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ABSTRACT

Large institutional investors own an increasing share of equity markets. We conjecture that a financial market in which large institutions dominate operates differently than a market populated by smaller independent investors. To support this view, we show that funds within the same family display higher correlation in flows and investment strategies. As a result, large institutions are likely to impose greater liquidity demand on the stocks they trade. Accordingly, we find that ownership and trades by large institutions lead to higher volatility and to increased return and liquidity comovement. Moreover, during times of market turmoil, stocks with higher ownership by large institutions display significantly larger price drops.

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1 Introduction

The recent decades have witnessed the rise of large institutional players in financial markets. Since 1980, the top 10 institutional investors have quadrupled their holdings in the equity market. As of December 2016, the largest U.S. institutional investor oversaw 6.3% of the total equity assets in Security and Exchange Commission (SEC) 13F filings, and the top 10 investors managed 26.5% of these assets. Observing these trends, some authors argue that the large size of investors is a variable to take into account when assessing the efficiency of market outcomes (Azar, Schmalz, and Tecu, 2017).

This paper studies whether ownership by large institutional investors has implications for stock prices. Gabaix (2011) posits that large market players are "granular", i.e. shocks to these agents are not easily diversified when aggregating across units and are reflected in aggregate market outcomes. Applying this notion to financial markets, Gabaix et al. (2006) suggest that the trades of large investors can explain excess volatility. A similar prediction emerges as a natural extension of Greenwood and Thesmar's (2011) framework. They show that volatility is a positive function of the correlation of capital flows across the *different investors* that hold a given stock. Extending their logic, if the different managers *within a single institution* have more correlated flows, the stocks held by large institutions should display higher volatility and correlation.

Inspired by these arguments, we conjecture that large institutions operate differently than a collection of smaller independent entities that oversee an equivalent amount of assets. Specifically, centralized functions such as marketing, research, and risk management as well as a unique corporate identity may induce correlation of capital flows and reduce correlation of investment strategies within an institution. Due to this commonality across units, large institutions could end up trading in larger amounts and on fewer securities. This more intense demand for liquidity, in turn, could increase price volatility and comovement.

Our novel contribution to the literature on institutional investors is twofold. We first present empirical evidence supporting the view that flows and trading strategies are more correlated across different entities within the same institution than across independent managers. Then, we show that ownership by large institutions increases stock volatility and pin down this effect to their trading activity. We also find that return and liquidity comovement increase because

of ownership by large players. Finally, during times of market turmoil, stocks with higher ownership by large institutions display significantly larger price drops.

In more detail, in the first part of the paper, we explore the implications of a common institutional affiliation for flows and the investment behavior of the different units in the same family. First, intuitive arguments suggest that the various asset managers in the same institution experience more correlated capital flows than independent entities. For example, institutions typically cultivate a brand name (e.g., a Fidelity fund), and therefore affiliated entities are perceived as sharing the destiny of the broader family. Similarly, distribution policies and cross-selling practices (e.g., funds that are offered in pension fund programs) may increase flow correlation. We test this premise by comparing the correlation of flows of mutual funds that belong to the same family to that of independent funds. We find that the correlation of flows of mutual funds within the same family is higher than that of independent funds by about 10%.

Second, institutions often rely on a centralized research division that generates investment views that inform trading decisions across the family. Thus, even though different asset managers have leeway in their portfolio allocation, their behavior may display abnormal correlation due to the family-wide investment directions. We test this conjecture in multiple ways. We first show that mutual funds within the same family display about 11% higher correlation in their active holdings (measured as in Cremers and Petajisto 2009) than independent funds. Then, we show that the active component of portfolio rebalancing, computed following Greenwood and Thesmar (2011) as the change in holdings that is not flow-driven, is significantly more correlated for mutual funds in the same family (about 38% of a standard deviation). Finally, we predict that entities within the same group, because of their partly overlapping investment strategies, trade on a smaller set of stocks relative to independent firms. We find support for this conjecture in a block bootstrap test comparing the portfolios of large institutions to those of random samples of smaller institutions amounting to the same total assets.

Third, based on the evidence above, we conjecture that the different units within the same firm are more likely to trade in the same direction on the same stocks, so that their trades do not cancel out. As a result, the trading intensity on stocks owned by large institutions is more pronounced. We test this idea by comparing the trades of large institutions to those of random samples of smaller institutions with the same total assets under management (a 'synthetic'

institution). Using a block bootstrap approach, we show that stock-level trades by large institutions are bigger than those of their synthetic counterparts. For example, 9.4% of the trades by top institutions are above the 95th percentile of the distribution of trades by synthetic institutions, where the null hypothesis of equal trade size would predict this number to be 5%.

In the second part of the paper, we study the implications for asset prices of the heavier demand for liquidity originating from the larger trades of big institutions. First, we posit that large investors' trading activity leads to more intense price pressure, which in turn translates into higher stock price volatility. We confirm this prediction by showing a significant relation between ownership by top institutions and stock-level volatility. The economic magnitude is significant; a one–standard deviation increase in top 10 institutions' ownership is associated with an increase in volatility by 3% of a standard deviation. In further tests, we show that changes in portfolio holdings drive out ownership as a determinant of volatility, confirming the view that large institutions affect stock prices through their heavier demand for liquidity.

To address potential endogeneity concerns, we exploit the natural experiment originating from the mergers of large institutional investors, which are arguably exogenous events relative to the determinants of the volatility. A merger of large institutions yields an even larger institution. Therefore, we expect that the securities in the institutions' portfolios will become more volatile after the merger. We start from the BlackRock-Barclays Global Investors (BGI) merger that took place at the end of 2009 and spawned the largest institution in the market. We find that ownership by the consolidated organization has a greater impact on the volatility of the underlying portfolio than the impact of the two separate entities (the pre-merger organizations). This effect persists well after the merger event. The evidence is broadly confirmed when we extend the analysis to include up to 11 different mergers of large institutional investors during our sample period of 1980 to 2016 We also confirm our results using a second identification strategy, in which we exploit the local bias effect (Coval and Moskowitz 1999) to develop an instrument for institutional ownership.[1]

Second, we conjecture that stocks owned by the same large institutions are likely exposed to correlated trading activity from these institutions. Hence, we predict that their returns will display abnormal comovement with large institutions' portfolios. Consistent with this prediction, we find a significant relation between stock-level ownership by a large institution and return

[1] For reasons of space, we report these results in the Internet Appendix.

comovement with the rest of that institution's portfolio, controlling for exposure to standard risk factors. Based on the same logic, we also expect comovement in the level of liquidity of stocks owned by the same large institutions. Supporting this prediction, we find that ownership by large institutions induces higher comovement between stock-level liquidity and the average liquidity of the rest of the institutional owner's portfolio. The identification through the merger experiment reassures us about the causal interpretation of both findings.

In the last part of the paper, we study the effect of large institutional investors on stock prices during periods of market turmoil. Regulators have expressed concerns about systemic risks that could result from the high concentration of assets under a few large institutional investors.[2] The potential threat is that institutional investors, when experiencing massive redemptions, liquidate their portfolios and destabilize asset prices, propagating the effect to other investors' balance sheets. Given our conjecture that large investors influence asset prices through a more intense demand for liquidity, we expect the prices of the stocks that they own to be more fragile when aggregate liquidity is especially low. Accordingly, we find that in turmoil periods, captured by extreme realizations of the VIX index, the TED spread, and the aggregate market return, stocks with higher ownership by large institutions experience significantly more negative returns. The economic magnitude is important: In a bad month, defined as one with extremely low market returns, a one–standard deviation increase in ownership by the top 10 institutions is associated with lower monthly returns by 5% of a standard deviation. The monthly frequency at which we detect this evidence suggests that the effect of large institutions is not merely microstructure noise. Rather, this result supports the view that institutions can exacerbate the impact of fire sales on prices (e.g., Coval and Stafford 2007, Cella, Ellul, and Giannetti 2013), and it speaks to the systemic threat originating from a concentrated asset management sector.

Our study makes an additional contribution as we document and fix a major inconsistency in a commonly used database in the literature. In particular, we detect several missing entries in the Thomson-Reuters 13F data involving very large institutions and large stocks in recent years.

[2] The Office of Financial Research (2013) identifies redemption risk as a major vulnerability of asset managers, and points to the fire sale channel as a source of systemic risk. Relatedly, a recent Financial Stability Board publication (2015) remarks that, although research studying market contagion is abundant, a gap exists in the study of the potential effect of large individual organizations.

For this reason, we develop a methodology to fix these issues that relies on the original 13F filings posted on the SEC website, and we make our data publicly available.

We contribute to a rich literature showing the impact of institutional investors on asset prices. More closely related to our paper, Sias (1996) and Bushee and Noe (2000) find evidence that increases in institutional ownership are accompanied by a rise in stock volatility. Our novel contribution is to identify large institutional investors as a separate and more important contributor to stock price volatility. Other papers establish that aggregate institutional ownership can affect the volatility and correlation of asset returns and liquidity (Greenwood and Thesmar 2011; Anton and Polk 2014). Our original contribution is to show that a single large institution can induce this effect, and that the effect increases with the institution's size. Jotikasthira, Lundblad, and Ramadorai (2012) and Bartram, Griffin, Lim, and Ng (2015) demonstrate that flows by investors and common ownership, respectively, can propagate shocks across markets. In our analysis, large institutions induce correlation in returns because of the sheer size of their liquidity demand. Koijen and Yogo (2015) estimate a structural model in which large institutional investors smooth their price impact and therefore have a muted effect on aggregate market volatility. Different from these authors, we provide reduced-form evidence on the effect of ownership structure on volatility.

Our results can also be interpreted in light of the literature that studies demand- and supply-side drivers of market liquidity, which owes much to the theory of Brunnermeier and Pedersen (2008). For example, Hameed, Kang, and Viswanathan (2010) and Aragon and Strahan (2012) identify a significant role of supply-side determinants (funding liquidity). Karolyi, Lee, and Dijk (2012) show that correlated demand for liquidity, proxied by commonality in trading volume, is a prominent factor. Koch, Ruenzi, and Starks (2016) show that correlated demand by mutual funds generates liquidity commonality. Our work identifies large institutions' trading activity as a novel demand-side determinant of liquidity commonality.

