Heterogeneity of institutional ownership and stock price delay

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Abstract: While the competition among institutional investors helps share price efficiently reflect information, information asymmetry and adverse selection resulting from their information advantage also hinder the information dissemination to share price. This study examines how heterogeneous institutional ownership affects stock price delay. Our first result shows higher total institutional ownership and number of institutions reduce price delay. We further classify institution types from stock's perspective (top 5 and year-long) and institution's perspective (low churn rate, high churn rate, concentrated, skilled, and independent). After controlling the total institutional ownership, investor attention, and firm characteristic variables, we find ownership from top 5 and low churn rate institutions helps lower price delay while high churn rate, concentrated, and skilled institutional ownership increases the delay. Moreover, the price delay components related to concentrated and skilled institutions are positively associated with expected stock returns. Our results suggest top 5 and low churn rate institutions actively monitor firms and reduce price delay, while other types of institutions utilize their information advantage, potentially hindering uninformed investors' trading and resulting in delayed price adjustment to information.

JEL Classification: G12, G14, G20
Keywords: institutional ownership, stock price delay, market frictions, adverse selection, information efficiency

1. Introduction

More and more people delegate their stock investment decisions to professional institutional investors and currently the average institutional ownership of stocks are more than 50% in the U.S. stock market.[1] Since institutional investors play a more important role in the stock market than before, it is critical to understand how institutional ownership affects stock price discovery and market efficiency. Akins, Ng, and Verdi (2012) use the number and the concentration of institutional ownership to proxy for competition among institutional investors and find that a lower pricing of information asymmetry when more competition exists. Brennan and Subrahmanyam (1995) also claim that increases in institutional ownership may induce subsequent increase in the number of analyst following and change the information environment. Hou and Moskowitz (2005) document that investor recognition variables including total institutional ownership are most responsible for the U.S. stock price delay effect.[2] However, Hou and Moskowitz (2005) do not address the influences from different types of institutions on price delay and related premium. We believe a thorough analysis for this question is important for two reasons. First, institutions which increase price efficiency and reduce price delay of their holding stocks should be encouraged since shares with less friction will result in a lower cost of equity and more positive NPV projects for their holding firms. Second, institutions which increase a company's price delay should be identified because their informed trading may cause uninformed investors refrain from holding this stock, reducing the stock's liquidity and increasing the firm's financing cost.[3]

Our study is motivated by a variant in the literature that examines the impact of institutional ownership on stock market and information environment. For research related to stock returns, Gompers and Metrick (2001) find that an increasing demand for large companies from institutional investors during 1980 to 1996 can explain part of the disappearance of the small company stock premium. However, Lewellen (2011) shows that institutions as a whole seem to do little more than hold the market portfolio and institutions' aggregate returns almost perfectly mimic the value-weighted index. Therefore, Lewellen (2011) does not believe institutions provide additional value for investors. For research related to stock volatility, Sias (1996), Gabaix, Gopikrishnan, Plerou and Stanley (2006) and Greenwood and

[1] As of December 2013, the average institutional ownership of 3353 common stocks in our sample is 52.15%.

[2] Investor recognition variables in Hou and Moskowitz (2005) include institutional ownership, analyst coverage, number of shareholders, number of employees, advertising expense, regional exchange dummy, the average distance between each firm's headquarter and the nearest airport, and the average airfare between the nearest airport and all U.S. airports.

[3] Lin, Singh, Sun, and Yu (2014) document that firms with greater price delay have more difficulty attracting traders (higher incidents of non-trading) and their investors face higher liquidity risk, which accounts for their anomalous returns.

Thesmar (2011) show that increase in institutional holdings and correlated liquidity shocks result in an increase in volatility. Basak and Pavlova (2013) also find that institutions tilt their portfolios towards stocks that compose their benchmark index and amplify the index volatilities and stock mark volatility. Cella, Ellul and Giannetti (2013) further show that institutional investors with short horizons amplify the effects of market-wide negative shocks and stocks held by them experience large prices drops during market turmoil.

The empirical results on the relationship between institution ownership and stock liquidity are mixed. Some studies support that institutional investors reduce stock liquidity. For example, Glosten and Milgrom (1985) propose a model to explain the effect of the presence of traders with superior information on the bid-ask spread and claim that market makers will request higher spreads when trading stocks with higher institutional holdings. Easley and O' Hara (1987) also claim that in the presence of informed investors, the risk-neutral market maker will request a higher bid-ask spread due to the adverse selection risk. Sarin, Shastri and Shastri (2000) empirically show that higher institutional holding is associated with wider spreads and smaller quoted depth. In contrast, Tinic (1972) and Hamilton (1978) document a negative relationship between institutional holdings and bid-ask spread for NYSE and NASDAQ stocks respectively. Jenning, Schnatterly and Seguin (2002) also find that stock spreads of NASDAQ securities are negatively associated with levels of institutional ownership. Rubin (2007) claims that liquidity is positively related to total institutional holdings but negatively related to institutional block holdings. Interestingly, Agarwal (2007) proposes that institutional investors' information advantage can affect stock liquidity through adverse selection (reducing liquidity) and information efficiency (improving liquidity) channels, and documents a U-shaped relationship between the institutional ownership and stock illiquidity measures. Blume and Keim (2012) further show that the number of institutions owning and trading a stock is more important than the percentage of institutional ownership in explaining the cross-sectional variability of illiquidity. However, some empirical studies fail to find any relationship between bid-ask spread and institutional holdings (Fabozzi, 1979 and Chiang and Venkatesh, 1988).

The aforementioned research collectively suggests a potential linkage between institution ownership and the change of information environment. Hou and Mokowitz (2005) also claim that institutional forces can delay the process of information incorporation for less visible firms and price delay may also result from lack of liquidity of an asset's shares. Previous studies show that different institutional investors have their own trading strategies and distinct tastes for stocks. For example, Falkenstein (1996) find mutual funds have a significant preference towards stocks with visibility and low transaction costs due to investor recognition and potential agency problems in mutual funds. Yan and Zhang (2009) highlight the difference between short-term and long-term institutional preferences for their portfolios, where

short-term institutions prefer younger firms and firms with higher turnover and lower dividend yields. Furthermore, Lewellen (2011) and Hotchkiss and Strickland (2003) point out that high turnover institutions tend to buy small and high momentum firms. Similarly, Bushee (2001) shows that transient investors with high turnover and more diversification are associated with an over-weighting of near-term expected earnings. Therefore, the systematic preference differences suggest that stocks held by various types of institutions will respond to information at different speed.

In our study, we first examine how institutional investors influence the stock price delay and related expected stock return. After controlling firm characteristics and investor recognition variables, we find both the total institutional ownership of a stock and the number of institutions holding it help reduce stock price delay in our sample period from 1981 to 2013. Our evidence suggests institutional investors as a whole improve the stock price efficiency. Nevertheless, we find the price delay component related to the total institutional ownership does not correlate with the expected stock return.

We then separate types of institutions from the stock's perspective and from the institution's perspective to examine the relationship between different types of institutional ownership and stock price delay. From the stock's perspective, a stock's top 1, top 5, and blockholder (who holds more than 5% of the stock) institutions are often more influential than other institutions. Rubin (2007) documents that a stock's liquidity is negatively related to its institutional blockholdings and argues that the concentration of such ownership proxies for adverse selection. In addition, institutional investors could be long-term investors or short-term speculators. Chen, Harford, and Li (2007) document that only concentrated holdings by independent long-term institutions are related to post-merger performance, suggesting independent long-term institutions will make more efforts to monitor a firm.[4] In our study, we examine how a stock's top 5 or year-long institutional investors (keeping the stock longer than one year) influence the price delay of the stock. After controlling firm characteristics, investor recognition, and total institutional investor variables, we find that the ownership of top 5 institutions further helps lower the stock price delay. However, year-long institutions do not have any additional effect on price delay. Similar to the result from treating institutions as a whole, the price delay components related to top 5 and year-long institutional ownership do not correlate with the expected stock return.

From the institution's perspective, institutions can be classified on the basis of institutions' legal classification, independence, trading frequency, holdings' concentration, and skill level. For an institution's legal classification, CDA/Spectrum

[4] Chen et al. (2007) define a long-term institutional investor as the institution which has maintained stakes in a firm for at least one year.

database classifies all institutions into five types: (1) bank, (2) insurance company, (3) investment company (mutual fund), (4) investment advisor which includes large brokerage firms, and (5) other which includes pension funds and university endowments. However, according to Chen, Harford, and Li (2007), due to a mapping error, this classification is not accurate beyond 1998. To solve this issue, Professor Brian Bushee manually classifies institutions on the Thomson Reuters Institutional (13F) Holdings database into the following types: (1) bank trust, (2) insurance company, (3) investment company, (4) independent investment advisor, (5) corporate (private) pension fund, (6) public pension fund, (7) university and foundation endowments, and (8) miscellaneous.[5] In our study, we follow Chen et al. (2007) to classify (3) investment company, (4) independent investment advisor, and (6) public pension fund as independent institutions and find independent institutional ownership does not have additional effect on price delay and the price delay component related to independent institutional ownership does not correlate with the expected stock return.

In terms of institutions' trading frequency, following Yan and Zhang (2009), we separate institutions into high-churn-rate institutions (top tertile quarterly churn rate) and low-churn-rate institutions (bottom tertile quarterly churn rate). Yan and Zhang (2009) document that short-term institutions (high churn rate) are more informed because their trading forecasts future stock returns and that this return predictability does not reverse in the long run and is stronger for small and growth stocks with more information asymmetry. However, Gaspar, Massa and Matos (2005) show that target firms with short-term institutional shareholders are more likely to receive an acquisition bid with lower premiums due to weaker monitoring from these short-term institutions. Attig, Cleary, Ghoul, and Guedhami (2013) also demonstrate that a firm's cost of equity declines in the presence of institutional investors with long-term investment horizons (low-churn-rate institutions). After controlling firm characteristics, investor recognition, and total institutional investor variables, we find high churn rate institutional ownership further increases stock price delay while low churn rate institutional ownership reduces the delay. However, the stock price delay components related to both high churn rate and low churn rate institutional ownership do not correlate with the expected stock return.

Finally, we examine the influences of institutional investors on the stock price delay on the basis of their holding concentration and skill. We calculate each institution's holding Herfindahl Hirschmann index (HHI) as the sum of square of each stock's holding value percentage in the institution's portfolio. Institutions with high

[5] Professor Brian Bushee provides the definition of institution types at website:

http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

HHI are classified as concentrated institutions.[6] Our results show that concentrated institutional ownership further increases a stock's price delay. Furthermore, the stock price delay component related to the concentrated institutional ownership positively correlates with the expected stock return. Kacperczyk, Van Nieuwerburgh, and Veldkamp (2014) propose a new measure of managerial ability that weighs a fund's market timing more in recessions and stock picking more in booms. We apply this skill measure to classify institution skills and find skilled institutional ownership further increases stock price delay and the price delay component related to skilled institutional ownership positively correlates with the expected stock return.

Our study contributes to the literature by providing further insights into the interaction between institutional ownership and market efficiency as follows. First, our investigation reveals that institutional investors reduce stock price delay. When viewing institutional investors as a whole, we find both the total institutional ownership and the number of institutions negatively correlate with stock price delay. Second, we provide detailed examination of the influences of different institutional investors on price delay. Controlling total institutional ownership, number of institutions, firm characteristic, and investor recognition variables, we show only top 5 institutions and low churn rate institutions further reduce stock price delay. This finding suggests that, from a stock's perspective, its major institutional holders actually monitor the firm closely and help public available information be impounded into the stock price more efficiently. In addition, from an institution's perspective, institutions with less trading frequency would follow their holding stocks more closely and help these stocks respond to information faster. On the other hand, institutions with higher trading frequency, more concentrated stock holdings, and more skill increase stock price delay. This finding suggests their information advantage potentially discourage other investors from participating in the stock and therefore reduce stock price efficiency. Finally, we find the price delay components related to concentrated and skilled institutional ownership positively correlate with the expected stock return, suggesting investors require additional price delay premium to invest in stocks held by concentrated or skilled institutions.

The rest of the paper is organized as follows. Section 2 describes data sources, price delay measure, investor recognition and firm characteristic variables, and the classification of institutional ownership. Section 3 reports the empirical tests and results. Section 4 concludes our paper.

2. Data

2.1. Data sources

[6] Agarwal (2007) considers institutions with more concentrated portfolios and holding fewer securities as less risk averse, and institutions with less-concentrated portfolios and holding more securities as more risk averse.

