capitalization at the end of the previous year), leverage (the ratio of total debt to asset), MB (market to book ratio equity ratio),

[11] An alternative explanation provided by Pirinski and Wang (2006) is that local comovement is rooted on local investors' preferences toward local stocks stemming from familiarity and/or loyalty.

ROA (return on asset), advertising (advertising expenditures), the number of shareholders (the natural logarithm of number of shareholders), and IO (institutional ownership) in the regressions. Additionally, we include as controls regional characteristics, such as the industry agglomeration by MSA (Industry HHI, a Herfindahl index), investment income (the per capita investment income in an MSA), and personal income (the per capita personal income in an MSA).

The results in Table 1.3 indicate that shareholder coordination has a strong negative impact on local comovement. Take *RES_COORD_PORT*, for example: a 10 percent increase in shareholder coordination results in an approximate 6 percentage decline in local beta, ceteris paribus. The results still hold after the inclusion of regional characteristics. Consistent with the findings in Pirinsky and Wang (2006), we also find a negative effect of size, ROA and industry concentration on local beta. In contrast, the institutional ownership coefficient is negative, albeit not statistically significant.

Next, we examine whether shareholder coordination plays a role in explaining post-earnings announcement drift. Earnings surprises are measured as the difference between actual earnings as reported by I/B/E/S ($e_{i,q}$) and consensus earnings forecast ($F_{i,q}$), defined as the median of forecasts reported to I/B/E/S in the 90 day period prior to the earnings announcement. We then normalize the difference by the stock price at the end of the corresponding quarter q[12]:

$$UE\_FERROR_{i,q} = \frac{e_{i,q} - F_{i,q}}{P_{i,q}} \qquad (5)$$

If an analyst made multiple forecasts during a 90-day period, we use the most recent earnings forecast.

[12] To avoid the potential rounding issues in I/B/E/S adjusted data described in Payne and Thomas (2003), we use the I/B/E/S Unadjusted Detail History data that do not have adjustments for stock splits and stock dividends, and put both forecast and actual earnings on the same per share basis to accurately calculate analyst-based earnings surprise using the CRSP adjustment factor.

The cumulative abnormal returns over the post-announcement window from day 2 to day 61 (BHAR[2,61]) are defined as the difference between the buy-and-hold return of the announcing firm and that of a size and book-to-market (B/M) matching portfolio over the window [2, 61][13] in trading days relative to the announcement date.

$$BHAR[2,61]_{i,q} = \prod_{k=t+2}^{t+61}(1+R_{i,k}) - \prod_{k=t+2}^{t+61}(1+R_{p,k}) \qquad (6)$$

where $R_{i,k}$ and $R_{p,k}$ are the return of firm i and the return of size and book-to-market matching portfolio on day k relative to the announcement date t in quarter q.

For each quarter from 1994 to 2010, we first perform quarterly sorts based on each firm's earnings surprises. Then for each earnings surprises quintiles in each quarter, we further sort stocks into quintiles based on the most recent corresponding shareholder coordination. For each shareholder coordination quintile, we calculate the mean cumulative abnormal returns in the post-announcement period for the top (most positive, ES5) and the bottom (most negative, ES1) earnings surprise quintiles, and the difference in post-announcement cumulative abnormal returns between the two extreme earnings surprise quintiles. The spread in post-announcement abnormal returns between ES5 and ES1 measures captures underreaction to earnings news as reflected in subsequent drift.

In Table 1.4, consistent with prior evidence, the spread in the cumulative abnormal return over the post-announcement period between extreme earnings surprise quintiles is significantly positive, indicating delayed market response to earnings news. If firms with high shareholder coordination have a better information environment, the market reaction to the earnings announcements will be less delayed. In other words, the post-earnings announcement drift will

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[13] Bernard and Thomas (1989) document that the post-earnings announcement drift primarily concentrate on the 60 trading days period after the earnings announcement.

be weaker for firms with higher shareholder coordination than firms with lower shareholder coordination. Consistent with our prediction, the spread in mean BHAR[2,61] between good and bad earnings news quintiles is largest in the low shareholder coordination quintiles, indicating that the lack of coordination is associated with greater underreaction to earnings news. Take *RES_COORD_PROX*, for example: in the top *RES_COORD_PROX* quintile, the mean post-announcement abnormal return spread is small (2.94%), whereas the mean spread in the bottom quintile is substantially larger (5.40%). The last row of Table 1.4 reports the difference of the spread between top and bottom shareholder coordination quintiles. For both measures of shareholder coordination, the differences are statistically and economically significant (for *RES_COORD_PROX*, difference=-2.47% (p-value<0.01); for *RES_COORD_PORT*, difference=-2.79% (p-value<0.01)), supporting the notion that shareholder coordination weakens the post earnings announcement drift by delivering more transparent and precise information to the market.

4.2 Shareholder Coordination and Information Diffusion

In this section, we examine whether shareholder coordination serves as an information transmission channel thereby giving rise to lead-lag return phenomena between firms with strong and weak information sharing networks. Social network literature suggests that informal ties are likely to develop when there is homophily, i.e. the tendency of individuals to associate and bond with others driven by familiarity, often rooted in geographic proximity or the sharing of common values (McPherson, Smith-Lovin and Cook (2001)). The stronger the informal ties among institutional shareholders, the more likely they are to build up information sharing networks that facilitate the diffusion of value relevant information into the market. Accordingly, stock prices of firms with high shareholder coordination will respond faster to information shocks than firms with low shareholder coordination. Therefore, we hypothesize that there exists a lead-lag effect wherein stock returns of firms with high levels of shareholder coordination will lead those of firms with low shareholder coordination.

We test the aforementioned return predictability implications of slow information diffusion as it pertains to both industry and market-wide information. We start with testing return predictability arising from slow diffusion of industry information. At the end of June in each year, we first sort firms into 144 portfolios corresponding to the 48 Fama-French industry portfolios, each split into 3 size portfolios (i.e., 48×3=144). We further independently sort firms into two portfolios based on whether the average residual shareholder coordination over the past four quarters was high (i.e., ranking in the top coordination tercile) or low (i.e., ranking in the bottom coordination tercile). This sorting technique insulates our results from the previously documented intra-industry lead-lag effect that exists between big and small firms (Lo and McKinley (1990) and Hou (2007)). We then use the high coordination portfolios as the benchmarks and match them with stocks in the low coordination portfolios within each industry-size portfolio. The performance of each benchmark portfolio is measured by averaging the stock returns of firms each month. Following Cohen and Lou (2012), at the beginning of each month (starting in July), we sort stocks in low coordination portfolios into quintiles based on the returns of their corresponding high coordination benchmarks in the previous month. The quintile portfolios are rebalanced at the beginning of each month.

We employ the Fama-French-Carhart four factor model that includes the market, size, book-to-market and momentum factors to examine the risk-adjusted return performance of portfolios.

$$R_m^P - R_m^F = \beta_0 + \beta_1(R_m^M - R_m^F) + \beta_2 SMB_m + \beta_3 HML_m + \beta_4 UMD_m + e_m \qquad (7)$$

where R_m^P is a particular portfolio's monthly return, R_m^F is the one-month Treasury bill rate, R_m^M is the value-weighted market return, *SMB* (small minus big) is the difference between the monthly returns of the small and big firms' portfolios, *HML* (high minus low) is the difference between the monthly returns of high book-to-market and low book-to-market firms' portfolios, and *UMD* (up minus down) is the momentum factor computed as the monthly return differential between a portfolio of winners and a portfolio of losers. For the test of the performance on zero-cost investment portfolios, we also use the same four factor model:

$$R_m^H - R_m^L = \beta_0 + \beta_1(R_m^M - R_m^F) + \beta_2 SMB_m + \beta_3 HML_m + \beta_4 UMD_m + e_m \qquad (8)$$

where R_m^H is the monthly return of the portfolio with stocks in the top shareholder coordination quintile, and R_m^L is the monthly return of the portfolio with stocks in the bottom shareholder coordination quintile.

If shareholder coordination serves as an information diffusion channel, the information update in stock prices of high coordination firms should predict the information update in stock prices of low coordination firms. We test this prediction in Table 1.5. As we can see, we find strong evidence consistent with the notion that shareholder coordination affects the speed at which information is impounded into stock prices. After controlling other common stock returns determinants, such as the market excess return (*MKTRF*), size (*SMB*), book-to-market (*HML*), and momentum (*UMD*), the zero-cost investment portfolio that buys (sells) low coordination firms whose corresponding high coordination benchmarks performed best (worst) in the prior month has an equally-weighted return of 93 basis points (t=2.69) for *RES_COORD_PROX* and

101 basis points (t=2.59) for *RES_COORD_PORT* per month, roughly 11.75% and 12.82% per year. The corresponding value-weighted returns from the zero-cost investment portfolios are 85 (99) basis points for *RES_COORD_PROX* (*RES_COORD_PORT*), around 10.69% (12.54%) per year.

Next, we test the information diffusion hypothesis in a more general setting where we use test assets more appropriate for testing whether coordination can affect the diffusion of market-wide rather than industry-specific, value relevant information. Specifically, at the end of June in each year, we sort firms into 125 portfolios (DGTW 125) based on size, book-to-market and momentum characteristics (see Daniel, Grinblatt, Titman and Wermers (1997)). We then idependently sort firms based on shareholder coordination and identify the portfolio of stocks with high shareholder coordination (top coordination tercile) and the matching portfolio of otherwise similar stocks with low shareholder coordination (bottom coordination tercile). This sorting and matching technique isolates the impact of stock characteristics and allows us to test whether market-wide information shocks travel from prices of firms with high shareholder coordination to those of firms with low shareholder coordination. We replicate the tests found in Table 1.5 using the DGTW 125 portfolios as test assets and report the results in Table 1.6. As we can see, there is again strong evidence that shareholder coordination serves as an information diffusion channel. Take *RES_COORD_PROX*, for example: after controlling other common factors, the zero-cost investment portfolio that buys (sells) low coordination firms whose corresponding high coordination benchmarks performed best (worst) in the prior month delivers an equally-weighted return of 66 basis points (t=2.92) per month, about 8.21% per year. The corresponding value-weighted return is 111 basis points (t=3.30) per month, about 14.16% per year. Finally, *RES_COORD_PORT* generates quantitatively similar results.

We then test our hypothesis in a cross-sectional framework, using Fama-MacBeth regressions. The dependent variable is the stock return for low shareholder coordination firms in month t (Ret_t). The main independent variable is the stock return of the high shareholder coordination benchmark in month t-1 (i.e., the return of a "clone" portfolio of otherwise similar firms with high coordination, $Clone\_ret_{t-1}$). Other independent variables include the low shareholder coordination firm's own return in month t-1 (Ret_{t-1}) to control for the short-term reversal effect (Jegadeesh (1990)). We also control for firm size (Size), book-to-market ratio (BM), Beta, momentum (Ret (-2,-7)), and liquidity (Turnover and CV_Turnover) in the regressions. Cross-sectional regressions are run every month and the times-series standard errors are adjusted for heteroskedasticity and autocorrelation up to 12 lags (Newey and West (1987)). Consistent with the portfolio results, we find that $Clone\_ret_{t-1}$ is a strong and significant predictor of next month's stock return of matched low shareholder coordination firms. Take RES_COORD_PROX in specification (1) in Table 1.7, for example: the coefficient on $Clone\_ret_{t-1}$ is 0.0312 with a t-statistics of 3.36, indicating that one standard deviation increase in the high coordination benchmark portfolio return in the month t-1 leads to a 31 basis point increase in the return of low shareholder coordination firms in month t. In short, both our time-series and cross-sectional tests provide strong, consistent evidence in support of the hypothesis that good (poor) institutional shareholder coordination facilitates (slows) the diffusion of information into market prices.

The results from the time series tests in Tables 1.5 and 1.6 and from the cross-sectional tests in columns (1), (3), (5) and (7) of Table 1.7 documented a lead-lag effect in asset prices between firms with high and low shareholder coordination. This implies that investors gradually update prices of firms lacking coordination based on observation of prices of firms with coordination. The natural question to ask is how long this information flow process lasts. In columns (2), (4), (6) and (8) of Table 1.7 we test whether stock returns of high shareholder coordination benchmarks in deeper lags (e.g. month t-2 and month t-3) also have the ability to predict current stock returns of firms with low shareholder coordination. The tests are conducted for both industry-level (column (2) and (4)) and market-level information shocks (columns (6) and (8)), i.e., using the 125 DGTW and 144 industry-size portfolios as test assets, respectively. The results in columns (2) and (4) show that the predictive power of high shareholder coordination benchmarks disappear at month t-3, implying that investors update prices of firms lacking coordination over a period of approximately two months after the industry-level information shock arrives. In comparison, the results in columns (6) and (8) indicate that the updating of prices occurs faster in the case of market-level than industry-level information shocks in that the coefficients on deeper lagged stock returns of high shareholder coordination benchmarks are not significant. This suggests that the speed at which information is digested depends on the type of information (market-wide vs industry-specific).

To further test whether there exists a lead-lag relation between firms with high shareholder coordination and firms with low shareholder coordination, we employ the vector autoregression (VAR) model to examine the cross-stock return dynamics based on earlier studies in the literature that show significant lead-lag relations among US stock returns (Lo and MacKinlay (1990); Chordia and Swaminathan (2000); and Hou (2007)).

To construct shareholder coordination portfolios, at the end of June in each year, we first sort firms into two portfolios based on whether the average residual shareholder coordination over the past four quarters was high (i.e., ranking in the top coordination tercile) or low (i.e., ranking in the bottom coordination tercile). We then independently sort firms into 144 portfolios corresponding to the 48 Fama-French industry portfolios, each split into 3 size portfolios (i.e., 48×3=144). After partitioning firms into double-sorted portfolios, we compute the equally weighted monthly returns for each portfolio. We replicate the same sorting procedure for DGTW125 portfolios. We estimate the following vector autoregression (VAR) model jointly across industry-size 144 or DGTW125 portfolios.

$$R_{LI,t} = \alpha_0 + a_1 R_{LI,t-1} + a_2 R_{HI,t-1} + u_t \quad (9)$$

$$R_{HI,t} = \alpha_1 + b_1 R_{LI,t-1} + b_2 R_{HI,t-1} + v_t \quad (10)$$

where $R_{LI,t}$ and $R_{HI,t}$ represent the low and high shareholder coordination portfolio returns at time t, respectively. This bivariate VAR system allows us to test whether the lagged returns on the high shareholder coordination portfolio in Eq. (9) have any significant power in predicting the current returns of the low shareholder coordination portfolio by testing the hypothesis that a_2=0. In addition, this system allows us to examine whether there is any asymmetry in the cross-autocorrelations across the high and low shareholder coordination portfolios by test the hypothesis that a_2-b_1=0.

In Panels A and B of Table 1.8, we present the estimation results for industry-size 144 and DGTW 125 groups, respectively. The results indicate that the lagged returns on the high shareholder coordination portfolio predict the current returns on the low shareholder coordination portfolio. Interestingly, the coefficient estimates of the lagged return on the low shareholder coordination in predicting the current return on the high shareholder coordination are significantly positive. However, their magnitude is smaller in comparison with that of the lagged returns on the high coordination portfolio in predicting current returns on the low coordination portfolio. Additionally, the cross-equation tests confirm that the statistical differences between the coefficients of the lagged returns on high coordination portfolio in predicting the current returns on the low coordination portfolio and those of the lagged returns on low coordination portfolio in predicting the current returns on the high coordination portfolio are positive and significant. Therefore, we conclude that there exists a lead-lag relation in stock returns across shareholder coordination portfolios.

4.3 Shareholder Coordination and Stock Returns

4.3.1 Fama-MacBeth and panel regressions. In this section, we analyze the relation between shareholder coordination and future stock returns using Fama-MacBeth regressions. Specifically, for each of the 204 months in our sample period, we estimate the following regression model:

$$R_{i,t} = \alpha + \beta RES\_COORD\_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t} \qquad (11)$$

where $R_{i,t}$ is the stock return of firm i in month t. $RES\_COORD\_{i,t}$ is one of the shareholder coordination measures (*RES_COORD_PROX* or *RES_COORD_PORT*) for firm i in month t. At the end of June in each year, we take the simple average of the constructed quarterly measure in the past four quarters to obtain the annual measures of shareholder coordination. We then use the annual measures in June to explain the stock returns of the following 12 months. $X_{i,t}$ is a vector of explanatory variables of cross-sectional expected returns such as beta, size and book-to-market ratio.

Specifications 1-6 of Table 1.9 report the mean coefficient of the regression, along with Newey-West adjusted t statistics. In specifications 1 and 4, the model includes only the shareholder coordination measure along with industry and time fixed effects. In the extensive specifications, we control for firm size (Size), book-to-market ratio (BM), systematic risk (Beta), momentum (RET (-2, -7)), liquidity (Turnover and CV_Turnover), institutional ownership (IO) and institutional ownership concentration (IO_HHI). Size and BM are constructed as in Fama and French (1992). Beta is estimated from the market model over the 36-month window prior to the current date. RET (-2, -7) is the compound gross return from month t-7 to month t-2, as in Fu (2009). Following Chorida, Subrahmanyam and Anshuman (2001), we measure Turnover as the average share turnover over the past 36 months and CV_Turnover as the coefficient of variation of the past 36 months' share turnover. IO is the most recent available fraction of outstanding shares held by institutional investors. Following Hartzell and Starks (2003), IO_HHI is measured as the Herfindahl Index of institutional ownership concentration based on the percentages of institutional holdings by all 13F institutions.

The results in specifications (1) and (4) indicate that shareholder coordination is strongly positively related with future stock returns. For example, a one-standard-deviation increase in *RES_COORD_PROX* (*RES_COORD_PORT*) is associated with an 0.16% (0.25%) increase in average monthly returns. On an annualized basis, a one-standard-deviation increase in shareholder coordination implies an increase in returns of 1.94% for *RES_COORD_PROX* and 3.09% for *RES_COORD_PORT*. We find consistent results in the models with the extensive specifications. In addition, the relations between stock returns and the other controlling variables are consistent with prior evidence documented in the literature. For instance, the negative relation between Size and average stock return is consistent with the notion that small firms on average have higher returns than large firms. BM is positively associated with future stock returns, indicating that value firms tend to have higher future returns than growth firms. The average slope of Beta is not significantly different from zero. Finally, institutional ownership concentration has an adverse impact on firm performance.

To alleviate the concern that the estimation may be biased due to the correlation in residuals across years within each firm, we also examine the relation between shareholder coordination and stock returns in a panel data regression setting. Petersen (2009) points out that in panel analysis, after clustering the standard error by firm, the bias caused by correlated residuals due to unobserved firm effects disappears. In specifications 7-12, we repeat the tests using models that control for industry and time fixed effects and standard errors clustered by firm. We obtain quantitively similar results and confirm that the positive relation between shareholder coordination and stock returns is robust.

4.3.2 Zero cost trading strategies. Do portfolios formed based on shareholder coordination yield systematic positive returns, and to what extent can these returns be explained by the traditional risk factors? We address these questions by constructing zero-cost investment portfolios as follows. At the end of each June, we sort the stocks into quintile (deciles) on the basis of corresponding shareholder coordination. The zero-cost portfolios are constructed by taking long positions in stocks in the top shareholder coordination quintile (decile) and taking short positions in stocks in the bottom shareholder quintile (decile). The portfolios are rebalanced at the end of each June. We employ the Fama-French-Carhart four factor model that includes the market, size, book-to-market and momentum factors to examine the risk-adjusted return performance of portfolios.

The results in Table 1.10 are consistent with the notion that firms with high shareholder coordination achieve better return performance. For example, in Table 10 Panel D, the average abnormal return of the zero-cost investment portfolio that buys top *RES_COORD_PORT* decile firms and sells bottom *RES_COORD_PORT* firms is 67 basis points per month (t=4.30), or roughly 8.34% per year. Given the fact that these portfolios only entail trading every twelve months, they are likely to remain quite profitable even if we allow for sizeable transaction costs. It is also worth noting that although the four factor model possesses some power in explaining the monthly returns of zero-cost portfolios, it explains at best less than 25% of the variability of these returns. Interestingly, the four factor model explains at least 70% of the variability of returns of the long portfolio and the short portfolio when considered individually, indicating that the zero-cost portfolios average out exposures to the traditional risk factors reasonably well.