The paper proceeds as follows. Section 2 describes the data. Section 3 provides empirical evidence showing that large institutions differ from a collection of independent units. Section 4 explores the implications of large institutions for asset prices. Section 5 concludes.

2 Data Description

To construct our sample, we use institutional ownership data from the first quarter of 1980 to the fourth quarter of 2016, merging information from Thomson-Reuters and the original SEC 13F filings.[3]

In our preliminary analysis, we noticed that the Thomson-Reuters' data exhibit a substantial increase in stale holdings reports and in the number of dropped institutions, starting in 2013. For example, we found that in 2015 Thomson-Reuters' data underreports institutional ownership in the 13F filings by about 10% due to omissions of institutions and securities.[4] To overcome these limitations, we developed an alternative data collection approach that relies on the original SEC 13F filings and involves cleaning those filings and mapping them to the Thomson data. Appendix C provides a detailed description of our methodology and makes it available for other researchers.

We identify the largest institutional investors in each quarter based on a rolling four-quarter average of the rankings of their aggregate equity holdings. At the top of the ranking, we find a firm that held its position almost uninterruptedly since 1990 to the end of the sample, experiencing a change of denomination of the reporting entity in 1997 and a merger in 2009, which we will further discuss below. Overall, our sample contains 40 unique institutions that fell within the top 10 institutions at some point during our sample period. They hold an average of $169 billion (inflation

[3] The 13F filings require all institutions with investment discretion over $100 million or more of equity assets at the end of the year to provide detailed quarterly reports of their long holdings in these qualified securities in the next year. See Ben-David, Franzoni, and Moussawi (2012) for institutional details regarding 13F data and an overview of the Thomson-Reuters Institutional Ownership database. Asset managers also report positions that are managed for clients. For example, consider CalPERS, which uses Blackrock as one of its asset managers. According to CalPERS' investment statement (https://www.calpers.ca.gov/docs/forms-publications/facts-at-a-glance.pdf), it has about $160 billion in public equity. Because its 13F assets as of the end of June 2015 accounted for only about $67 billion (http://www.sec.gov/Archives/edgar/data/919079/000114036115032277/xslForm13F_X01/primary_doc.xml), CalPERS is likely to have a few billion dollars reported by asset managers, such as Blackrock and others. Those assets are reported under the respective asset managers' 13Fs.

[4] For example, Blackrock Inc. has stale data after September 2013; it is completely dropped from Thomson in 2014; and it is added back to Thomson in 2015 with a fraction of the assets under management that was historically associated with Blackrock. Additionally, we find a substantial number of excluded securities in recent quarters for unknown reasons. For example, Apple Inc. and most ETFs are dropped from Thomson-Reuters 13F data in recent quarters. We reported many of those data quality issues to WRDS and Thomson-Reuters, and worked with WRDS to provide a detailed report that includes the code on how to fix Thomson-Reuters 13F data problems using original SEC 13F filings. Please see the WRDS report for a comprehensive discussion of the data quality issues: https://wrds-web.wharton.upenn.edu/wrds/support/Data/_001Manuals%20and%20Overviews/_004Thomson%20Reuters/Mutual%20Fund%20and%20Investment%20Company/_001Research%20Note%20-Thomson%20S34%20Data%20Issues.pdf.cfm. The mapping table between Thomson's mgrno and SEC's CIK is available on the WRDS server under the WRDS_13FLink.

adjusted to the end of 2016) in assets in a given quarter of our sample. Appendix B provides a list of all institutions that appear in the top-10 ranking during our sample period.

We measure large institutional holdings as aggregated ownership by subsets of large institutions, specifically the top 3, top 5, top 7, and top 10 institutional investors. Table 1, Panel A, provides summary statistics for our sample of institutional investors. The top 10 institutional investors hold on average 8.1% of the outstanding shares of a given stock, with a standard deviation of ownership of 9%. Ownership of the average stock decreases for the combined top 11 through top 20 institutions and beyond. The top 30 through top 50 institutions together hold 2.7% of the shares outstanding of the average stock in our sample.

Figure 1 plots the time series of the percentage of holdings of large institutions over our sample period. We include the holdings of the largest institutional investor as well as those of the groups of the top 3, 5, 7, and 10 largest investors. We observe that the percentage of total shares outstanding held by large institutions in the average stock is increasing over time. For example, the largest institution in the economy more than quadruples its holdings from 1.4% of the equity market at the beginning of the sample (1980) to 6.3% at the end of the sample (2016). Similarly, the largest 10 institutions own 5.6% at the beginning of the sample and 26.5% at the end. Over the same period, ownership by all institutions roughly doubles. Comparing this trend to the faster growth of large institutions suggests that ownership has become more concentrated over time.

Ownership by large institutions can be compared to aggregate institutional ownership. We observe that for the average stock in our sample, institutional investors own 38% of its shares (*Ownership by all institutions*).[5]

We use all stocks in the Center for Research in Security Prices (CRSP) universe, regardless of whether they are held by the largest institutional investors. We use data from CRSP and Compustat to construct other stock-level variables. Because the main variables from the 13F filings are at a quarterly frequency, we construct all other variables at a quarterly frequency.

One of the main dependent variables is *Daily volatility (%)*, which is measured for each stock in each quarter as the standard deviation of daily log returns. Panel A of Table 1 provides

[5] We note the maximum value of *Ownership by all institutions* is 1.27. Indeed, institutional ownership might be above 100%. This rare situation occurs when shares that have been short sold are double-counted. Lewellen (2011) discusses these situations and concludes that they do not represent data errors, but rather are the result of short selling.

summary statistics for our sample of stocks. The mean daily volatility over the entire sample is 3.5%, and the median is 2.8%.

Table 1, Panel B, provides a correlation matrix for the key variables used in our analysis. Most variables exhibit low correlation with each other, with some exceptions. Ownership by the top 10 institutions is correlated with the ownership by all institutions at 78%. Moreover, ownership by the top 10 institutions is correlated at 53% with Greenwood and Thesmar's (2011) measure of fragility, which is discussed below.

Table 1, Panel C, provides summary statistics on monthly stock-level returns and ownership for selected months including the top 5% daily realizations of the VIX index, the TED spread, and the bottom 5% of the monthly market excess return.

Appendix A provides a detailed description of the variables we use in the study.

3 Do Large Institutions Differ from a Collection of Small Institutions?

The key to understanding the effects of large institutions on financial markets is to identify the features that distinguish a single large institution with multiple units (e.g., a family of mutual funds) from a collection of smaller independent entities that are not under the same institutional umbrella. In other words, we ask what makes large institutional investors different from a collection of smaller investors that add up to the same total size.

Our main conjecture is that centralized functions, such as research, marketing, and risk management, create correlated behavior across the units within a large firm, which in turn generates correlated trades coming from the different divisions within the organization. These trades are likely to have a significant price impact because they do not offset one another, but rather they hit the market as a single large shock. Price impact and volatility result from the price concessions that liquidity providers require to accommodate the large trades. These effects are mitigated for independent investors, because their trading behavior is less correlated. Consequently, their trades are more likely to offset each other. Hence, the price impact of the trades of independent investors would be less pronounced.[6]

[6] The Internet Appendix provides a simplified reduced-form model that formalizes these predictions. The equations of the model provide guidance for how we approached the empirical analysis that is the main contribution of the paper.

The notion that a concentrated market is exposed to fewer diversifiable trading shocks than one in which smaller investors prevail is an application to financial markets of the granularity hypothesis that Gabaix (2011) develops to explain aggregate growth. According to Gabaix, aggregate fluctuations can result from firm-level shocks if the distribution of firms is fat-tailed. In particular, idiosyncratic shocks are not diversified away if large firms are present in the market.

In this section, we empirically test whether different units within the same institution display more correlated behavior than entities that are part of independent organizations. Our tests focus on the hypothesis that both capital flows and investment styles are correlated across units within large organizations. The correlation of capital flows may be the result of a centralized marketing function or a common organizational identity vis-à-vis external investors (e.g., Fidelity funds). The correlation in investment styles may originate from a centralized research function, a centralized risk management function, or simply "views" expressed by the top management of the organization.[7] We also test the hypothesis that large firms invest in a smaller set of stocks and carry out larger trades, which is a consequence of the correlated trading behavior of the different units within a large firm.

3.1 Correlated Flows: Evidence from Mutual Funds

Marketing efforts aimed at creating a family brand and at cross-selling an array of family products are likely to increase the correlation of flows to the units within the organization. This can happen in several ways. For example, when a provider of a 401(k) pension plan includes multiple funds from a given family among the investment options, correlated flows will hit all of the funds in the family. Moreover, mutual funds often inherit the reputation of the umbrella organization and are identified with it, as in "a Fidelity fund." Hence, the stellar performance of a given fund may induce investors to invest in other family funds as well (as in Nanda, Wang, and Zheng 2004). Or, investors may perceive funds in the same family as following a similar investment style and move capital in and out of the family as a result of style investing (Barberis and Shleifer 2003) Also important, events that occur at the level of the parent company may trickle

[7] Additional functions could generate similarities across units, such as a human resources (HR) unit that hires portfolio managers with similar characteristics, a risk management unit that imposes similar restrictions on trading, or an information technology (IT) unit that is susceptible to the same risks (e.g., hacking, quality, etc.).

down to affect the entities within it. As an example, Bill Gross's departure from PIMCO triggered outflows from funds at PIMCO that Gross was not directly managing.[8] Because of these outflows, five of PIMCO's funds appeared in the infamous ranking of the 10 funds with the heaviest customer redemptions in 2014.

This discussion suggests that the correlation of investor flows across units of a unique institution is higher than across independent institutions. Testing this conjecture is not feasible using the quarterly 13F data, because these data do not include investor flows, but only changes in long equity positions. To overcome this empirical hurdle, we use mutual fund data. We then test whether the pairwise correlation of flows between funds in the same family (i.e., same management company) is higher than the correlation between funds in distinct families.