Our sample period is from 1981Q1 to 2013Q4 since it takes one year to classify year-long, low churn rate, and high churn rate institutions. We use NYSE/AMEX/NASDAQ common stocks (with share codes of 10 or 11) listed on the Center for Research in Security Prices (CRSP) database to create our sample. In addition, we only keep common stocks with institutional ownership from Thomson Reuters' Institutional (13f) Holdings – s34 database. Necessary variables to calculate firm characteristics such as book equity, total revenue, costs of goods sold, total asset, S&P500 index constituents are from Standard & Poor's Compustat database. Analyst coverage (number of analysts following a firm) is from Thomson Reuters' Institutional Brokers' Estimate System (I/B/E/S) database.

2.2. Stock price delay

We follow Hou and Moskowitz (2005) to construct our price delay measure ($D1$). The regression equations are as follows:

$$r_{j,t} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{j,t} \tag{1}$$

$$r_{j,t} = \alpha_j + \beta_j R_{m,t} + \sum_{n=1}^{4} \delta_{j,(-n)} R_{m,t-n} + \varepsilon_{j,t} \tag{2}$$

where $r_{j,t}$ is the weekly return of stock j and $R_{m,t}$ is the CRSP value-weighted market return in week t. For stocks in our sample, we run time series regressions (52 past weekly observations) for both equation (1) and (2) every week from 1980Q1 to 2013Q4 to get the R^2 from both the restricted regression (1) and unrestricted regression (2).[7] The price delay measure in our study is defined as follows:

$$D1 = 1 - \frac{R^2_{restricted}}{R^2_{unrestrcted}} \tag{3}$$

The intuition of this measure could be described as follows: the $R^2_{restricted}$ measures a stock's return variation explained by the concurrent market return and the $R^2_{unrestricted}$ measures a stock's return variation explained by the concurrent plus four lagged weekly market returns. If the ratio between this two number is high (approaching to 1), there is not much additional explanatory power by adding lagged weekly market returns in the regression and the delay of market information transmission for the stock is low. Hence, the larger $D1$, the more stock return

[7] McQueen, Pinegar, and Throley (1996) find it takes small stocks up to 5 weeks to reflect positive lagged large stock portfolio returns and up to two weeks to reflect negative lagged large stock portfolio returns. Hou and Moskowitz (2005) employ weekly returns for the majority of their price delay measures and argue that at monthly frequencies, there is little dispersion in delay measures since most stocks respond to information within a month's time. At daily frequencies, there may be confounding microstructure influences such as bid-ask bounce and nonsynchronous trading.

variation is captured by lagged weekly market returns and then the more price delay for the stock.

To avoid the errors-in-variables problem, we follow Hou and Moskowitz (2005) to sort firms into portfolios based on their market capitalization (size) and individual delay measure, compute delay measures for the portfolio, and assign the portfolio delay measure to each firm in the portfolio. Specifically, at the end of each quarter from 1980Q4 to 2013Q3, we sort stocks into decile portfolios on the basis of their size. Within each size decile, we then sort stocks into decile portfolios on the basis of their individual stock price delay. We then compute the equally-weighted weekly returns of the 100 size-delay portfolios over the following quarter from 1981Q1 to 2013Q4. Following equation (1), (2), and (3), we use the whole sample period from 1981 to 2013 to estimate the 100 portfolios' price delay measure. We then assign the portfolio delay measure back to individual stock based on each stock's size rank, individual delay rank in each quarter from 1981 to 2013.

Table 1 shows the portfolio delay measures during the sample period 1981 – 2013. Stocks with smaller size tend to have higher stock price delay across each individual stock price delay ranked deciles. For example, the portfolio delay measure for the smallest size and highest delay ranked portfolio is 0.4834 and the portfolio delay measure for the biggest size and lowest delay ranked portfolio is 0.0003. We then use the stock's portfolio delay measure for the remaining analysis.

(Insert Table 1 here)

2.3. Investor recognition and firm characteristic variables

We use I/B/E/S database to get a firm's number of analysts following (*Num_Analyst*) to be the main investor recognition variable. Other investor recognition variables include a firm's age, price, and S&P 500 index inclusion. A firm's age is defined as number of months since its first monthly observation has been shown in the CRSP database (*age*). A firm's stock price is the stock price in each quarter end (*price*). We use S&P 500 index constituents from Standard & Poor's Compustat database to identify whether a stock is included in the S&P 500 index.

For firm characteristic variables, we multiply each individual stock's price at each quarter end times its outstanding shares and record the market capitalization in millions to be the stock's size. Using the Compustat database, we calculate a firm's book equity as its book value of shareholder equity plus balance sheet deferred taxes and investment tax credits minus book value of preferred stocks. The book to market ratio (*B/M*) is the firm's book equity divided by its market capitalization. *Ret(t-3, t)* is a stock's most recent quarter's accumulated monthly returns. *Ret(t-12, t-3)* is a stock's accumulated monthly returns from last year to the beginning of the most recent quarter. We follow Novy-Marx (2013) to calculate each individual stock's gross

profitability by taking the difference between a firm's total revenues and costs of goods sold and dividing the difference by the firm's total asset. A firm's dividend yield in each quarter is its cash dividends during the quarter divided by its end of quarter price. A stock's turnover ratio is the average monthly turnover ratio during a quarter and a monthly turnover ratio is defined as shares traded in a month divided by outstanding shares in the end of the month. We follow Amihud (2002) to calculate a stock's illiquidity ratio which is defined as the quarterly average daily absolute return divided by the dollar trading volume in millions. We calculate a stock's return volatility as the standard deviation of its monthly returns over past 24 months.

2.4. Classification of institutional ownership

2.4.1. Total institutional ownership and number of institutions of a stock

To get a stock's total institutional ownership (*Total*) and the number of institutions (*Num_Institutions*) which hold the stock, we take the following steps. First, drop duplicate observations on the Thomson Reuter's 13f database for the combination of unique stock (CUSIP), reporting date (RDATE), and institution (MGRNO). Second, merge observations on the 13f database with data in the CRSP database in the end of March, June, September, and December by CUSIP. Third, summarize the total institutional ownership and the number of institutions for each for each individual stock, drop observations with total institutional ownership above 100%.

2.4.2. Top 5 institutional ownership

We rank a stock's ownership by different institutions and summarize the top 5 largest institutional ownership to be the top 5 institutional ownership (*Top 5*) for that stock.

2.4.3. Year-long institutional ownership

For each individual stock, we compare institutions' ownership with their ownership in the stock a year ago and keep only the institutions whose ownership in the stock is higher than their ownership in the previous year. Next, we classify those institutions as year-long institutions and summarize their ownership in the stock as year-long institutional ownership (*Yearlong*).

2.4.4. Low churn rate & high churn rate institutional ownership

Following Yan and Zhang (2009), we classify institutional investors into low churn rate and high churn rate institutions based on their average portfolio turnover rate over the past four quarters. We first summarize each institution's stock *i* holding cash inflow/outflow in quarter *t* and calculate its aggregate purchase and sale at the end of quarter *t* as follows,

$$CR\_buy_{k,t}\left(S_{k,i,t} > S_{k,i,t-1}\right) = \sum_{i=1}^{N_k}\left|S_{k,i,t}P_{i,t} - S_{k,i,t-1}P_{i,t-1} - S_{k,i,t-1}\Delta P_{i,t}\right| \quad (4)$$

$$CR\_sell_{k,t}\left(S_{k,i,t} \le S_{k,i,t-1}\right) = \sum_{i=1}^{N_k}\left|S_{k,i,t}P_{i,t} - S_{k,i,t-1}P_{i,t-1} - S_{k,i,t-1}\Delta P_{i,t}\right| \quad (5)$$

where $CR\_buy_{k,t}$ and $CR\_sell_{k,t}$ are institution *k*'s aggregate purchase and sale for quarter *t* respectively, $S_{k,i,t-1}$ and $S_{k,i,t}$ are number of shares of stock *i* held by institution *k* at the end of quarter *t-1* and *t* respectively, $P_{i,t-1}$ and $P_{i,t}$ are listed share prices of stock *i* at the end of quarter *t-1* and *t* respectively. We use CRSP price adjustment factor to adjust stock splits and stock dividends for stock *i*'s price change $\Delta P_{i,t}$ at the end of quarter *t*.

Next, we calculate institution *k*'s churn rate, $CR_{k,t}$, at the end of quarter *t* as the minimum of aggregate purchase and sale divided by its average portfolio holding value during quarter *t*,

$$CR_{k,t} \equiv \frac{\min\left(CR\_buy_{k,t}, CR\_sell_{k,t}\right)}{\sum_{i=1}^{N_k}\frac{S_{k,i,t}P_{i,t} + S_{k,i,t-1}P_{i,t-1}}{2}} \quad (6)$$

Finally, we calculate each institution's average churn rate over the past four quarters.

$$AVG\_CR_{k,t} = \frac{1}{4}\sum_{j=0}^{3} CR_{k,t-j} \quad (7)$$

At the end of each quarter, we sort each institution's $AVG\_CR_{k,t}$ into three groups. Those that are in the lowest tercile are classified as low churn rate institutions while those in the highest tercile are considered as high churn rate institutions. We then summarize each sample stock's low churn rate institutional ownership (*low_churnrate*) and high churn rate institutional ownership (*high_churnrate*).

2.4.5. Concentrated institutional ownership

For each institution *k*, we use its holding value of a stock *i* divided by the institution's total common stock holding value to calculate the stock's holding fraction $frac_{k,i}$ by the institution *k*. As shown in equation (8), we then calculate the institution k's Herfindahl Hirschmann index, $HHI_{k,t}$ as follows.

$$HHI_{k,t} = \sum_{k=1}^{n} frac_{k,i}^2 \quad (8)$$

At the end of each quarter, we sort each institution's $HHI_{k,t}$ into three groups. Institutions that are in the highest tercile are classified as concentrated institutions. We then summarize each stock's concentrated institutional ownership (*Concentrated*).

2.4.6. Skilled institutional ownership

To measure institutions' skill, we follow Kacperczyk et al. (2014) who develop measures to assess fund managers' skills. For fund *j* at time *t*, $Timing_t^j$ measures how fund *j*'s holdings of each asset, relative to the market, comove with the systematic component of the stock return. Before the market return increases, a fund with a high timing ability ($Timing_t^j$) should overweight assets that have high betas.

$$Timing_t^j = \sum_{i=1}^{N^j} (w_{i,t}^j - w_{i,t}^m)(\beta_{i,t} R_{t+1}^m) \tag{9}$$

where the portfolio weight $w_{i,t}^j$ is the fraction of fund *j*'s total assets held in risky asset *i* at the start of time *t* and the market weight $w_{i,t}^m$ is the fraction of total market capitalization in asset *i*. $\beta_{i,t}$ measures the covariance of stock *i*'s return with the market return R_t^m divided by the variance of the market return. The return R_{t+1}^m is the realized market return between the beginnings of period *t* and *t+1*, and

$Picking_t^j$ measures how fund *j*'s holdings of each stock, relative to the market, comove with the idiosyncratic component of the stock return:

$$Picking_t^j = \sum_{i=1}^{N^j} (w_{i,t}^j - w_{i,t}^m)(R_{t+1}^i - \beta_{i,t} R_{t+1}^m) \tag{10}$$

According to Eq. (10), a fund with a high picking ability will overweight assets with subsequently high idiosyncratic returns and underweight assets with low idiosyncratic returns when the stock market return in the next period is positive. $Timing_t^j$ and $Picking_t^j$ are expressed in units of return per quarter. Kacperczyk et al. (2014) further develop a skill index for fund *j* in quarter *t + 1* as a weighted average of $Timing_t^j$ and $Picking_t^j$, where the weights (w_t) is the recession probability from the survey of professional forecasters on the website of Federal Reserve Bank of Philadelphia.[8]

[8] The web page address is http://www.phil.frb.org/research-and-data/real-time-center/survey-of-professional-forecasters/historical-data/probability-variables.cfm

$$Skill_{t+1}^{j} = w_t Timing_t^j + (1 - w_t) Picking_t^j \quad (11)$$

As shown in equation (11), at the end of each quarter, we sort each institution's skill measure into three groups. Institutions that are in the highest tercile are classified as skilled institutions. We then summarize each stock's skilled institutional ownership (*Skilled*).

2.4.7. Independent institutional ownership

Chen et al. (2007) document institutional investors such as insurance companies and banks through their trust departments might want to protect existing or potential business relationships with firms and therefore less willing to challenge management decisions. In contrast, institutions such as investment companies, independent investment advisors, and public pension funds do not seek business relationships with the firms in which they invest. Hence, we follow Chen et al. (2007) to classify investment companies, independent investment advisors, and public pension funds as independent institutions and summarize each stock's independent institutional ownership (*Independent*).