4.3.3 Mechanism. In this section, we explore the mechanism through which shareholder coordination forecasts future stock returns. As mentioned in section 2, the evidence on the positive relation between corporate governance and future stock returns is sparse. Giroud and Mueller (2011) provide indirect evidence in support of the hypothesis that investors do not recognize the agency costs caused by weak corporate governance. This hypothesis implies that markets are slow to fully incorporate into prices information about the quality of a firm's corporate governance. In other words, the positive relation between quality of corporate governance and subsequent returns could be attributed to investors' gradual incorporation of such information spearheaded by sophisticated investor demand for the stock. To test this hypothesis we utilize a methodology similar to that of Choi and Sias (2012). Accordingly, the gradual incorporation of information explanation in this paper's context predicts that more sophisticated investors (institutional investors) will subsequently buy (sell) stocks of firms with high (low) shareholder coordination from less sophisticated investors (retail investors).[14]

The annual shareholder coordination is constructed by taking the simple average of the quarterly measures in year t. Following Choi and Sias (2012), we use two measures of

[14] Choi and Sias (2012) posit that the gradual incorporation of information explanation predicts that more sophisticated investors will subsequently buy (sell) strong (weak) financial strength stocks from less sophisticated investors.

institutional demand: the adjusted percentage change in the fraction of shares held by institutional investors and the adjusted percentage change in the number of institutional investors of a firm.[15] The first measure is defined as the difference between the change of institutional ownership for stock i in year t and quarter q and the average change of institutional ownership for all stocks within the same market capitalization decile d, normalized by the average institutional ownership at the end of the last quarter q in year t-1 (q=0) for stocks within the same market capitalization decile d:

$$C\_IO_{i,q} = institutional\ ownership_{i,q} - institutional\ ownership_{i,q-1} \tag{12}$$

$$ADJC\_IO_{i \in d,q} = \frac{C\_IO_{i \in d,q} - \overline{C\_IO_{i \in d,q}}}{IO_{i \in d,q=0}} \tag{13}$$

The second measure is defined as the difference between the change of institutional breadth for stock i in year t quarter q and the average change of institutional breadth for all stocks within the same market capitalization decile d, normalized by the average number of institutional shareholders at the end of the last quarter q in year t-1 (q=0) for stocks within the same market capitalization decile d:

$$C\_IB_{i,q} = \#\ institutional\ shareholders_{i,q} - \#\ institutional\ shareholders_{i,q-1} \tag{14}$$

$$ADJC\_IB_{i \in d,q} = \frac{C\_IB_{i \in d,q} - \overline{C\_IB_{i \in d,q}}}{IB_{i \in d,q=0}} \tag{15}$$

To mitigate the concern that our results are driven by statistical outliers, we winsorize the above two measures of institutional demand at the 1% and the 99% level. If the positive impact of shareholder coordination on future stock returns can be explained, at least partially, by the

[15] Sias (2007) and Choi and Sias (2012) point out that the adjusted change in institutional ownership (breadth) overcomes the limitation: the absolute value of the change in institutional ownership (breadth) is correlated with firm size and institutional ownership (breadth).

gradual information incorporation hypothesis, we should observe a positive relation between shareholder coordination and subsequent institutional trading demand. Empirically, we estimate the regressions of annual institutional trading demand in year t on shareholder coordination in year t-1, and three other variables known to explain the cross-sectional variation in institutional trading demand (Chen, Harford and Li (2007)): the natural logarithm of firm size, book-to-market ratios, and the natural logarithm of shareholder turnover.

Table 1.11 Panel A reports the time-series average coefficients over 17 years estimated from Fama-MacBeth regressions with Newey-West adjusted t-statistics. As we can see, the coefficients on *RES_COORD_PROX* in specifications (1) and (5) and the coefficients on *RES_COORD_PORT* in specifications (3) and (7) indicate that high shareholder coordination triggers subsequent institutional trading demand, supporting the gradual information incorporation hypothesis. In the extended specifications, our results still hold after controlling for other relevant variables. The significant and positive coefficients also suggest that our results are not driven by institutional trading momentum, because if that were the case, we should not see any difference in subsequent institutional trading demand between high shareholder coordination and low shareholder coordination firms. To further alleviate the concern that the positive relation between shareholder coordination and subsequent institutional trading demand is driven by short-term momentum trading and/or aggregate liquidity demand by institutional investors, we conduct the tests on a quarterly basis. Each year, we divide firms into quintiles based on the shareholder coordination. Then we examine whether the quarterly return differences between top and bottom shareholder coordination quintiles are related to the contemporaneous quarterly institutional trading demand differences in the subsequent year. The results in Table 1.11 Panel B confirm that our results are not driven by the aforementioned alternative explanations.

Theoretical work and empirical evidence suggest that arbitrage costs and information uncertainty impede the information incorporation process and cause delayed market reactions to certain information.[16] Therefore, we hypothesize that institutional trading demand becomes stronger when arbitrage costs and information uncertainty are higher. We use seven proxies for arbitrage limits and information uncertainty: (1) firm size (the market capitalization); (2) institutional ownership (the ratio of shares held by institutional investors divided by shares outstanding); (3) institutional breadth (the number of institutional investors); (4) shares turnover (average monthly share trading volume divided by the average number of shares outstanding during a 1-year period ending at the portfolio formation date); (5) analyst coverage (the number of analysts following the firm during the most recent fiscal year); (6) idiosyncratic volatility (standard deviation of residuals from the regression of excess daily return on Fama-French-Carhart four factor model over the quarter q=0); and (7) total return volatility (standard deviation of daily return over the quarter q=0).

In each year from 1994 to 2010, we independently sort firms into 25 portfolios based on combinations of shareholder coordination quintiles and quintiles formed after sorting on each of the seven proxies for limits to arbitrage and information uncertainty. We then calculate the differences in subsequent institutional trading demand between top and bottom shareholder coordination quintiles (*SC5-SC1*) within each arbitrage costs/information uncertainty quintiles. If the positive relation between shareholder coordination and stock returns is driven, at least in part,

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[16] For example, Shleifer and Vishny (1997) establish a model suggesting that arbitrage is constrained by a variety of limits. Wurgler and Zhuravskaya (2002) provide evidence that when stocks have no close substitutes, arbitrage risk is high and mispricing is more likely to be common. Mendenhall (2004) documents that post earnings announcement drift, is strongly related to arbitrage risk. Zhang (2006) finds that stocks with greater information uncertainty experience greater momentum and price drift. Caskey (2009) provides a theoretical model where the failure of information ambiguity-averse investors to incorporate value-relevant information into stock prices contributes to the market anomalies.

by the gradual incorporation of information, the differences in subsequent institutional trading between top and bottom shareholder coordination quintiles should amplify when arbitrage costs/information uncertainty are high. Therefore, the differences in highest arbitrage costs/information uncertainty quintile (*ACIU*5) should be significantly larger than the differences in lowest arbitrage costs/information uncertainty quintile (*ACIU*1).

The first two rows of each panel in Table 1.12 report the time-series average of the seventeen annual cross-sectional means of the high minus low coordination differences in subsequent institutional demand for the highest and lowest arbitrage costs/information uncertainty portfolios. The last row in each panel of Table 1.12 reports the differences between the first two rows. To verify that these differences are statistically meaningful, we estimate the following regression model using stocks in the top and bottom of the subsequent institutional trading quintiles and top and bottom of arbitrage costs/information uncertainty quintiles.

$$ADJC\_IO / ADJC\_IB = \alpha_0 + \alpha_1 SC5 + \alpha_2 ACIU5 + \alpha_3 SC5 \times ACIU5 + \varepsilon \quad (16)$$

where *SC*5 is an indicator variable that is equal to one for the top quintile of shareholder coordination and zero for the bottom quintile of shareholder coordination, and *ACIU*5 is an indicator variable that is equal to one for the top quintile of arbitrage costs/information uncertainty and zero for the bottom quintile. *ADJC_IO* and *ADJC_IB* are measures of institutional trading demand for each stock. Thus, the regression coefficient α_3 tests whether institutional trading differences between firms with high shareholder coordination and firms with low shareholder coordination are significantly different between firms with high arbitrage costs/information uncertainty and firms with low arbitrage costs/information uncertainty. The results in the last row of each panel reveal that in most cases, α_3 is significant at the 1% level using standard errors adjusted as suggested by Newey and West (1987), supporting our hypothesis that the gradual incorporation of information explains, at least partially, the positive relation between shareholder coordination and stock returns.

5. Conclusion

Institutional shareholder coordination, i.e. the existence of information sharing networks linking institutional investors of a particular firm, has been proven to be an effective mechanism that improves corporate governance. In this paper, we focus on the asset prices implications of shareholder coordination. We start by showing that local comovement and post-earnings announcement drift are weaker in the presence of shareholder coordination, in support of the notion that coordination can improve firms' information environment. We then examine whether shareholder coordination serves as an information diffusion channel across firms. Following Cohen and Lou (2012), we devise time series and cross-sectional tests that yield strong evidence of a lead-lag effect in stock returns between firms with and without coordination, consistent with the view that information shocks travel from firms with high shareholder coordination to firms with low shareholder coordination.

We also document that firms with stronger shareholder coordination are exhibiting better stock performance in the future. This finding is consistent with evidence in Gompers, Ishii, and Metrick (2003) that firms with better corporate governance have better performance and higher firm value. To answer the question why shareholder coordination forecasts stock returns, we follow Choi and Sias (2012) and use institutional trading demand as a proxy for the updates in institutional investors' expectations to test whether gradual information incorporation explains, at least partially, the positive relation between shareholder coordination and stock returns. Our results show that coordination predicts both future returns and subsequent institutional (sophisticated) investor demand, consistent with the argument that investors' lack of knowledge about the true consequences of the quality of corporate governance is the driver of the abnormal return performance of high coordination firms.

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Table 1.1 **Summary Statistics**

This table reports the descriptive statistics of main variables in the sample during January 1994 to December 2010. *COORD_PROX* is the inverse of the natural logarithm of 1+ weighted-average geographical distance among institutional shareholders of the firm in each firm-quarter, where the weight is the ratio of ownership held by the institution to the total ownership held by all institutions in a firm at each calendar quarter. *COORD_PORT* is the weighted-average excess portfolio correlation among institutional shareholders of the firm in each firm-quarter, where the weight is the ratio of ownership held by the institution to the total ownership held by all institutions in a firm at each calendar quarter, and excess portfolio is the actual weight relative to the weight in market portfolio. *RES_COORD_PROX* is the residual of the quarterly cross-sectional regression of *COORD_PROX* on a series of firm characteristics (see Table 1.2). *RES_COORD_PORT* is residual of the quarterly cross-sectional regression of *COORD_PORT* on a series of firm characteristics (see Table 1.2). *Size* is the natural logarithm of the stock market value at the end of each June. *BM* is the natural logarithm of the fiscal year-end book value of common equity divided by the calendar year-end stock market value. Beta is estimated from the market model over 36 months prior to the beginning of the current period. *IO* is the ratio of institutional holdings of a firm to shares outstanding. *IO_HHI* is the Herfindahl Index of institutional ownership concentration based on percentages of institutional holdings by all 13F institutions. *Ret (-2, -7)* is the compound gross return from month t-7 to t-2. *Turnover* is the average turnover and *CV_Turnover* is the coefficient of variation of turnovers in the past 36 months. *ROA* is the return on asset measured as the ratio of earnings before extraordinary items. Leverage is the ratio of long-term debt plus current debt in liabilities to total asset. *Sale_Growth* is the annual sale growth in percentage. *Firm_age* is the natural logarithm of firm age defined as the number of years since the firm was included in the Compustat database. *BHRET12* is the compound gross return in year t-1. *City_dummy* is equal to 1 if the firm's headquarter is located in one of the major 21 cities or metropolitan areas in the US. The list of major cities is from the US Census Bureau population surveys of 1990 and 2000: New York, San Francisco, San Jose, Boston, Los Angeles, Philadelphia, Chicago, Dallas, Houston, Baltimore, Washington, San Diego, Milwaukee, Detroit, Phoenix, Columbus, Indianapolis, Austin, San Antonio, Jacksonville and Memphis.

	N	Mean	Std	Median	P25	P75
Shareholder Coordination						
COORD_PROX	226,914	-5.9062	1.3666	-6.3611	-6.6687	-5.7397
COORD_PORT	226,914	0.2900	0.1884	0.2363	0.1551	0.3707
RES_COORD_PROX	226,914	0.0000	1.0590	-0.0794	-0.5450	0.3420
RES_COORD_PORT	226,914	0.0000	0.1153	-0.0085	-0.0682	0.0467
Firm Characteristics						
ROA	226,914	-0.0281	0.2270	0.0340	-0.0363	0.0779
Leverage	226,914	0.1946	0.1879	0.1563	0.0133	0.3205
Sale_Growth	226,914	0.2638	0.7780	0.1055	-0.0087	0.2858
Firm_age	226,914	2.5530	0.7815	2.4849	1.9459	3.1781
BHRET12	226,914	0.1679	0.7468	0.0323	-0.2790	0.3929
City_dummy	226,914	0.1578	0.3646	0.0000	0.0000	0.0000
Size	591,041	12.3275	2.0311	12.1951	10.8474	13.6277
BM	591,041	-0.7338	0.9501	-0.6864	-1.2719	-0.1370
Beta	591,041	1.2392	0.9193	1.0798	0.6171	1.7077
IO	591,041	0.4344	0.2834	0.4189	0.1769	0.6770
IO_HHI	591,041	0.0219	0.0324	0.0162	0.0060	0.0290
Ret_{t-1}	591,041	0.0151	0.2069	0.0000	-0.0805	0.0872
Ret (-2, -7)	591,041	0.0940	4.4007	0.0142	-0.1994	0.2438
Turnover	591,041	-2.3425	0.9596	-2.2723	-2.9431	-1.6741
CV_Turnover	591,041	-0.4732	0.4815	-0.4742	-0.8055	-0.1597

Table 1.2 The Determinants of Shareholder Coordination

Table 1.2 Panel A reports the Fama-MacBeth regressions of shareholder coordination. The dependent variable is quarterly shareholder coordination (*COORD_PROX*/*COORD_PORT*). Control variables are defined in Table i. Cross-sectional regressions are run every calendar quarter and the time-series standard errors are adjusted for heteroskedasticity and autocorrelation (up to 4 lags). t-Statistics are reported in parentheses below coefficient estimates. Panel B presents the correlation matrix of shareholder coordination measures. Panel C shows the results of panel regression of shareholder coordination on the degree of synchronization in institutional trading. The latter is captured by the standard deviation of the quarterly changes across institutional shareholdings of a particular firm. Time and industry fixed effects are included. Standard errors are clustered by firm. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

Panel A. Fama-MacBeth regression

	COORD_PROX	*COORD_PORT*
Size	-0.1860***	-0.0468***
	(-16.82)	(-36.99)
BM	0.0067	-0.0065***
	(1.58)	(-10.79)
Beta	-0.0545***	-0.0127***
	(-11.43)	(-15.42)
ROA	-0.0054	0.0093***
	(-0.29)	(4.79)
Leverage	0.2797***	0.0252***
	(19.94)	(15.27)
Sale_Growth	-0.0171***	0.0017***
	(-5.51)	(3.96)
Firm_age	0.1120***	-0.0001
	(14.49)	(-0.14)
IO	-1.8648***	-0.2839***
	(-19.38)	(-70.70)
IO_HHI	5.5756***	2.7555***
	(24.20)	(60.07)
BHRET12	0.0140**	0.0017**
	(2.63)	(2.15)
City_dummy	-0.0201***	-0.0020***
	(-5.13)	(-4.14)
Constant	-3.2048***	0.9396***
	(-19.55)	(53.19)
Observations	226,914	226,914
R-squared	0.308	0.602

Panel B. Correlation Matrix

Correlation Matrix (Pearson Correlations Are Shown above the Diagonal with Spearman Below)				
	COORD_PROX	*COORD_PORT*	*RES_COORD_PROX*	*RES_COORD_PORT*
COORD_PROX	1	0.6550	0.7669	0.3499
COORD_PORT	0.4637	1	0.2802	0.6241
RES_COORD_PROX	0.4276	-0.1304	1	0.4498
RES_COORD_PORT	-0.0039	0.2693	0.3310	1

Panel C. Shareholder Coordination and Synchronization in Institutional trading

	(1)	(2)
RES_COORD_PROX	-0.1605***	
	(-4.92)	
RES_COORD_PORT		-0.6368**
		(-2.14)
IO	2.7804***	2.7785***
	(9.10)	(9.09)
IO_HHI	-17.2629***	-17.4511***
	(-6.59)	(-6.67)
Size	1.5777***	1.5715***
	(37.96)	(38.00)
BM	0.2973***	0.2968***
	(5.14)	(5.13)
Turnover	8.7972***	8.7650***
	(21.73)	(21.62)
Ret (-1,-6)	0.0736	0.0739
	(1.56)	(1.57)
Constant	-15.7157***	-15.6186***
	(-34.95)	(-35.01)
Observations	215,653	215,653
R-squared	0.126	0.126

Table 1.3 Cross-sectional Determinants of Local Comovement

For each firm in the sample, we estimate time-series regressions of monthly stock returns on the returns of a local index and the market portfolio for three periods: 1994–1999, 2000–2004, and 2005–2010. We then regress the estimated local beta on firm and regional characteristics. The main independent variable of interest is shareholder coordination (*RES_COORD_PROX* / *RES_COORD_PORT*). Dividend Yield is the dividend payout divided by the market value of equity; MTB is, the market to book ratio. Advertising is the natural logarithm of advertising expenditures. Number of Shareholders is the natural logarithm of number of shareholders. Number of Firms is the total number of firms in one MSA; Industry HHI is the Herfindahl index calculated based on the percentage of firms in one industry for an MSA; Personal Income is the per capita personal income for the MSA; Investment Income is the per capita investment income for the MSA. Other control variables are defined in Table1. All independent variables are the averages over the three periods. Time fixed effects are also included. t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)
RES_COORD_PROX	-0.0404***	-0.0399***		
	(-3.42)	(-3.43)		
RES_COORD_PORT			-0.6128***	-0.5823***
			(-5.86)	(-5.66)
Size	-0.0965***	-0.1090***	-0.0981***	-0.1105***
	(-11.62)	(-13.31)	(-11.83)	(-13.49)
MB	0.0000	0.0000	0.0000	0.0000
	(0.16)	(0.13)	(0.14)	(0.12)
Dividend yield	-0.0767	-0.0598	-0.0760	-0.0592
	(-1.10)	(-0.87)	(-1.09)	(-0.86)
Leverage	-0.0969**	-0.0055	-0.0927**	-0.0022
	(-2.09)	(-0.12)	(-2.00)	(-0.05)
ROA	-0.3918***	-0.3463***	-0.3914***	-0.3464***
	(-15.40)	(-13.70)	(-15.40)	(-13.71)
Advertising	0.0008	0.0021	0.0009	0.0022
	(0.57)	(1.52)	(0.62)	(1.57)
Number of shareholders	-0.0023	0.0076	-0.0017	0.0081
	(-0.36)	(1.18)	(-0.26)	(1.26)
IO	-0.0295	-0.0077	-0.0326	-0.0112
	(-0.54)	(-0.14)	(-0.60)	(-0.21)
Industry HHI		-0.3836***		-0.3820***
		(-10.06)		(-10.03)
Number of firms		0.0014***		0.0014***
		(11.41)		(11.43)
Investment income		-0.1241		-0.1225
		(-1.35)		(-1.34)
Personal income		0.1073		0.1064
		(1.41)		(1.40)
Constant	2.5586***	2.6980***	2.5873***	2.7202***
	(19.42)	(20.04)	(19.64)	(20.21)
Observations	12,646	12,646	12,646	12,646
R-squared	0.366	0.397	0.368	0.399

Table 1.4 Shareholder Coordination and Post-Earnings Announcement Drift

For each quarter from 1994 to 2010, we sort firms into quintiles based on corresponding earnings surprises proxied by analyst forecast error. ES1 (bad news) and ES5 (good news) refer to the extreme earnings surprises (bottom and top), respectively. For each earnings surprise quintile in each quarter, we further sort firms into five portfolios based on shareholder coordination. Then we calculate the average buy-and-hold cumulative abnormal return over the window [2, 61] relative to announcement date for each quintile. The buy-and-hold cumulative abnormal returns are defined as the difference between the buy-and-hold return of the announcing firm and that of a size and book-to-market (B/M) matching portfolio. t-Statistics adjusted for heteroskedasticity are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