The CRSP Mutual Fund Database does not have an explicit mutual fund family identifier, so we create one manually.[9] We then compute the monthly flows for each share class using the monthly assets and net return figures in CRSP, and then aggregate the flows at the portfolio level. The flow-correlation measure is constructed using 12-month rolling Pearson correlations of the monthly percentage of portfolio flows. To this end, we generate a dataset that includes all combinations of mutual fund pairs. We restrict our sample to only those correlations that have non-missing flows in the last 12 months. Finally, to avoid overlapping observations, we keep one observation per fund pair-year as of December. We end up with a sample of 249,665,892 observations on 8,410 different portfolios belonging to 924 family groups in the period between 1980 and 2016. Table 1, Panel A, shows the summary statistics for the variables used in this analysis. We note that the average pairwise correlation is not high, at about 3%.

We test whether the correlation between mutual fund pairs is higher when funds belong to the same family. We thus regress the correlation coefficient on an indicator variable for whether

[8] See, e.g., http://www.reuters.com/article/us-pimco-allianz-outflows-idUSKBN0IP2NW20141105

[9] We start with all 57,645 fund share classes in the CRSP Mutual Fund Database with data after 1980. We attempt to group them into their family categories using historical management company information in CRSP, after accounting for variations in management company names over the time series. When such information is not available in CRSP, we try to derive the management company information using the historical fund name itself. We end up with 1,692 distinct groups of share classes with common family assignment, which obviously exceeds the number of fund families in the United States, and it reflects our conservative approach to family assignment. We then map all of these share classes to their respective portfolios. This information is not available in CRSP for most of the 1980–2008 period. Hence, we rely on the WRDS MFLinks database that focuses on U.S. equity mutual fund portfolios. We note that because of our conservative approach to family assignment, we are likely classifying some funds in the same family as belonging to different families. This potential misclassification, however, can only make finding an effect of family membership more difficult in our analysis.

the pair belongs to the same family dummy. Panel A of Table 2 presents the results. The different columns correspond to different combinations of fixed effects: from a specification with time fixed effects (column (1)) to a specification that includes fixed effects for each fund *i*-year and fund *j*-year (column (4)). The standard errors in these regressions are clustered along three dimensions: year, fund *i*, and fund *j*. Despite the different levels of fixed effects, the results are very similar across specifications. We find the correlation coefficient is about 3.3% higher when funds are within the same family; that is, it is about twice as large as the sample average correlation. Given that the standard deviation of the dependent variable is approximately 33.2% (Table 1, Panel A), funds that belong to the same family have a correlation that is about 10% of a standard deviation higher than that of the entire population of funds. Hence, the effect is economically significant.[10]

Overall, we find supportive evidence for one of the potential channels that make the different units within a large institution behave in a similar way. Investor flows that involve funds within the same family are more correlated. Hence, units within the same institutional umbrella are more likely to trade in a correlated fashion and therefore to have a greater price impact when adjusting their portfolios in response to flows.

3.2 Similarity in Investment Strategies: Evidence from Mutual Funds

Next, we explore whether portfolio holdings and trades are more similar across units within an organization than across independent firms. Again, we focus on mutual fund families in order to identify portfolio holdings of subentities. We posit that mutual funds that are part of a family have access to common resources when making investment decisions. For example, mutual fund managers in the same firm may rely on the same equity research done by a centralized research department, they may share information with neighboring managers in the spirit of Hong, Kubik, and Stein (2005), and may be bound by the same risk management rules set by the risk management department of the organization.

[10] The large number of observations may raise concerns about the validity of our inference. Hence, we have also drawn a random sample of 1% of the observations. The estimates in this restricted sample are very similar to those in the whole sample, and statistical significance is strong.

3.2.1 Correlation in Active Shares

We start by studying equity portfolio allocations, which we can infer from the CRSP Mutual Fund Database. Our analysis tests whether mutual funds that are part of the same family display more similar portfolio holdings. Of course, similarity can originate from the fact that mutual funds in the same family track related benchmarks, which is likely if families tend to specialize in specific asset classes (e.g., bonds for PIMCO, emerging markets for Aberdeen Asset Management, etc.). Therefore, the novelty in our argument lies in showing that same-family funds place correlated *active bets*. For this reason, we focus on the active share of each stock holding, computed as the deviation in the mutual fund's portfolio weight of the stock relative to the weight of the stock in the stated benchmark (Cremers and Petajisto 2009).

For this analysis, we use a fund-quarter level dataset. We include the pairwise correlations of active shares for each pair of funds, with the correlation computed across the quarterly stock holdings of the two funds. We restrict the dataset to the fourth quarter of each year to keep the size of the data manageable. Then, we test whether the correlation in active shares is higher for funds that are in the same family.

Table 2, Panel B, reports the results. The standard errors in these regressions are clustered along three dimensions: year, fund *i*, and fund *j*. The slopes on the same-family dummy range from 9.6%, in the first specification, to 2.6%, in the most restrictive specification with time fixed effects interacted with fund fixed effects. Given that the standard deviation of the correlation in active shares between two random funds in the data is 22.5%, the same-family effect is economically important at over 10% of a standard deviation of the dependent variable.

3.2.2 Correlation in Active Trades

Next, we focus on the related issue of whether funds in the same family trade in a more correlated fashion. Given the evidence on correlation in portfolio holdings that we have just produced (Panel B, Table 2), it is natural that same-family funds would adjust their portfolios in the same direction when they receive flows, which are also more correlated for same-family funds (Panel A, Table 2). Hence, to obtain a result that is not mechanically related to our prior evidence, we focus on mutual funds' *active trades,* using the methodology of Greenwood and Thesmar

(2011). An active trade is the residual change in a stock quarterly holding after subtracting the change in holding that would result from a simple rescaling of the portfolio proportional to the quarterly flows. In a different empirical setting, Pool, Stoffman, and Yonker (2015) show that fund managers who operate in close proximity trade in a similar direction.

As with the prior tests, we compute fund-quarter level pairwise correlations in active trades for any two funds in our database. Then, we regress these correlations on the same-family dummy. The results of the analysis are presented in Table 2, Panel C. The standard errors in these regressions are clustered along three dimensions: year, fund *i*, and fund *j*. The estimates indicate that mutual funds that belong to the same family have higher correlation between trades. The correlation is about 2.6% higher for same-family funds in the most restrictive specification. Again, the effect is highly economically significant, given that the standard deviation of the dependent variable is about 6.9%.

To summarize, it appears that mutual funds within the same family trade in a significantly more correlated fashion. This fact is consistent with the conjecture that they have access to similar research resources and are subject to similar risk management constraints. The possible consequence of these findings is that large institutional investors' trades are less diversified than the trades of independent institutions of comparable size. That is, they are concentrated on fewer stocks and are larger in absolute size. The next analysis tests this conjecture.

3.3 Large Institutions vs. Synthetic Institutions

So far, we have collected evidence on correlated flows and trading behavior within mutual fund families. We are now interested in whether the above inference about within-family similarity can be the key to interpreting the difference between large institutional investors and a collection of smaller institutions.

If units within large institutional investors behave in a more correlated way than independent firms do, we expect to find two effects. First, the trades of large institutions should be more concentrated (i.e., restricted to a smaller set of stocks). This happens, for example, if the different managers within a given firm rely on the same research sources, while managers in unrelated firms develop their trading ideas independently. Second, we expect that large institutions

place trades that are larger in absolute value than the trades placed by a collection of independent institutions that manage the same amount of total assets. This prediction emerges because correlated trading behavior prevents diversification of trades, so that trades reach the market as a large shock. On the other hand, uncorrelated trades from independent institutions are more likely to be netted against each other.

To test these conjectures, we compare large institutions' trades to the trades of smaller institutions that add up to the same total 13F equity holdings as the large institution. The comparison, therefore, aims at keeping the size of the assets under management constant so that we can analyze the effect of variation in the organizational structure.

In this analysis, we proxy for trades using the quarterly changes in 13F holdings at the stock level. For each large institution among the top 10 in a given quarter (called here the "original institution"), we generate a sample of 99 "synthetic institutions" in a block bootstrapping procedure. Each synthetic institution results from pooling together institutions that rank below the 10th largest institution. These component institutions are randomly drawn without replacement until the dollar value of the equity holdings of the original institution is matched.[11] In 1980, the size of the equity portfolio of the largest institutional investor equaled the aggregate size of about 25 random institutions. In contrast, reflecting the dramatic increase in concentration in the industry, in 2016, 424 random institutional investors were needed to match the size of the top firm. For the synthetic institutions to represent a valid benchmark, we need to assume that the type of investors or investor behavior in the synthetic institutions is comparable to what would prevail in the counterfactual market configuration in which no large institutions were present.

3.3.1 Portfolio Holdings

We first examine the size of the universe of stocks that large institutional investors hold. If indeed units within large institutional investors use common information sources, they may end up investing in a relatively small number of securities. In Table 3, Panel A, we compute the average number of stocks that make up certain fractions of the institutional portfolio. For example, 50% of

[11] We add a fraction of the last institution drawn to ensure we exactly match the total dollar value of the equity holdings of the random sample to those of the large institution.

the equity portfolio of the top institutional investor in the economy consists of 79 stocks on average (the largest holdings). In contrast, the average number of stocks that account for 50% of the portfolio of a similar-size synthetic portfolio is 93. The same pattern appears in almost every cell in the panel: The number of stocks held by the original institutional investors is significantly lower (in the order of 24% to 39% lower) than the number of stocks held in the portfolio of the synthetic institutions. Interestingly, on average the portfolios of the top 10 original institutions contain 1,995 stocks, while 2,550 stocks comprise the portfolio of the synthetic institutions.

These findings mean that the original large institutional investors allocate a given amount of money to a smaller set of stocks than the synthetic institutions. This fact suggests that top institutions are likely to trade each stock in larger amounts and to have bigger price impacts. The next analysis, therefore, focuses on trade size.

3.3.2 Trade Size

Given the prior findings of correlated flows and similar and concentrated portfolio holdings, we anticipate that the subentities within large institutions are less likely to execute offsetting trades. Hence, we predict that large institutions will execute larger trades in comparison to their synthetic counterparts.