3. Empirical results

3.1. Firm characteristics of total institutional ownership sorted decile portfolios

Table 2 shows our sample stocks' characteristics of the total institutional ownership sorted decile portfolios from 1981 to 2013. The quarterly average number of stocks in each decile portfolio is 463. Panel A shows that, as the stock's total institutional ownership increases, its stock price delay decreases monotonically from 0.2408 to 0.0117, showing that total institutional ownership helps improve a firm's stock price efficiency. Panel B describes the average institutional ownership and number of institutions of the total institutional ownership sorted decile portfolios. The average quarterly institutional ownership of a stock is 1.46% for the lowest decile portfolio and 75.98% for the highest decile portfolio. The average number of institutions holding a stock is 4.56 for the lowest decile portfolio and 139.40 for the highest decile portfolio. In the beginning of our sample period 1981Q1, the total institutional ownership is 0.45% for the lowest decile portfolio and 49.88% for the highest decile portfolio. As the institutional ownership increases through past three decades, as of 2013Q4, the total institutional ownership of a stock is 4.53% for the lowest decile portfolio and 88.02% for the highest decile portfolio.

From the stock's perspective, the average quarterly top 5 institutional ownership of a stock is 1.36% for the lowest institutional ownership decile portfolio and 32.71% for the highest decile. The average quarterly year-long institutional ownership is 0.54% for the lowest decile portfolio and 41.08% for the highest decile. From the institution's perspective, the average quarterly low churn rate institutional ownership of a stock is 0.53% for the lowest decile portfolio and 15.50% for the highest decile.

The average quarterly high churn rate institutional ownership of a stock is 0.44% for the lowest decile portfolio and 37.85% for the highest decile, suggesting that high churn rate institutions hold more number of stocks than low churn rate institutions and therefore stocks have more, on average, high churn rate institutional ownership. The average quarterly concentrated institutional ownership of a stock is 0.12% for the lowest decile portfolio and 7.81% for the highest decile. The average quarterly skilled institutional ownership of a stock is 0.33% for the lowest decile and 19.18% for the highest decile. Finally, the average quarterly total institutional ownership of a stock is 0.99% for the lowest decile portfolio and 52.55% for the highest decile.

Panel C of table 2 provide the information of the investor recognition variables. The average number of analysts increases monotonically from 0.06 of the lowest total institutional ownership decile portfolio to 4.67 of the highest decile portfolio, showing that stocks with higher institutional ownership also attract more analysts following. Similarly, the average age also increases from 112.25 months of the lowest decile portfolio to 231.34 months of the highest decile, showing that institutional investors tend to hold stocks which have been publicly traded for a longer period of time. While the average stock price does not show a monotonic trend as the number of analysts and age, the average stock price is $5.89 of the lowest decile portfolio and $34.80 of the highest decile, suggesting that institutional investors prefer to hold stocks with higher share price. Finally, the probability of a stock included in the S&P 500 index increases monotonically from 0.05% of the lowest decile portfolio to 24.20% of the highest decile, showing that institutional investors prefer to hold stocks included in the S&P 500 index.

Panel D of table 2 describes firm characteristic variables of the total institutional ownership sorted decile portfolios. The average size of stocks increases from 54.05 million of the lowest decile to 3751.86 million of the 3rd decile and then declines to 2257.25 million of the highest decile portfolio, showing that although institutional investors tend to hold big size stocks, the size of the most held stocks is not the biggest. The book to market ratio of stocks decreases from 0.82 of the lowest decile to 0.63 of the highest decile, showing that institutional investors prefer to hold growth stocks than value stocks. Both Ret(t-3, t) and Ret(t-12, t-3) increase from 2.43% and 5.87% of the lowest ownership decile to 4.95% and 18.44% of the highest decile, showing that institutional investors prefer to hold past winner than loser stocks. In terms of firms' gross profitability, the gross profitability of stocks increases from 6.65% of the lowest decile to 9.65% of the highest decile, showing that institutional investors prefer to hold stocks with higher profitability. The dividend yield increases from 0.31% of the lowest decile to 0.66% of the 5th decile and declines to 0.47% of the highest decile, exhibiting an inverse U-shaped trend and showing that institutional investors do not focus too much on stocks which have higher dividend yield. In terms of Amihud (2002) illiquidity ratio, the illiquidity ratio of stocks decreases monotonically from 34.46 of the lowest decile to 0.17 of the highest ownership decile, showing that

institutional investors prefer to hold liquid stocks. Finally, when the total institutional ownership increases, monthly stock return volatility decreases monotonically from 20.88% to 11.28%, showing that institutional investors prefer to hold more stable stocks.

(Insert Table 2 here)

3.2. Influences of total institutional ownership on the stock price delay

We first run the Fama-MacBeth (1973) regression as equation (12) and report the result in table 3, showing the influences of total institutional ownership on price delay for the ten total institutional ownership sorted decile portfolios from 1981 to 2013.

$$\begin{aligned} Port\_D1 &= \alpha + \beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\ &+ \beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\ &+ \beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\ &+ \beta_{10} * \log(price) + \beta_{11} * S\&P500 + e \end{aligned} \tag{12}$$

After controlling firm characteristic variables such as firm size, book to market ratio, most recent quarter return, cumulated monthly return from last year to the most recent quarter, illiquidity ratio and investor recognition variables such as number of analysts following, firm age, stock price, and inclusion of the S&P 500 index, we find that, except for the lowest institutional ownership stocks, total institutional ownership negatively correlates with the stock price delay and 5 of the decile portfolios have significant coefficients. This result shows that generally institutional investors help stock price reflect public information faster. In addition, the number of institutions also negatively correlates with the stock price delay and 9 of the decile portfolios have significant coefficients, showing that as the number of institutions holding a stock increases, the price delay will decrease. This result suggests the competition among institutional investors promotes faster information transmission, a finding consistent with the study of Akins, Ng and Verdi (2012).

Table 3 also shows how stock price delay correlates with firm characteristic and investor recognition variables. In terms of firm characteristic variables, firm size significantly negatively correlates with stock price delay, showing that bigger firms reflect public information more efficiently. Book to market ratio significantly positively correlates with stock price delay, showing that value firms tend to have more price delay. Except for the two lowest institutional ownership stocks, our results show that, as a stock's past year performance increases, its stock price delay will decrease, showing that past winner stocks tend to have lower stock price delay. A stock's illiquidity ratio significantly negatively correlates with stock price delay, showing that illiquid stocks also have higher stock price delay because of higher transaction costs, which is consistent with the argument of Hou and Moskowitz (2005) that price delay may result from lack of liquidity.

In terms of investor recognition variables, in the bottom total institutional ownership decile portfolios, stocks with more analysts following tend to have more stock price delay. Only in the top total institutional ownership decile portfolios, the number of analysts following negatively correlates with the stock price delay. This result suggests analysts' influences to reduce a stock's price delay only exist when the stock has higher institutional ownership because institutional investors can discipline financial analysts' biased forecasts through their star analyst votes and trading allocations as mentioned by Ljungqvist, Marston, Starks, Wei, and Yan (2007). Except for the highest total institutional ownership decile portfolio where firms with higher age tend to have lower stock price delay, the firm age positively correlates with the stock price delay, suggesting older firms tend to have lower stock price efficiency after controlling other variables in our regression. A firm's stock price significantly negatively correlates with the stock price delay in all decile portfolios, showing that stocks with higher price attract more investor attention and reflect information more efficiently. Finally, surprisingly, the S&P 500 index inclusion significantly positively correlates with price delay. When a stock is included in the S&P 500 index, some institutional investors have to include the stock in their portfolios to track the market portfolio closely. Because we already control the total institutional ownership in our regression, the S&P 500 index inclusion dummy variable may represent this passive institutional ownership which hinders the information transmission.

(Insert Table 3 here)

3.3. Influences of heterogeneous institutional ownership from the stock's perspective

Our second regression analysis is to examine the influences of heterogeneous institutional ownership on price delay from the stock's perspective by running equation (13) and (14) and reporting the result in table 4.

$$\begin{aligned} Port\_D1 &= \alpha + \beta_0 * \log(Top5) \\ &+ \beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\ &+ \beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\ &+ \beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\ &+ \beta_{10} * \log(price) + \beta_{11} * S\&P500 + e \end{aligned} \tag{13}$$

$$\begin{aligned} Port\_D1 &= \alpha + \beta_0 * \log(Yearlong) \\ &+ \beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\ &+ \beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\ &+ \beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\ &+ \beta_{10} * \log(price) + \beta_{11} * S\&P500 + e \end{aligned} \tag{14}$$

Since we already discuss how total institutional ownership, firm characteristic, and investor recognition variables correlate with the stock price delay in the result of table 3, our focus here is how top 5 and year-long institutional ownership correlate with the stock price delay.

Panel A of table 4 shows that, except for the highest total institutional ownership decile, after controlling total institutional ownership, firm characteristic, and investor attention variables, top 5 institutional ownership significantly negatively correlates with the stock price delay. This result suggests since top 5 institutional investors have a big stake at a company, those institutions monitor the company closely and help reduce stock price delay further. Panel B of table 4 shows that the relationship between the year-long institutional ownership and price delay is mixed. For the bottom 3 decile portfolios, year-long institutional ownership positively correlate with the stock price delay while for the middle 5 decile portfolios, year-long institutional ownership negatively correlate with the stock price delay.

(Insert Table 4 here)

3.4. Influences of heterogeneous institutional ownership from the institution's perspective

Our third analysis is to examine the influences of heterogeneous institutional ownership on price delay from the institution's perspective. As shown in equation (15), (16), (17), (18), and (19), table 5 reports the Fama-MacBeth (1973) regression results from 1981 to 2013. Our focus is how low churn rate, high churn rate, concentrated, skilled, and independent institutional ownership correlate with stock price delay.

$$\begin{aligned} Port\_D1 &= \alpha + \beta_0 * \log(low\_churnrate) \\ &+ \beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\ &+ \beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\ &+ \beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\ &+ \beta_{10} * \log(price) + \beta_{11} * S\&P500 + e \end{aligned} \tag{15}$$

$$\begin{aligned} Port\_D1 &= \alpha + \beta_0 * \log(high\_churnrate) \\ &+ \beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\ &+ \beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\ &+ \beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\ &+ \beta_{10} * \log(price) + \beta_{11} * S\&P500 + e \end{aligned} \tag{16}$$

$$
\begin{aligned}
&Port\_D1 = \alpha + \beta_0 * \log(Concentrated) \\
&+\beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\
&+\beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\
&+\beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\
&+\beta_{10} * \log(price) + \beta_{11} * S\&P500 + e
\end{aligned}
\tag{17}
$$

$$
\begin{aligned}
&Port\_D1 = \alpha + \beta_0 * \log(Skilled) \\
&+\beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\
&+\beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\
&+\beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\
&+\beta_{10} * \log(price) + \beta_{11} * S\&P500 + e
\end{aligned}
\tag{18}
$$

$$
\begin{aligned}
&Port\_D1 = \alpha + \beta_0 * \log(Independent) \\
&+\beta_1 * \log(Total) + \beta_2 * \log(Num\_Institutions) \\
&+\beta_3 * \log(size) + \beta_4 * \log(B/M) + \beta_5 * Ret(t-3,t) + \beta_6 * Ret(t-12,t-3) \\
&+\beta_7 * Illiquidity\_ratio + \beta_8 * \log(1+Num\_Analyst) + \beta_9 * \log(age) \\
&+\beta_{10} * \log(price) + \beta_{11} * S\&P500 + e
\end{aligned}
\tag{19}
$$

Panel A of table 5 shows that, after controlling total institutional ownership, firm characteristic, and investor attention variables, low churn rate institutional ownership significantly negatively correlates with price delay. This result suggests institutional investors with lower trading frequency tend to help information transmission into stock prices, consistent with Attig et al. (2013) who find the cost of equity will decrease in the presence of institutional investors with longer-term investment horizons due to improved monitoring and information quality.

Panel B of table 5 shows that high churn rate institutional ownership in the bottom 5 decile portfolios significantly positively correlates with price delay but significantly negatively correlates with price delay in two of the top 5 decile portfolios, suggesting that the adverse selection effect of high churn rate institutions dominates the information efficiency effect for stocks with lower total institutional ownership while the opposite is true for stocks with higher total institutional ownership.

Panel C of table 5 indicates that concentrated institutional ownership significantly positively correlate with price delay. Since institutions with concentrated ownership hold fewer stocks in their portfolio and they are less risk averse, our result suggests the information advantage of their holdings may discourage other investors and hinder the information transmission into those stocks' prices.

Panel D of table 5 shows that, similar to the result of high churn rate institutional ownership, skilled institutional ownership significantly positively correlates with price delay in the bottom 4 decile portfolios but negatively correlates with price delay when total institutional ownership increases. Therefore, our result shows that the adverse selection effect of skilled institutional ownership dominates the information efficiency effect for stocks with lower total institutional ownership while the opposite is true for stocks with higher total institutional ownership.