	RES_COORD_PROX			*RES_COORD_PROT*		
	ES1	ES5	ES5-ES1	ES1	ES5	ES5-ES1
Low	-0.0183	0.0357	0.0540***	-0.0208	0.0352	0.0560***
			(10.11)			(10.54)
2	-0.0139	0.0296	0.0436***	-0.0113	0.0290	0.0403***
			(8.86)			(8.21)
3	-0.0026	0.0281	0.0307***	-0.0089	0.0248	0.0337***
			(6.49)			(7.14)
4	-0.0079	0.0229	0.0308***	-0.0057	0.0250	0.0306***
			(6.67)			(6.63)
High	-0.0078	0.0215	0.0294***	-0.0042	0.0240	0.0281***
			(6.35)			(5.99)
High-Low	0.0105***	-0.0141***	-0.0247***	0.0167***	-0.0112**	-0.0279***
	(2.15)	(-2.78)	(-3.49)	(3.41)	(-2.19)	(-3.93)

Table 1.5 Stock Return Predictability Time-Series Test: FF48×3Size=144 Portfolios

At the end of June in each year from 1994 to 2010, we first sort firms into 3 size portfolios within each Fama-French 48 industries. The firms are independently sorted into 3 portfolios based on the simple average of shareholder coordination over the past 4 quarters. We then construct the clone firm for each low shareholder coordination firm (firms in bottom tercile) with the portfolio of firms with high shareholder coordination (stocks in top tercile) in the same industry-size portfolio. At the beginning of every calendar month, all low shareholder coordination firms are ranked into quintiles in an ascending order on the basis of stock returns of their corresponding clone firms in the previous month. All stocks are equally (value) weighted within a given portfolio, and the portfolios are rebalanced every calendar month. Panel A and B report the results for *RES_COORD_PROX* and *RES_COORD_PORT*, respectively. The explanatory variables are MKTRF (the value-weighted market return in excess of one month Treasury bill rate, SMB (the difference each month between the return on small and big firms), HML (the monthly difference of the returns on a portfolio of high book-to-market and low book-to-market firms), and UMD (the momentum factor computed on a monthly basis as the return difference between a portfolio of winners and a portfolio of losers). High/Low is the zero-cost investment portfolio of low shareholder coordination firms that longs the clone firms with the top quintile returns and shorts the clone firms with the bottom quintile returns in the previous month. t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

Panel A. *RES_COORD_PROX*

Panel A1. Equal weights						
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	-0.0004	1.0756***	0.8917***	0.1191	-0.3361***	0.799
	(-0.13)	(17.59)	(11.63)	(1.45)	(-6.84)	
2	0.0056**	0.9131***	0.9080***	-0.0572	-0.3965***	0.820
	(2.33)	(16.67)	(13.22)	(-0.78)	(-9.01)	
3	0.0074***	1.0072***	0.9452***	0.0252	-0.2608***	0.859
	(3.55)	(21.09)	(15.79)	(0.39)	(-6.79)	
4	0.0086***	1.0208***	1.0574***	0.0477	-0.2443***	0.878
	(4.31)	(22.36)	(18.48)	(0.78)	(-6.66)	
High	0.0090***	0.9385***	1.1774***	0.0812	-0.1694***	0.823
	(3.72)	(16.96)	(16.97)	(1.09)	(-3.81)	
High-Low	0.0093***	-0.1371*	0.2857***	-0.0379	0.1667***	0.113
	(2.69)	(-1.72)	(2.86)	(-0.36)	(2.60)	
Panel A2. Value weights						
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	-0.0035	1.0860***	0.5116***	-0.0175	-0.2087***	0.784
	(-1.34)	(18.43)	(6.83)	(-0.22)	(-4.37)	
2	-0.0016	0.9797***	0.4438***	-0.1283*	-0.1984***	0.773
	(-0.67)	(17.49)	(6.23)	(-1.72)	(-4.37)	
3	0.0034	0.8830***	0.7074***	0.0495	-0.1069**	0.750
	(1.35)	(15.56)	(9.81)	(0.65)	(-2.33)	
4	0.0037*	1.0169***	0.6297***	-0.1369**	-0.0610	0.825
	(1.68)	(20.40)	(9.94)	(-2.06)	(-1.51)	
High	0.0051**	0.9628***	0.7020***	-0.1215*	-0.1033**	0.822
	(2.32)	(19.22)	(11.02)	(-1.82)	(-2.55)	
High-Low	0.0085**	-0.1203	0.1891**	-0.1009	0.1044*	0.074
	(2.57)	(-1.61)	(1.99)	(-1.01)	(1.72)	

Panel B. *RES_COORD_PORT*

Panel B1. Equal weights						
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	0.0014	1.0289***	1.0198***	0.1298	-0.3912***	0.784
	(0.49)	(15.58)	(12.32)	(1.47)	(-7.37)	
2	0.0031	1.0448***	0.8633***	0.0001	-0.3067***	0.846
	(1.38)	(20.46)	(13.49)	(0.00)	(-7.47)	
3	0.0041*	1.0081***	0.8881***	-0.0370	-0.2684***	0.856
	(1.97)	(20.99)	(14.75)	(-0.57)	(-6.95)	
4	0.0065***	0.9625***	1.0736***	0.1189*	-0.2679***	0.865
	(3.19)	(20.49)	(18.23)	(1.89)	(-7.10)	
High	0.0115***	0.9422***	1.2155***	0.0807	-0.2073***	0.826
	(4.69)	(16.78)	(17.27)	(1.07)	(-4.60)	
High-Low	0.0101**	-0.0866	0.1957*	-0.0491	0.1839**	0.074
	(2.59)	(-0.97)	(1.75)	(-0.41)	(2.56)	
Panel B2. Value weights						
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	0.0008	0.8953***	0.7575***	-0.0328	-0.5398***	0.746
	(0.26)	(12.39)	(8.25)	(-0.34)	(-9.23)	
2	0.0012	1.1013***	0.6972***	-0.2768***	-0.0036	0.849
	(0.52)	(21.80)	(10.86)	(-4.11)	(-0.09)	
3	0.0019	1.0363***	0.5299***	-0.2971***	-0.2873***	0.800
	(0.72)	(17.49)	(7.04)	(-3.76)	(-5.99)	
4	0.0067***	0.8604***	0.8893***	-0.2610***	-0.0696	0.799
	(2.74)	(15.43)	(12.55)	(-3.51)	(-1.54)	
High	0.0107***	0.9109***	0.9937***	-0.0994	-0.0115	0.724
	(3.47)	(12.96)	(11.13)	(-1.06)	(-0.20)	
High-Low	0.0099*	0.0156	0.2362	-0.0667	0.5284***	0.190
	(1.94)	(0.13)	(1.60)	(-0.43)	(5.62)	

Table 1.6 Stock Return Predictability Time-Series Test: DGTW 125 Portfolios

At the end of June in each year from 1994 to 2010, we independently sort firms into the DGTW 125 portfolios and 3 portfolios based on the simple average of shareholder coordination over the past four quarters. We then construct the clone firm for each low shareholder coordination firm (firms in bottom tercile) with the portfolio of high shareholder coordination firms (stocks in top tercile) within the same DGTW 125 portfolios. At the beginning of every calendar month, all low shareholder coordination firms are ranked into quintiles in an ascending order on the basis of stock returns of their corresponding clone firms in the previous month. All stocks are equally (value) weighted within a given portfolio, and the portfolios are rebalanced every calendar month. Panel A and B report the results for *RES_COORD_PROX* and *RES_COORD_PORT*, respectively. The explanatory variables are MKTRF (the value-weighted market return in excess of one month Treasury bill rate, SMB (the difference each month between the return on small and big firms), HML (the monthly difference if the returns on a portfolio of high book-to-market and low book-to-market firms), and UMD (the momentum factor computed on a monthly basis as the return difference between a portfolio of winners and a portfolio of losers). High/Low is the zero-cost investment portfolio of firms with low coordination that longs the clone firms with the top quintile returns and shorts the clone firms with the bottom quintile returns in the previous month. t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

Panel A. *RES_COORD_PROX*

	Panel A. Equal weights					
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	0.0024	1.0056***	0.9235***	0.0218	-0.3030***	0.849
	(1.12)	(19.71)	(14.49)	(0.32)	(-7.60)	
2	0.0055**	0.9342***	1.0212***	0.0130	-0.2897***	0.849
	(2.55)	(18.50)	(16.20)	(0.19)	(-7.34)	
3	0.0070***	0.9689***	0.9645***	0.0834	-0.2243***	0.846
	(3.31)	(19.61)	(15.63)	(1.25)	(-5.81)	
4	0.0054***	1.0043***	0.9812***	0.2357***	-0.2392***	0.883
	(2.97)	(23.58)	(18.45)	(4.11)	(-7.18)	
High	0.0090***	1.0169***	0.9745***	0.1816***	-0.3169***	0.888
	(4.85)	(23.51)	(18.04)	(3.12)	(-9.37)	
High-Low	0.0066***	0.0113	0.0510	0.1597**	-0.0139	0.031
	(2.92)	(0.22)	(0.78)	(2.27)	(-0.34)	
	Panel A2. Value weights					
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	-0.0016	1.0980***	0.4556***	-0.0449	-0.3180***	0.769
	(-0.61)	(17.54)	(5.83)	(-0.53)	(-6.50)	
2	-0.0000	1.1094***	0.7980***	0.2490***	-0.2344***	0.800
	(-0.01)	(18.89)	(10.88)	(3.15)	(-5.11)	
3	0.0007	0.9552***	0.7050***	-0.0756	-0.1154***	0.785
	(0.30)	(17.58)	(10.39)	(-1.03)	(-2.72)	
4	0.0023	0.8569***	0.6609***	-0.2076***	-0.2835***	0.825
	(1.11)	(17.84)	(11.02)	(-3.21)	(-7.55)	
High	0.0095***	0.9011***	0.5688***	0.0822	-0.2576***	0.816
	(4.79)	(19.51)	(9.86)	(1.32)	(-7.14)	
High-Low	0.0111***	-0.1969**	0.1132	0.1271	0.0604	0.068
	(3.30)	(-2.51)	(1.15)	(1.20)	(0.98)	

Panel B. *RES_COORD_PORT*

Panel B1. Equal weights						
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	0.0028	0.9798***	0.8863***	-0.0147	-0.3186***	0.799
	(1.15)	(17.06)	(12.23)	(-0.19)	(-7.06)	
2	0.0041**	1.0017***	0.9748***	0.0211	-0.2893***	0.870
	(2.13)	(22.03)	(16.99)	(0.34)	(-8.10)	
3	0.0058***	0.9786***	1.1001***	0.1855***	-0.2355***	0.842
	(2.74)	(19.45)	(17.33)	(2.71)	(-5.96)	
4	0.0058***	0.9493***	1.0757***	0.1880***	-0.3005***	0.876
	(3.18)	(21.82)	(19.60)	(3.18)	(-8.80)	
High	0.0078***	0.9829***	0.9992***	0.2398***	-0.3132***	0.877
	(4.28)	(22.87)	(18.43)	(4.10)	(-9.28)	
High-Low	0.0050**	0.0031	0.1129*	0.2545***	0.0054	0.063
	(2.18)	(0.06)	(1.66)	(3.47)	(0.13)	
Panel B2. Value weights						
	Constant	MKTRF	SMB	HML	UMD	R-squared
Low	-0.0024	0.8868***	0.4771***	-0.1018	-0.1943***	0.714
	(-0.99)	(15.49)	(6.61)	(-1.31)	(-4.32)	
2	-0.0024	0.8789***	0.6027***	-0.2286***	-0.2071***	0.774
	(-1.09)	(16.70)	(9.08)	(-3.19)	(-5.01)	
3	-0.0002	0.8916***	0.7353***	-0.1081	-0.2354***	0.757
	(-0.09)	(15.55)	(10.16)	(-1.39)	(-5.22)	
4	0.0014	0.8049***	0.7612***	-0.0783	-0.2676***	0.825
	(0.75)	(18.27)	(13.69)	(-1.31)	(-7.73)	
High	0.0067***	0.8640***	0.6638***	0.1032	-0.3020***	0.792
	(3.22)	(17.62)	(10.73)	(1.55)	(-7.84)	
High-Low	0.0091***	-0.0228	0.1867**	0.2050**	-0.1077*	0.054
	(2.99)	(-0.32)	(2.06)	(2.10)	(-1.91)	

Table 1.7 Stock Return Predictability Cross-Sectional Test: Fama-MacBeth Regressions

This table reports Fama-MacBeth forecasting regressions of stock returns. The dependent variable is the monthly stock return of the firms with low shareholder coordination. In columns (1) and (3), the main independent variable is the lagged monthly return of corresponding clone firms (Clone_ret) constructed using the portfolio of firms with high coordination in the same industry-size portfolio at the end of each June. In columns (2) and (4), we further include the monthly return of corresponding clone firms at deeper lags (e.g. month t-2 and month t-3). In columns (5) and (7), the main independent variable is the lagged monthly return of corresponding clone firms (Clone_ret) constructed using the portfolio of firms with high coordination in the same DGTW 125 portfolio at the end of each June. In columns (6) and (8), we further include the monthly return of corresponding clone firms at deeper lags (e.g. month t-2 and month t-3). Refer to Table 1 for detailed variable definitions. Cross-sectional regressions are run every calendar month and the time-series standard errors are adjusted for heteroskedasticity and autocorrelation (up to 12 lags). t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

	FF48 3SIZE				DGTW 125			
	RES_COORD_PROX		RES_COORD_PORT		RES_COORD_PROX		RES_COORD_PORT	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Clone\_ret_{t-1}$	0.0312***	0.0308***	0.0329***	0.0288***	0.0223***	0.0246***	0.0155**	0.0159*
	(3.36)	(3.45)	(3.75)	(3.25)	(2.63)	(2.82)	(1.98)	(1.76)
$Clone\_ret_{t-2}$		0.0191**		0.0174*		-0.0053		0.0048
		(2.39)		(1.88)		(-0.55)		(0.53)
$Clone\_ret_{t-3}$		0.0017		0.0104		-0.0051		-0.0096
		(0.23)		(1.33)		(-0.49)		(-1.11)
Size	-0.0035***	-0.0034***	-0.0034***	-0.0033***	-0.0039***	-0.0042***	-0.0061***	-0.0031***
	(-3.60)	(-3.41)	(-3.15)	(-2.95)	(-3.73)	(-3.43)	(-5.32)	(-3.02)
BM	0.0009	0.0010	0.0006	0.0007	0.0005	0.0013	0.0005	0.0017*
	(0.92)	(1.04)	(0.66)	(0.70)	(0.54)	(1.08)	(0.44)	(1.66)
Beta	0.0024	0.0023	0.0011	0.0012	0.0035**	0.0041**	0.0029	0.0010
	(1.36)	(1.31)	(0.62)	(0.65)	(2.05)	(2.01)	(1.65)	(0.64)
Ret (-2, -7)	0.0064	0.0062	0.0057	0.0053	0.0082**	0.0069	0.0075**	0.0092***
	(1.47)	(1.43)	(1.33)	(1.22)	(2.03)	(1.44)	(2.14)	(2.89)
Ret_{t-1}	-0.0555***	-0.0548***	-0.0528***	-0.0520***	-0.0510***	-0.0502***	-0.0435***	-0.0407***
	(-8.31)	(-8.19)	(-8.50)	(-8.35)	(-7.22)	(-6.25)	(-7.34)	(-8.16)
Turnover	0.0002	0.0001	0.0001	-0.0002	0.0005	0.0009	-0.0015	-0.0017
	(0.12)	(0.04)	(0.04)	(-0.13)	(0.35)	(0.54)	(-1.03)	(-1.17)
CV_Turnover	-0.0066***	-0.0067***	-0.0062***	-0.0061***	-0.0064***	-0.0068***	-0.0079***	-0.0093***
	(-3.83)	(-3.87)	(-4.09)	(-4.00)	(-3.83)	(-3.75)	(-4.50)	(-5.54)
Constant	0.0486***	0.0461***	0.0469***	0.0453***	0.0547***	0.0614***	0.0748***	0.0432***
	(3.30)	(3.09)	(2.94)	(2.78)	(3.43)	(3.35)	(4.44)	(2.85)
Observations	205,520	203,142	205,520	203,142	195,755	168,248	195,755	168,248
Adj. R-squared	0.049	0.049	0.047	0.047	0.046	0.046	0.047	0.047

Table 1.8 Vector-Auto Regressions Test of Intra-Portfolio Lead-Lag Effect

This table presents the estimation results of vector autoregression (VAR) model using equal-weighted monthly returns on the industry&size144-coordination and DGTW125-coordination portfolios. At the end of each June, stocks are sorted into terciles according to the average shareholder coordination over past four quarters. In addition, stocks are independently sorted into three size groups within each of 48 industries based on their latest available market capitalization or DGTW 125 portfolios, respectively. Then, equal-weighted returns of low coordination portfolio (and high coordination portfolio are computed within each industry-size or DGTW125 group, respectively. Finally, the following VAR is estimated jointly across all industry&size144 or DGTW125 group.

$$R_{LI,t} = \alpha_0 + a_1 R_{LI,t-1} + a_2 R_{HI,t-1} + u_t$$
$$R_{HI,t} = \alpha_1 + b_1 R_{LI,t-1} + b_2 R_{HI,t-1} + v_t$$

where $R_{LI,,t}$ and $R_{HI,t}$ are the month t return on the low and high coordination portfolio, respectively. Panel A and B report the VAR estimation for low and high coordination portfolio returns controlling for industry-size and DGTW firm characteristics, respectively. The F-values are reported for the cross-equation test of null hypotheses: a_2-b_1=0, and for the within-equation test of null hypotheses: a_2-a_1=0 and b_2-b_1=0, respectively. The t-values are in parentheses. ***, **, * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

		Independent Variables		Cross-equation test	Within-equation test	
Groups	Dependent Variables	$R_{LI,,t-1}$	$R_{HI,t-1}$	a_2-b_1=0	a_2-a_1=0	b_2-b_1=0
Industry-size144	Panel A1: RES_COORD_PROX					
	$R_{LI,,t}$	0.0443***	**0.1627*** **	77.84***	39.86***	20.23***
		(3.27)	**(8.71)**			
	$R_{HI,t}$	**0.0186*** **	0.0508***			
		(5.18)	(6.51)			
Industry-size144	Panel A2: RES_COORD_PORT					
	$R_{LI,,t}$	0.0413***	**0.1676*** **	69.92***	42.73***	13.36***
		(3.38)	**(8.96)**			
	$R_{HI,t}$	**0.0275*** **	0.0553***			
		(7.25)	(6.99)			
DGTW 125	Panel B1: RES_COORD_PROX					
	$R_{LI,,t}$	0.0467***	**0.1592*** **	75.78***	38.31***	15.40***
		(3.44)	**(7.88)**			
	$R_{HI,t}$	**0.0190*** **	0.0469***			
		(4.44)	(5.34)			
DGTW 125	Panel B2: RES_COORD_PORT					
	$R_{LI,,t}$	0.0815***	**0.1181*** **	69.92***	5.92**	4.05**
		(5.95)	**(6.07)**			
	$R_{HI,t}$	**0.0276*** **	0.0410***			
		(6.42)	(4.61)			

Table 1.9 Shareholder Coordination and Stock Returns: Regression Analysis

This table reports the estimate of Fama-MacBeth and panel regression analysis relating shareholder coordination to stock returns. The sample period is from January 1994 to December 2010. The dependent variable is monthly stock return. The main independent variables are shareholder coordination (*RES_COORD_PROX* and *RES_COORD_PORT*). Other control variables are defined in Table1. Specifications 1-6 report the results for monthly Fama-MacBeth regressions with standard errors adjusted for heteroskedasticity and autocorrelation (up to 12 lags). Specifications 7-12 report the results for panel regressions with time and industry fixed effects. Standard errors are clustered by firm. t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