To test this supposition, we study the distributions of trade size (i.e., absolute changes in portfolio holdings) for the original large institutional investors and the synthetic ones. We construct a stock-quarter indicator for whether the original institution's trade is above a given percentile of the distribution of the synthetic institutions' trades. Then, we average this indicator across stocks and quarters. For each top-10 institutional investor, Panel B of Table 3 reports the average across stocks and quarters of this indicator for the 50^{th}, 90^{th}, 95^{th}, and 99^{th} percentiles. On average across the top-10 institutions, 56.1% of trades by the original institution are larger than the trades placed by 50% of the synthetic institutions. Moreover, 16.2% of the trades are larger than 90% of the synthetic institutions' trades, 9.4% of trades are larger than the 95^{th} percentile, and 3.7% of trades are larger than the 99^{th} percentile. These numbers exceed the percentages expected if the distributions of trade size were the same for the original and synthetic institutions (i.e., we would expect 50% of trades to be above the 50^{th} percentile, 10% to be above the 90^{th} percentile, and 1% to be above the 99^{th} percentile).

In sum, the evidence shows that the quarterly changes in equity portfolio holdings for large institutional investors are significantly larger than for the synthetic institutions. Hence, large institutions impose a higher low-frequency liquidity demand on the market than smaller independent firms. This liquidity demand can translate into price impact and volatility if the investors taking the other side of these trades require price concessions. On the other hand, it is possible that, within a quarter, large institutions take actions to minimize their price impact, e.g., they break up their trades. It is, therefore, an open empirical question whether large institutions have a significant impact on asset prices. We address this question in the next section.

4 The Effect of Large Institutions on Asset Prices

The effect of large institutions on asset prices can manifest itself in multiple ways. First, if large institutions trade in larger quantities, their trades will have a bigger price impact. In turn, the repeated arrival of these trading shocks can translate into higher volatility. Second, if large institutions trade multiple stocks at the same time, the price movements of these stocks could be correlated. Hence, the returns of stocks in the large institutions' basket can display comovement above and beyond the comovement related to standard risk factors. Similarly, if large institutions trade multiple stocks at the same time, their liquidity demands on these stocks are correlated. Thus, we would expect liquidity comovement for the stocks in the same large institution's portfolio. Finally, and importantly from the point of view of the regulatory concern mentioned in the introduction, if large institutions engage in fire sales at times of market turmoil, we expect the stocks in their portfolios to exhibit larger price drops. This evidence would suggest that large institutions are destabilizing in crisis times.[12] The next analysis investigates each of these issues.

4.1 The Effect on Volatility

We are interested in testing the effect of large institutional ownership on stock volatility. To this purpose, our main explanatory variable is the ownership by large institutional investors at

[12] Kruttli, Patton, and Ramadorai (2015) focus on liquidity provision by hedge funds, which can at times evaporate. the authors identify a supply channel for the decrease in liquidity in periods of market stress, whereas our study focuses a demand channel.

the stock level, whose construction is described in Section 2.[13] Hence, our main specification takes the following form:

$$Volatility_{iq} = Top\ Inst\ Ownership_{i,q-1} + Controls_{i,q-1} + Time\ FE_q + Stock\ FE_i + \varepsilon_{iq}. \quad (1)$$

We estimate equation (1) using ordinary least squares (OLS) regressions. The variables are measured quarterly at the stock level. The dependent variable is the stock's daily return volatility measured over the calendar quarter. Institutional ownership is the fraction of shares outstanding collectively held by the top 3, 5, 7, and 10 institutions (*Top inst. ownership*). We include the following controls: lagged *log(market cap)*, lagged *book-to-market* ratio, *past 6-month returns*, lagged inverse price ratio (*1/price*), lagged *Amihud illiquidity* ratio (Amihud 2002), and lagged total *ownership by all institutions*. We also add a variable that measures the lagged total *ownership by bottom institutions* whose aggregate equity holdings sum up to that of the largest 10 institutions. This variable can serve as a placebo test to verify whether the effect of interest originates from the size of assets under management, irrespective of whether the assets are managed by top institutions. Lastly, our specifications include calendar quarter and stock fixed effects. Standard errors are double-clustered at the stock and quarter level throughout our analysis, unless otherwise specified.

The estimates are presented in Table 4, Panel A. We note that up to the 30th largest institution, the positive relation between ownership by large institutions and stock volatility is statistically significant. The magnitude decreases by 56% for institutional investors ranked 21st to 30th, and it is indistinguishable from zero for institutional investors ranked 31st to 50th. Furthermore, the effect of ownership by the bottom institutional investors with the same total size as the top 10 institutions is negative, strengthening the view that only large investors play a role in increasing volatility.[14]

[13] The model in the Internet Appendix provides support for the functional form that we bring to the data. In particular, it predicts that stock level volatility positively depends on the ownership share in the stock interacted with the size of the institutional investor. Hence, it makes sense to define the explanatory variable of interest as ownership by large institutional investors.

[14] Addressing the concern that the variable total ownership by all institutions may be highly collinear with ownership by top institutions, in the Internet Appendix, we propose a different specification in which we replace ownership by non-top institutions for total ownership. The results, which are largely overlapping with those in Table 4, are in Internet Appendix Table IA.6.

The economic magnitude is also significant. Focusing on the top 10 investors and using the summary statistics in Table 1, a one–standard deviation increase in their ownership is associated with an increase in volatility of 3% of a standard deviation. Moreover, if stock ownership by top 10 investors moves from the 10^{th} (0% ownership) to the 90^{th} (20.7% ownership) percentile of the distribution, volatility increases by 7%, assuming that linearity holds over the entire sample.

In the Internet Appendix, we analyze several extensions of the main result. First, a legitimate concern is the simultaneity induced by news, which could contemporaneously drive changes in holdings and returns in both the cross section and the time series. Although stock and time fixed effects may absorb part of this effect, the concern remains that top institutions are potentially better at anticipating news. As in Campbell, Ramadorai, and Schwartz (2009), we perform the analysis for positive, negative, or neutral earnings announcements for the stock-quarter in question and show that the effect persists (Internet Appendix Table IA.4). Second, one may wonder whether the effect of interest originates from active or passive investment styles. From a theoretical perspective, both investment styles could be playing a role. The idiosyncratic institutional shocks that in our model generate trading can occur, for example, if the institution revises its portfolio based on new trading strategies, as an active manager would do, or based on investor flows, which arrive on a daily basis even in the case of index funds. Empirically, we use CRSP mutual fund data to separately compute active and passive ownership by top institutions, with institutions ranked using CRSP fund family assets under management. Our analysis in Appendix Table IA.3 shows that both active and passive ownership of large institutions have a positive and significant relation to volatility, with comparable magnitudes across the two investment styles. Finally, we test the robustness of our results in meaningful subsamples. In particular, the effect is also present, although somewhat smaller, among large S&P 500 stocks (Table IA.7). It is present during the 2007–2009 financial crisis (Table IA.5, Panel A) as well as outside of the crisis period (Table IA.5, Panel B).

4.1.1 Greenwood and Thesmar's (2011) Fragility Measure

As argued in Section 3.1, the effect of large institutional investors' ownership on the volatility that emerges in our model is partly related to the effect of correlated investor flows,

which is present in Greenwood and Thesmar's (2011) theory. The summary statistics in Table 1, Panel B, reveal a high correlation (53%) between Greenwood and Thesmar's (2011) fragility measure and ownership by the top 10 institutions. Therefore, a test of whether the two effects can coexist in the data is interesting.

In Table 4, Panel B, we add Greenwood and Thesmar's (2011) measure (G) to our main regression model. We again find that the coefficient on large institutional ownership is positive and statistically significant. Meanwhile, the coefficient on Greenwood and Thesmar's fragility measure is also positive and statistically significant, with coefficients similar in magnitude to those found in the original study. We conclude that ownership by large institutions and fragility capture two independent empirical phenomena. Going forward, we restrict our usage of the fragility measure because the data required to construct this variable reduce our sample size by nearly 20%.

4.2 Identification: Mergers of Large Institutional Investors and Local Bias

The association between large institutional investors and volatility may not reflect a causal relation. For example, one possible explanation for this correlation is that large institutional investors might prefer holding popular stocks, which may be more volatile. In the next analysis, we focus on a natural experiment that can provide causal evidence.

We rely on the mergers of large institutional investors. Our test compares the relation between institutional ownership and stock-level volatility before and after the merger of institutional investors. If the size of the institutional investors affects the volatility of the stocks in their portfolios, holdings by the combined institution resulting from the merger should have a larger impact on volatility than holdings by the two separate institutions before the merger. The identifying assumption is that the merger is an exogenous event relative to the volatility of the stocks in the portfolios of the two original institutions.

We start by focusing on the most significant merger during our sample period, which involved the top institution in the market and took place in December 2009. Right before the merger, BGI held equities worth about $596 billion and was the top institution in our ranking, while BlackRock held equities worth about $156 billion and ranked in the 12th position. In December 2009, the combined entity was the largest institutional investor in the equity market,

overseeing approximately $815 billion in equities. The merger caused the largest institutional investor to increase its asset holdings by 37%.

An important question relates to the exogeneity of the merger with respect to the outcome variable of interest, stock volatility. To address this concern, we rely on the investigative work of Azar, Schmalz, and Tecu (2017) regarding the drivers of the merger. They report that the merger took place due to the desire of Barclays to sell some of its divisions to strengthen its balance sheet following the financial crisis. Blackrock made a bid of $13.5 billion. The merger was announced on June 11, 2009, and was completed at the end of 2009. Hence, the reason for the merger appears to have been unrelated to the volatility of the underlying securities (in support of this claim, also see Massa, Schumacher, and Wang 2016).