Finally, Panel E of table 5 shows that, except for the top 2 total institutional ownership sorted decile portfolios, independent institutional ownership positively correlates with price delay, suggesting independent institutional investors such as investment companies, independent investment advisors, and public pension funds utilize their information advantage when they own relatively small percentage of a stock and hinder the information transmission of the stock and the independent institutional investors will exert their monitoring only when they hold relatively higher percentage of a stock as shown in Chen et al. (2007).

(Insert Table 5 here)

3.5. Heterogeneity of institutional ownership and stock price delay

To provide a robustness check, we also pool all samples and run the Fama-MacBeth (1973) regression as equation (20) to examine the average influences of heterogeneous institutional ownership on price delay from 1981Q1 to 2013Q3 and present the result in table 6.

$$\begin{aligned} Port\_D1 &= \alpha + \beta_{01} * \log(Top5) + \beta_{02} * \log(Yearlong) \\ &+ \beta_{03} * \log(low\_churnrate) + \beta_{04} * \log(high\_churnrate) \\ &+ \beta_{05} * \log(Concentrated) + \beta_{06} * \log(Skilled) \\ &+ \beta_{07} * \log(Independent) + + \beta_{1} * \log(Total) \\ &+ \beta_{2} * \log(Num\_Institutions) + \beta_{3} * \log(size) + \beta_{4} * \log(B/M) \\ &+ \beta_{5} * Ret(t-3,t) + \beta_{6} * Ret(t-12,t-3) + \beta_{7} * Illiquidity\_ratio \\ &+ \beta_{8} * \log(1+Num\_Analyst) + \beta_{9} * \log(age) \\ &+ \beta_{10} * \log(price) + \beta_{11} * S\&P500 + e \end{aligned} \tag{20}$$

Model 1 shows that, after controlling firm characteristic and investor recognition variables, both total institutional ownership and the number of institutions holding a stock significantly negatively correlate with price delay, showing that institutional investors as a whole improve the stock price efficiency.

Model 2 shows that, after controlling total institutional ownership, firm characteristic, and investor attention variables, top 5 institutional ownership significantly negatively correlates with price delay, suggesting that top 5 institutional

investors further exert their monitoring on the stock to facilitate the information transmission to the stock price. Model 3 shows that year-long institutional ownership positively correlates with price delay without statistical significance. This is consistent with our finding in table 4 that, on average, year-long institutional investors may not provide additional information role when compared with the total institutional ownership.

Model 4 indicates that, after controlling total institutional ownership, firm characteristic, and investor attention variables, low churn rate institutional ownership significantly negatively correlates with price delay, suggesting that institutional investors with lower trading frequency, usually long-term institutions, tend to monitor the firm closely and help information transmission to stock price faster. Instead, model 5 shows that high churn rate institutional ownership significantly positively correlates with the stock price delay, suggesting that those short-term institutions utilize their information advantage of their holdings and hinder information transmission into the stock price.

Model 6 shows that concentrated institutional ownership significantly positively correlates with stock price delay. One possible explanation is that institutions with fewer stocks in their portfolios can monitor their holding with more efforts and gain some information advantage, which may discourage other investors from participating in these stocks and therefore hinder the information transmission into the stock price. Similarly, model 7 also shows that skilled institutional ownership significantly positively correlates with price delay, suggesting that institutions with good market timing and stock picking ability tend to utilize their information advantage and hinder the information transmission into the stock price. Finally, Model 8 shows that, independent institutional ownership positively correlates with price delay without statistical significance, suggesting that, on average, independent institutional investors may not provide additional information role when compared with the total institutional ownership.

(Insert Table 6 here)

3.6. Regressions of stock excess returns on heterogeneous institutional ownership components of price delay

As shown in equation (21), table 7 shows the Fama-MacBeth (1973) regression result of regressing monthly stocks' excess return (raw minus risk-free rate) on the heterogeneous institutional ownership components of price delay from 1981Q2 to 2013Q4. We use the coefficients of heterogeneous institutional ownership on price delay reported in table 6 to extract the heterogeneous institutional ownership components of price delay.

$$
\begin{aligned}
Excess\_return &= \alpha + \beta_1 * Delay\_Total + \beta_2 * Delay\_Top5 \\
&+ \beta_3 * Delay\_Yearlong + \beta_4 * Delay\_low\_churnrate \\
&+ \beta_5 * Delay\_high\_churnrate + \beta_6 * Delay\_Concentrated \\
&+ \beta_7 * Delay\_Skilled + \beta_8 * Delay\_Independent + e
\end{aligned} \tag{21}
$$

Our results show that only concentrated institutional ownership component and skilled institutional ownership component of price delay significantly positively correlate with the stock excess returns, suggesting only concentrated and skilled institutional investors account for part of the price delay premium documented by Hou and Moskowitz (2005).

(Insert Table 7 here)

4. Conclusion

Previous studies have suggested it is important to consider institutional heterogeneity when examining the influence of institutional investors. We follow this thinking to study the relationship between institutional ownership and stock price delay. Our findings show that total institutional ownership and number of institutions help reduce the average delay with which a firm's stock price responds to information. In addition, while a firm's top 5 and low churn rate institutional investors further help reduce the price delay, high churn rate, concentrated, and skilled institutional investors increase the delay. Furthermore, our findings suggest concentrated and skilled institutional investors partly account for the stock price delay premium documented by Hou and Moskowitz (2005). Collectively, our results suggest corporate managers should design policies to encourage more ownership from top 5 and low churn rate institutional investors and to avoid ownership from high churn rate, concentrated, and skilled institutional investors to reduce the stock price delay and related delay premium.

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Table 1. Portfolio delay

This table summarizes size-delay portfolios' delay measures of our sample stocks which have institutional ownership. In the end of each quarter from 1981 to 2013, stocks are sorted on the basis of their market capitalization into size deciles. Within each size deciles, stocks are further sorted on the basis of their individual stock price delay into delay deciles. For the 100 size-delay portfolios, we calculate their weekly returns from 1981 to 2013 and use the whole sample period to estimate each size-delay portfolio's portfolio delay measures. We then assign the 100 portfolio delay measures back to individual stock based on their size rank and individual stock price delay rank in each quarter from 1981 to 2013.

	Individual D1 rank										
Size rank		0 (low D1)	1	2	3	4	5	6	7	8	9 (high D1)
	0 (small)	0.3656	0.3460	0.3543	0.3282	0.3621	0.4072	0.3604	0.4150	0.3557	0.4834
	1	0.1990	0.2259	0.2334	0.2222	0.2878	0.2608	0.2412	0.2733	0.2978	0.2634
	2	0.1195	0.1724	0.1599	0.1687	0.1773	0.1863	0.1764	0.2177	0.2387	0.2375
	3	0.0687	0.0714	0.0711	0.0785	0.0767	0.0862	0.1079	0.1130	0.1174	0.0862
	4	0.0307	0.0427	0.0451	0.0484	0.0441	0.0408	0.0387	0.0476	0.0440	0.0608
	5	0.0246	0.0238	0.0366	0.0242	0.0258	0.0236	0.0369	0.0206	0.0302	0.0260
	6	0.0170	0.0174	0.0151	0.0177	0.0189	0.0175	0.0162	0.0166	0.0178	0.0186
	7	0.0065	0.0105	0.0077	0.0096	0.0077	0.0158	0.0129	0.0081	0.0102	0.0171
	8	0.0014	0.0025	0.0042	0.0038	0.0048	0.0067	0.0061	0.0062	0.0057	0.0099
	9 (big)	0.0003	0.0008	0.0005	0.0002	0.0002	0.0013	0.0007	0.0021	0.0011	0.0036

Table 2. Firm characteristics of total institutional ownership sorted decile portfolios

This table reports quarterly average firm characteristics of total institutional ownership sorted decile portfolios from 1981Q1 to 2013Q4. Port_D1 is the 100 size-delay portfolios' price delay estimated from 1981 to 2013. Total is the average total institutional ownership of a stock. Number of institutions measures how many institutions holding the stock. Top5 is the sum of a stock's top 5 institutional investors' holding percentage. Yearlong is a stock's sum of the ownership of institutional investors who maintain the stakes for at least one year. Low_churnrate is a stock's sum of bottom tertile quarterly churn rate institutional ownership. High_churnrate is a stock's sum of top tertile quarterly churn rate institutional ownership. Concentrated is a stock's sum of top tertile HHI institutional ownership. Skilled is a stock's sum of top tertile Kacperzayk et al. (2014) skill institutional ownership. Independent is a stock's sum of investment companies, independent investment advisors, and public pension funds' institutional ownership. Number of analysts measures how many analysts follow the stock. Age measures how many months a stock has been recorded in the CRSP database. Price is the stock's quarter end price. S&P 500 is the dummy variable and equals to 1 if the stock is included in the S&P 500 index. Size is a stock's market capitalization in millions. B/M is a stock's book to market ratio. Ret(t-3,t) is a stock's most recent quarter's cumulated monthly returns. Ret(t-12,t-3) is a stock's cumulated monthly returns from last year to the beginning of the most recent quarter. Gross profitability is the difference between a firm's total revenue and costs of goods sold divided by its total asset. D/P is a firm's quarterly cash dividends divided by its quarter end stock price. Turnover is the average monthly shares traded divided by shares outstanding in the quarter. Illiquidity ratio is the quarterly average of Amihud (2002) daily absolute stock return divided by its dollar trading volume in millions. Volatility is the standard deviation of a stock's past 24 monthly returns. t-statistics are reported in the parenthesis under the number of the 9 – 0 column. *, **, *** represents statistical significance at 10%, 5%, and 1% level respectively.

Panel A

Total_rank	0	1	2	3	4	5	6	7	8	9	9 – 0
Port_D1	0.2408	0.1854	0.1485	0.1118	0.0801	0.0542	0.0366	0.0233	0.0156	0.0117	-0.2291*** (-66.66)

Panel B

Total_rank	0	1	2	3	4	5	6	7	8	9	9 – 0
Total	1.46%	5.94%	11.97%	19.09%	27.03%	35.40%	44.04%	53.08%	62.83%	75.98%	74.52%*** (63.61)
Number of institutions	4.56	10.43	17.75	29.06	50.05	80.94	106.79	127.86	139.31	139.40	134.84*** (61.63)
Total (1981Q1)	0.45%	1.57%	3.08%	5.31%	8.40%	12.53%	18.02%	25.58%	34.94%	49.88%	
Total (2013Q4)	4.53%	16.86%	29.77%	42.65%	53.73%	62.30%	69.06%	74.72%	79.83%	88.02%	
Stock perspective											
Top5	1.36%	5.20%	9.66%	14.01%	17.86%	20.91%	23.49%	25.64%	27.92%	32.71%	31.35%*** (97.67)
Yearlong	0.54%	2.50%	5.51%	9.22%	13.48%	18.13%	23.15%	28.34%	33.89%	41.08%	40.54%*** (48.90)
Institution perspective											
Low_churnrate	0.53%	1.82%	3.32%	4.93%	6.53%	8.25%	9.98%	11.58%	13.21%	15.50%	14.96%*** (51.91)
High_churnrate	0.44%	1.97%	4.31%	7.42%	11.22%	15.24%	19.64%	24.32%	29.83%	37.85%	37.41%*** (53.20)
Concentrated	0.12%	0.57%	1.28%	1.95%	2.61%	3.26%	3.82%	4.57%	5.38%	7.81%	7.70%*** (49.50)
Skilled	0.33%	1.52%	3.21%	5.12%	7.05%	9.09%	11.11%	13.21%	15.72%	19.18%	18.85%*** (22.17)
Independent	0.99%	4.30%	9.01%	14.33%	20.04%	25.68%	31.45%	37.26%	43.81%	52.55%	51.57%*** (36.46)

Panel C

Total_rank	0	1	2	3	4	5	6	7	8	9	9 – 0
Investor Recognition											
Number of Analysts	0.06	0.20	0.48	0.83	1.43	2.27	3.09	3.74	4.40	4.67	4.61*** (28.49)
Age	112.25	127.44	138.84	152.73	168.83	191.33	210.65	231.95	245.70	231.34	119.09*** (21.02)
Price	5.89	53.74	62.25	40.90	17.65	20.15	23.44	27.30	30.65	34.80	28.91*** (66.76)
S&P500	0.05%	0.08%	0.33%	0.98%	3.27%	7.46%	13.04%	18.72%	23.61%	24.20%	24.15%*** (25.42)