	Fama-Macbeth Regressions						Panel Regressions					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RES_COORD_PROX	0.0012**	0.0010**	0.0011**				0.0014***	0.0013***	0.0012***			
	(2.44)	(2.16)	(2.34)				(4.76)	(4.25)	(3.88)			
RES_COORD_PORT				0.0135***	0.0112**	0.0110**				0.0136***	0.0116***	0.0111***
				(2.95)	(2.46)	(2.56)				(5.11)	(4.31)	(4.07)
Size		-0.0017**	-0.0025***		-0.0017**	-0.0026***		-0.0020***	-0.0033***		-0.0020***	-0.0033***
		(-2.12)	(-4.17)		(-2.13)	(-4.24)		(-15.06)	(-15.00)		(-15.11)	(-15.09)
BM		0.0037***	0.0024***		0.0037***	0.0024***		0.0047***	0.0041***		0.0047***	0.0041***
		(2.90)	(2.66)		(2.87)	(2.61)		(12.94)	(10.75)		(12.89)	(10.72)
Beta			0.0012			0.0012			0.0007**			0.0007**
			(0.88)			(0.85)			(2.10)			(2.03)
Ret (-2, -7)			0.0017			0.0018			-0.0001			-0.0001
			(0.53)			(0.54)			(-1.27)			(-1.26)
Turnover			-0.0016			-0.0015			-0.0009**			-0.0008**
			(-1.16)			(-1.09)			(-2.57)			(-2.35)
CV_Turnover			-0.0049***			-0.0051***			-0.0079***			-0.0080***
			(-4.12)			(-4.27)			(-10.25)			(-10.42)
IO			0.0034			0.0031			0.0006			0.0004
			(0.75)			(0.69)			(0.38)			(0.23)
IO_HHI			-0.0415***			-0.0406***			-0.0264***			-0.0254***
			(-3.19)			(-3.14)			(-2.83)			(-2.81)
Constant	0.0126***	0.0340***	0.0338***	0.0126***	0.0340***	0.0345***	0.0105***	0.0381***	0.0464***	0.0104***	0.0381***	0.0467***
	(2.74)	(2.90)	(2.77)	(2.73)	(2.90)	(2.84)	(15.85)	(20.98)	(16.59)	(15.68)	(20.99)	(16.67)
INDUSTRY FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
TIME FE	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
Observations	591,041	591,041	591,041	591,041	591,041	591,041	591,041	591,041	591,041	591,041	591,041	591,041
Adj. R-squared	0.117	0.119	0.119	0.117	0.119	0.119	0.026	0.04	0.062	0.027	0.04	0.062

Table 1.10 Zero-Cost Investment Portfolio based on Shareholder Coordination

This table reports the results of the performance of zero-cost investment portfolios based on the shareholder coordination. At the end of each year from 1994 to 2010, we sort firms into quintiles (deciles) based on shareholder coordination. Zero-cost portfolios are then formed by taking long positions in firms with highest shareholder coordination (high) and taking short positions in firms with lowest shareholder coordination (low). Portfolios are rebalanced annually. The explanatory variables are MKTRF (the value-weighted market return in excess of one month Treasury bill rate, SMB (the difference each month between the return on small and big firms), HML (the monthly difference if the returns on a portfolio of high book-to-market and low book-to-market firms), and UMD (the momentum factor computed on a monthly basis as the return difference between a portfolio of winners and a portfolio of losers). t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

Panel A: *RES_COORD_PROX* (Quintiles)						
	Intercept	MKTRF	SMB	HML	UMD	R-squared
Low	0.0055***	0.9764***	0.9832***	0.0519	-0.2879***	0.870
	(2.82)	(22.17)	(17.38)	(0.86)	(-7.96)	
High	0.0076***	0.9554***	0.7506***	-0.0176	-0.2709***	0.856
	(4.05)	(22.37)	(13.68)	(-0.30)	(-7.73)	
High-Low	0.0021**	-0.021	-0.2326***	-0.0695**	0.017	0.243
	(2.09)	(-0.90)	(-7.80)	(-2.19)	(0.89)	
Panel B: *RES_COORD_PROX* (Deciles)						
	Intercept	MKTRF	SMB	HML	UMD	R-squared
Low	0.0077***	0.9437***	0.9939***	0.0266	-0.2704***	0.806
	(3.18)	(17.22)	(14.12)	(0.36)	(-6.01)	
High	0.0116***	0.8609***	0.8867***	-0.0985	-0.2780***	0.708
	(3.93)	(12.85)	(10.30)	(-1.08)	(-5.05)	
High-Low	0.0039**	-0.0828**	-0.1072**	-0.1251***	-0.0075	0.058
	(2.58)	(-2.39)	(-2.41)	(-2.64)	(-0.26)	
Panel C: *RES_COORD_PORT* (Quintiles)						
	Intercept	MKTRF	SMB	HML	UMD	R-squared
Low	0.0042**	0.9928***	0.9787***	0.0518	-0.2839***	0.891
	(2.35)	(24.72)	(18.97)	(0.95)	(-8.61)	
High	0.0074***	0.9430***	0.7671***	-0.0266	-0.2757***	0.85
	(3.87)	(21.59)	(13.67)	(-0.45)	(-7.69)	
High-Low	0.0033***	-0.0498**	-0.2116***	-0.0784**	0.0083	0.249
	(3.36)	(-2.24)	(-7.39)	(-2.58)	(0.45)	
Panel D: *RES_COORD_PORT* (Deciles)						
	Intercept	MKTRF	SMB	HML	UMD	R-squared
Low	0.0042*	1.0044***	1.0311***	-0.0226	-0.2932	0.853
	(1.92)	(20.29)	(16.22)	(-0.33)	(-7.21)	
High	0.0109***	0.8720***	0.9020***	-0.0666	-0.2484***	0.723
	(3.83)	(13.54)	(10.91)	(-0.76)	(-4.70)	
High-Low	0.0067***	-0.1324***	-0.1290***	-0.044	0.0447	0.140
	(4.30)	(-3.76)	(-2.85)	(-0.91)	(1.54)	

Table 1.11 Predicting Institutional Demand

Table 1.11 Panel A presents the time-series average coefficients and associated t-statistics for seventeen annual regressions of subsequent institutional trading demand in year t on shareholder coordination in year t-1. Panel B reports results from regression of the quarterly market-adjusted return difference (cross-sectional average quarterly market-adjusted return for high shareholder coordination firms less the average quarterly market-adjusted return for low shareholder coordination firms) on the quarterly institutional trading demand difference (cross-sectional average institutional trading demand for high shareholder coordination firms less the average institutional trading demand for low shareholder coordination firms). The institutional demand metrics and other control variable are defined in Table 1. Cross-sectional regressions are run every calendar year and the time-series standard errors are adjusted for heteroskedasticity and autocorrelation (up to 4 lags). t-Statistics are reported in parentheses below coefficient estimates. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

Panel A. Determinants of institutional trading demand

	$ADJC\_IO_t$				$ADJC\_IB_t$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$RES\_COORD\_PROX_{-1}$	0.0133***	0.0126***	0.0180***	0.0156***				
	(4.06)	(3.52)	(4.70)	(4.06)				
$RES\_COORD\_PORT_{t-1}$					0.1174***	0.1032***	0.2856***	0.2554***
					(3.92)	(3.29)	(9.91)	(8.29)
$Size_{t-1}$		-0.0161***		-0.0366***		-0.0162***		-0.0365***
		(-6.60)		(-9.79)		(-6.60)		(-9.74)
BM_{t-1}		-0.0126**		-0.0158***		-0.0125**		-0.0156***
		(-2.36)		(-3.96)		(-2.37)		(-3.92)
Ret_t		0.0968***		0.2024***		0.0968***		0.2021***
		(10.21)		(8.46)		(10.15)		(8.47)
Ret_{t-1}		0.0346***		0.0418***		0.0349***		0.0430***
		(5.93)		(6.93)		(5.98)		(7.08)
$Turnover_t$		-0.0527*		0.1715***		-0.0517		0.1714***
		(-1.76)		(3.68)		(-1.73)		(3.66)
$Turnover_{t-1}$		-0.0718***		-0.2562***		-0.0712***		-0.2526***
		(-3.55)		(-5.80)		(-3.60)		(-5.79)
Constant	-0.0029	0.1941***	0.0434***	0.4746***	-0.0030	0.1948***	0.0432***	0.4726***
	(-0.58)	(5.02)	(7.70)	(8.26)	(-0.60)	(5.01)	(7.68)	(8.22)
Observations	53,159	53,159	53,159	53,159	53,159	53,159	53,159	53,159
R-squared	0.003	0.064	0.002	0.063	0.004	0.196	0.009	0.200

Panel B. Regression of quarterly return difference (high shareholder coordination firms less low shareholder coordination firms) on quarterly institutional trading demand difference

	RES_COORD_PROX$_q$		*RES_COORD_PORT*$_q$	
	(1)	(2)	(3)	(4)
ADJC_IO$_q$	0.4607**		0.1864	
	(2.55)		(0.76)	
ADJC_IO$_q$		0.3728**		0.6592**
		(2.00)		(2.07)
Constant	0.0005	0.0013	0.0007	-0.016
	(0.15)	(0.43)	(0.11)	(-1.52)
R-squared	0.095	0.061	0.009	0.065

Table 1.12 Institutional Demand Difference between Firms with Low and High Coordination for High and Low Limits to Arbitrage/Information Uncertainty Portfolios

In each year from 1994 to 2010, we independently sort the firms into 5×5 groups based on the annual shareholder coordination (*RES_COORD_PROX* / *RES_COORD_PORT*) and each of seven proxies for limits to arbitrage / information uncertainty. We then calculate the differences in subsequent institutional trading demand between top and bottom shareholder coordination quintiles (*SC*5-*SC*1) within each arbitrage costs/information uncertainty quintile. The first two rows in each panel report the time-series average of the seventeen cross-sectional means for the stocks in the highest and lowest limits to arbitrage / information uncertainty portfolios. The third row in each panel reports the difference between the first two rows and associated t-statistics. ***, **, and * indicate a two-tailed test significance level at 1%, 5% and 10%, respectively.

Arbitrage limits / Information uncertainty (AL / IU)	*RES_COORD_PROX*		*RES_COORD_PORT*	
	ADJC_IO	ADJC_IB	ADJC_IO	ADJC_IB
	Panel A: Market capitalization			
Small firms	8.034%	7.777%	3.753%	9.339%
Large firms	-5.545%	-0.406%	-2.393%	-0.824%
High-Low (AL/IU)	13.579%	8.183%	6.146%	10.163%
	(7.38)***	(4.35)***	(3.16)***	(5.15)***
	Panel B: Number of Institutional shareholders			
Small IO breadth	5.388%	3.948%	0.875%	4.709%
Large IO breadth	-4.508%	0.846%	1.190%	-0.121%
High-Low (AL/IU)	9.896%	3.102%	-0.315%	4.830%
	(4.52)***	(1.38)	(0.14)	(2.04)**
	Panel C: Institutional ownership			
Low IO ownership	7.684%	8.083%	3.277%	11.153%
High IO ownership	5.393%	-2.257%	8.180%	-4.516%
High-Low (AL/IU)	2.291%	10.340%	-4.903%	15.669%
	(1.40)	(4.06)***	(-3.58)***	(9.73)***
	Panel D: Liquidity			
Low turnover	7.684%	8.083%	4.957%	9.420%
High turnover	-4.520%	-2.845%	-2.081%	2.306%
High-Low (AL/IU)	12.204%	10.929%	7.038%	7.114%
	(9.68)***	(8.04)***	(5.59)***	(5.25)***
	Panel E: Analyst coverage			
Few analyst	3.752%	3.747%	4.689%	13.122%
Many analyst	-7.686%	-4.408%	-4.703%	-6.782%
High-Low (AL/IU)	11.438%	8.155%	9.392%	19.904%
	(5.94)***	(3.75)***	(4.93)***	(9.14)***
	Panel F: Idiosyncratic volatility			
High volatility	8.317%	9.297%	5.319%	13.635%
Low volatility	-3.088%	-4.640%	-0.357%	-4.191%
High-Low (AL/IU)	11.404%	13.937%	5.676%	17.826%
	(8.35)***	(9.23)***	(4.21)***	(12.09)***
	Panel G: Total return volatility			
High volatility	4.441%	6.796%	3.274%	13.124%
Low volatility	-0.455%	-3.776%	-0.426%	-1.920%
High-Low (AL/IU)	4.896%	10.572%	3.701%	15.045%
	(3.89)***	(7.36)***	(2.98)***	(10.72)***

Shareholder Coordination and Stock Price Informativeness

1. Introduction

Although the importance of institutional shareholders for corporate governance (e.g., Gillan and Starks (2000); Chen, Harford and Li (2007)) and informational efficiency (e.g., Piotroski and Roulstone (2004); Boehmer and Kelley (2009)) has been emphasized by the findings of numerous studies in the past, the role of information sharing networks linking institutional investors has gone largely unnoticed. This is surprising, in light of the ample evidence in the literature suggesting that institutional investors are better informed than other market participants (Grinblatt and Titman (1989, 1993); Daniel, Grinblatt, Titman, and Wermers (1997); Nofsinger and Sias (1999); Wermers (1999, 2000); Chen, Jegadeesh, and Wermers (2000); and Bennett, Sias, and Starks (2003)) and of recent survey evidence indicating that a large majority of institutional investors either directly engages in or favors coordination of shareholder activism measures (McCahery, Sautner, and Starks (2010)).[17] In this study we refer to shareholder coordination when institutional shareholders are linked via informal social networks that are formed based on the principle of geographic proximity- and values-based homophily.[18] The information transfer in these networks occurs through social interactions and

[17] Institutional investors' superior information and trading activities have been shown to mitigate anomalies such as post-earnings announcement drift (Bartov, Radhakrishnan, and Krinsky (2000)) and to facilitate price adjustment to new information (Badrinath, Kale, and Noe (1995); Sias and Starks (1997)).

[18] Informal ties between institutional shareholders exist and continuously develop based on the principle of homophily, i.e. the tendency of individuals to associate and bond with others driven by familiarity emanating from geographic proximity or from sharing common values (McPherson, Smith-Lovin and Cook (2001)).

word-of-mouth exchanges among people connected through friendship, common background, shared environs, etc. Moreover, the way information diffuses among investors can influence trading patterns, with investors linked in a network displaying more similar trading behavior (Bildik, Ozgul, Walden, and Yavuz (2013)).

We argue that coordination among institutional shareholders should further encourage the collection of and trading on private information, and therefore it should lead to more informative prices. Our investigation is motivated by the ample evidence that information sharing with peers through social networks is an important factor that affects both fund managers' and households' investment decisions (e.g., Grinblatt and Keloharju (2001); Hong, Kubik and Stein (2004, 2005); Ivkovic and Weisbenner (2007); and Cohen, Frazzini and Malloy (2008, 2010)). There is also recent evidence that online social networks that facilitate information sharing among fund managers may be aiding the price discovery process (Gray and Kern (2011)). In a theoretical context, Colla and Mele (2010) show that in the presence of information linkages among traders, volume and price informativeness increase. In our study, we focus on networks linking institutional investors and hypothesize that such networks encourage the collection of private information and facilitate the diffusion of such information into prices via institutional investor trading.

Whereas prior studies of the role of institutional investors in corporate governance and informational efficiency primarily focus on either the level of institutional ownership or on institutions' trading behavior, in this paper we investigate the influence of shareholder coordination on stock price informativeness. To measure the degree of coordination among institutional investors, we follow Huang (2013a) and devise two proxies that rely on the premise that the likelihood and strength of social connections increase with geographic proximity and similarity of values, attitudes, and beliefs comprising their corporate investment philosophy. The first proxy is the inverse of the weighted average of the geographic distance among institutional shareholders (hereafter COORD_PROX) and the second one is the weighted average correlation among institutions' portfolios of stock holdings (hereafter COORD_PORT).

Our results show a significantly positive relation between the degree of shareholder coordination and the amount of firm-specific information impounded into stock prices as measured by idiosyncratic volatility. Consistent with the notion that the stable information-sharing networks are more likely to develop among active monitors, we also find that shareholder coordination among independent institutions is the main driver for both shareholder coordination measures in the positive relation between coordination and stock price informativeness.[19] In the same vein, we further provide evidence of a significant positive relationship between shareholder coordination among dedicated institutions and stock price informativeness, whereas the relationship is insignificant in the case of coordination among transient institutions.

To address potential concerns about endogeneity and reverse causality, we conduct a battery of tests, including change-on-change analysis, generalized method of moments (GMM) dynamic panel estimation analysis, instrumental variable (IV) analysis, unexplained shareholder coordination analysis, and firm fixed effect analysis. Our results hold in each test.

To ensure the robustness of our findings, we also conduct tests using several alternative measures of price informativeness, such as the probability of information-based trading (PIN) developed by Easley, Kiefer, O'Hara (1997a, b), adjusted PIN (ADJ_PIN) developed by Duarte and Young (2009), and price impact of Amihud (2002) (AMIHUD_PI). All of these tests provide

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[19] Following Brickley, Lease, and Smith (1988) we classify mutual funds and independent investment advisors as independent institutions and classify bank trusts, insurance companies, and other institutions as grey institutions.

further support for the notion that coordination among institutional shareholders improves stock price informativeness. In addition, we conduct further robustness tests to rule out the possibility that our results are driven by the other factors that prior studies have shown to be related to informativeness. Specifically, Ferreira and Laux (2007) show that firms with stronger corporate governance display higher levels of stock price informativeness. Bushee and Noe (2000) find that firms' financial reporting transparency is positively related to idiosyncratic volatility. Our results show that the inclusion of corporate governance and accounting transparency does not substitute for or replace the coordination-price informativeness relation. Consistent with the findings in Jin and Myers (2005) and Ferreira and Laux (2007), the positive impact of accounting transparency on idiosyncratic volatility is also confirmed in our results.

In the final part of our paper, we test whether institutional trading is a mechanism through which shareholder coordination enhances price informativeness. Specifically, we hypothesize that increased institutional trading would facilitate faster incorporation of privately collected firm-specific information into stock prices. We reason that a high degree of shareholder coordination makes the collection of and trading on private information easier, thereby improving stock price informativeness. We provide direct evidence in support of the notion that institutional trading is partially responsible for the impact of coordination on informativeness. Specifically, the relation between shareholder coordination and price informativeness is even stronger for stocks that are intensely traded by institutional investors.

Our study is timely in that it applies what practitioners such as fund managers have long regarded as an important tool in monitoring managers (e.g., McCahery, Sautner, and Starks (2010)). Understanding the impact of shareholder coordination on stock prices is essential in evaluating the intricacies of the role played by institutional investors in corporate information environment. As an empirical extension of the theoretical work by Colla and Mele (2010), we contribute to the social networks' literature by showing that information sharing networks linking institutions enhance stock price informativeness. Our work also contributes to the microstructure literature on information-based trading. While prior research focuses on corporate governance (e.g., Ferriera and Laux (2007); Ferriera, Ferriera, and Raposo (2011); Gul, Srinidhi and Ng (2011); and Yu (2011)), corporate disclosure (Gelb and Zarowin (2002) and Haggard, Martin, and Pereira (2008)), and legal regimes (Fernandes and Ferreira (2009)) as determinants for idiosyncratic volatility, our paper documents a new determinant, shareholder coordination, for price informativeness. Finally, our study is the first to establish shareholder coordination and subsequent trading activity as a source of firms' improved information environment. Our findings have important implications for the real economy, because more informative prices facilitate better-informed financing and investment decisions (e.g., Chen, Goldstein and Jiang (2007)) and Foucault and Gehrig (2008)).

The remainder of the paper is organized as follows. Section 2 presents literature review and construction of main variables. Section 3 describes the sample used in this paper. Section 4 contains empirical results. Section 5 provides concluding remarks.

2. Literature Review, Hypothesis Development and Construction of Main Variables

2.1 Shareholder Coordination and Stock Price Informativeness

The importance of social networks has been recently realized by financial researchers. Literature has shown that social networks can influence investment decisions. Grinblatt and Keloharju (2001) find that social networks rooted in distance, language, and culture have a substantial influence on household investment decisions. Hong, Kubik and Stein (2004, 2005) and Ivkovic and Weisbenner (2007) document that investment decisions of households and mutual fund managers are strongly affected by their “neighbors” through the word-of-mouth communications. Investigating the education networks between corporate board members and mutual fund managers, Cohen, Frazzini and Malloy (2008) provide evidence that mutual fund managers gain information advantages through connections and thereby perform better on those “connected” stocks. Gray and Kern (2011) further document that on line social networks facilitate information sharing among fund managers and thereby the price discovery process. Theoretically, Colla and Mele (2010) show that information linkages among traders facilitate information diffusion and enhance price informativeness. Therefore, it is conceivable that the information sharing networks among institutional shareholders can also facilitate the information transmission and accelerate the price discovery process.