Our specification resembles a difference-in-differences approach because we examine the effect on volatility of the combined stock-level ownership by the two institutions before and after the merger; after the merger, ownership is measured for the resulting institution. The main distinction from a difference-in-differences analysis is that we focus on the effect of a continuous variable (ownership by the merging institutions), rather than having treatment and control groups. The pre-merger window is set to last one quarter before the merger completion (2009/Q4) to minimize the confounding effect of the financial crisis of 2008–2009. We look at various post-event windows, from one quarter to eight quarters after the merger event. We estimate the following specification:

$$Volatility_{iq} = Combined\ Ownership_{i,q-1} \times Post\ Merger + Combined\ Ownership_{i,q-1} + Controls_{i,q-1} + Time\ FE_q + Stock\ FE_i + \varepsilon_{iq}, \quad (2)$$

where *Combined Ownership* is the combined holdings of the merging firms in each stock-quarter before the merger, and the ownership of the resulting entity after the merger. The *Post-Merger* dummy is an indicator for whether the quarter is the first quarter of 2010 or later. The variable of interest, the interaction between *Combined Ownership* and the *Post-Merger* dummy, captures the impact on volatility of ownership by the combined institution following the merger relative to the pre-merger effect of the two separate institutions. We control for the usual stock characteristics (main effects and interactions with the merger indicator).

The results are reported in Table 5. Standard errors are clustered at the stock level.[15] The samples in Columns (1) through (8) include post-merger periods ranging from one to eight quarters, respectively. The estimates show that the impact of ownership on volatility increases significantly following the merger. The economic magnitude is comparable to the OLS results. Using summary statistics in Table 1, a one–standard deviation change in combined ownership after the merge leads to a volatility increase of 3.9%.[16]

The persistence and stability of the effect across specifications allows us to rule out alternative explanations. In particular, one might be concerned that the event of the merger *per se* increases stock volatility, irrespective of the "large-firm" effect we aim to identify. For example, trading related to portfolio restructuring in the aftermath of the merger could lead to higher turnover and volatility. However, this alternative story would lead to a temporary effect that wears out as we extend the window. The estimates in Table 5, instead, suggest the effect persists unabated for at least two years after the merger.

In Panel B of Table 5, we extend the analysis to other mergers occurring during our sample period. We report only the main variables, and provide the full specifications in Internet Appendix Table IA.8. In the top part of the panel, we restrict the sample to the mergers in which the average ranking of the two merging institutions is above the 25th position. The goal is to focus on truly large institutional investors, for which we expect the largest impact on volatility. These mergers are BlackRock and BGI (2009), Deutsche Bank and Scudder (2002), and Mellon and The Boston Company (1993). In this sample, we fully confirm the result in Panel A. In the bottom part of Panel B, we extend the sample to mergers in which the average ranking of the merging institutions is above the 50th position. In addition to the aforementioned mergers, our sample for Panel B contains the following: Ameriprise and Columbia Financial (2010), Wells Fargo and Wachovia (2008), Travelers and Citi (1998), Chase and JPMorgan (2000), JPMorgan and Bank One (2004), Mellon

[15] Clustering at the quarter level as well is not appropriate given that the reduced number of quarters is not compatible with the large sample assumption that is necessary to achieve asymptotic convergence of the standard errors. However, we note for the interested reader that results remain highly significant also when we cluster at the quarter level.

[16] We note that Massa, Schumacher, and Wang (2016) find that ownership of the combined entity, as measured *before the merger*, is associated with lower stock volatility after the merger occurs. The difference in our research design is that we measure ownership of the combined entity *after the merger* as well. Our motivation is to capture the effect of the behavior of the combined entity after the merger, e.g., the effect of non-diversifiable large trades. In this sense, we measure an ex-post effect, whereas Massa, Schumacher, and Wang measure the ex-ante effect triggered by the repositioning of other traders in anticipation of the risk of fire sales sparked by the merger.

and Dreyfus (1994), BNY and Mellon (2007), and First Interstate and Continental Illinois (1984). Admittedly, this sample includes institutions that are not necessarily among the largest. Probably because of the smaller size of these institutions, the statistical significance of the results is somewhat reduced, but it remains strong in the first quarters after the merger. This finding meshes with our results in Table 4 showing that as institutional rankings decrease, so do the effects of ownership on volatility.

In a second identification strategy, we rely on "local bias," that is, the prior finding that asset managers overweight firms that are located closer to the investor's headquarters (Coval and Moskowitz 1999). We use an indicator for whether a company is headquartered in the same state as the large asset managers (Baik, Kang, and Kim 2010). Consistent with a local bias, we show that institutional investors hold significantly larger stakes in firms that are located in the same state. This variable is a valid instrument because it is not likely to have a direct effect on stock volatility. The second stage in the analysis shows that instrumented ownership by large institutions leads to significantly higher stock volatility. To conserve space, we report the results of this additional test in table IA.9 of our Internet Appendix.

4.3 The Role of Trades in the Effect on Volatility

The conjectured channel for large institutions to have a differential impact on volatility ultimately relies on the assumption that large institutions trade in larger amounts, which is consistent with the evidence in Table 3, Panel B. These larger trades cause a bigger price impact, which leads to higher volatility.

We can test this channel by running a horse race between large institutions' ownership and their trades. We do not directly observe the actual trades, but we can approximate them using the quarterly change in stock holdings from the 13F filings. We take the absolute value of this variable, and label it 'trades' for simplicity, because both positive and negative changes in holdings can have a price impact. Measurement error in this proxy depends on the extent of intra-quarter turnover of the position. However, measurement error raises the bar for finding a significant effect of trades on volatility, which is the channel being tested.

For the top 3, 5, 7, and 10 institutions, we compute the sum of the absolute trades (expressed as fractions of capitalization) in a given stock in the same quarter in which volatility is measured. Intuitively, we expect trades to impact prices in the same quarter in which they occur. This timing choice can induce a reverse-causality issue, which we address later.

Table 6, Panel A, reports the estimates from OLS regressions in which the dependent variable is the daily stock-level volatility within the quarter. In addition to the usual controls, we include a variable measuring the sum of the absolute trades by all institutions below the top 10. The purpose of this variable is to provide a benchmark in terms of the effect of the trading activity by institutions that are not large. We include lagged volatility to alleviate the potential endogeneity of the trade variable (see below). Standard errors are clustered at the stock and quarter level. For each set of top institutions, we report two specifications: one that focuses on the trades by top institutions and one that carries out the horse race between trades and ownership. We also note that the effect of ownership on volatility remains significant in this sample, without including the trade variable. We do not report these regressions, as they are very similar to those in Table 4.

Across all sets of top institutions, the coefficient on the trade variable is positive and strongly significant in isolation. Moreover, the slope on trading by top institutions far exceeds that on trading by other institutions. This fact suggests that top institutions trade in a way that has a greater price impact. Importantly, top institutions' trades drive out the effect of top institutions' ownership in most specifications. This finding supports the view that the impact of top institutions on volatility is channeled through their trading activity.

The concern with the OLS estimates in Panel A is the endogeneity of the trade variable induced by reverse causality. For example, institutions may decide to trade stocks that are in the news and are, for this reason, more volatile. To address this issue, we instrument quarter-q trades with their lagged value. Because institutions trade when they receive flows, and flows are highly persistent (e.g., Coval and Stafford 2007), we expect trades also to be positively autocorrelated. Indeed, the first stage is highly significant. Furthermore, lagged trades are a legitimate instrument if they do not contain information on future volatility. Hence, to strengthen the exogeneity of this instrument, we also include lagged volatility, which captures the component of volatility that carries over to the next period. The IV estimates in Panel B of Table 6 broadly confirm the

magnitude and significance of top institutions' trades. While the significance of the ownership variable increases, its magnitude remains small.

Overall, this analysis confirms the prediction that the effect of large institutions on volatility occurs through the more significant impact that their trades have on prices. In turn, this finding further corroborates the view that large institutions trade in large amounts due to correlated behavior within the firm.

4.4 Comovement with Large Institutions' Portfolios

4.4.1 Return Comovement

The literature has shown convincingly that common institutional ownership modifies the correlation structure of returns, generating abnormal comovement among stocks in the same institutional portfolio (Barberis, Shleifer, and Wurgler 2005, Greenwood and Thesmar 2011, Anton and Polk 2014). Given the conjecture that large institutions' trades have significantly larger effects on prices, the abnormal return comovement observed in this prior literature should be particularly pronounced for stocks with higher ownership by large institutions.

To measure comovement with the institutional portfolio, for each stock-quarter, we compute the beta from the rolling regression of the daily excess return of a stock with respect to the excess return of a top institution's portfolio (excluding the stock itself) within the quarter. To test the effect of interest, we regress this beta on ownership by the top institution while controlling for the factor loadings on the Fama and French (1993) factors and the Carhart (1997) momentum factor, which are also estimated within the quarter from daily returns. In addition to time fixed effects, we include stock fixed effects in the regression as well as various stock characteristics such as the logarithm of size, liquidity, book-to-market, and momentum. Doing so allows us to control for the possibility that institutions prefer stocks with similar characteristics that load on the same set of factors.

In Table 7, Panel A, the results show unambiguously that the comovement of stocks with the institutional portfolio increases with the institution's ownership in the stock. We further note that the effect is more sizable for larger institutions (compare Top 1–Top 5 with Top 6–Top 10).

This fact suggests that top institutions impound noise into prices at a greater rate than other institutions, consistent with the hypothesis that the shocks originating from large investors are less diversifiable than other idiosyncratic shocks. In this sense, our findings extend the prior literature.

The same endogeneity concern applies here as for the analysis in Table 4. Top institutions may choose to hold stocks that display abnormal comovement for reasons unrelated to the ownership structure. To address this issue, we again use the identification strategy based on the BGI-BlackRock merger, discussed in relation to Table 5. The estimates in Panel B, Table 7, suggest that ownership by the combined entity, after the merger date, has a significant impact on the abnormal comovement of a given stock with the portfolio of the merged firm. Given the identifying assumption that the merger is an exogenous event relative to the comovement of the portfolio, we confidently attach a causal interpretation to these estimates.

4.4.2 Liquidity Comovement

A natural implication of the evidence of abnormal return comovement is that a given stock's liquidity should display comovement with the liquidity of the top institution's portfolio. This prediction relies on recent evidence by Koch, Ruenzi, and Starks (2016) showing that there is commonality in liquidity for stocks that are exposed to correlated institutional demand. In our context, therefore, if a top institution trades multiple stocks in its portfolio at the same time, the levels of liquidity of these stocks should move together.