Panel D

Total_rank	0	1	2	3	4	5	6	7	8	9	9 – 0
Firm characteristics											
Size	54.05	162.99	321.38	659.16	1609.63	3164.66	3722.89	3751.86	2984.55	2257.25	2203.20*** (34.18)
B/M	0.82	0.79	0.82	0.82	0.84	0.73	0.77	0.72	0.67	0.63	-0.19*** (-6.24)
Ret(t-3,t)	2.43%	3.51%	3.61%	3.56%	3.85%	3.89%	3.98%	4.12%	4.41%	4.95%	2.52%*** (2.95)
Ret(t-12,t-3)	5.87%	9.42%	10.03%	10.53%	12.30%	12.75%	13.49%	15.51%	16.28%	18.44%	12.57%*** (9.96)

Panel D continued

Total_rank	0	1	2	3	4	5	6	7	8	9	9 – 0
Firm characteristics											
Gross Profitability	6.65%	7.88%	8.04%	8.12%	8.34%	8.79%	9.10%	9.20%	9.50%	9.65%	3.00%*** (20.62)
D/P	0.31%	0.39%	0.43%	0.45%	0.48%	0.66%	0.55%	0.54%	0.52%	0.47%	0.16%*** (3.71)
Turnover	7.23%	6.87%	7.10%	7.91%	9.21%	10.62%	12.07%	13.38%	14.50%	16.34%	9.12%*** (14.41)
Illiquidity ratio	34.46	19.11	12.82	7.59	3.82	2.20	1.36	0.82	0.32	0.17	-34.29*** (-10.27)
Volatility	20.88%	17.53%	16.00%	14.87%	14.00%	13.19%	12.40%	11.80%	11.40%	11.28%	-9.60%*** (-38.87)
Number of firms	462	463	463	463	463	463	463	463	463	462	

Table 3.Influences of total institutional ownership on stock price delay

This table reports the Fama-MacBeth regression results of influences of total institutional ownership and number of institutions on stock price delay after controlling investor recognition and firm characteristic variables from 1981 to 2013. Regressions are performed on stocks in each total institutional ownership sorted portfolio. log(Total) is the logarithm of total institutional ownership. log(Num_Institutions) is the logarithm of the number of institutions holding the stock. log(size) is the logarithm of the stock's market capitalization. log(B/M) is the logarithm of the stock's book to market ratio. Ret(t-3,t) is a stock's most recent quarter's cumulated monthly returns. Ret(t-12,t-3) is a stock's cumulated monthly returns from last year to the beginning of the most recent quarter. Illiquidity ratio is the quarterly average of Amihud (2002) daily absolute stock return divided by its dollar trading volume in millions. log(1+Num_Analyst) is the logarithm of one plus number of analysts following the stock. log(age) is the logarithm of how many months a stock has been recorded in the CRSP database. log(price) is the logarithm of a stock's quarter end price. S&P 500 is the dummy variable and equals to 1 if the stock is included in the S&P 500 index. Standard errors are Newey-West (1987) corrected with lag = 4. t-statistics are reported in the parenthesis under each number. Adj_RSQ is the adjusted R-squared measure and *, **, *** represents statistical significance at 10%, 5%, and 1% level respectively.

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4968***	0.4656***	0.4105***	0.3837***	0.2924***	0.2164***	0.1721***	0.1242***	0.0855***	0.0696***
	(29.52)	(21.83)	(19.60)	(18.08)	(19.07)	(17.96)	(16.94)	(15.89)	(15.95)	
log(Total)	0.0017**	-0.0013	-0.0057***	0.0025	-0.0043	-0.0103**	-0.0052	-0.0140***	-0.0084**	-0.0051***
	(2.42)	(-1.12)	(-3.41)	(0.70)	(-1.10)	(-2.43)	(-1.27)	(-3.06)	(-2.40)	(-2.93)
log(Num_Institution)	-0.0056*	-0.0073***	-0.0116***	-0.0192***	-0.0166***	-0.0173***	-0.0149***	-0.0117***	-0.0061***	-0.0010
	(-2.30)	(-2.89)	(-3.33)	(-3.77)	(-3.51)	(-4.67)	(-4.46)	(-5.31)	(-2.69)	(-0.90)
log(size)	-0.0899***	-0.0822***	-0.0687***	-0.0507***	-0.0358***	-0.0189***	-0.0121***	-0.0066***	-0.0058***	-0.0071***
	(-34.68)	(-47.05)	(-30.05)	(-19.81)	(-12.10)	(-8.45)	(-6.63)	(-6.06)	(-4.66)	(-9.54)
log(B/M)	0.0009*	0.0050***	0.0073***	0.0070***	0.0068***	0.0046***	0.0032***	0.0023***	0.0006***	0.0004**
	(1.70)	(8.82)	(13.94)	(7.76)	(6.42)	(5.67)	(7.34)	(7.43)	(3.18)	(2.30)
Ret (t-3, t)	0.0048***	0.0041***	-0.0021	-0.0028*	-0.0060***	-0.0069***	-0.0079***	-0.0039***	-0.0036***	-0.0008
	(2.99)	(2.82)	(-1.47)	(-1.78)	(-3.27)	(-3.88)	(-5.53)	(-3.57)	(-4.22)	(-1.33)

Table 3 continued

Total_rank	0	1	2	3	4	5	6	7	8	9
Ret (t-12, t-3)	0.0014*	0.0015*	-0.0004	-0.0013	-0.0007	-0.0012	-0.0008	-0.0005	-0.0004	0.0006
	(1.86)	(1.83)	(-0.32)	(-1.18)	(-0.59)	(-1.17)	(-1.14)	(-0.77)	(-0.75)	(1.43)
Illiquidity ratio	0.0002	0.0003**	0.0008***	0.0016***	0.0055***	0.0218***	0.0193***	0.0674***	0.1348***	0.1744***
	(0.62)	(2.00)	(2.91)	(5.26)	(4.54)	(3.06)	(4.64)	(3.14)	(3.28)	(2.98)
log(1+Num_Analyst)	0.0120**	0.0158***	0.0141***	0.0068***	0.0035**	-0.0001	-0.0012***	-0.0007***	-0.0002	-0.0000
	(2.09)	(4.21)	(4.60)	(2.85)	(2.23)	(-0.10)	(-2.62)	(-3.26)	(-0.86)	(-0.37)
log(age)	0.0026***	0.0048***	0.0060***	0.0050***	0.0060***	0.0046***	0.0019***	0.0006**	0.0002	-0.0003**
	(3.87)	(6.61)	(7.41)	(5.93)	(10.22)	(8.15)	(6.04)	(2.37)	(0.98)	(-1.99)
log(price)	-0.0023**	-0.0057***	-0.0067***	-0.0096***	-0.0113***	-0.0134***	-0.0091***	-0.0064***	-0.0031***	-0.0017***
	(-2.45)	(-8.67)	(-8.17)	(-11.95)	(-10.65)	(-14.10)	(-10.29)	(-9.77)	(-5.78)	(-4.94)
S&P500	0.0184***	0.0260**	0.0632***	0.0842***	0.0771***	0.0545***	0.0344***	0.0184***	0.0089***	0.0052***
	(2.70)	(2.35)	(4.25)	(5.35)	(8.33)	(15.62)	(19.73)	(14.37)	(12.40)	(9.54)
Adj_RSQ	0.7867	0.8082	0.7997	0.7653	0.7233	0.6869	0.6710	0.6856	0.7045	0.7268
Total observations	390868									

Table 4.Influences of heterogeneous institutional ownership on stock price delay from the stock's perspective

This table reports the Fama-MacBeth regression results of influences of heterogeneous institutional ownership on stock price delay from the stock's perspective after controlling investor recognition and firm characteristic variables from 1981 to 2013. Regressions are performed on stocks in each total institutional ownership sorted portfolio. log(Top5) is the logarithm of top 5 institutional ownership. log(Yearlong) is the logarithm of year-long institutional ownership. log(Total) is the logarithm of total institutional ownership. log(Num_Institutions) is the logarithm of the number of institutions holding the stock. log(size) is the logarithm of the stock's market capitalization. log(B/M) is the logarithm of the stock's book to market ratio. Ret(t-3,t) is a stock's most recent quarter's cumulated monthly returns. Ret(t-12,t-3) is a stock's cumulated monthly returns from last year to the beginning of the most recent quarter. Illiquidity ratio is the quarterly average of Amihud (2002) daily absolute stock return divided by its dollar trading volume in millions. log(1+Num_Analyst) is the logarithm of one plus number of analysts following the stock. log(age) is the logarithm of how many months a stock has been recorded in the CRSP database. log(price) is the logarithm of a stock's quarter end price. S&P 500 is the dummy variable and equals to 1 if the stock is included in the S&P 500 index. Standard errors are Newey-West (1987) corrected with lag = 4. t-statistics are reported in the parenthesis under each number. Adj_RSQ is the adjusted R-squared measure and *, **, *** represents statistical significance at 10%, 5%, and 1% level respectively.

Panel A

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4928***	0.4795***	0.4452***	0.4126***	0.3210***	0.2321***	0.1767***	0.1263***	0.0884***	0.0686***
	(32.68)	(23.82)	(23.69)	(22.89)	(25.31)	(22.98)	(19.24)	(17.29)	(16.39)	(11.75)
log(Top5)	-0.1125**	-0.1732***	-0.1312***	-0.0867***	-0.0627***	-0.0241***	-0.0098*	-0.0038	-0.0036**	0.0002
	(-2.19)	(-5.98)	(-7.72)	(-6.55)	(-5.90)	(-3.66)	(-1.78)	(-1.46)	(-2.05)	(0.19)
log(Total)	0.1139**	0.1702***	0.1267***	0.0902***	0.0588***	0.0161*	0.0049	-0.0106	-0.0043	-0.0051**
	(2.22)	(5.98)	(7.52)	(7.03)	(5.17)	(1.81)	(0.66)	(-1.64)	(-0.90)	(-2.20)
log(Num_Institution)	-0.0041**	-0.0150***	-0.0257***	-0.0337***	-0.0323***	-0.0249***	-0.0174***	-0.0133***	-0.0082***	-0.0005
	(-2.46)	(-7.66)	(-9.24)	(-9.26)	(-7.87)	(-7.31)	(-4.45)	(-5.00)	(-2.73)	(-0.38)
log(size)	-0.0900***	-0.0866***	-0.0722***	-0.0523***	-0.0353***	-0.0182***	-0.0122***	-0.0064***	-0.0053***	-0.0073***
	(-32.08)	(-45.05)	(-28.18)	(-19.52)	(-12.25)	(-8.81)	(-6.55)	(-5.08)	(-3.56)	(-8.72)

Panel A continued

Total_rank	0	1	2	3	4	5	6	7	8	9
log(B/M)	0.0008*	0.0038***	0.0069***	0.0065***	0.0071***	0.0048***	0.0036***	0.0025***	0.0009***	0.0004**
	(1.70)	(7.62)	(12.63)	(6.95)	(6.80)	(6.14)	(8.20)	(7.76)	(4.92)	(2.30)
Ret (t-3, t)	0.0047***	0.0048***	-0.0006	-0.0025	-0.0063***	-0.0074***	-0.0075***	-0.0038***	-0.0036***	-0.0007
	(3.04)	(3.37)	(-0.42)	(-1.58)	(-3.52)	(-4.27)	(-5.34)	(-3.63)	(-4.20)	(-1.15)
Ret (t-12, t-3)	0.0015*	0.0015*	-0.0004	-0.0017*	-0.0015	-0.0020**	-0.0011*	-0.0005	-0.0004	0.0006
	(1.97)	(1.95)	(-0.32)	(-1.66)	(-1.21)	(-2.14)	(-1.67)	(-0.90)	(-0.80)	(1.65)
Illiquidity ratio	0.0001	0.0002*	0.0006***	0.0015***	0.0053***	0.0217***	0.0192***	0.0661***	0.1336***	0.1736***
	(0.61)	(1.67)	(2.80)	(5.28)	(4.40)	(3.04)	(4.57)	(3.17)	(3.28)	(2.98)
log(1+Num_Analyst)	0.0113**	0.0118***	0.0094***	0.0046***	0.0016	-0.0003	-0.0013***	-0.0007***	-0.0002	-0.0000
	(2.24)	(4.29)	(4.44)	(2.66)	(1.35)	(-0.49)	(-3.29)	(-3.13)	(-0.90)	(-0.14)
log(age)	0.0025***	0.0042***	0.0057***	0.0052***	0.0060***	0.0045***	0.0017***	0.0006**	0.0002	-0.0003**
	(3.54)	(5.78)	(6.83)	(6.59)	(10.14)	(7.91)	(5.59)	(2.41)	(1.02)	(-2.14)
log(price)	-0.0022**	-0.0046***	-0.0074***	-0.0105***	-0.0129***	-0.0143***	-0.0093***	-0.0066***	-0.0033***	-0.0017***
	(-2.34)	(-7.51)	(-10.49)	(-14.31)	(-12.97)	(-15.31)	(-10.48)	(-9.20)	(-5.76)	(-4.60)
S&P500	0.0170***	0.0240**	0.0547***	0.0766***	0.0749***	0.0524***	0.0328***	0.0179***	0.0086***	0.0050***
	(2.72)	(2.19)	(3.70)	(4.56)	(7.33)	(13.40)	(18.65)	(13.72)	(11.32)	(9.11)
Adj_RSQ	0.7893	0.8190	0.8138	0.7783	0.7358	0.6942	0.6782	0.6896	0.7098	0.7281
Total observations	390868									