If social networks linking institutions facilitate information diffusion between nodes and improve corporate information environment, we should observe that substantial information flows into stock prices for firms with strong information sharing network. The testable implication is that firms with a higher degree of shareholder coordination are associated with more informative stock prices.

2.2 Development of Shareholder Coordination Measures

Social network literature suggests that these are more likely to develop when there is homophily, i.e. the tendency of individuals to associate and bond with others driven by familiarity, often rooted in geographic proximity or sharing of common values. The homophily principle that familiarity breeds connection is well established in the social networks’ literature.

Geographic proximity has been shown to be influential in the development of close relationships, such as friendship and marriage (Bossard (1932)), in the frequency of communications within firms (Allen (1984)), in the forming of interlocked corporate boards (Kono, Palmer, Friedland, and Zafonte (1998)), in dealings among floor traders (Baker (1984)), and in investment patterns of venture capital firms (Sorenson and Stuart (2001)). In addition to propinquity, studies have shown that relationships are more likely when individuals share similar backgrounds, demographic characteristics and values (e.g. Marsden (1988); McPherson, Smith-Lovin and Cook (2001)).

Finance literature has also shown that geographic proximity or sharing of common values facilitate communications and the exchange of ideas, and thereby forms the social ties (e.g., Grinblatt and Keloharju (2001); Hong, Kubik and Stein (2004, 2005); Ivkovic and Weisbenner (2007)). Therefore, we first conjecture that institutions that are geographically close to each other are more likely to share information, allowing for faster price-relevant information diffusion among other market participants and, ultimately, more informative stock prices. In addition to geographic proximity-driven homophily, social networks linking institutional investors can also develop based on common values, or common background (e.g. in terms of education, military service, work experience) of institutions' managers. Such value- and status homophily based network ties should foster the development of a shared set of investment philosophy dimensions across linked institutions. Thus, we argue that shareholder coordination can exist even without geographic proximity and will be reflected in the correlations among the investment portfolio allocations of institutional investors. Moreover, one can envision that institutions sharing common investment philosophies (high portfolio correlation) are more inclined to maintain coordination through an information sharing network in the foreseeable future in order to achieve mutual benefits. In fact, portfolio correlations can be the result of exposure to homogeneous information sources within a network that is based on either geographic location (Gaspar and Massa (2007)), communication due to geographic proximity (Hong, Kubik, and Stein (2005)), or social ties (Cohen, Frazzini, and Malloy (2008)). Therefore, we propose to use both geographic proximity and portfolio correlation among institutional investors as two measures of shareholder coordination.

The first measure of coordination is based on geographic distance between institutional investors. We identify the location of institutions by collecting their headquarter address zip code information from Securities and Exchange Commission (SEC) documents (SEC Edgar). We obtain the latitude and longitude for each of the zip codes from the U.S. Census Bureau's Gazetteer Place and Zip Code Database. Following prior research (e.g., Coval and Moskowitz (2001)), we calculate the distance between institution i and j using the following standard formula:

$$D_{i,j} = r\times\arccos\{\cos(lat_i)\cos(lon_i)\cos(lat_j)\cos(lon_j)+\cos(lat_i)\sin(lon_i)\cos(lat_j)\sin(lon_j)+\sin(lat_i)\sin(lat_j)\} \quad (1)$$

where $D_{i,j}$ is distance in statutory miles, r denotes the radius of the Earth (approximately 3,963 statutory miles), and lat and lon are institution latitudes and longitudes.

Following Huang (2013a), for each firm-quarter, we first calculate the distance of each institutional investor of the firm and all institutional shareholders of the firm, weighted by their respective fractional holdings of the total institutional ownership in the firm. We then take the product of minus one with the logarithm-transformed fractional holdings weighted-average of these distances across all institutional shareholders of the firm to obtain the geographic-proximity-based shareholder coordination measure for each firm-quarter.[24] The

[24] In the following regression analysis, we take the simple average of shareholder coordination over the four quarters in the past year t-1.

weighting scheme delivers a more accurate gauge of coordination than the simple average of the distances among institutions, because it accounts for the fact that institutions with large shareholdings typically have a more substantial impact on corporate governance. Specifically, the geographic-proximity-based shareholder coordination measure is designed as follows:

$$COORD\_PROX = -LOG\left(1 + \sum_{i\in\alpha} w_i \sum_{j\in\alpha} w_j \; {}_{i,}\right) \qquad (2)$$

where α is the set of institutional investors, w_i is the ownership weight of institution i in the total ownership held by all institutions in a firm at the end of each quarter, and $DIST_{i,j}$ is the geographic distance between institution i and j. The logarithm transformation, log (1 + weighted-average of geographic distance between institutions) serves the purpose of reducing the skewness of this variable's distribution.

The second measure of shareholder coordination is the weighted average correlation between institutions' portfolios of stock holdings. The intuition behind this measure is based on the premise that institutions with similar portfolio allocations are more likely to share common investment philosophies and therefore they are more likely to have developed social links that lead to better coordination. Additionally, stronger connectedness among institutions based on similarities of their portfolio allocations may also motivate them to coordinate their monitoring efforts and corporate governance roles.

To calculate the portfolio correlation among institutional investors for each firm-quarter, we first identify the stocks held by each institutional investor at the end of each quarter, and then calculate the correlation of the excess portfolio weights[26] on the stocks held by both institutions.

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[26] The excess portfolio weight allocated to stock i in quarter t is given by:

$$EW_{ipt} = \frac{W_{ipt} - W_{imt}}{W_{imt}} \times 100$$

For each institutional shareholder of the firm, we calculate the correlation of its portfolio with that of all institutions, weighted by their respective fractional holdings of all institutional ownership in the firm. As in the geographic-proximity-based shareholder coordination measure, we then take the fractional holdings weighted-average of these portfolio correlations across all institutional shareholders of the firm to obtain the portfolio-correlation-based shareholder coordination measure for each firm-quarter. Specifically,

$$COORD\_PORT = \sum_{i\in\alpha} w_i \sum_{j\notin \alpha} w_j \quad w_i \, (\qquad (3)$$

where α is the set of institutional investors, w_i is the ownership weight of institution i in the total ownership held by all institutions in a firm at the end of each quarter, and $CORR_{i,j}$ is the correlation coefficient of the excess portfolio weight (measured as the actual weight relative to the weight in the market portfolio) allocated to common holdings between institutions i and j at quarter t.

2.3 Development of Stock Price Informativeness Measures

We use idiosyncratic volatility (Ψ) as our main proxy for stock price informativeness. French and Roll (1986) and Roll (1988) state that idiosyncratic volatility, defined as stock return variation unexplained by market movements, measures the rate of firm-specific information impounded into stock prices. Previous empirical studies support the view that idiosyncratic volatility measures the rate of information flow into stock prices. For instance, Durnev et al. (2003) show that the stock prices of firms with more idiosyncratic volatility embed more information about future earnings. Idiosyncratic volatility is also commonly used in empirical

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where W_{ipt} is the actual weight assigned to stock i in the institution's portfolio pin quarter t and W_{imt} is the weight of stock i in the aggregate market portfolio in quarter t.

studies to proxy for the informativeness of stock prices (e.g., Ferreira and Laux (2007); Ferreira, Ferreira, and Raposo (2011)).

We estimate annual firm-specific idiosyncratic volatility by regressing stock returns on the three Fama-French model factors. For each firm-year, firm-specific return variation is estimated by $1-R_{i,t}^2$ from the regression:

$$r_{i,t} - r_t^f = \beta_0 + \beta_1(r_t^m - r_t^f) + \beta_2 SMB_t + \beta_3 HML_t + e_{i,t} \tag{4}$$

where $r_{i,t}$ is the return of stock i in day t, r_t^f is the risk-free rate of return in day t, r_t^m is the value-weighted market return, SMB (small minus big) is the difference between the monthly returns of the small and big firms' portfolios, and HML (high minus low) is the difference between the monthly returns of high book-to-market and low book-to-market firms' portfolios. Since $1-R_{i,t}^2$ is skewed (Durnev, Morck, Yeung and Zarowin (2004)), we take the logistic transformation of $1-R_{i,t}^2$ to ensure a normality distribution. Formally, idiosyncratic volatility $\psi_{i,t}$ is defined as:

$$\psi_{i,t} = Ln\left(\frac{1-R_{i,t}^2}{R_{i,t}^2}\right) \tag{5}$$

Alternatively, following Chen, Goldstein and Jiang (2006), we also use the augmented market model with the inclusion of an industry index to estimate idiosyncratic volatility (Ψ_MKT).

To provide further support to our interpretation of idiosyncratic volatility as a measure of stock price informativeness, we use several alternative proxies that are commonly used in prior literature. The first measure is the probability of information-based trading (PIN) measure developed by Easley et al. (1997a, b). The PIN measure proxies for the probability of informed trading estimated from a structural market microstructure model.[27] Our second measure is adjusted PIN (ADJ_PIN) developed by Duarte and Young (2009), who argue that the PIN measure of Easley et al. (2002) is an imperfect measurement of private information because PIN may capture some illiquidity effects that are not related to private information.[28] They augment the PIN measure by decomposing it into a private information component and a liquidity component. The ADJ_PIN variable is the annual component of PIN related to private information and serves as a clearer measure of private information. Finally, as an alternative measure of price informativeness, we use the price impact measure of Amihud (2002). This measure is defined as the annual average of the daily ratio between a stock's absolute return and its dollar volume (multiplied by 10^6):

$$\text{AMIHUD\_PI} = \frac{1}{D_i}\sum_{t=1}^{D_i}\frac{|r_{it}|}{\text{VOLD}_{it}} \qquad (6)$$

where D_i is the annual number of valid observation days for stock i and $VOLD_{it}$ is the dollar volume of stock i on day t. The ratio is measured as the absolute percentage price change per dollar of daily trading volume. More informed trading would induce greater price impact as dealers price protect themselves from adverse selections (Kyle (1985)). Therefore, the magnitude of the price impact should be positively associated with the perceived amount of informed trading on a stock.

[27] Previous empirical work supports the use of PIN as a proxy for stock price informativeness. For example, Vega (2006) finds that stocks associated with high PIN experience low or insignificant drift, which is consistent with the notion that their prices incorporate more private information and become more informative. Chen, Goldstein and Jiang (2007) find the sensitivity of corporate investment to stock prices increases when PIN is high, suggesting that managers learn from the private information incorporated into stock prices. Ferreira and Laux (2007) find that firms with fewer antitakeover provisions display high PIN, supporting the hypothesis that strong shareholder protection enhances stock price informativeness by encouraging private information collection and trading. Ferreira, Ferreira and Raposo (2011) document a negative relation between corporate board structure PIN, supporting the hypothesis that stock price informativeness and board monitoring are substitutes.

[28] We thank Jefferson Duarte for providing access to the PIN data. The PIN and ADJ_PIN data are only available from years 1983 to 2004. Thus, our sample size drops when using PIN and ADJ_PIN as alternative measures of stock price informativeness.

Several studies show that better shareholder protection is associated with greater stock price informativeness. For example, Morck, Yeung and Yu (2000) argue that greater firm-specific stock price variation (i.e., greater idiosyncratic volatility or less synchronicity of returns across firms) is associated with stronger investor property rights. Ferreira and Laux (2007) provide direct evidence that strong shareholder protection encourages investors to collect and trade on private information, leading to informative stock prices. Therefore, in our multivariate tests we control for shareholder protection as measured by the G-index developed by Gompers, Ishii and Metrick (2003).

Accounting transparency provides more reliable public information about firms. Literature suggests that high disclosure quality encourages the collection of private information and leads to subsequent intense trading, causing stock prices to be more informative. Bushee and Noe (2000) find that disclosure ratings, which are based on analysts' assessments of informativeness of corporate disclosure practices, are positively associated with stock return volatility. Jin and Myers (2006) show that poor country-level governance and accounting opaqueness induce low idiosyncratic volatility. Ferreira and Laux (2007) extend the country-level evidence to firm level by showing that accounting transparency is positively associated with idiosyncratic volatility. Therefore, we also control for the transparency of firm's financial reporting in our tests.

3. Sample

We draw the data for our study from the Center for Research in Stock Prices (CRSP) Database, COMPUSTAT, the Thomson Reuters F13 Institutional Holdings database. Our initial sample includes all firms in the CRSP-COMPUSTAT-F13 merged database for the period from

1994 to 2010, omitting financial firms (SIC 6000-6999) and utilities (SIC 4900-4999). We winsorize all continuous variables at the bottom and top 1% levels. Appendix A defines in detail the variables used in this study.

Table 2.1 presents descriptive statistics of our data. Panel A shows that the mean value of idiosyncratic volatility (Ψ) is 2.586 with the standard deviation of 1.872. Panel B of Table 2.1 presents summary statistics for the two measures of shareholder coordination. The average geographic-proximity-based shareholder coordination (COORD_PROX) is -5.975. The average portfolio-correlation-based shareholder coordination (COORD_PORT) is 0.290. Both of the coordination measures exhibit a fair degree of cross-sectional variation across sample firms. Table 2.1 also presents summary statistics for other shareholder characteristics and firm characteristics. In particular, institutional shareholders, on average, own 43.3% of the outstanding shares of the average firm. Following Hartzell and Starks (2003), we calculate institutional ownership concentration as a Herfindahl Index of institutional ownership concentration (IO_HHI) based on the percentages of institutional holdings by all 13F institutions. The mean value of IO_HHI is 0.021. These statistics (and others in Table 1) are comparable to those in other studies (e.g., Ferreira and Laux (2007) and Huang (2013b)).

Table 2.2 shows the correlation matrix. The stock price informativeness measures, Ψ, Ψ_MKT, PIN, adjusted PIN, and Amihud price impact (AMIHUD_PI) are positively and significantly correlated with each other, supporting the idea that these measures capture the same phenomenon. The correlations between shareholder coordination and all stock price informativeness measures are positive and significant, consistent with our prediction that firms with a higher degree of shareholder coordination are associated with more informative stock prices. As expected, the two shareholder coordination measures, COORD_PROX and

COORD_PORT, are highly correlated with each other (Pearson = 0.648), suggesting that, although constructed in different ways, both measures capture similar aspects of shareholder coordination. Given the fact that shareholder coordination is negatively correlated with institutional ownership and ownership concentration, we expand our Ferreira and Laux (2007) baseline model by adding the institutional ownership and ownership concentration variables to alleviate concerns about omitted variable effects.

4. Empirical Regression Models and Results

In this section, we establish our baseline model and provide regression evidence on the relation between shareholder coordination and stock price informativeness.

4.1 Impact of Shareholder Coordination on Stock Price Informativeness

4.1.1 Empirical design: baseline model. We estimate the following baseline empirical model to analyze the relation between shareholder coordination and stock price informativeness.

$$\begin{aligned}\psi_{i,t} = {} & \beta_0 + \beta_1 COORD\__{i,t-1} + \beta_2 IO_{i,t-1} + \beta_3 IO\_HHI_{i,t-1} + \beta_4 SIZE_{i,t-1} + \beta_5 MB_{i,t-1} \\ & + \beta_7 VROE_{i,t-1} + \beta_8 LEV_{i,t-1} + \beta_9 DD_{i,t-1} + \beta_{10} AGE_{i,t-1} + \beta_{11} DIVER_{i,t-1} + d\end{aligned} \quad (7)$$

where i indexes firm, j indexes industry, and t indexes year. Industry and year indicators are denoted by d_j and d_t, respectively. COORD_ is one of shareholder coordination measures for firm i at year t-1: geographic-proximity-based coordination (COORD_PROX) or portfolio-correlation-based coordination (COORD_PORT). We include a number of control variables drawn from the literature on price informativeness. These control variables include institutional ownership (IO), institutional ownership concentration (IO_HHI), market capitalization (SIZE), market-to-book ratio (MB), firm profitability (ROE), profits volatility

(VROE), leverage (LEV), a dividend payer dummy (DD), firm age (AGE), and an internal diversification dummy (DIVER). Year dummies are included to account for pervasive macro-economy factors that affect the cross-section of firms, and industry dummies are included to control the unobservable industry characteristics that could be drivers of the results. We estimate equation (7) as a pooled cross-sectional time-series model. Standard errors are clustered at the firm level to control for time series dependence within the firm that could bias the statistics as suggested in Peterson (2009) and Thompson (2011).

4.1.2 Regression results. Table 2.3 presents the baseline regression results on the relation between shareholder coordination and idiosyncratic volatility Ψ estimated from regression model (4). This table reports restricted versions of the baseline model as well as full versions with the complete set of control variables.

Columns (1) and (4) report restricted regression results with shareholder coordination as the only regressor. There is a significant positive relation between shareholder coordination and idiosyncratic volatility. Specifically, the coefficient estimate on the geographic-proximity-based (portfolio-based) shareholder coordination is 0.604 (5.662) with a t-statistic of 60.88 (52.05). It is clear that shareholder coordination improves stock price informativeness. Including other control variables does not change the qualitative results. Columns (2) and (5) include the same control variables as in previous studies (e.g., Ferreira and Laux (2007)). Although the coefficients and robust t-statistics are predictably attenuated, the results confirm the significantly positive relation between shareholder coordination and stock price informativeness. Considering the significant correlation between shareholder coordination and institutional ownership as well as institutional ownership concentration shown in Panel A of Table 2.1, we decided to also explore the full model that includes both variables in the baseline regression in order to rule out the possibility that omitted variables can drive our results. The coefficient estimates for the full models are reported in Columns (3) and (6). As we can see, the significantly positive relation between coordination and stock price informativeness still holds. The relation is also economically significant: controlling for other firm characteristics, a one-standard deviation increase in COORD_PROX (COORD_PORT) enhances Ψ by about 1.7% (9.6%) relative to the unconditional sample mean of Ψ.

4.2 Impact of Shareholder Coordination on Stock Price Informativeness, by Institution Type

Existing literature shows that different types of shareholders may differ in their incentives and abilities to play a governance role. Therefore, it is also possible that the strength of information sharing networks linking institutional investors might vary depending on the type of institutions involved. To investigate this issue, we first follow Brickley, Lease, and Smith (1988) and classify institutions into independent and grey institutions according to their potential for having business ties to the firm. Independent institutions include mutual funds and investment advisory firms, which are likely to have fewer potential business relationships with the corporations in which they invest. Grey institutions include bank trusts, insurance companies, and other institutions, which have current or prospective business relationships with corporations in which they invest. We then construct separate shareholder coordination measures among independent and grey institutions, respectively. We expect that stronger information sharing networks are more likely to develop among institutions not subject to conflicts of interest or legal constraints associated with having a business relationship with the firm. Accordingly, we predict that the effect of shareholder coordination on stock price informativeness should be driven mainly by independent institutions. The results shown in Columns (1) and (3) of Table 2.4 are consistent with our expectation: the positive impact of shareholder coordination on stock price informativeness is strong and always significant in the case of independent institutions, whereas it is much weaker and only significant in one of the two models in the case of grey institutions.

Second, following Bushee (2001), we classify institutions into dedicated and transient institutions. Dedicated institutions' investments are associated with low turnover, low diversification, and long investment horizon. Therefore, dedicated institutions are more likely to play an important role in corporate governance and to be proponents of a better informational environment for the firms in which they invest. Transient institutions, which are characterized by high turnover, high diversification, and short investment horizon, are less likely to engage in corporate governance and less likely to espouse the view that benefits from an improved information environment significantly outweighs the costs associated with promoting informativeness.

Columns (2) and (4) of Table 2.4 present the results of the regressions that include shareholder coordination measures among dedicated and transient institutions. Consistent with the notion that dedicated institutions are more effective monitors and promoters of a transparent information environment of firms they invest in, we find that only coordination among dedicated institutions has a significant positive impact on stock price informativeness. It is noteworthy that, although the coordination among transient institutions enters the regressions with a negative sign, the coefficients are insignificant.