To test this prediction, we start by estimating the liquidity beta of a given stock with the liquidity of a top institution's portfolio. Specifically, within a quarter, we regress percentage changes in the stock's daily Amihud (2002) ratio on the percentage changes of the top institution portfolio's weighted average Amihud (2002) ratio, excluding the stock itself from the portfolio. As in Koch, Ruenzi, and Starks (2016), we include one daily lead and lag of the dependent variable as well as of the market's changes in liquidity, to account for asynchronous trading and for aggregate changes in liquidity, respectively. Then, in the second step, we regress the stock's liquidity beta on ownership by the top institution, including the usual controls, time and stock fixed effects, and the stock's beta on the Pastor and Stambaugh (2003) aggregate liquidity factor to

further account for aggregate movement in liquidity. Standard errors are clustered at the time and stock level.

Table 8, Panel A presents the second step estimates for each of the top 10 institutions. Across most specifications, ownership by top institutions displays a significant positive relation to liquidity comovement. Hence, the more present a stock is in a top institution's portfolio, the higher its commonality in liquidity with the rest of the stocks in the top institution's portfolio. As in the case of Table 7, this effect is more pronounced for more highly ranked institutions. Finally, to impute a causal interpretation to these estimates, in Panel B, we report estimates from the experiment based on the BlackRock-BGI merger. The evidence suggests that ownership by the combined institution increases the commonality in liquidity, after the merger. The estimates are significant starting four quarters after the merger. Given the identifying assumption, we can conclude that ownership by large institutions induces an increase in liquidity commonality.

The evidence of liquidity commonality suggests that a large liquidation by a top institution can induce illiquidity in all the stocks that are in the institution's portfolio. Through this channel, an idiosyncratic shock to an institution can propagate to other investors that hold the same stocks. Based on this logic, large institutional investors can be systemically important, consistent with the regulatory concern cited in the introduction.

4.5 Market Stress and Return Asymmetry

In periods of turmoil, portfolio liquidations become more likely and the trades of large institutional investors are potentially more impactful because they fall upon an already illiquid market. Therefore, top institutions' trades may induce significant price dislocations at these times.

To test this possibility, we identify periods of market stress using three common indicators: the VIX, the TED spread, and the excess return on the market. We identify bad times as months when these variables have realizations in the bottom 5% of their distribution.[17] We test whether stocks with higher ownership by top institutions earn significantly lower returns in these months.

[17] To be precise, we identify bad months as those in which the daily realizations are in the bottom 5% of the distribution, in the case of the VIX and the TED spread, and those in which the monthly realization of the excess market return is in the bottom 5% of the monthly return distribution.

Specifically, we compute abnormal returns as in Daniel, Grinblatt, Titman, and Wermers (1997) and regress them on ownership by top institutions and the usual controls.

Table 9 shows the results. For the three measures of turmoil and across top institutions, we find that returns tend to be significantly lower when ownership by top institutions is higher. This effect is on top of the significant effect of institutional ownership at large. The economic magnitude is also important. For example, based on column (10) and the summary statistics in Table 1, Panel C, in a bad month as indicated by extremely low market returns, a one–standard deviation increase in ownership by the top 10 institutions is associated with lower monthly returns by 5% of a standard deviation.

The monthly frequency at which we compute returns makes this evidence particularly meaningful for regulators. Based on these findings, the effect of large institutions is not merely microstructure noise that washes out at lower frequency. Rather, it persists at frequencies that are relevant for long-term investors. Consistent with the evidence in Coval and Stafford (2007), we interpret this finding as a result of the persistence of portfolio flows, which ultimately induces persistence of trades and price impact.[18] This result, therefore, validates the regulatory concern that large institutions may exacerbate systemic risk through the fire sale channel.[19]

5 Conclusion

Motivated by the dramatic increase in the concentration of institutional ownership in the stock market, we study the impact of large institutional investors on asset pricing. We first confirm that large institutions differ from a collection of smaller independent firms in terms of their trading behavior. Arguably, due to centralized marketing, risk management, and research divisions, the

[18] Further supporting evidence of the persistence of the effect of large institutional ownership on prices at lower frequency comes from Internet Appendix Table IA.1, in which we use weekly, monthly, and quarterly measures of price volatility as dependent variables.

[19] In the Internet Appendix, we also study the relationship between skewness and large institutions' ownership. In Table IA.2, columns (1)–(4), we find that stocks that are held by large institutions display significantly lower skewness, which is computed non-parametrically as in Ghysels, Plazzi, and Valkanov (2016). This finding can imply that returns are less positively skewed or more negatively skewed. To disentangle the two scenarios, in columns (5)–(8), we use the absolute value of skewness as a dependent variable, and find that this variable is significantly higher for stocks with more ownership by top institutions. We are therefore able to conclude that skewness becomes more negative for stocks with greater ownership by top institutions. This finding is consistent with Table 9 and supports the conclusion that large institutional investors can be destabilizing for prices.

various units within large institutions are likely to be exposed to correlated flows and to exhibit similar investment strategies. Consequently, we expect them to trade in greater amounts and to focus on a smaller set of stocks.

We present novel empirical evidence consistent with this conjecture. First, mutual funds within a family display significantly higher correlation in flows than funds belonging to separate families. Second, the active portfolio allocations and trades of same-family funds are significantly more similar than those of unrelated funds. Finally, large institutions trade in a restricted universe of stocks relative to a collection of firms of the same total size, and their trades are bigger in absolute value.

Given this evidence, we expect large institutions to impose heavier liquidity demands on the market when they trade. Accordingly, the stocks in their portfolios should be exposed to stronger price impact, which translates into higher volatility. Supporting this prediction, we provide original evidence that daily return volatility is positively related to ownership by top institutions. A natural experiment based on the merger of large institutional investors gives us confidence in the causal interpretation of this result, and a horse race suggests that this effect originates from large institutions' trading activity. Also consistent with a more important price impact of large institutions, we find abnormal comovement in returns and liquidity of the stocks in the same top institution's portfolio.

The evidence that we produce is not merely a reflection of microstructure noise because the effect survives at lower frequencies (weekly, monthly, and quarterly). This low-frequency persistence of our findings is consistent with the strong autocorrelation in institutional flows and trading activity that other authors document (e.g., Coval and Stafford 2007). Furthermore, at times of market stress, the stocks in large institutions' portfolios experience a negative spread in returns that is both statistically and economically significant. This effect on stock price fragility speaks to the current regulatory debate on the potential systemic effect of large institutions through the fire sale channel.

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Figure 1. Time Series of Large Institutions' Ownership

The chart shows the aggregate equity holdings by all institutions and the top institutions over time, as a percentage of total market capitalization of the U.S. equity market.

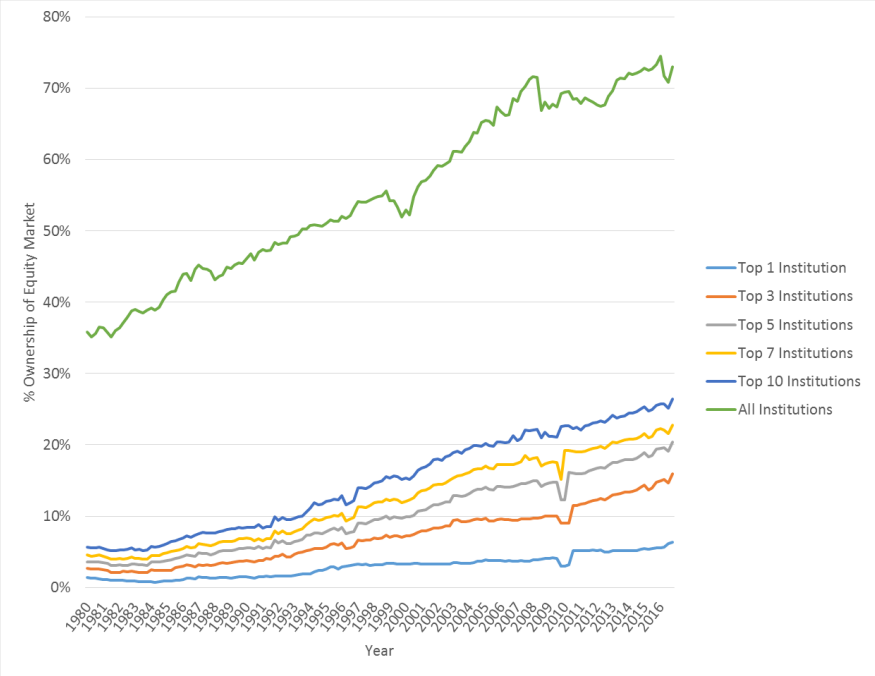

Table 1. Summary Statistics

This table presents summary statistics for key variables used in the analysis. Panel A presents statistics for variables that are used in different parts of our analysis. The first and second groups within Panel A report stock-quarter-level variables. The third and fourth groups of Panel A report mutual fund-year-level variables. The fifth and sixth groups in Panel A report stock-quarter level variables. Panel B presents correlations of key variables used in the analysis. Panel C focuses on extreme months and reports stock-month level statistics. Unless otherwise specified, the sample period is 1980/Q1–2016/Q4.