Panel B

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4966***	0.4444***	0.3935***	0.3668***	0.2783***	0.2023***	0.1615***	0.1184***	0.0812***	0.0657***
	(26.15)	(18.55)	(16.88)	(16.17)	(17.31)	(16.18)	(16.86)	(16.41)	(15.36)	(12.87)
log(Yearlong)	0.0018	0.0028***	0.0014**	-0.0004	-0.0012	-0.0015	-0.0028**	-0.0020**	0.0001	0.0001
	(0.61)	(2.88)	(2.59)	(-0.57)	(-1.30)	(-1.60)	(-2.32)	(-2.11)	(0.14)	(0.26)
log(Total)	0.0014	-0.0051**	-0.0084***	0.0014	-0.0029	-0.0103**	-0.0020	-0.0123***	-0.0090***	-0.0045***
	(0.53)	(-2.24)	(-4.02)	(0.36)	(-0.71)	(-2.54)	(-0.47)	(-3.02)	(-2.67)	(-2.96)
log(Num_Institution)	-0.0047	-0.0058*	-0.0089**	-0.0172***	-0.0146***	-0.0156***	-0.0132***	-0.0103***	-0.0052**	-0.0004
	(-0.80)	(-1.92)	(-2.20)	(-3.18)	(-3.00)	(-4.32)	(-3.97)	(-4.73)	(-2.45)	(-0.31)
log(size)	-0.0872***	-0.0778***	-0.0663***	-0.0492***	-0.0348***	-0.0184***	-0.0120***	-0.0070***	-0.0059***	-0.0072***
	(-35.45)	(-28.28)	(-25.41)	(-18.15)	(-11.81)	(-8.70)	(-6.73)	(-6.42)	(-4.87)	(-9.20)
log(B/M)	0.0052***	0.0056***	0.0078***	0.0070***	0.0068***	0.0046***	0.0032***	0.0022***	0.0007***	0.0004**
	(2.68)	(6.17)	(12.80)	(7.34)	(6.54)	(6.10)	(7.18)	(7.54)	(3.68)	(2.50)
Ret (t-3, t)	0.0096**	0.0052***	-0.0020	-0.0046***	-0.0063***	-0.0068***	-0.0082***	-0.0044***	-0.0030***	-0.0006
	(2.20)	(2.81)	(-1.18)	(-2.94)	(-3.12)	(-3.71)	(-5.67)	(-3.78)	(-3.09)	(-0.82)
Ret (t-12, t-3)	0.0024*	0.0028*	0.0012	-0.0009	-0.0011	-0.0012	-0.0010	-0.0008	-0.0002	0.0005
	(1.93)	(1.85)	(0.71)	(-0.86)	(-0.86)	(-1.05)	(-1.07)	(-1.17)	(-0.40)	(1.33)
Illiquidity ratio	-0.0001	0.0007*	0.0013**	0.0020***	0.0061***	0.0228***	0.0197***	0.0706***	0.1387***	0.2132***
	(-0.72)	(1.86)	(2.53)	(4.80)	(4.77)	(3.20)	(4.99)	(3.21)	(3.34)	(3.39)
log(1+Num_Analyst)	0.0134*	0.0176***	0.0138***	0.0069***	0.0031**	-0.0002	-0.0011***	-0.0007***	-0.0002	0.0000
	(1.68)	(3.79)	(4.73)	(2.97)	(2.14)	(-0.23)	(-2.70)	(-3.21)	(-0.85)	(0.18)
log(age)	0.0038***	0.0057***	0.0059***	0.0048***	0.0060***	0.0044***	0.0019***	0.0006**	0.0001	-0.0003**
	(3.71)	(5.90)	(7.63)	(5.94)	(10.52)	(7.68)	(5.66)	(2.20)	(0.71)	(-2.05)
log(price)	-0.0039***	-0.0062***	-0.0064***	-0.0084***	-0.0102***	-0.0125***	-0.0083***	-0.0061***	-0.0029***	-0.0015***
	(-2.92)	(-7.57)	(-6.80)	(-8.91)	(-9.10)	(-12.65)	(-10.04)	(-9.22)	(-6.01)	(-4.59)

Panel B continued

Total_rank	0	1	2	3	4	5	6	7	8	9
S&P500	0.0123* (1.96)	0.0226** (2.06)	0.0596*** (4.06)	0.0801*** (5.09)	0.0731*** (8.04)	0.0516*** (14.48)	0.0320*** (18.67)	0.0176*** (13.85)	0.0082*** (11.92)	0.0048*** (9.70)
Adj_RSQ	0.7962	0.8070	0.7979	0.7602	0.7216	0.6860	0.6749	0.6878	0.7043	0.7269
Total observations	352586									

Table 5. Influences of heterogeneous institutional ownership on stock price delay from the institution's perspective

This table reports the Fama-MacBeth regression results of influences of heterogeneous institutional ownership on stock price delay from the stock's perspective after controlling investor recognition and firm characteristic variables from 1981 to 2013. Regressions are performed on stocks in each total institutional ownership sorted portfolio. log(low_churnrate) is the logarithm of bottom tertile churn rate institutional ownership. log(high_churnrate) is the logarithm of top tertile churn rate institutional ownership. log(Concentrated) is the logarithm of top tertile HHI index institutional ownership. log(Skilled) is the logarithm of top tertile Kacperzayk et al. (2014) skill institutional ownership. log(Independent) is the logarithm of investment companies, independent investment advisors, and public pension funds' institutional ownership. log(Total) is the logarithm of total institutional ownership. log(Num_Institutions) is the logarithm of the number of institutions holding the stock. log(size) is the logarithm of the stock's market capitalization. log(B/M) is the logarithm of the stock's book to market ratio. Ret(t-3,t) is a stock's most recent quarter's cumulated monthly returns. Ret(t-12,t-3) is a stock's cumulated monthly returns from last year to the beginning of the most recent quarter. Illiquidity ratio is the quarterly average of Amihud (2002) daily absolute stock return divided by its dollar trading volume in millions. log(1+Num_Analyst) is the logarithm of one plus number of analysts following the stock. log(age) is the logarithm of how many months a stock has been recorded in the CRSP database. log(price) is the logarithm of a stock's quarter end price. S&P 500 is the dummy variable and equals to 1 if the stock is included in the S&P 500 index. Standard errors are Newey-West (1987) corrected with lag = 4. t-statistics are reported in the parenthesis under each number. Adj_RSQ is the adjusted R-squared measure and *, **, *** represents statistical significance at 10%, 5%, and 1% level respectively.

Panel A

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4622***	0.4332***	0.3668***	0.3319***	0.2461***	0.1866***	0.1491***	0.1129***	0.0756***	0.0644***
	(11.87)	(16.92)	(14.37)	(13.31)	(13.33)	(15.80)	(14.71)	(14.98)	(13.77)	(11.22)
log(low_churnrate)	-0.0018*	-0.0005	-0.0032***	-0.0048***	-0.0069***	-0.0055***	-0.0041***	-0.0018***	-0.0011***	-0.0006*
	(-1.68)	(-0.47)	(-3.78)	(-5.27)	(-4.41)	(-4.73)	(-4.73)	(-2.77)	(-3.19)	(-1.91)
log(Total)	0.0017	-0.0038**	-0.0071***	0.0016	-0.0018	-0.0069*	-0.0035	-0.0134***	-0.0086***	-0.0057***
	(0.77)	(-1.98)	(-3.35)	(0.46)	(-0.39)	(-1.70)	(-0.86)	(-2.98)	(-2.69)	(-4.41)
log(Num_Institution)	-0.0042	-0.0032	-0.0068*	-0.0116**	-0.0093*	-0.0133***	-0.0124***	-0.0093***	-0.0039*	-0.0011
	(-1.01)	(-1.23)	(-1.90)	(-2.14)	(-1.81)	(-3.52)	(-3.81)	(-4.35)	(-1.87)	(-0.88)

Panel A continued

Total_rank	0	1	2	3	4	5	6	7	8	9
log(size)	-0.0893***	-0.0799***	-0.0665***	-0.0505***	-0.0362***	-0.0189***	-0.0119***	-0.0074***	-0.0066***	-0.0068***
	(-30.05)	(-30.73)	(-22.94)	(-17.65)	(-11.85)	(-8.17)	(-6.73)	(-6.94)	(-5.70)	(-8.89)
log(B/M)	0.0009	0.0056***	0.0076***	0.0068***	0.0069***	0.0047***	0.0032***	0.0023***	0.0008***	0.0004**
	(0.65)	(8.07)	(13.88)	(7.26)	(6.63)	(6.08)	(6.78)	(7.09)	(4.31)	(2.32)
Ret (t-3, t)	-0.0042	0.0044**	-0.0023	-0.0034**	-0.0056***	-0.0071***	-0.0084***	-0.0039***	-0.0034***	-0.0011**
	(-0.49)	(2.19)	(-1.43)	(-2.45)	(-2.91)	(-3.90)	(-5.95)	(-3.45)	(-3.88)	(-2.05)
Ret (t-12, t-3)	-0.0020	0.0020**	-0.0005	-0.0008	-0.0014	-0.0015	-0.0016**	-0.0008	-0.0007	0.0005
	(-0.45)	(2.17)	(-0.36)	(-0.63)	(-1.29)	(-1.32)	(-2.54)	(-1.15)	(-1.63)	(1.19)
Illiquidity ratio	0.0000	0.0007**	0.0014***	0.0024***	0.0075***	0.0224***	0.0201***	0.0682***	0.1362***	0.1825***
	(0.08)	(2.11)	(2.64)	(4.09)	(3.53)	(3.16)	(4.80)	(3.14)	(3.30)	(3.07)
log(1+Num_Analyst)	0.0089*	0.0155***	0.0132***	0.0061***	0.0026*	-0.0001	-0.0014***	-0.0008***	-0.0002	-0.0000
	(1.73)	(4.05)	(4.48)	(2.70)	(1.84)	(-0.15)	(-2.98)	(-3.85)	(-1.36)	(-1.37)
log(age)	0.0062***	0.0055***	0.0071***	0.0066***	0.0068***	0.0050***	0.0025***	0.0007***	0.0002	-0.0001
	(2.66)	(6.61)	(8.95)	(8.19)	(8.25)	(8.80)	(8.70)	(2.81)	(0.94)	(-1.37)
log(price)	-0.0005	-0.0054***	-0.0058***	-0.0079***	-0.0095***	-0.0119***	-0.0083***	-0.0058***	-0.0023***	-0.0016***
	(-0.19)	(-6.78)	(-7.67)	(-8.48)	(-8.92)	(-11.94)	(-9.55)	(-8.68)	(-5.06)	(-4.62)
S&P500	0.0111**	0.0246**	0.0574***	0.0764***	0.0701***	0.0513***	0.0326***	0.0178***	0.0081***	0.0049***
	(2.26)	(2.25)	(3.95)	(4.75)	(7.26)	(13.76)	(15.21)	(13.03)	(10.41)	(9.00)
Adj_RSQ	0.8043	0.8068	0.7964	0.7604	0.7309	0.6894	0.6733	0.6909	0.7096	0.7378
Total observations	365901									