To summarize, we find that the stock price informativeness varies with shareholder coordination by different institution types in systematic ways that are consistent with the view that the higher degree of shareholder coordination encourages the collection of and trading on private information, and thereby leads to more informative stock prices.

4.3 Establishing causality

As endogeneity can be a serious concern, the results so far do not allow us to draw a strong conclusion regarding the relation between shareholder coordination and stock price informativeness. It is possible that institutional investors don't invest randomly so that what we label the "shareholder coordination effect" may just be a reflection of preferences by geographically clustered institutions or by institutions sharing similar portfolio allocations favoring firms with stronger stock price informativeness. To address this concern, we use different regression methods to establish the directional link in this relationship.

4.3.1 Change-on-change regressions. Since the relationship between coordination and price informativeness could be bi-directional, we explore several methods in order to empirically establish the direction of causality. We first employ the change-on-change regression model as used in Aggarwal, Erel, Ferreira, and Matos (2011) and Chhaochharia, Kumar and Niessen-Ruenzi (2011). If the degree of shareholder coordination has a significant influence on stock price informativeness as our results imply, then as shareholder coordination increases over time, we would expect to see corresponding increases in stock price informativeness. If causality runs only in this direction, then increases in stock price informativeness should not drive increases in shareholder coordination.

Columns (1) and (2) in Table 2.5 report the results for regression models with changes in stock price informativeness as the dependent variable and lagged changes in shareholder coordination as the main independent variable. The dependent variable $\Delta\Psi_t$ is the change in stock price informativness from year t-1 to year t. The main independent variable ($\Delta COORD\_PROX_{t-1}$ in Column (1) and $\Delta COORD\_PORT_{t-1}$ in Column (2)) is the change in shareholder coordination from year t-2 to year t-1. All other independent variables are also expressed in terms of changes from year t-2 to year t-1. The coefficient estimates on the change in shareholder coordination are positive and significant.

Columns (3) and (4) of Table 2.5 report the results for regression models with changes in shareholder coordination as the dependent variable and lagged changes in stock price informativeness as the main independent variable. In contrast to the results shown in Columns (1) and (2), the coefficient estimates on the change in idiosyncratic volatility ($\Delta\Psi_{t-1}$) are not statistically significant, indicating that changes in stock price informativeness don't have any effect on subsequent changes in shareholder coordination. This evidence indicates that the causal link from shareholder coordination to stock price informativeness is considerably stronger than the reverse causal relation.

4.3.2 Firm fixed effect regressions. To further establish the causal relation between shareholder coordination and stock price informativeness, we employ the firm fixed effects model which accounts for the impact of any unobserved firm effects on the relation. The results with firm fixed effects are reported in Columns (1) and (2) of Table 2.6. We find that even after controlling firm fixed effects along with year fixed effects, the positive impact of shareholder coordination on stock price informativeness is still strong, both statistically and economically. Specifically, we find that the coefficient estimate on COORD_PROX is 0.031, which is statistically significant at the 1% level (t-statistic=3.32). A one-standard deviation increase in COORD_PROX will cause Ψ to increase by 1.4% relative to the sample mean. This evidence is consistent with our hypothesis and partially addresses the endogeneity concern.

4.3.3 Unexplained shareholder coordination and stock price informativeness. In this subsection**,** we design a prediction model that captures the effect of firm characteristics on shareholder coordination, and then examine the relation between unexplained shareholder coordination and stock price informativeness. The rationale is that the predicted shareholder coordination is a linear combination of firm characteristics and as such it could be endogenously determined. Thus, if firm characteristics used to predict shareholder coordination also explain most of the variation in price informativeness, then the positive relation between shareholder coordination and price informativeness could be explained by the notion that shareholder coordination simply acts as an aggregate proxy for those firm characteristics. Conversely, if the part of shareholder coordination that cannot be explained by firm characteristics, i.e. the residual from a prediction model explains most of the variation in the variables of interest, then it is more likely that we have established a causal relation between them.

To obtain the unexplained (residual) shareholder coordination measure, we use a methodology similar to that used by Hong, Lim, and Stein (2000) and Nagel (2005) in different contexts. Given the fact that there is neither any prior theoretical model nor prior empirical evidence regarding the determinants of shareholder coordination, we include a battery of variables that reflect firm characteristics (e.g., market capitalization (SIZE), accounting performance (ROA) and market performance (BM, BETA and BHRET12)) in the prediction model. Considering the way we construct shareholder coordination variables, we also include the percentage of institutional ownership (IO) and institutional ownership concentration (IO_HHI) to control for their potential impact on the degree of shareholder coordination. Finally, our prediction model is as follows:

$$\begin{aligned} COORD\_ &= a_0 + a_1 SIZE + a_2 BM + a_3 BETA + a_4 ROA + a_5 LEV + a_6 SALE\_GROWTH \\ &+ a_7 AGE + a_8 IO + a_9 IO\_HHI + a_{10} BHRET12 + \varepsilon \end{aligned} \tag{8}$$

We estimate this cross-sectional regression of shareholder coordination every quarter with lagged independent variables and obtain coefficient estimations of each controlling variable, which we then use to obtain predicted shareholder coordination for each firm and each quarter. After obtaining the predicted shareholder coordination, we obtain the unexplained part for geographic-proximity-based (RES_COORD_PROX) and portfolio-correlation-based (RES_COORD_PORT) shareholder coordination.

Columns (3) and (4) of Table 2.6 report the results for regressions using residual shareholder coordination as the main explanatory variable. Unexplained shareholder coordination still has a significant positive impact on stock price informativeness.

4.3.4 Instrumental variables method. We also utilize instrumental variables method to alleviate any remaining concerns of endogeneity. Under standard identification assumptions, we apply two-stage least squares (2SLS) tests to isolate the effect of shareholder coordination on idiosyncratic volatility. This procedure requires valid instruments for shareholder coordination that meet the criteria: (1) strong correlation with shareholder coordination; and (2) orthogonality with idiosyncratic volatility except indirectly through other independent variables.

Following Gaspar and Massa (2007), we use a series of binary variables that represent location dummies of the major 21 cities or metropolitan areas[29] in the U.S., plus a dummy for a firm located in a remote city. A remote city is defined as a city located more than 150 miles away from one of the 21 major cities. Specifically, the location dummies take the value of one if a firm is located in any of the major 21 cities or a remote city in the U.S, and zero otherwise. These variables represent ideal instruments as the location of the institutional investor is not directly related to informativeness but could have an impact on shareholder coordination. Specifically, clustering of institutions in major cities provides money managers a greater chance to

[29] We obtain the list of the major cities by US Census Bureau population surveys of 1990 and 2000. The full list of the cities is as follows: New York, San Francisco, Boston, Los Angeles, Philadelphia, Chicago, Dallas, Houston, Baltimore, Washington, San Diego, Milwaukee, Detroit, Phoenix, Columbus, Indianapolis, Austin, San Antonio, Jacksonville, Memphis, and San Jose.

communicate and exchange their private information, leading to better coordination.[30] To formally assess the quality of the instruments in each of the 2SLS regressions, we perform the following two tests: (1) a Cragg and Donald (1993) instrument relevance test; and (2) a Hansen overidentification test to examine the instrument orthogonality.

Columns (5) and (6) of Table 2.6 report the results for 2SLS regressions. In Column (5), we use idiosyncratic volatility Ψ as the dependent variable and the instrumented COORD_PROX as the main independent variable. We find that the coefficient estimate on the instrumented shareholder coordination COORD_PROX is still positive and significant at the 5% level. In addition, the p-value for the Cragg and Donald (1993) F test is less than 0.001, rejecting the null hypothesis that instruments are weak. The p-value of the overidentification test (Hansen test) is 0.556, suggesting that the null hypotheses of orthogonality of instruments with the errors is not rejected. The results of instrument validity tests lead us to not reject the null hypothesis of instrument suitability. Results for shareholder coordination, COORD_PORT, are consistent. Thus, our finding that shareholder coordination enhances stock price informativeness appears to be robust to controlling for endogeneity concerns, suggesting a causal link between them.

4.3.5 GMM estimation. As another causality check, we use the generalized method of moments (GMM) dynamic panel estimation method, which is robust to endogeneity problems due to reverse causality, simultaneity, and unobserved heterogeneity (e.g., Wintoki, Linck, and Netter (2012)).

We report the results in Columns (7) and (8) of Table 2.6. Results from the GMM analysis confirm our early findings. The coefficient estimate of shareholder coordination is significantly positive for both measures: COORD_PROX (coefficient=0.140, t-statistic=2.22)

[30] Hong, Kubik and Stein (2005) find that a mutual fund manager's investment decision is more likely to be affected by the investment decision of other managers in the same city through the word-of-mouth effects.

and COORD_PORT (coefficient=1.046, t-statistic=2.41). As we can see, the GMM coefficient estimate is much larger than the OLS coefficient estimate, which could be due to a reduction in the measurement error. Table 6 also reports the results of specification tests for the validity of the GMM estimation procedure. If the assumptions of the specification are valid, then residuals in the first differences (AR(1)) should be correlated, but uncorrelated in the second differences (AR(2)). Results of these tests confirm that these are indeed the case. The Hansen test for over-identifying restrictions (*J*-statistic) shows that under the null hypothesis of instrument validity, we cannot reject that our GMM instruments are valid. As GMM accounts for time-invariant firm heterogeneities, we also control for year- and industry- fixed effects in the GMM regression.

Taken together, the evidence from various causality tests strongly suggests that a high degree of shareholder coordination improves stock price informativeness but not vice versa.

4.4 Alternative Measures of Stock Price Informativeness

To substantiate our informational interpretation of the coordination-idiosyncratic volatility relationship, we next test for the relation between shareholder coordination and several alternative price informativeness measures.

Specifically, we use idiosyncratic volatility (Ψ_MKT) following Chen, Goldstein and Jiang (2007); probability of information-based trading (PIN) as used in Easley, Hvidkjaer and O'Hara (2002); the adjusted probability of information-based trading (ADJ_PIN) following Duarte and Young (2009); and the Amihud price impact measure (AMIHUD_PI) as used in Amihud (2002). Table 2.7 reports the regression results using the alternative measures of stock price informativeness. Overall, the results support our hypothesis that firms with stronger shareholder coordination have more informative stock prices. Results in Columns (1) and (2) show a strong and positive relation between shareholder coordination and Ψ_MKT, suggesting that our findings are not specific to the particular model used to estimate idiosyncratic volatility. The regressions whose results are shown in Columns (3) and (4) of Table 2.7 use the annual probability of information trading (PIN) measure as the dependent variable. We find that PIN is also positively related to shareholder coordination, which supports our hypothesis that firms with a higher degree of shareholder coordination are more subject to private information trading. Columns (5) and (6) of Table 2.7 present estimates using adjusted PIN (ADJ_PIN) measure as proposed by Duarte and Young (2009), who argue that PIN may capture some illiquidity effects that are not related to private information. We find that ADJ_PIN is also positively related to shareholder coordination. The coefficients of shareholder coordination (COORD_PROX and COORD_PORT) are positive and significant, although their magnitude and significance is lower compared to those in Columns (3) and (4). The results for regressions using Amihud price impact measure (AMIHUD_PI) as an alternative price informativeness measure are reported in Columns (7) and (8). Again, the positive relation between shareholder coordination and price informativeness is confirmed.

Overall, our results on alternative measures of stock price informativeness confirm our earlier findings that firms with stronger shareholder coordination have more informed stock prices. Our robustness results further substantiate our interpretation that shareholder coordination promotes private information collection and leads to more informed stock prices.

4.5 Robustness

In this section, we show that our primary findings are robust to controls for corporate governance, accounting transparency, and also the use of other alternative methodologies.

4.5.1 Controlling for corporate governance. Ferreira and Laux (2007) show that corporate governance, measured by G-index, encourages the collection of and trading on private information, in particular via merger arbitrage trading. We proxy for corporate governance using the G-index (G) developed by Gompers et al. (2003). Higher G-index represents more anti-takeover related governance provisions and therefore weaker corporate governance. The results of regressions controlling for corporate governance are shown in Columns (1) and (4) of Table 2.8. Consistent with our earlier evidence, shareholder coordination continues to exhibit significant positive association with stock price informativeness, suggesting that the effect of shareholder coordination on price informativeness is not captured by the existing measures of corporate governance.

4.5.2 Controlling for accounting transparency. Theories predict that more accounting transparency can either promote or discourage private information collection (Kim and Verrecchia (1991, 2001)). Jin and Myers (2006) find cross-country evidence that more accounting transparency is associated with higher levels of idiosyncratic volatility. We measure accounting transparency using proxies in the earnings management literature. A number of studies show that earnings management reduces the information content of accounting reports (e.g., Trueman and Titman (1988)). Bhattacharya et al. (2003) and Jayaraman (2008) find that discretionary earnings management reduces the information content of earnings and cash flow and therefore accounting transparency. Therefore, we use earnings management to proxy for accounting transparency.

To capture the level of earnings management, we construct two measures. Following Dechow, Sloan and Sweeney (1995), the first measure of earnings management (EM_MODJONES) is the absolute value of discretionary accruals estimated from the modified Jones model as the difference between total current accruals (TCA)[31] and nondiscretionary accruals (NDA)[32]. The second measure of earnings management is absolute value of performance-matched discretionary accruals as used in Kothari, Leone and Wasley (2005). As in the case of the first measure, we estimate the modified Jones model cross-sectionally using all firm-year observations in the same two-digit SIC code to obtain discretionary accruals. Then we match the firm with a firm with the same two-digit SIC code and with the closest return on assets in the current year and use the difference of discretionary accruals between them as the performance-matched earnings management (EM_PERMATCH).

The results of the regressions are reported in Columns (2), (3), (5) and (6) in Table 2.8. We employ EM_MODJONES in columns (2) and (5), and EM_PERMATCH in columns (3) and (6). The coefficient estimates on both earnings management measures are significant and negative, which implies accounting transparency enhances price informativeness. This is indicative of more private information flowing to market when accounting numbers are more transparent. The results are consistent with theoretical predictions that sound accounting transparency encourages the collection of private information, leading the stock prices to be

[31] $TCA_{i,t}$= (Δcurrent $asset_{i,t}$-Δcurrent $liabilities_{i,t}$- $\Delta cash_{i,t}$ + Δlong-term debt in current liabilities-depreciation and amortization expense of the firm) / $asset_{i,t-1}$, where Δis the first difference (with respect to time) operator.

[32] Nondiscretionary accruals is estimated as the fitted value from a regression of total current accruals (TCA) on the lagged total firm assets (Asset), the change in sales less the change in receivables (ΔREV - ΔREC) and gross property plant and equipment (PPE) scaled by lagged total firm assets (Asset).We use the following model to get the estimation of the coefficients $TCA_{i,t}=\alpha_0 + \alpha_1\times(1 / Asset_{i,t-1}) + \alpha_2\times(\Delta REV_{i,t}- \Delta REC_{i,t}) + \alpha_3\times PPE_{i,t}+ \epsilon_{i,t}$, and then use the estimated coefficients to obtain nondiscretionary accruals in the following equation: $NDA_{i,t}=\alpha_0' + \alpha_1' \times (1 / Asset_{i,t-1})+\alpha_2' \times (\Delta REV_{i,t}-\Delta REC_{i,t})+\alpha_3' \times PPE_{i,t}+ \epsilon_{i,t}$. Finally, we obtain the first measure of earnings management in the equation follwoing: $DA_{i,t}= TA_{i,t}- NDA_{i,t.}$

more informative. Both shareholder coordination measures are significantly positively associated with stock price informativeness after controlling for earnings quality. Thus, our results suggest that shareholder coordination remains a significant determinant of price informativeness even after controlling accounting transparency.

4.5.3 Additional robustness checks. In this subsection, we report test results from additional robustness checks in Table 2.9. We first estimate our baseline model using the Fama and MacBeth (1973) regression approach to make sure that our results are not driven by errors-in-variables and autocorrelation (Columns (1) and (2) of Table 2.9). The coefficient estimates have similar economic and statistical significance to those of the panel baseline regressions. To obtain standard-error estimates that are more conservative, we cluster standard errors by both firm and year to take into account the correlation of residuals across firms and over time, as suggested by Petersen (2009) and Thompson (2009). Although, compared with the results in baseline regressions, the t-statistics of coefficient estimates on shareholder coordination measures shown in Columns (3) and (4) have been attenuated, shareholder coordination (COORD_PROX and COORD_PORT) still has a significantly positive impact on price informativeness.

We further use three-digit industry fixed effects instead of two-digit industry fixed effects in our model to ensure that our results are not driven by some unobserved industry characteristics. The results in Columns (5) and (6) of Table 2.9 show that the impact of shareholder coordination on price informativeness remains statistically and economically significant. Using industry fixed effects, which use the Fama and French (1997) 48 industry SIC classification scheme delivers similar results as reported in Columns (7) and (8) of Table 2.9.

One remaining concern is that the findings could be driven by a few metropolitan cities with a high concentration of institutional investors. We thus repeat the analysis by excluding these cities. For each metropolitan statistical area (MSA) and each quarter, we calculate the total dollar value of equity holdings that are managed by institutions located in that MSA. We then delete institutional investors located in New York and Boston, as both MSAs dominate the institutional investors' landscape, and reconstruct both shareholder coordination measures: COORD_PROX and COORD_PORT. Results in Columns (9) and (10) of Table 2.9 indicate that the results are again qualitatively unchanged.

Literature has shown that geographic proximity to investment opportunities provides information advantages for institutional investors to guide their investment and monitoring of corporate management (e.g., Coval and Moskowitz (2001); Gaspar and Massa (2007); and Baik, Kang, and Kim (2010)). Therefore, local institutional ownership, a proxy for the amount of private information, may have a positive impact on stock price informativeness. To rule out the possibility that our results merely capture the impact of local institutional ownership, we reconstruct the two measures of coordination by excluding institutional investors located within 150 miles of the firm's headquarter and re-estimate the baseline model equation (6). The results, reported in the last two Columns of Table 2.9, show that the effects of shareholder coordination on price informativeness are qualitatively unchanged, suggesting that our findings are not driven by local institutions.

Taken together, the coefficient on shareholder coordination remains positive and strongly positive in all models. Our early findings are confirmed: stronger shareholder coordination is strongly associated with more price informativeness.

4.6 The Mechanism: Institutioanl Trading

Our evidence so far is consistent with the hypothesis that shareholder coordination enhances stock price informativeness. In this section, we examine institutional trading as a possible underlying mechanism that facilitates this effect. Specifically, we argue that institutional trading can serve as a channel of information diffusion between the different nodes of the information sharing network that links institutional shareholders. Our conjecture is derived from recent evidence identifying investors with similar trading behavior as linked in an empirical investor network (Bildik, Ozgul, Walden, and Yavuz (2013)). Moreover, Hartzell and Starks (2003) find that institutional investors, rather than retail investors, contribute to private information collection and trading. Piotroski and Roulstone (2004) provide direct evidence on the positive relation between institutional trading and price informativeness.

To test whether the institutional trading channel exists, we include institutional trading and its interaction term with shareholder coordination in our stock price informativeness model. If institutional trading contributes to the private information incorporation into stock prices of firms with a high degree of shareholder coordination, we expect to find a positive and significant coefficient on the interaction variable. Specifically, we use INST to denote the average absolute changes in the number of a firm's shares held by institutional investors as the percentage of annual trading volume as reported in 13F filings. The interaction variables between shareholder coordination and institutional trading are: COORD_PROX × INST and COORD_PORT × INST.

Columns (1) and (2) of Table 2.10 report the coefficient estimates using INST without the interaction variables COORD_PROX × INST (COORD_PORT × INST). This test serves the purpose of verifying whether the relation between shareholder coordination and price informativeness is robust to the addition of institutional trading. The results show that the coefficient estimates on both shareholder coordination measures are still positive and significant. Consistent with the prior findings, institutional trading is associated with more informative stock prices as the coefficient estimate on INST is positive and significant. Columns (3) and (4) of Table 2.10 report coefficient estimates for the models that include the interaction terms. As expected, the coefficient estimates on the interaction variables are positive and significant, supporting our conjecture that the positive relation between shareholder coordination and price informativeness is stronger when institutional trading intensifies. As we can see in Columns (3) and (4), INST still has a positive, albeit considerably weaker, impact on price informativeness, which is consistent with the findings documented in Piotroski and Roulstone (2004). Overall, we conclude that results in Table 2.10 provide direct evidence that institutional trading activity serves as a mechanism that enables shareholder coordination to enhance price informativeness.