Panel A: Summary Statistics of Regression Variables

	N	Mean	Std Dev	Min	p25	Median	p75	Max
Stock-quarter-level sample								
Daily volatility (%)	666,605	3.510	2.550	0.210	1.830	2.780	4.330	25.700
Top 3 insts ownership	666,605	0.042	0.051	0.000	0.003	0.022	0.059	0.339
Top 5 insts ownership	666,605	0.056	0.068	0.000	0.005	0.029	0.082	0.517
Top 7 insts ownership	666,605	0.067	0.078	0.000	0.008	0.036	0.100	0.610
Top 10 insts ownership	666,605	0.081	0.090	0.000	0.011	0.046	0.122	0.709
Top 11-Top 20 ownership	666,605	0.033	0.045	0.000	0.001	0.012	0.051	0.537
Top 21-Top 30 ownership	666,605	0.022	0.033	0.000	0.000	0.006	0.032	0.636
Top 30-Top 50 ownership	666,605	0.027	0.039	0.000	0.000	0.009	0.042	0.737
Ownership by all institutions (q-1)	666,605	0.380	0.301	0.000	0.110	0.320	0.616	1.270
Ownership by bottom institutions	666,605	0.017	0.033	0.000	0.000	0.005	0.018	0.311
1 / price (q-1)	666,605	0.246	0.613	0.005	0.038	0.076	0.196	10.500
Amihud illiquidity (q-1)	666,605	0.360	0.588	0.000	0.006	0.074	0.473	4.490
log(market cap) (q-1)	666,605	5.220	2.090	0.408	3.660	5.060	6.640	11.600
Past 6-month return (q-3 to q-1)	666,605	0.065	0.423	-0.942	-0.161	0.027	0.221	8.540
Book-to-market (q-1)	666,605	0.750	0.658	-0.062	0.334	0.595	0.961	10.100
Abs(Trade) by Top 3 insts	601,715	0.006	0.010	0.000	0.000	0.002	0.007	0.123
Abs(Trade) by Top 5 insts	601,715	0.008	0.012	0.000	0.000	0.004	0.011	0.131
Abs(Trade) by Top 7 insts	601,715	0.011	0.015	0.000	0.001	0.005	0.015	0.158
Abs(Trade) by Top 10 insts	601,715	0.014	0.018	0.000	0.001	0.007	0.020	0.195
Greenwood and Thesmar Fragility	498,482	0.118	0.195	0.000	0.014	0.047	0.122	1.540
Non-Parametric Daily Skewness	627,171	-0.027	2.340	-8.900	-0.983	0.000	1.120	8.900
Weekly Volatility (%)	651,188	6.860	4.960	0.000	3.600	5.500	8.510	47.600
Monthly Volatility (%)	650,764	13.700	8.800	0.000	7.670	11.500	17.300	142.000
Quarterly Range (%)	650,714	38.900	26.800	0.000	20.400	31.500	49.400	200.000
2009 Blackrock-BGI Merger: stock-quarter-level								
Daily volatility (%) (q)	31,331	3.004	1.546	0.205	1.940	2.695	3.693	11.131
Combined ownership (q-1)	31,331	0.046	0.030	0.000	0.020	0.049	0.066	0.365
Mutual Fund Flows: fund-year-level								
Mutual funds (i, j) correlation	249,665,892	0.030	0.332	-1.000	-0.192	0.028	0.253	1.000
Same management company indicator	249,665,892	0.008	0.088	0.000	0.000	0.000	0.000	1.000
Mutual Fund Active Share and Rebalancing Trades: US Equity fund-year-level								
Pairwise Correlation of Active Share Weights	115,398,353	-0.257	0.225	-1.000	-0.415	-0.239	-0.084	1.000
Pairwise Correlation of Active Rebalancing Trades	126,533,009	0.009	0.069	-1.000	-0.001	0.000	0.003	1.000
Daily Return Comovement with Top Institution Excess Return Factor (Excluding Individual Stock)								
Beta with Top 1 Portfolio	638,029	0.652	0.710	-1.420	0.170	0.593	1.090	2.860
Beta with Top 2 Portfolio	637,880	0.639	0.717	-1.470	0.158	0.582	1.080	2.880
Beta with Top 3 Portfolio	637,844	0.635	0.725	-1.450	0.147	0.573	1.080	2.890
Beta with Top 4 Portfolio	637,846	0.612	0.720	-1.520	0.134	0.554	1.050	2.840
Beta with Top 5 Portfolio	637,760	0.603	0.711	-1.510	0.127	0.540	1.040	2.810
Beta with Top 6 Portfolio	637,805	0.592	0.712	-1.490	0.118	0.530	1.020	2.840
Beta with Top 7 Portfolio	637,969	0.584	0.715	-1.510	0.108	0.521	1.020	2.810
Beta with Top 8 Portfolio	637,808	0.583	0.719	-1.520	0.104	0.514	1.020	2.810
Beta with Top 9 Portfolio	637,821	0.582	0.725	-1.540	0.100	0.517	1.030	2.830
Beta with Top 10 Portfolio	637,800	0.576	0.726	-1.570	0.097	0.514	1.020	2.790
Daily Excess Liquidity Comovement with Top Institution Liquidity Factor (Excluding Individual Stock)								
Excess Liquidity Beta with Top 1 Liquidity Factor	486,783	-0.021	9.396	-57.252	-4.338	0.037	4.311	53.319
Excess Liquidity Beta with Top 2 Liquidity Factor	486,783	-1.126	11.593	-61.001	-6.917	-0.647	4.669	58.283
Excess Liquidity Beta with Top 3 Liquidity Factor	486,783	-1.238	7.768	-46.662	-5.343	-0.951	2.901	38.650
Excess Liquidity Beta with Top 4 Liquidity Factor	486,783	-0.564	6.679	-40.250	-3.240	-0.266	2.453	32.479
Excess Liquidity Beta with Top 5 Liquidity Factor	486,783	-0.425	7.759	-55.709	-2.875	-0.105	2.486	48.958
Excess Liquidity Beta with Top 6 Liquidity Factor	486,783	-0.430	6.446	-41.544	-2.809	-0.168	2.311	41.566
Excess Liquidity Beta with Top 7 Liquidity Factor	486,783	-0.343	5.549	-45.633	-2.641	-0.147	2.250	40.153
Excess Liquidity Beta with Top 8 Liquidity Factor	486,783	-0.405	6.850	-45.207	-3.285	-0.251	2.602	43.818
Excess Liquidity Beta with Top 9 Liquidity Factor	486,783	-0.407	6.404	-36.661	-3.130	-0.183	2.574	34.172
Excess Liquidity Beta with Top 10 Liquidity Factor	486,783	-0.510	6.210	-33.018	-3.369	-0.236	2.599	31.262

Table 1. Summary Statistics (Cont.)

Panel B: Correlation of Key Variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	Daily volatility (%)	1.00									
(2)	Ownership by Top Ten Insts	-0.22	1.00								
(3)	Ownership by all institutions (q-1)	-0.27	0.78	1.00							
(4)	1 / price (q-1)	0.42	-0.21	-0.27	1.00						
(5)	Amihud illiquidity (q-1)	0.51	-0.38	-0.47	0.37	1.00					
(6)	log(market cap) (q-1)	-0.46	0.58	0.66	-0.43	-0.69	1.00				
(7)	Past 6-month return (q-3 to q-1)	-0.18	0.03	0.04	-0.16	-0.17	0.16	1.00			
(8)	Book-to-market (q-1)	0.10	-0.10	-0.11	0.18	0.31	-0.27	-0.12	1.00		
(9)	Ownership by bottom institutions	-0.01	0.10	0.27	-0.04	-0.09	0.05	0.00	0.02	1.00	
(10)	Greenwood and Thesmar fragility	-0.15	0.53	0.56	-0.14	-0.28	0.39	0.02	-0.06	0.14	1.00

Panel C: Summary Statistics for Extreme Return Days and Non-Parametric Skewness

Worst VIX Month

	N	Mean	Std. Dev.	Min	p25	p50	p75	Max
DGTW Excess Return (t+1)	154,102	0.001	0.213	-1.440	-0.091	-0.009	0.073	15.600
Top 3 Holdings	154,102	0.048	0.052	0.050	0.027	0.076	0.298	0.298
Top 5 Holdings	154,102	0.063	0.069	0.000	0.009	0.036	0.103	0.538
Top 7 Holdings	154,102	0.075	0.079	0.000	0.012	0.046	0.120	0.585
Top 10 Holdings	154,102	0.092	0.094	0.000	0.015	0.061	0.147	0.635

Worst TED Month

	N	Mean	Std. Dev.	Min	p25	p50	p75	Max
DGTW Excess Return (t+1)	145,473	0.004	0.186	-1.440	-0.077	-0.008	0.065	12.600
Top 3 Holdings	145,473	0.038	0.046	0.000	0.007	0.022	0.050	0.326
Top 5 Holdings	145,473	0.055	0.061	0.000	0.011	0.033	0.079	0.406
Top 7 Holdings	145,473	0.064	0.071	0.000	0.012	0.037	0.093	0.480
Top 10 Holdings	145,473	0.080	0.087	0.000	0.016	0.050	0.115	0.694

Worst Market Month

	N	Mean	Std. Dev.	Min	p25	p50	p75	Max
DGTW Excess Return (t+1)	85,523	0.001	0.179	-2.010	-0.076	-0.008	0.062	15.600
Top 3 Holdings	85,523	0.044	0.051	0.000	0.004	0.024	0.067	0.347
Top 5 Holdings	85,523	0.059	0.067	0.000	0.007	0.032	0.092	0.538
Top 7 Holdings	85,523	0.070	0.077	0.000	0.010	0.041	0.110	0.715
Top 10 Holdings	85,523	0.086	0.091	0.000	0.014	0.053	0.134	0.814

Table 2. Correlation of Fund Flows and Similarities in Holdings and Trades

The table presents tests for whether mutual funds within the same family have correlated flows and similar portfolio holdings and trades. All panels present results from ordinary least squares regressions of the correlation of mutual fund flows on an indicator for membership of the funds in the same family. In Panel A, for each fund pair-year, we compute the 12-month correlation of flows (scaled by lagged total net assets) over the calendar year. The dependent variable is the correlation between each pair of funds. In Panel B, we compute the 12-month correlation of the active share of two funds over the calendar year. The dependent variable is the correlation of the active share between each pair of funds. In Panel C, we compute the 12-month correlation of the active trades of two funds over the calendar year. The dependent variable is the correlation of active trades between each pair of funds. Appendix A provides variable descriptions. *t*-statistics in parentheses are based on standard errors with three-way clustering: year, fund i, and fund j. The sample period is 1980/Q1–2016/Q4. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Correlation of Fund Flows within the Same Family

Dependent variable:	Correlation of flows between Fund i and Fund j			
	(1)	(2)	(3)	(4)
Same management company (i, j)	0.034***	0.033***	0.033***	0.033***
	(13.91)	(24.71)	(24.89)	(25.57)
Year FE	Yes	No	Yes	No
Fund i, Fund j FE	No	Yes	Yes	No
Year × Fund i FE, Year × Fund j FE	No	No	No	Yes
Observations	249,665,961	249,665,960	249,665,960	249,665,960
Adj R^2	0.002	0.014	0.016	0.089

Panel B: Correlation in Active Shares within the Same Family

Dependent variable:	Correlation of active share between Fund i and Fund j			
	(1)	(2)	(3)	(4)
Same management company (i, j)	0.096***	0.025***	0.026***	0.026***
	(21.84)	(11.96)	(11.92)	(11.88)
Year FE	Yes	No	Yes	No
Fund i, Fund j FE	No	Yes	Yes	No
Year × Fund i FE, Year × Fund j FE	No	No	No	Yes
Observations	115,398,353	115,398,352	115,398,352	115,398,281
Adj R^2	0.023	0.562	0.578	0.726

Table 2. Correlation of Fund Flows and Similarities in Holdings and Trades (Cont.)