Panel B

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4955***	0.4435***	0.3943***	0.3695***	0.2785***	0.2030***	0.1603***	0.1131***	0.0768***	0.0655***
	(27.62)	(18.14)	(16.60)	(16.62)	(16.37)	(15.30)	(14.66)	(14.09)	(13.75)	(10.78)
log(high_churnrate)	0.0009	0.0032***	0.0037***	0.0031***	0.0027***	-0.0001	-0.0020**	-0.0038***	0.0001	0.0004
	(1.56)	(4.99)	(6.37)	(3.96)	(3.81)	(-0.25)	(-2.54)	(-5.12)	(0.16)	(1.25)
log(Total)	0.0011	-0.0058***	-0.0096***	-0.0013	-0.0087**	-0.0115***	-0.0031	-0.0103***	-0.0101***	-0.0060***
	(1.05)	(-3.09)	(-5.22)	(-0.39)	(-2.27)	(-2.72)	(-0.76)	(-2.69)	(-2.90)	(-3.59)
log(Num_Institution)	-0.0060**	-0.0081***	-0.0118***	-0.0185***	-0.0150***	-0.0130***	-0.0113***	-0.0072***	-0.0031	-0.0008
	(-2.39)	(-3.08)	(-3.25)	(-3.51)	(-3.10)	(-3.25)	(-3.23)	(-3.02)	(-1.54)	(-0.66)
log(size)	-0.0878***	-0.0768***	-0.0642***	-0.0478***	-0.0343***	-0.0195***	-0.0130***	-0.0081***	-0.0066***	-0.0069***
	(-34.19)	(-33.88)	(-28.08)	(-19.23)	(-11.89)	(-8.85)	(-7.11)	(-6.79)	(-5.70)	(-8.94)
log(B/M)	0.0023***	0.0056***	0.0074***	0.0069***	0.0066***	0.0043***	0.0030***	0.0022***	0.0008***	0.0005***
	(3.12)	(9.04)	(13.75)	(7.19)	(6.23)	(5.47)	(7.12)	(6.81)	(4.31)	(3.31)
Ret (t-3, t)	0.0039**	0.0025	-0.0034**	-0.0038**	-0.0061***	-0.0074***	-0.0077***	-0.0031***	-0.0032***	-0.0010*
	(2.29)	(1.38)	(-2.49)	(-2.35)	(-3.42)	(-4.48)	(-5.70)	(-2.95)	(-4.99)	(-1.70)
Ret (t-12, t-3)	0.0025**	0.0003	-0.0006	-0.0019*	-0.0012	-0.0013	-0.0005	0.0001	-0.0003	0.0003
	(2.28)	(0.31)	(-0.45)	(-1.89)	(-1.08)	(-1.30)	(-0.74)	(0.24)	(-0.72)	(0.97)
Illiquidity ratio	0.0002	0.0006**	0.0012***	0.0020***	0.0062***	0.0231***	0.0197***	0.0709***	0.1423***	0.1771***
	(0.61)	(2.37)	(2.94)	(5.22)	(4.92)	(3.21)	(4.92)	(3.27)	(3.37)	(3.02)
log(1+Num_Analyst)	0.0113*	0.0170***	0.0130***	0.0060***	0.0024*	-0.0003	-0.0011***	-0.0004**	-0.0002	-0.0000
	(1.92)	(3.94)	(4.57)	(2.93)	(1.78)	(-0.34)	(-2.92)	(-2.06)	(-1.01)	(-0.48)
log(age)	0.0028***	0.0060***	0.0068***	0.0057***	0.0060***	0.0039***	0.0014***	-0.0001	-0.0002	-0.0003**
	(2.89)	(6.42)	(9.29)	(7.19)	(10.64)	(7.13)	(4.53)	(-0.51)	(-0.95)	(-2.25)
log(price)	-0.0035***	-0.0058***	-0.0071***	-0.0095***	-0.0105***	-0.0121***	-0.0082***	-0.0061***	-0.0026***	-0.0013***
	(-4.12)	(-7.06)	(-8.12)	(-11.81)	(-9.92)	(-12.37)	(-9.65)	(-8.96)	(-7.01)	(-4.81)

Panel B continued

Total_rank	0	1	2	3	4	5	6	7	8	9
S&P500	0.0121**	0.0240**	0.0582***	0.0804***	0.0736***	0.0503***	0.0315***	0.0161***	0.0076***	0.0045***
	(2.24)	(2.22)	(3.98)	(5.06)	(7.86)	(13.34)	(18.05)	(12.66)	(11.00)	(9.02)
Adj_RSQ	0.7945	0.8022	0.7928	0.7611	0.7196	0.6884	0.6715	0.6837	0.7025	0.7356
Total observations	359194									

Panel C

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.5018***	0.4191***	0.3680***	0.3471***	0.2461***	0.1831***	0.1463***	0.1038***	0.0706***	0.0565***
	(20.04)	(16.78)	(15.97)	(16.37)	(12.78)	(15.64)	(15.11)	(14.01)	(11.37)	(11.52)
log(Concentrated)	0.0023	0.0037***	0.0029***	0.0029***	0.0026***	0.0019***	0.0016***	0.0010***	0.0002***	0.0003***
	(1.11)	(5.25)	(6.87)	(6.98)	(12.82)	(10.36)	(7.71)	(6.71)	(2.98)	(4.24)
log(Total)	0.0030	-0.0056*	-0.0072***	0.0018	-0.0101**	-0.0109**	-0.0053	-0.0138***	-0.0094***	-0.0050***
	(0.90)	(-1.92)	(-3.13)	(0.54)	(-2.51)	(-2.26)	(-1.43)	(-3.86)	(-3.22)	(-5.05)
log(Num_Institution)	-0.0134*	-0.0090***	-0.0132***	-0.0186***	-0.0113**	-0.0103***	-0.0084***	-0.0065***	-0.0019	0.0012
	(-1.87)	(-3.29)	(-3.99)	(-3.51)	(-2.41)	(-3.16)	(-3.04)	(-3.32)	(-0.99)	(1.10)
log(size)	-0.0839***	-0.0674***	-0.0557***	-0.0397***	-0.0298***	-0.0164***	-0.0116***	-0.0072***	-0.0067***	-0.0071***
	(-16.87)	(-22.85)	(-26.94)	(-21.98)	(-13.41)	(-10.05)	(-7.70)	(-6.56)	(-5.92)	(-9.31)
log(B/M)	0.0033***	0.0078***	0.0080***	0.0063***	0.0055***	0.0034***	0.0025***	0.0017***	0.0005***	0.0004**
	(2.91)	(10.32)	(11.13)	(6.56)	(5.16)	(5.42)	(6.30)	(8.37)	(3.18)	(2.29)
Ret (t-3, t)	-0.0025	0.0018	-0.0032*	-0.0046***	-0.0044*	-0.0061***	-0.0066***	-0.0033***	-0.0027***	-0.0010**
	(-0.41)	(0.60)	(-1.90)	(-2.66)	(-1.95)	(-3.08)	(-4.60)	(-3.57)	(-3.94)	(-2.06)
Ret (t-12, t-3)	0.0018	0.0002	-0.0007	0.0006	0.0006	-0.0006	-0.0009	-0.0006	-0.0005	0.0004
	(0.82)	(0.11)	(-0.52)	(0.50)	(0.53)	(-0.55)	(-1.30)	(-1.15)	(-1.64)	(1.08)
Illiquidity ratio	0.0005	0.0011***	0.0018***	0.0033***	0.0090***	0.0349***	0.0258***	0.0883***	0.1428***	0.2583***
	(0.88)	(2.85)	(3.95)	(5.28)	(5.00)	(3.29)	(4.50)	(3.10)	(3.38)	(3.31)
log(1+Num_Analyst)	0.0216**	0.0231***	0.0173***	0.0065***	0.0032**	-0.0001	-0.0011***	-0.0005***	-0.0002	0.0001
	(2.17)	(3.77)	(4.67)	(3.06)	(2.38)	(-0.17)	(-2.79)	(-3.08)	(-1.17)	(1.10)
log(age)	0.0045***	0.0074***	0.0064***	0.0050***	0.0051***	0.0032***	0.0012***	0.0004**	-0.0000	-0.0003***
	(3.31)	(5.30)	(6.36)	(7.32)	(8.78)	(7.30)	(4.57)	(2.16)	(-0.25)	(-2.99)
log(price)	-0.0029*	-0.0090***	-0.0065***	-0.0094***	-0.0096***	-0.0102***	-0.0068***	-0.0051***	-0.0021***	-0.0010***
	(-1.94)	(-4.96)	(-8.42)	(-10.76)	(-10.95)	(-10.65)	(-8.56)	(-7.83)	(-5.37)	(-4.57)

Panel C continued

Total_rank	0	1	2	3	4	5	6	7	8	9
S&P500	0.0118** (2.25)	0.0229* (2.12)	0.0508*** (3.92)	0.0672*** (4.73)	0.0567*** (6.68)	0.0391*** (13.07)	0.0248*** (16.82)	0.0133*** (12.56)	0.0062*** (9.05)	0.0036*** (7.78)
Adj_RSQ	0.8189	0.7915	0.7873	0.7459	0.7097	0.6778	0.6736	0.6955	0.7210	0.7488
Total observations	281048									

Panel D

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4834***	0.4417***	0.3847***	0.3542***	0.2698***	0.2063***	0.1535***	0.1127***	0.0778***	0.0615***
	(18.93)	(17.69)	(16.21)	(15.66)	(15.16)	(17.11)	(14.15)	(15.14)	(14.15)	(11.16)
log(Skilled)	0.0001	0.0013**	0.0014***	0.0006	-0.0001	-0.0004	-0.0018***	-0.0008	-0.0006**	-0.0001
	(0.07)	(2.09)	(2.71)	(1.14)	(-0.19)	(-0.90)	(-2.79)	(-1.47)	(-2.03)	(-0.86)
log(Total)	-0.0005	-0.0023	-0.0062***	-0.0001	-0.0061	-0.0073*	-0.0042	-0.0145***	-0.0093***	-0.0061***
	(-0.39)	(-1.35)	(-3.09)	(-0.03)	(-1.63)	(-1.79)	(-1.18)	(-3.38)	(-2.78)	(-4.94)
log(Num_Institution)	-0.0057*	-0.0087***	-0.0096***	-0.0149***	-0.0124**	-0.0135***	-0.0105***	-0.0079***	-0.0037*	-0.0004
	(-1.66)	(-3.47)	(-2.68)	(-2.85)	(-2.53)	(-3.40)	(-3.14)	(-3.79)	(-1.88)	(-0.37)
log(size)	-0.0886***	-0.0748***	-0.0636***	-0.0478***	-0.0339***	-0.0187***	-0.0128***	-0.0078***	-0.0066***	-0.0068***
	(-27.93)	(-29.84)	(-27.22)	(-19.67)	(-12.46)	(8.68)	(-7.47)	(-7.37)	(-5.88)	(-9.16)
log(B/M)	0.0020***	0.0061***	0.0068***	0.0070***	0.0067***	0.0042***	0.0030***	0.0024***	0.0006***	0.0004***
	(2.74)	(9.69)	(11.20)	(7.55)	(6.26)	(5.42)	(6.92)	(7.67)	(3.47)	(2.62)
Ret (t-3, t)	0.0072*	0.0008	-0.0040**	-0.0033**	-0.0061***	-0.0066***	-0.0074***	-0.0035***	-0.0032***	-0.0010*
	(2.42)	(0.40)	(-2.33)	(-2.14)	(-3.42)	(-3.63)	(-5.82)	(-3.54)	(-4.69)	(-2.33)
Ret (t-12, t-3)	0.0015	0.0003	-0.0009	-0.0010	-0.0006	-0.0014	-0.0012*	-0.0004	-0.0005	0.0002
	(1.13)	(0.30)	(-0.70)	(-1.00)	(-0.52)	(-1.46)	(-1.80)	(-0.66)	(-1.40)	(0.86)
Illiquidity ratio	0.0001	0.0008***	0.0016***	0.0025***	0.0064***	0.0207***	0.0209***	0.0847***	0.1237***	0.2006***
	(0.45)	(2.62)	(3.22)	(4.80)	(4.81)	(3.10)	(4.98)	(3.13)	(3.52)	(3.00)
log(1+Num_Analyst)	0.0101	0.0175***	0.0140***	0.0056***	0.0024*	-0.0003	-0.0012***	-0.0007***	-0.0002	0.0001
	(1.50)	(3.88)	(4.53)	(2.88)	(1.92)	(-0.40)	(-2.86)	(-3.38)	(-0.98)	(0.62)
log(age)	0.0030***	0.0057***	0.0066***	0.0053***	0.0053***	0.0041***	0.0018***	0.0004	0.0000	-0.0003***
	(3.32)	(6.29)	(8.91)	(6.48)	(8.40)	(7.97)	(6.43)	(1.61)	(0.17)	(-2.97)
log(price)	-0.0027***	-0.0069***	-0.0066***	-0.0089***	-0.0103***	-0.0125***	-0.0076***	-0.0057***	-0.0026***	-0.0012***
	(-2.64)	(-6.38)	(-7.83)	(-10.86)	(-10.37)	(-13.32)	(-8.24)	(-8.33)	(-6.36)	(-4.78)

Panel D continued

Total_rank	0	1	2	3	4	5	6	7	8	9
S&P500	0.0115** (2.35)	0.0223** (2.04)	0.0550*** (3.92)	0.0762*** (4.85)	0.0686*** (7.30)	0.0492*** (13.27)	0.0298*** (16.24)	0.0162*** (12.29)	0.0076*** (11.01)	0.0042*** (8.50)
Adj_RSQ	0.8025	0.7992	0.7911	0.7542	0.7160	0.6796	0.6664	0.6808	0.7097	0.7461
Total observations	339792									