5. Concluding Remarks

Although the role of institutional investors in improving corporate governance has been recognized by many prior studies, the question whether coordination (i.e. the sharing of information and/or resources within a network) among institutional shareholders can improve the corporate information environment has not been fully answered.

In this paper, we demonstrate that shareholder coordination has implications for stock price informativeness. We use geographic proximity between institutional shareholders and the correlations between institutional shareholders' portfolio holdings as the basis for designing two alternative measures of shareholder coordination. We find that a higher degree of shareholder coordination is associated with more informative stock prices. The positive relation between shareholder coordination and price informativeness stands up to a variety of endogeneity tests. In addition, our results are robust to alternative measures of price informativeness and shareholder coordination, addition of other control variables, and different regression estimation methodologies. We then examine the possible mechanism through which shareholder coordination exert its impact on stock price informativeness and provide direct evidence in support of the conjecture that institutional trading plays the role of a channel of information diffusion between nodes in the network that links institutional investors, thereby facilitating the positive relation between coordination and informativeness.

Taken together, our results support the notion that a high degree of shareholder coordination motivates investors to collect and trade on private information. The diffusion of value-relevant information into prices increases price informativeness.

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Table 2.1 Descriptive Statistics

This table reports descriptive statistics of variables used in this paper. All variables are defined in Appendix A. The sample period is from 1994 to 2010. Financial and utilities industries are omitted (SIC 6000–6999 and 4900–4999). All variables are winsorized at bottom and top 1% levels.

	N	Mean	Median	SD	5th	95th
Panel A. Stock Price Informativeness Variables						
Ψ	52,865	2.586	2.482	1.872	-0.226	5.837
Panel B. Alternative Measures of Stock Price Informativeness						
Ψ_MKT	48,624	2.286	2.158	1.566	-0.025	4.990
PIN	15,486	0.200	0.169	0.109	0.084	0.434
ADJ_PIN	15,486	0.162	0.143	0.082	0.071	0.327
AMIHUD_PI	51,214	2.111	0.038	7.616	0.000	10.372
Panel C. Shareholder Coordination Variables						
COORD_PROX	51,214	-5.975	-6.375	1.197	-6.937	-3.432
COORD_PORT	51,214	0.290	0.245	0.177	0.094	0.647
Panel D. Control Variables for Stock Price Informativeness Regressions						
IO	51,214	0.433	0.406	0.284	0.031	0.908
IO_HHI	51,214	0.021	0.017	0.021	0.001	0.056
SIZE	51,214	19.373	19.228	1.923	16.452	22.880
MB	51,214	0.820	0.769	0.853	-0.522	2.334
ROE	51,214	-0.074	0.070	0.723	-1.095	0.366
VROE	51,214	0.668	0.121	1.909	0.016	2.997
LEV	51,214	0.201	0.150	0.209	0.001	0.605
AGE	51,214	2.527	2.485	0.797	1.099	3.850
DD	51,214	0.343	0.000	0.475	0.000	1.000
DIVER	51,214	0.962	1.000	0.192	1.000	1.000
Panel E. Corporate Governance and Accounting Transparency Variables						
G	15,639	8.962	9.000	2.677	5.000	13.000
EM_MODJONES	49,536	0.087	0.084	0.064	0.005	0.247
EM_PERMATCH	49,536	0.100	0.080	0.070	0.006	0.258
Panel F. Institutional Trading Variable						
INST	51,214	0.124	0.074	0.209	0.014	0.362

Table 2.2 Correlation Matrix

This table presents the correlation matrix for the main variables. Pearson correlations are shown. Numbers in bold are significantly different from zero at the 5% level.

Correlation Matrix																	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Ψ	1.000																
(2) Ψ_MKT	**0.753**	1.000															
(3) PIN	**0.589**	**0.572**	1.000														
(4) ADJPIN	**0.586**	**0.561**	**0.749**	1.000													
(5) AMIHUD_PI	**0.299**	**0.333**	**0.350**	**0.279**	1.000												
(6) COORD_PROX	**0.389**	**0.381**	**0.488**	**0.428**	**0.316**	1.000											
(7) COORD_PORT	**0.615**	**0.572**	**0.606**	**0.561**	**0.339**	**0.648**	1.000										
(8) IO	**-0.583**	**-0.557**	**-0.468**	**-0.437**	**-0.248**	**-0.466**	**-0.564**	1.000									
(9) IO_HHI	**-0.204**	**-0.210**	**-0.038**	**-0.031**	**-0.094**	**-0.199**	**-0.073**	**0.626**	1.000								
(10) SIZE	**-0.740**	**-0.658**	**-0.642**	**-0.638**	**-0.346**	**-0.500**	**-0.720**	**0.619**	**0.180**	1.000							
(11) MB	**-0.254**	**-0.218**	**-0.341**	**-0.331**	**-0.197**	**-0.181**	**-0.209**	**0.023**	**-0.058**	**0.406**	1.000						
(12) ROE	**-0.130**	**-0.110**	**-0.060**	**-0.049**	**-0.081**	**-0.095**	**-0.128**	**0.142**	**0.051**	**0.196**	**-0.090**	1.000					
(13) VROE	**0.080**	**0.069**	**0.030**	**0.030**	**0.033**	**0.072**	**0.110**	**-0.136**	**-0.034**	**-0.108**	**0.217**	**-0.175**	1.000				
(14) LEV	0.001	0.000	**0.041**	**0.039**	**0.014**	**0.032**	**0.028**	**0.038**	**0.091**	**0.048**	**-0.029**	**0.055**	**0.139**	1.000			
(15) AGE	**-0.247**	**-0.203**	**-0.111**	**-0.141**	**-0.046**	**-0.037**	**-0.238**	**0.280**	**0.076**	**0.267**	**-0.135**	**0.134**	**-0.131**	**0.033**	1.000		
(16) DD	**-0.163**	**-0.142**	**-0.179**	**-0.179**	**-0.077**	**-0.089**	**-0.171**	**0.133**	0.004	**0.277**	**0.013**	**0.104**	**-0.038**	**0.103**	**0.351**	1.000	
(17) DIVER	**0.132**	**0.113**	**0.081**	**0.081**	**0.031**	**0.044**	**0.103**	**-0.108**	**-0.040**	**-0.146**	-0.002	**-0.027**	**0.018**	**-0.058**	**-0.099**	**-0.060**	1.000

Table 2.3 The Effect of Shareholder Coordination on Stock Price Informativeness

This table reports estimates of coefficients of the panel regression where the dependent variable is the logistic transformed relative idiosyncratic volatility (Ψ).The main independent variables are the proxies for shareholder coordination measured by the inverse of the weighted average of the geographic distance between institutional shareholders (COORD_PROX) and the weighted average correlation between institutions' portfolios of stock holdings (COORD_PORT). Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included. Numbers in parentheses are t-statistics calculated using standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
$COORD\_PROX_{t-1}$	0.604***	0.094***	0.037***			
	(60.88)	(12.61)	(4.73)			
$COORD\_PORT_{t-1}$				5.662***	1.618***	1.407***
				(52.05)	(21.53)	(18.94)
IO_{t-1}			-1.428***			-1.141***
			(-27.18)			(-21.61)
IO_HHI_{t-1}			7.533***			4.299***
			(13.81)			(7.65)
$SIZE_{t-1}$		-0.617***	-0.514***		-0.541***	-0.455***
		(-88.15)	(-63.29)		(-66.94)	(-53.16)
MB_{t-1}		-0.602***	-0.574***		-0.556***	-0.534***
		(-59.87)	(-54.97)		(-55.35)	(-51.22)
ROE_{t-1}		-0.113***	-0.105***		-0.112***	-0.105***
		(-10.54)	(-9.48)		(-10.76)	(-9.63)
$VROE_{t-1}$		0.027***	0.021***		0.023***	0.019***
		(5.83)	(4.31)		(5.00)	(3.92)
LEV_{t-1}		1.119***	1.071***		0.956***	0.930***
		(26.33)	(22.49)		(22.79)	(19.90)
AGE_{t-1}		0.075***	0.091***		0.089***	0.094***
		(5.62)	(6.21)		(6.95)	(6.54)
DD_{t-1}		0.049***	0.027		0.040**	0.019
		(2.61)	(1.38)		(2.17)	(0.98)
$DIVER_{t-1}$		-0.092**	-0.058		-0.081**	-0.047
		(-2.14)	(-1.42)		(-1.98)	(-1.19)
Constant	7.714***	7.456***	6.940***	1.932***	5.913***	5.893***
	(80.18)	(80.84)	(73.00)	(23.88)	(60.29)	(60.43)
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES
Observations	52,865	51,214	51,214	52,865	51,214	51,214
Adj. R-squared	0.351	0.640	0.664	0.484	0.649	0.670

Table 13 The Effect of Shareholder Coordination on Stock Price Informativeness: Different types of Institutional Investors

This table reports estimates of coefficients of the panel regression where the dependent variable is the logistic transformed relative idiosyncratic volatility (Ψ). In Columns (1) and (3), the main independent variables are shareholder coordination measured among independent (COORD_IND) and grey institutional shareholders (COORD_GREY), respectively. In Columns (2) and (4), the main independent variables are shareholder coordination measured among dedicated (COORD_DED) and transient institutional shareholders (COORD_TRA), respectively. Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included. Numbers in parentheses are t-statistics calculated using standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	COORD_PROX		COORD_PORT	
	(1)	(2)	(3)	(4)
$COORD\_IND_{t-1}$	0.031***		0.522***	
	(4.70)		(9.84)	
$COORD\_GREY_{t-1}$	0.017**		0.066	
	(2.58)		(0.58)	
$COORD\_DED_{t-1}$		0.046***		0.543***
		(7.56)		(2.76)
$COORD\_TRA_{t-1}$		-0.007		-0.078
		(-1.40)		(-0.64)
IO_{t-1}	-1.447***	-1.443***	-1.457***	-1.477***
	(-27.71)	(-27.96)	(-28.17)	(-28.46)
IO_HHI_{t-1}	7.541***	7.469***	7.324***	7.574***
	(13.83)	(13.71)	(13.44)	(13.89)
$SIZE_{t-1}$	-0.516***	-0.523***	-0.510***	-0.521***
	(-64.26)	(-66.55)	(-63.92)	(-65.93)
MB_{t-1}	-0.578***	-0.577***	-0.573***	-0.580***
	(-55.88)	(-56.55)	(-56.29)	(-56.93)
ROE_{t-1}	-0.106***	-0.106***	-0.109***	-0.107***
	(-9.49)	(-9.56)	(-9.83)	(-9.57)
$VROE_{t-1}$	0.021***	0.022***	0.021***	0.021***
	(4.33)	(4.39)	(4.31)	(4.32)
LEV_{t-1}	1.082***	1.098***	1.071***	1.096***
	(22.71)	(23.08)	(22.58)	(22.96)
AGE_{t-1}	0.098***	0.068***	0.094***	0.097***
	(6.69)	(4.42)	(6.48)	(6.63)
$DIVER_{t-1}$	0.028	0.023	0.031	0.027
	(1.40)	(1.18)	(1.62)	(1.40)
DD_{t-1}	-0.058	-0.060	-0.056	-0.061
	(-1.43)	(-1.48)	(-1.39)	(-1.48)
Constant	7.001***	6.999***	6.642***	6.744***
	(69.18)	(69.93)	(75.62)	(77.13)
YEAR FE	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES
Observations	51,198	51,198	51,198	51,198
Adj. R-squared	0.664	0.665	0.666	0.664

Table 2.5 Endogeneity Test: Change-on-Change Regressions

This table shows estimates of change-on-change regressions. In Columns (1) and (2), the dependent variable is changes in logistic transformed relative idiosyncratic volatility ($\Delta\Psi$) from year t-1 to year t. The main independent variables are lagged changes in geographic-proximity-based (ΔCOORD_PROX) and portfolio-correlation-based shareholder coordination (ΔCOORD_PORT) from year t-2 to year t-1, respectively. In Columns (3) and (4), the main dependent variables are changes in geographic-proximity-based (ΔCOORD_PROX) and portfolio-correlation-based shareholder coordination (ΔCOORD_PORT) from year t-1 to year t, respectively. The main independent variable is lagged changes in logistic transformed relative idiosyncratic volatility ($\Delta\Psi$) from year t-2 to year t-1. Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included. Numbers in parentheses are t-statistics calculated using standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	$\Delta\Psi_t$		$\Delta COORD\_PROX_t$	$\Delta COORD\_PORT_t$
	(1)	(2)	(3)	(4)
$\Delta COORD\_PROX_{t-1}$	0.045*			
	(1.73)			
$\Delta COORD\_PORT_{t-1}$		0.381***		
		(3.54)		
$\Delta\Psi_{t-1}$			0.002	0.000
			(0.93)	(0.26)
ΔIO_{t-1}	0.211***	0.418***	0.010	-0.027***
	(2.58)	(5.18)	(0.36)	(-3.51)
ΔIO_HHI_{t-1}	-0.411	-1.111	-0.383*	0.043
	(-0.61)	(-1.64)	(-1.94)	(0.82)
$\Delta SIZE_{t-1}$	-0.274***	-0.347***	-0.006	0.003
	(-11.94)	(-18.39)	(-1.02)	(1.50)
ΔMB_{t-1}	-0.358***	-0.066***	0.033***	0.010***
	(-27.72)	(-3.54)	(5.77)	(5.78)
ΔROE_{t-1}	-0.086***	-0.024*	0.010***	0.003***
	(-7.00)	(-1.90)	(2.65)	(3.24)
$\Delta VROE_{t-1}$	0.023***	0.002	0.002	0.001
	(2.90)	(0.32)	(0.94)	(1.43)
ΔLEV_{t-1}	-0.070	-0.073	-0.040*	-0.028***
	(-0.96)	(-1.00)	(-1.94)	(-4.41)
ΔAGE_{t-1}	-0.144*	-0.190***	-0.203***	-0.084***
	(-1.93)	(-2.59)	(-6.07)	(-8.14)
ΔDD_{t-1}	-0.027	-0.019	-0.006	-0.000
	(-0.91)	(-0.65)	(-0.79)	(-0.08)
$\Delta DIVER_{t-1}$	0.016	0.021	0.017	0.003
	(0.33)	(0.41)	(1.36)	(1.03)
Constant	-0.352***	-0.344***	-0.017**	0.001
	(-13.99)	(-13.85)	(-2.47)	(0.57)
YEAR FE	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES
Observations	43,785	43,785	42,218	42,218
Adj. R-squared	0.122	0.129	0.045	0.022

Table 2.6 Endogeneity Test: Other Methods

This table reports the results of other endogeneity tests. In Columns (1) and (2), we estimate the baseline model with firm fixed effect. In Columns (3) and (4), we use residual geographic-proximity-based (COORD_PROX_RES) and portfolio-correlation-based shareholder coordination (COORD_PORT_RES) instead of raw shareholder coordination measures, respectively. In Columns (5) and (6), we instrument for both shareholder coordination measures using a series of binary variables that represent firms' headquarters location dummies of the major 21 cities or metropolitan areas in the US plus a dummy for a firm located in a remote city. A remote city is defined as a city located more than 150 miles away from one of the 21 major cities. In Columns (7) and (8), we report the regression results using the GMM method. In all regressions, the dependent variable is the logistic transformed relative idiosyncratic volatility (Ψ). Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included except for results in Columns (1) and (2). Numbers in parentheses are t-statistics calculated using standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	Firm FE		Residual Coordination		IV		GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$COORD\_PROX_{t-1}$	0.031***				0.448**		0.140**	
	(3.32)				(2.04)		(2.22)	
$COORD\_PORT_{t-1}$		0.620***				9.859***		1.046**
		(6.62)				(3.51)		(2.41)
$COORD\_PROX\_RES_{t-1}$			0.020**					
			(2.01)					
$COORD\_PORT\_RES_{t-1}$				0.730***				
				(9.52)				
IV_{t-1}							0.335***	0.355***
							(2.74)	(2.70)
IV_{t-2}							0.031	0.027
							(1.08)	(0.91)
IO_{t-1}	-0.720***	-0.893***	-1.483***	-1.367***	-0.592***	-1.693***	-0.438**	-0.419
	(-10.97)	(-11.69)	(-27.58)	(-25.65)	(-5.76)	(-6.47)	(-2.04)	(-1.11)
IO_HHI_{t-1}	2.735***	2.218***	7.631***	6.113***	-0.421	-6.862***	1.402***	0.389
	(3.99)	(3.34)	(13.34)	(11.62)	(-0.59)	(-3.20)	(2.77)	(0.13)
$SIZE_{t-1}$	-0.561***	-0.492***	-0.522***	-0.561***	-0.490***	-0.274***	-0.283***	-0.264***
	(-36.44)	(-30.99)	(-63.94)	(-69.07)	(-37.63)	(-3.30)	(-3.58)	(-3.35)
MB_{t-1}	-0.079***	-0.092***	-0.594***	-0.086***	-0.533***	-0.104***	0.007	0.024
	(-4.94)	(-5.84)	(-55.37)	(-7.14)	(-22.23)	(-7.41)	(0.10)	(0.36)
ROE_{t-1}	-0.026**	-0.028**	-0.121***	-0.001	-0.098***	-0.033**	-0.966***	-0.845***
	(-2.17)	(-2.38)	(-9.75)	(-0.06)	(-7.72)	(-2.42)	(-4.93)	(-4.33)
$VROE_{t-1}$	0.001	-0.001	0.027***	0.002	0.023***	0.006	-0.060***	-0.056***
	(0.09)	(-0.10)	(4.65)	(0.39)	(4.52)	(1.23)	(-3.16)	(-3.13)
LEV_{t-1}	0.017	-0.003	1.104***	0.157***	0.970***	0.113**	-0.173	-0.329
	(0.27)	(-0.05)	(21.59)	(3.36)	(14.83)	(2.24)	(-0.66)	(-1.32)
AGE_{t-1}	0.136***	0.183***	0.096***	0.059***	0.031	0.119***	0.150***	0.142***
	(2.73)	(3.67)	(6.29)	(4.13)	(1.06)	(4.74)	(4.02)	(3.98)
DD_{t-1}	-0.017	-0.024	0.037*	0.041**	0.017	0.003	-0.065	-0.059
	(-0.62)	(-0.91)	(1.80)	(2.12)	(0.85)	(0.14)	(-0.72)	(-0.65)
$DIVER_{t-1}$	0.042	0.048	-0.061	-0.030	-0.055	-0.045	-0.092	-0.082
	(0.84)	(0.97)	(-1.49)	(-0.78)	(-1.31)	(-1.06)	(-1.02)	(-0.97)
Constant	14.008***	12.706***	6.731***	14.578***	9.305***	7.689***	5.196***	5.524***
	(47.47)	(39.26)	(74.88)	(91.15)	(5.91)	(3.49)	(3.04)	(3.28)
YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
INDUSTRY FE	NO	NO	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	NO	NO	NO	NO	NO	NO
First-stage F statistics (p-value)					0.000	0.038		
Hansen test (p-value)					0.556	0.317	0.648	0.350
Serial correlation test (p-value)							0.476	0.915
Observations	51,214	51,214	48,949	48,949	51,214	51,214	42,561	42,561
Adj. R-squared	0.744	0.746	0.664	0.484	0.544	0.496	-	-

Table 2.7 Baseline Model Estimates Using Alternative Stock Price Informativeness Measures