Panel E

Total_rank	0	1	2	3	4	5	6	7	8	9
Intercept	0.4873***	0.4534***	0.4042***	0.3741***	0.2816***	0.2127***	0.1617***	0.1180***	0.0817***	0.0648***
	(24.12)	(18.83)	(18.18)	(16.72)	(17.23)	(18.00)	(14.61)	(14.45)	(14.20)	(10.40)
log(Independent)	0.0006	0.0019	0.0003	0.0061*	0.0059**	0.0023	0.0047**	0.0031*	-0.0003	-0.0005
	(0.82)	(1.41)	(0.21)	(1.74)	(2.12)	(1.16)	(2.03)	(1.75)	(-0.36)	(-0.89)
log(Total)	-0.0003	-0.0031	-0.0057***	-0.0045	-0.0118***	-0.0120**	-0.0124***	-0.0182***	-0.0089**	-0.0058***
	(-0.24)	(-1.58)	(-2.65)	(-0.94)	(-2.71)	(-2.44)	(-3.40)	(-3.35)	(-2.40)	(-3.58)
log(Num_Institution)	-0.0045*	-0.0074***	-0.0108***	-0.0181***	-0.0158***	-0.0149***	-0.0125***	-0.0088***	-0.0048**	-0.0007
	(-1.80)	(-3.07)	(-3.11)	(-3.54)	(-3.37)	(-3.79)	(-3.63)	(-3.63)	(-2.28)	(-0.51)
log(size)	-0.0898***	-0.0795***	-0.0676***	-0.0499***	-0.0347***	-0.0194***	-0.0126***	-0.0078***	-0.0062***	-0.0070***
	(-31.73)	(-34.15)	(-27.90)	(-17.91)	(-11.32)	(-8.17)	(-6.66)	(-6.35)	(-5.30)	(-8.38)
log(B/M)	0.0016***	0.0048***	0.0071***	0.0070***	0.0068***	0.0045***	0.0032***	0.0023***	0.0007***	0.0006***
	(2.62)	(7.45)	(12.68)	(7.36)	(6.43)	(5.43)	(6.96)	(7.40)	(4.05)	(3.34)
Ret (t-3, t)	0.0051***	0.0023	-0.0024	-0.0036**	-0.0064***	-0.0074***	-0.0082***	-0.0039***	-0.0030***	-0.0010*
	(3.04)	(1.21)	(-1.65)	(-2.23)	(-3.42)	(-4.25)	(-5.80)	(-3.63)	(-3.56)	(-2.08)
Ret (t-12, t-3)	0.0014*	0.0010	-0.0001	-0.0017*	-0.0010	-0.0014	-0.0008	-0.0005	-0.0003	0.0006*
	(1.67)	(1.12)	(-0.09)	(-1.67)	(-0.87)	(-1.52)	(-1.11)	(-0.81)	(-0.50)	(1.87)
Illiquidity ratio	0.0002	0.0006*	0.0010**	0.0019***	0.0060***	0.0223***	0.0206***	0.0726***	0.1363***	0.1754***
	(0.76)	(1.87)	(2.54)	(4.70)	(4.50)	(3.12)	(4.90)	(3.15)	(3.34)	(3.00)
log(1+Num_Analyst)	0.0142**	0.0156***	0.0141***	0.0068***	0.0033**	-0.0002	-0.0013***	-0.0007***	-0.0002	0.0000
	(2.08)	(4.26)	(4.63)	(2.92)	(2.13)	(-0.21)	(-2.95)	(-3.63)	(-1.08)	(0.41)
log(age)	0.0029***	0.0054***	0.0062***	0.0051***	0.0058***	0.0043***	0.0018***	0.0005**	0.0000	-0.0003***
	(3.54)	(8.86)	(8.00)	(5.98)	(9.04)	(7.57)	(6.62)	(2.06)	(0.13)	(-3.12)
log(price)	-0.0023**	-0.0055***	-0.0068***	-0.0091***	-0.0106***	-0.0126***	-0.0080***	-0.0057***	-0.0028***	-0.0013***
	(-2.51)	(-7.17)	(-8.49)	(-10.79)	(-10.34)	(-14.03)	(-8.88)	(-8.46)	(-5.40)	(-4.18)

Panel E continued

Total_rank	0	1	2	3	4	5	6	7	8	9
S&P500	0.0201** (2.34)	0.0249** (2.28)	0.0612*** (4.13)	0.0830*** (5.23)	0.0752*** (8.08)	0.0531*** (14.42)	0.0330*** (17.61)	0.0175*** (13.12)	0.0083*** (11.82)	0.0046*** (8.37)
Adj_RSQ	0.7920	0.8003	0.7973	0.7652	0.7238	0.6865	0.6733	0.6858	0.7097	0.7417
Total observations	375979									

Table 6.Heterogeneity of institutional ownership and stock price delay

This table reports the Fama-MacBeth regression results of influences of heterogeneous institutional ownership on stock price delay after controlling investor recognition and firm characteristic variables from 1981Q1 to 2013Q3. Regressions are performed on stocks with institutional ownership in each quarter end. log(Top5) is the logarithm of top 5 institutional ownership. log(Yearlong) is the logarithm of year-long institutional ownership. log(low_churnrate) is the logarithm of bottom tertile churn rate institutional ownership. log(high_churnrate) is the logarithm of top tertile churn rate institutional ownership. log(Concentrated) is the logarithm of top tertile HHI index institutional ownership. log(Skilled) is the logarithm of top tertile Kacperzayk et al. (2014) skill institutional ownership. log(Independent) is the logarithm of investment companies, independent investment advisors, and public pension funds' institutional ownership. log(Total) is the logarithm of total institutional ownership. log(Num_Institutions) is the logarithm of the number of institutions holding the stock. log(size) is the logarithm of the stock's market capitalization. log(B/M) is the logarithm of the stock's book to market ratio. Ret(t-3,t) is a stock's most recent quarter's cumulated monthly returns. Ret(t-12,t-3) is a stock's cumulated monthly returns from last year to the beginning of the most recent quarter. Illiquidity ratio is the quarterly average of Amihud (2002) daily absolute stock return divided by its dollar trading volume in millions. log(1+Num_Analyst) is the logarithm of one plus number of analysts following the stock. log(age) is the logarithm of how many months a stock has been recorded in the CRSP database. log(price) is the logarithm of a stock's quarter end price. S&P 500 is the dummy variable and equals to 1 if the stock is included in the S&P 500 index. Standard errors are Newey-West (1987) corrected with lag = 4. t-statistics are reported in the parenthesis under each number. Adj_RSQ is the adjusted R-squared measure and *, **, *** represents statistical significance at 10%, 5%, and 1% level respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	0.2863*** (15.84)	0.3133*** (22.07)	0.2639*** (14.05)	0.2406*** (13.16)	0.2701*** (13.58)	0.2340*** (12.88)	0.2554*** (13.31)	0.2730*** (13.87)
log(Top5)		-0.0485*** (-6.17)						
log(Yearlong)			0.0014 (1.17)					
log(low_churnrate)				-0.0043*** (-4.37)				
Log(high_churnrate)					0.0024*** (3.10)			
log(Concentrated)						0.0042*** (10.89)		
log(Skilled)							0.0015** (2.32)	
log(Independent)								0.0001 (0.11)
log(Total)	-0.0089*** (-7.90)	0.0427*** (5.56)	-0.0112*** (-5.29)	-0.0092*** (-6.84)	-0.0109*** (-6.82)	-0.0155*** (-11.93)	-0.0116*** (-8.08)	-0.0092*** (-8.93)
log(Num_Institution)	-0.0137*** (-2.63)	-0.0277*** (-8.63)	-0.0141*** (-2.64)	-0.0082 (-1.52)	-0.0148*** (-2.91)	-0.0121** (-2.49)	-0.0127** (-2.43)	-0.0141*** (-2.76)
log(size)	-0.0349*** (-16.33)	-0.0339*** (-17.17)	-0.0297*** (-15.08)	-0.0333*** (-14.87)	-0.0296*** (-18.44)	-0.0230*** (-15.01)	-0.0285*** (-16.39)	-0.0321*** (-16.23)
log(B/M)	0.0050*** (14.77)	0.0055*** (17.44)	0.0047*** (12.01)	0.0047*** (10.23)	0.0043*** (12.42)	0.0030*** (8.92)	0.0042*** (11.63)	0.0045*** (12.23)

Table 6 continued

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Ret (t-3, t)	-0.0013 (-1.08)	-0.0017 (-1.39)	-0.0005 (-0.33)	-0.0013 (-1.09)	-0.0023** (-2.13)	-0.0024* (-1.74)	-0.0025** (-1.98)	-0.0022* (-1.94)
Ret (t-12, t-3)	0.0005 (0.60)	-0.0005 (-0.63)	0.0017* (1.69)	0.0004 (0.41)	0.0001 (0.08)	0.0008 (1.05)	0.0001 (0.08)	0.0002 (0.25)
Illiquidity ratio	0.0007*** (2.79)	0.0006*** (2.81)	0.0013*** (2.95)	0.0010*** (3.18)	0.0011*** (2.77)	0.0019*** (4.32)	0.0016*** (3.64)	0.0013** (2.56)
log(1+Num_Analyst)	0.0069*** (5.88)	0.0049*** (6.23)	0.0054*** (6.33)	0.0060*** (6.84)	0.0046*** (6.37)	0.0037*** (8.31)	0.0044*** (5.80)	0.0061*** (6.54)
log(age)	0.0080*** (13.94)	0.0079*** (13.71)	0.0071*** (11.66)	0.0084*** (12.92)	0.0070*** (13.81)	0.0052*** (11.91)	0.0066*** (12.56)	0.0075*** (13.72)
log(price)	-0.0146*** (-22.20)	-0.0160*** (-23.07)	-0.0140*** (-18.96)	-0.0132*** (-19.60)	-0.0144*** (-20.02)	-0.0125*** (-16.48)	-0.0135*** (-18.86)	-0.0138*** (-18.00)
S&P500	0.0818*** (21.89)	0.0769*** (16.20)	0.0709*** (16.80)	0.0723*** (16.23)	0.0725*** (16.80)	0.0515*** (14.13)	0.0663*** (15.90)	0.0768*** (17.87)
Adj_RSQ	0.7617	0.7743	0.7418	0.7486	0.7360	0.7028	0.7288	0.7492
Total observations	388873	388873	350622	363922	357201	279284	339792	373984

Table 7.Regressions of stock excess returns on heterogeneous institutional ownership components of stock price delay

This table reports the Fama-MacBeth regression results of regressing monthly stock excess returns (raw-return minus risk-free-rate) on heterogeneous institutional ownership components of stock price delay from April 1981 to December 2013. Regressions are performed on stocks with institutional ownership in each quarter end. Delay_Total is the stock price delay component related to total institutional ownership and number of institutions. Delay_Top5 is the stock price delay component related to the top 5 institutional ownership. Delay_Yearlong is the stock price delay component related to the year-long institutional ownership. Delay_low_churnrate is the stock price delay component related to the bottom tertile churn rate institutional ownership. Delay_high_churnrate is the stock price delay component related to the top tertile churn rate institutional ownership. Delay_Concentrated is the stock price delay component related to the top tertile HHI index institutional ownership. Delay_Skilled is the stock price delay component related to the top tertile Kacperzayk et al. (2014) skill institutional ownership. Delay_Independent is the stock price delay component related to investment companies, independent investment advisors, and public pension funds' institutional ownership. Standard errors are Newey-West (1987) corrected with lag = 4. t-statistics are reported in the parenthesis under each number. Adj_RSQ is the adjusted R-squared measure and *, **, *** represents statistical significance at 10%, 5%, and 1% level respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	0.0091** (2.44)	0.0091*** (2.81)	0.0090*** (2.98)	0.0085*** (2.92)	0.0090*** (2.81)	0.0111*** (3.40)	0.0232*** (6.85)	0.0089*** (2.80)
Delay_Total	0.0128 (0.48)							
Delay_Top5		-0.0052 (-0.48)						
Delay_Yearlong			0.0935 (0.30)					
Delay_low_churnrate				-0.0107 (-0.09)				
Delay_high_churnrate					0.1021 (0.68)			

Table 7 continued

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Delay_Concentrated						0.0111*** (3.40)		
Delay_Skilled							2.6682*** (10.03)	
Delay_Independent								2.0981 (0.47)
Adj_RSQ	0.0076	0.0050	0.0053	0.0048	0.0056	0.0017	0.0074	0.0055
Total observations	1794370	1794367	1584953	1650948	1626689	1260732	1540311	1707991