This table reports estimates of coefficients of panel regressions with alternative stock price informativeness measures. Columns (1) and (2) use the logistic transformed relative idiosyncratic volatility estimated by Fama and French (1992) three-factor model of returns. Columns (3) and (4) use the annual probability of information-based trading (PIN) of Easley et al. (2002). Columns (5) and (6) use the annual adjusted PIN (ADJ_PIN) of Duarte and Young (2009). Columns (7) and (8) use the price impact measure of Amihud (2002). Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included. Numbers in parentheses are t-statistics calculated using standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	Ψ_MKT$_t$		PIN$_t$		ADJ_PIN$_t$		AMIHUD_PI$_t$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COORD_PROX$_{t-1}$	0.071***		0.017***		0.009***		1.201***	
	(8.39)		(9.28)		(5.90)		(13.71)	
COORD_PORT$_{t-1}$		1.391***		0.177***		0.081***		10.916***
		(17.97)		(11.81)		(6.68)		(15.00)
IO$_{t-1}$	-1.347***	-1.121***	-0.090***	-0.079***	-0.057***	-0.054***	-1.908***	-1.126***
	(-24.68)	(-20.58)	(-10.60)	(-9.77)	(-9.98)	(-9.34)	(-6.43)	(-3.80)
IO_HHI$_{t-1}$	6.023***	3.004***	0.646***	0.301***	0.441***	0.286***	-0.160	-21.642***
	(10.70)	(5.19)	(5.84)	(2.82)	(6.21)	(3.93)	(-0.04)	(-5.33)
SIZE$_{t-1}$	-0.351***	-0.299***	-0.022***	-0.017***	-0.018***	-0.016***	-0.655***	-0.371***
	(-42.94)	(-34.36)	(-18.82)	(-12.65)	(-23.99)	(-18.16)	(-14.70)	(-7.70)
MB$_{t-1}$	-0.395***	-0.361***	-0.029***	-0.026***	-0.022***	-0.021***	-1.434***	-1.299***
	(-36.21)	(-33.18)	(-16.67)	(-14.34)	(-18.28)	(-16.47)	(-19.24)	(-17.02)
ROE$_{t-1}$	-0.060***	-0.060***	0.005**	0.006***	0.004**	0.005**	-0.491***	-0.512***
	(-5.44)	(-5.52)	(2.22)	(3.11)	(2.09)	(2.45)	(-6.34)	(-6.58)
VROE$_{t-1}$	0.009*	0.006	-0.002***	-0.002***	-0.002***	-0.002***	0.045	0.027
	(1.94)	(1.37)	(-2.78)	(-3.18)	(-3.26)	(-3.57)	(1.30)	(0.78)
LEV$_{t-1}$	0.719***	0.607***	0.036***	0.029***	0.034***	0.031***	2.365***	1.932***
	(14.62)	(12.55)	(4.78)	(3.78)	(6.25)	(5.59)	(7.28)	(6.00)
AGE$_{t-1}$	0.105***	0.113***	0.004**	0.007***	0.001	0.002*	0.178**	0.350***
	(7.00)	(7.80)	(2.21)	(3.58)	(0.71)	(1.71)	(2.09)	(4.17)
DIVER$_{t-1}$	-0.021	-0.027	-0.001	-0.002	-0.001	-0.001	0.005	-0.041
	(-0.99)	(-1.33)	(-0.46)	(-0.60)	(-0.27)	(-0.35)	(0.04)	(-0.36)
DD$_{t-1}$	-0.035	-0.026	0.004	0.005	-0.001	-0.000	-0.016	0.013
	(-0.85)	(-0.64)	(1.24)	(1.54)	(-0.24)	(-0.10)	(-0.09)	(0.07)
Constant	5.850***	4.633***	0.480***	0.283***	0.372***	0.277***	14.127***	1.166*
	(66.49)	(51.03)	(33.96)	(20.48)	(31.88)	(25.10)	(19.47)	(1.92)
YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	48,624	48,624	15,486	15,486	15,486	15,486	51,214	51,214
Adj. R-squared	0.563	0.569	0.494	0.499	0.472	0.472	0.188	0.190

Table 2.8 The Effect of Shareholder Coordination on Stock Price Informativeness: Controlling for Corporate Governance and Accounting Transparency

This table reports estimates of coefficients of the panel regression controlling for corporate governance and institutional trading. The dependent variable is the logistic transformed relative idiosyncratic volatility (Ψ). The main independent variables are the proxies for shareholder coordination measured by the inverse of the weighted average of the geographic distance between institutional shareholders (COORD_PROX) and the weighted average correlation between institutions' portfolios of stock holdings (COORD_PORT). G is the IRRC-Gompers et al. (2003) governance index. The first accounting transparency measure is measured by the absolute value of discretionary accruals estimated by the modified Jones model, EM_MODJONES, (Dechow et al.(1995)). The second accounting transparency measure is measured by the absolute value of discretionary accruals estimated the performance matched model, EM_PERMATCH, (Kothari et al. (2005)). Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included. Numbers in parentheses are t-statistics calculated using standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
$COORD\_PROX_{t-1}$	0.198***	0.025**	0.024**			
	(5.35)	(2.20)	(2.00)			
$COORD\_PORT_{t-1}$				3.540***	1.291***	1.299***
				(15.40)	(11.17)	(10.66)
G_{t-1}	0.002			0.004		
	(0.29)			(0.82)		
$EM\_MODJONES_{t-1}$		-0.061***			-0.060***	
		(-4.25)			(-4.20)	
$EM\_PERMATCH_{t-1}$			-0.041***			-0.040***
			(-5.44)			(-5.38)
IO_{t-1}	-0.720***	-1.409***	-1.454***	-0.441***	-1.133***	-1.176***
	(-7.99)	(-22.38)	(-24.75)	(-5.06)	(-17.87)	(-19.35)
IO_HHI_{t-1}	4.042***	7.592***	7.632***	-2.351**	4.625***	4.662***
	(4.68)	(13.27)	(12.87)	(-2.57)	(7.11)	(6.85)
$SIZE_{t-1}$	-0.439***	-0.519***	-0.517***	-0.346***	-0.462***	-0.459***
	(-32.38)	(-59.27)	(-58.12)	(-23.51)	(-48.03)	(-47.53)
MB_{t-1}	-0.505***	-0.563***	-0.567***	-0.430***	-0.523***	-0.526***
	(-24.79)	(-47.18)	(-45.83)	(-21.31)	(-43.47)	(-42.01)
ROE_{t-1}	-0.062***	-0.110***	-0.105***	-0.047**	-0.109***	-0.105***
	(-2.59)	(-9.24)	(-8.63)	(-2.00)	(-9.47)	(-8.92)
$VROE_{t-1}$	0.066***	0.023***	0.024***	0.058***	0.021***	0.022***
	(5.43)	(4.38)	(4.40)	(4.91)	(4.05)	(4.05)
LEV_{t-1}	1.046***	1.038***	1.012***	0.837***	0.892***	0.860***
	(11.68)	(16.16)	(15.21)	(9.71)	(13.81)	(12.95)
AGE_{t-1}	0.028	0.110***	0.099***	0.024	0.112***	0.100***
	(1.05)	(5.55)	(5.56)	(0.95)	(5.65)	(5.80)
DD_{t-1}	0.031	0.033	0.044**	0.028	0.025	0.037*
	(1.00)	(1.41)	(1.96)	(0.93)	(1.09)	(1.69)
$DIVER_{t-1}$	-0.077	-0.093**	-0.093*	-0.057	-0.077*	-0.077*
	(-1.53)	(-1.99)	(-1.93)	(-1.19)	(-1.76)	(-1.71)
Constant	7.229***	6.856***	6.909***	4.442***	5.928***	5.982***
	(24.54)	(58.46)	(56.12)	(21.27)	(53.30)	(52.04)
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES
Observations	15,639	49,536	49,536	15,639	49,536	49,536
Adj. R-squared	0.598	0.665	0.669	0.613	0.670	0.674

Table 2.9 The Effect of Shareholder Coordination on Stock Price Informativeness: Robustness Checks

This table reports estimates of coefficients of the panel regression where the dependent variable is the logistic transformed relative idiosyncratic volatility (Ψ).The main independent variables are the proxies for shareholder coordination measured by the inverse of the weighted average of the geographic distance between institutional shareholders (COORD_PROX) and the weighted average correlation between institutions' portfolios of stock holdings (COORD_PORT). Columns (1) and (2) report results using the Fama and MacBeth (1973) estimation approach with estimates given by annual cross-sectional firm-level regressions. Columns (3) and (4) report results using the Peterson (2009) estimation approach with estimates clustered by firm and year. Columns (5) and (6) report results using 3-digit SIC industry classification scheme as industry fixed effect. Columns (7) and (8) report results using Fama-French (1997) 48 industry SIC classification scheme as industry fixed effect. Columns (9) and (10) use shareholder coordination measures constructed without institutions located in New York City and Boston. Columns (11) and (12) use shareholder coordination measures constructed without local institutions. Detailed variable definitions are listed in Appendix A. Robust t-statistics are in parentheses. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	Fama-MacBeth		Two-way clustering		Industry FE (3-digit SIC code)		Industry FE (Fama-French 48 industry)		Coordination (without New York and Boston)		Coordination (without local institutions)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$COORD\_PROX_{t-1}$	0.071***		0.042**		0.033***		0.035***		0.056***		0.022***	
	(4.54)		(2.02)		(4.32)		(4.53)		(8.23)		(2.96)	
$COORD\_PORT_{t-1}$		1.641***		1.407***		1.357***		1.408***		0.130**		0.461***
		(6.93)		(6.18)		(18.57)		(19.09)		(2.28)		(5.07)
IO_{t-1}	-1.347***	-1.039***	-1.419***	-1.141***	-1.410***	-1.135***	-1.438***	-1.149***	-1.405***	-1.469***	-1.457***	-1.384***
	(-11.17)	(-12.32)	(-11.77)	(-12.44)	(-27.50)	(-22.03)	(-27.70)	(-22.05)	(-26.93)	(-28.22)	(-27.63)	(-24.94)
IO_HHI_{t-1}	6.920***	3.422***	7.504***	4.299***	7.391***	4.295***	7.551***	4.325***	7.232***	7.610***	7.635***	6.912***
	(12.92)	(5.43)	(11.47)	(6.02)	(13.84)	(7.79)	(13.68)	(7.63)	(13.27)	(13.89)	(13.94)	(12.01)
$SIZE_{t-1}$	-0.507***	-0.449***	-0.514***	-0.455***	-0.511***	-0.453***	-0.515***	-0.456***	-0.514***	-0.519***	-0.517***	-0.503***
	(-46.76)	(-30.61)	(-42.92)	(-30.74)	(-62.55)	(-53.09)	(-64.79)	(-54.43)	(-64.62)	(-64.31)	(-63.65)	(-57.78)
MB_{t-1}	-0.549***	-0.512***	-0.573***	-0.534***	-0.575***	-0.536***	-0.574***	-0.534***	-0.572***	-0.579***	-0.578***	-0.567***
	(-31.08)	(-25.12)	(-21.23)	(-18.80)	(-56.48)	(-52.70)	(-54.87)	(-51.14)	(-55.64)	(-56.40)	(-55.45)	(-53.91)
ROE_{t-1}	-0.123***	-0.124***	-0.105***	-0.105***	-0.110***	-0.109***	-0.105***	-0.104***	-0.104***	-0.106***	-0.106***	-0.105***
	(-8.36)	(-8.44)	(-5.64)	(-5.60)	(-10.09)	(-10.18)	(-9.47)	(-9.56)	(-9.38)	(-9.57)	(-9.47)	(-9.44)
$VROE_{t-1}$	0.022***	0.020***	0.021***	0.019***	0.021***	0.019***	0.020***	0.018***	0.021***	0.022***	0.022***	0.021***
	(4.95)	(4.81)	(3.61)	(3.51)	(4.19)	(3.82)	(3.95)	(3.55)	(4.24)	(4.36)	(4.31)	(4.31)
LEV_{t-1}	1.026***	0.876***	1.068***	0.930***	1.027***	0.893***	1.068***	0.928***	1.073***	1.089***	1.090***	1.049***
	(22.65)	(14.61)	(18.88)	(14.91)	(21.51)	(19.10)	(22.53)	(20.00)	(22.50)	(22.80)	(22.56)	(21.38)
AGE_{t-1}	0.076***	0.071***	0.090***	0.094***	0.085***	0.088***	0.096***	0.099***	0.094***	0.096***	0.094***	0.097***
	(4.61)	(4.50)	(4.35)	(4.84)	(5.91)	(6.27)	(6.59)	(6.98)	(6.46)	(6.56)	(6.32)	(6.60)
DD_{t-1}	0.022	0.015	0.027	0.019	-0.001	-0.007	0.024	0.016	0.028	0.028	0.030	0.027
	(0.84)	(0.59)	(0.84)	(0.59)	(-0.03)	(-0.38)	(1.25)	(0.85)	(1.41)	(1.41)	(1.51)	(1.39)
$DIVER_{t-1}$	-0.044	-0.051	-0.058	-0.047	-0.031	-0.021	-0.041	-0.030	-0.058	-0.060	-0.057	-0.055
	(-1.20)	(-1.56)	(-1.43)	(-1.19)	(-0.77)	(-0.55)	(-1.01)	(-0.77)	(-1.42)	(-1.46)	(-1.39)	(-1.36)
Constant	6.144***	4.865***	6.859***	5.771***	6.904***	5.903***	6.905***	5.866***	7.006***	6.711***	4.862***	4.514***
	(37.42)	(17.75)	(25.52)	(30.90)	(74.03)	(61.39)	(72.99)	(60.41)	(76.41)	(75.32)	(63.81)	(53.66)
YEAR FE	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	51,214	51,214	51,214	51,214	51,214	51,214	51,214	51,214	51,214	51,214	50,813	50,813
Adj. R-squared	0.580	0.590	0.665	0.671	0.674	0.680	0.665	0.671	0.666	0.665	0.665	0.666

Table 2.10 The Effect of Shareholder Coordination on Stock Price Informativeness: the Role of Institutional Trading

This table reports estimates of coefficients of the panel regression controlling for institutional trading. The dependent variable is the logistic transformed relative idiosyncratic volatility (Ψ). The main independent variables are shareholder coordination (COORD_PROX and COORD_PORT), institutional trading (INST) and the interaction term between them (COORD_PROX×INST and COORD_PORT×INST). INST is the absolute change in the number of shares held by institutions as a fraction of annual trading volume. Detailed variable definitions are listed in Appendix A. Both industry (i.e., the first two-digit SIC code) and year dummies are included. Numbers in parentheses are t-statistics calculated using robust standard errors adjusted by heteroskedasticity and clustered at the firm level. ***, **, and * indicate a two-tailed test significance level at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)
$COORD\_PROX_{t-1}$×$INST_{t-1}$			0.043**	
			(2.43)	
$COORD\_PORT_{t-1}$× $INST_{t-1}$				0.470***
				(3.25)
$INST_{t-1}$	2.413***	2.125***	0.572***	0.149***
	(24.01)	(21.07)	(5.32)	(2.76)
$COORD\_PROX_{t-1}$	0.030***		0.021*	
	(3.83)		(1.89)	
$COORD\_PORT_{t-1}$		1.148***		1.203***
		(16.04)		(10.41)
IO_{t-1}	-1.225***	-1.017***	-1.353***	-1.084***
	(-24.05)	(-19.82)	(-21.55)	(-17.21)
IO_HHI_{t-1}	5.018***	2.689***	6.531***	3.496***
	(9.86)	(5.11)	(11.56)	(5.50)
$SIZE_{t-1}$	-0.481***	-0.437***	-0.518***	-0.462***
	(-61.28)	(-52.73)	(-59.29)	(-48.20)
MB_{t-1}	-0.535***	-0.507***	-0.559***	-0.521***
	(-53.59)	(-50.59)	(-47.73)	(-44.25)
ROE_{t-1}	-0.118***	-0.116***	-0.120***	-0.120***
	(-10.78)	(-10.74)	(-10.26)	(-10.43)
$VROE_{t-1}$	0.024***	0.021***	0.025***	0.023***
	(4.93)	(4.53)	(4.82)	(4.45)
LEV_{t-1}	0.974***	0.873***	1.043***	0.899***
	(21.45)	(19.41)	(16.57)	(14.24)
AGE_{t-1}	0.063***	0.068***	0.096***	0.099***
	(4.49)	(4.95)	(4.93)	(5.08)
DD_{t-1}	0.010	0.006	0.025	0.019
	(0.57)	(0.33)	(1.05)	(0.82)
$DIVER_{t-1}$	-0.056	-0.047	-0.081*	-0.062
	(-1.44)	(-1.24)	(-1.95)	(-1.58)
Constant	6.563***	5.754***	6.734***	5.869***
	(69.62)	(60.05)	(58.95)	(54.06)
YEAR FE	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES
Observations	51,214	51,214	51,214	51,214
Adj. R-squared	0.675	0.678	0.667	0.672

Appendix A: Definition of Variables

Variables		Definition
Panel A. Stock Price Informativeness Variables		
Logistic relative Idiosyncratic Volatility	Ψ	Annual logistic transformed relative volatility estimated from Fama and French (1992) three factor model
Panel B. Alternative Measures of Stock Price Informativeness		
Logistic relative Idiosyncratic Volatility, alternative	Ψ_MKT	Annual logistic transformed relative volatility estimated from the expanded market model with Fama-French 48 industry returns (Cheng, Goldstein and Jiang (2007))
Probability of information-based trading	PIN	Annual probability of information-based trading of Easley et al. (2002)
Adjusted probability of information-based trading	ADJ_PIN	The annual component of PIN related to asymmetric information according to Duarte and Young (2009)
Amihud price impact	AMIHUD_PI	Average daily ratio of a stock absolute return by the dollar volume (Amihud (2002)).
Panel C. Shareholder Coordination Variables		
Geographic-proximity-based shareholder coordination	COORD_PROX	The inverse of the average of log(1+weighted-average geographic distance between institutional shareholders of the firm) in each firm-quarter in year t-1, where weight is the ratio of ownership held by institution i to the total ownership held by all institutions in firm b at quarter q
Portfolio-correlation-based shareholder coordination	COORD_PORT	The average of the weighted average correlation between institutions' portfolios of stock holdings (relative to the weight in the market portfolio) in each firm-quarter in year t-1, where weight is the ratio of ownership held by institution i to the total ownership held by all institutions in firm b at quarter q
Coordination among independent institutions	COORD_IND	Shareholder coordination measured among independent institutions (mutual funds and independent investment advisors)
Coordination among grey institutions	COORD_GREY	Shareholder coordination measured among grey institutions (bank trusts, insurance companies, and other institutions)
Coordination among dedicated institutions	COORD_DED	Shareholder coordination measured among dedicated institutions (as defined in Bushee (2001))
Coordination among transient institutions	COORD_TRA	Shareholder coordination measured among transient institutions (as defined in Bushee (2001))

Panel D. Control Variables for Stock Pice Informativeness Regressions		
Institutional ownership	IO	The average percentage of aggregated share holdings by institutional investors to total shares outstanding in year t-1
Institutional ownership concentration	IO_HHI	Herfindahl Index of institutional ownership concentration based on the percentages of institutional holdings by all 13F institutions (Hartzell and Starks, 2003).
Market capitalization	SIZE	Annual Market capitalization (COMPUSTAT#25 × COMPUSTAT #199)
Market-to-book ratio	MB	Log of the market-to-book ratio (COMPUSTAT#25 × COMPUSTAT #199) / (COMPUSTAT#60)
Return on equity	ROE	Return on equity calculated as earnings before extraordinary items (COMPUSTAT#18) divided by book value of equity (COMPUSTAT#60) by the end of prior year
Volatility of return on equity	VROE	Sample variance of annual ROE over the last 3 years
Leverage	LEV	The ratio of long-term debt (COMPUSTAT#10) to total assets (COMPUSTAT#6)
Firm age	AGE	Log age defined as the number of years since the stock was included in the CRSP database
Dividend dummy	DD	Annual dividend dummy, which equals 1 if the firm pays dividends, and 0 otherwise (COMPUSTAT #201>0)
Diversification dummy	DIVER	Annual dummy variable that equals 1 when a firm operates in multiple segments, and 0 otherwise
Panel E. Corporate Governance and Accounting Transparency Variables		
Governance index	G	IRRC-Gompers et al. (2003) governance index, which is based on 24 antitakeover provisions
Earnings Management, first version	EM_MODJONES	Absolute value of discretionary accruals estimated by using modified Jones model (Dechow et al. 1995)
Earnings Management, alternative version	EM_PERMATCH	Absolute value of performance matched discretionary accruals based on the difference of accruals from modified Jones model between the target firm and matched firm with the same two-digit SIC code and with closest return on assets in the current year (Kothari et al. (2005))
Panel F. Institutional Trading Variable		
Institutional trading	INST	Annual average of quarterly absolute change in the number of shares held by institutions, as a fraction of annual trading volume