Panel C: Correlation in Active Trades within the Same Family

Dependent variable:	Correlation of active trades between Fund i and Fund j			
	(1)	(2)	(3)	(4)
Same management company (i, j)	0.029***	0.026***	0.026***	0.026***
	(21.43)	(24.35)	(24.29)	(24.20)
Year FE	Yes	No	Yes	No
Fund i, Fund j FE	No	Yes	Yes	No
Year × Fund i FE, Year × Fund j FE	No	No	No	Yes
Observations	126,533,009	126,533,008	126,533,008	126,532,957
Adj R^2	0.005	0.051	0.054	0.136

Table 3. Comparison to Synthetic Institutions: Small Universe and Large Trades

The table compares the portfolio holdings and trade sizes of large institutional investors to synthetic institutional investors. For each top-10 institutional investor and quarter, we put together 99 synthetic institutions composed of smaller institutions that together equal at least the size (assets under management) of the top institution. Then, we sort the portfolio holdings (stocks) by their value in the portfolio and count how many stocks make a certain fraction of the portfolio value. We compare these numbers to the number of stocks held by the original institutional investors that make up the same portfolio fraction. Panel A presents the average number of stocks held in the original portfolio relative to the number of stocks held in the synthetic portfolio. In Panel B, we compare the size of the trades of large institutions to those of synthetic institutions. For each stock-quarter within a portfolio, we calculate the change in the value of portfolio holdings since the last quarter. Then, for each institution-quarter, we calculate the percentage of trades that have a larger absolute value than a certain percentile in the distribution of trade sizes by the synthetic institutions. The panel shows the average percentage of trades by large institutional investors that are above the 50th, 90th, 95th, and 99th percentiles of the distribution of trades of the synthetic institutions.

Panel A: Number of Stocks Contained in the Portfolios of Large Institutional Investors

	Average number of stocks that make up X% of the equity porfolio													
	100%		99%		90%		80%		70%		60%		50%	
Institutional investor	Orig.	Synth.	Orig.	Synth.	Orig.	Synth.	Orig.	Synth.	Orig.	Synth.	Orig.	Synth.	Orig.	Synth.
Top 1	2,836	3,056	1,658	1,634	637	654	339	370	205	230	128	147	79	93
Top 2	2,736	2,843	1,543	1,537	555	620	304	352	187	219	118	141	73	90
Top 3	2,202	2,702	1,235	1,480	409	603	233	343	147	214	94	137	60	88
Top 4	2,044	2,646	1,156	1,453	416	592	235	338	149	211	97	135	62	87
Top 5	1,571	2,491	937	1,376	379	562	221	321	144	201	95	129	62	83
Top 6	1,607	2,407	889	1,332	342	545	194	312	124	196	81	126	53	81
Top 7	1,562	2,422	873	1,342	336	549	194	314	124	197	82	127	54	81
Top 8	1,766	2,394	975	1,325	376	543	211	311	132	195	85	126	55	81
Top 9	1,682	2,283	966	1,270	363	523	203	301	127	189	81	122	52	79
Top 10	1,922	2,240	1,055	1,248	381	515	211	296	132	186	85	120	56	77
Average	1,995	2,550	1,130	1,401	420	571	235	326	147	204	95	131	61	84
Difference	-28%		-24%		-36%		-39%		-38%		-38%		-38%	

Panel B: Trades by Large Institutional Investors Relative to Trades by Synthetic Institutions

	%Stock-quarter with abs(trade) of top institutions			
	> 50th pctile	> 90th pctile	> 95th pctile	> 99th pctile
	(1)	(2)	(3)	(4)
Top 1	52.7%	14.8%	8.5%	4.3%
Top 2	51.3%	12.4%	6.7%	3.3%
Top 3	45.7%	12.9%	7.7%	3.4%
Top 4	57.2%	17.1%	9.7%	4.1%
Top 5	53.6%	15.7%	9.1%	3.5%
Top 6	57.8%	18.3%	10.6%	4.0%
Top 7	62.6%	21.0%	12.6%	4.7%
Top 8	59.4%	15.9%	9.0%	3.2%
Top 9	60.5%	16.8%	9.8%	3.5%
Top 10	60.1%	17.1%	9.9%	3.5%
Average	56.1%	16.2%	9.4%	3.7%

Table 4. Ownership by Large Institutional Investors and Stock Volatility

The table explores whether stock volatility is correlated with ownership by large institutional investors. This table presents ordinary least squares regression results. In Panels A and B, the dependent variable is the stock's *Daily volatility*, which is computed from daily returns during quarter q. All independent variables are measured during quarter q-1. In Panel A, the key independent variable is the *Top inst. ownership* of the largest institutional investors in a given stock. Time and stock fixed effects are also included. Panel B includes the fragility measure (G) of Greenwood and Thesmar (2011) among the controls. The sample period is 1980/Q1–2016/Q4. Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Ownership by Large Institutional Investors and Daily Volatility

Dependent variable:	Daily volatility (q) (%)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst ownership (q-1)	0.945***	0.958***	0.978***	0.863***	0.950***	0.422***	-0.033
	(4.17)	(5.04)	(6.31)	(6.48)	(5.41)	(2.76)	(-0.21)
Ownership by all institutions (q-1)	0.152***	0.122**	0.093*	0.082	0.150**	0.212***	0.239***
	(2.70)	(2.10)	(1.69)	(1.44)	(2.40)	(3.48)	(3.75)
1 / price (q-1)	0.599***	0.599***	0.598***	0.598***	0.598***	0.599***	0.599***
	(9.84)	(9.84)	(9.83)	(9.84)	(9.85)	(9.86)	(9.86)
Amihud illiquidity (q-1)	1.479***	1.477***	1.476***	1.476***	1.478***	1.480***	1.480***
	(23.63)	(23.56)	(23.55)	(23.53)	(23.59)	(23.63)	(23.63)
log(market cap) (q-1)	-0.293***	-0.297***	-0.298***	-0.299***	-0.292***	-0.289***	-0.289***
	(-11.17)	(-11.24)	(-11.26)	(-11.44)	(-11.36)	(-11.22)	(-11.23)
Past 6-month return (q-3 to q-1)	-0.109	-0.108	-0.107	-0.106	-0.108	-0.110	-0.111
	(-0.97)	(-0.96)	(-0.95)	(-0.94)	(-0.96)	(-0.98)	(-0.98)
Book-to-market (q-1)	0.013	0.012	0.012	0.013	0.014	0.013	0.014
	(0.48)	(0.46)	(0.47)	(0.48)	(0.52)	(0.50)	(0.51)
Ownership by bottom institutions (q-1)	-1.516***	-1.454***	-1.417***	-1.404***	-1.548***	-1.638***	-1.662***
	(-7.60)	(-7.46)	(-7.19)	(-7.23)	(-8.00)	(-8.21)	(-8.35)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	666,605	666,605	666,605	666,605	666,605	666,605	666,605
Adj R^2	0.666	0.666	0.666	0.666	0.666	0.666	0.666

Table 4. Ownership by Large Institutional Investors and Stock Volatility (Cont.)

Panel B: Including Greenwood and Thesmar's (2011) Fragility Measure

Dependent variable:	Daily volatility (q) (%)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst. ownership (q-1)	0.900***	0.865***	0.964***	0.864***	0.933***	0.392*	0.233
	(3.30)	(3.61)	(5.14)	(5.34)	(4.32)	(1.97)	(1.31)
Ownership by all institutions (q-1)	0.166**	0.146**	0.110	0.094	0.156**	0.222***	0.225***
	(2.38)	(2.03)	(1.61)	(1.36)	(2.08)	(3.11)	(2.98)
1 / price (q-1)	0.585***	0.585***	0.584***	0.584***	0.584***	0.585***	0.585***
	(9.58)	(9.58)	(9.57)	(9.57)	(9.57)	(9.58)	(9.58)
Amihud illiquidity (q-1)	1.492***	1.491***	1.490***	1.490***	1.489***	1.491***	1.491***
	(23.02)	(22.99)	(22.97)	(22.96)	(22.95)	(22.96)	(22.98)
log(market cap) (q-1)	-0.349***	-0.350***	-0.352***	-0.352***	-0.348***	-0.346***	-0.346***
	(-11.13)	(-11.15)	(-11.19)	(-11.29)	(-11.24)	(-11.17)	(-11.19)
Past 6-month return (q-3 to q-1)	-0.103	-0.103	-0.102	-0.101	-0.103	-0.104	-0.104
	(-0.94)	(-0.93)	(-0.92)	(-0.91)	(-0.93)	(-0.94)	(-0.94)
Book-to-market (q-1)	-0.021	-0.021	-0.021	-0.021	-0.020	-0.020	-0.020
	(-0.77)	(-0.78)	(-0.78)	(-0.77)	(-0.72)	(-0.74)	(-0.74)
Ownership by bottom institutions (q-1)	-1.538***	-1.499***	-1.454***	-1.436***	-1.544***	-1.629***	-1.633***
	(-6.64)	(-6.56)	(-6.37)	(-6.34)	(-6.85)	(-6.96)	(-7.06)
Greenwood and Thesmar Fragility (q-1)	0.178***	0.177***	0.173***	0.175***	0.193***	0.188***	0.192***
	(5.31)	(5.29)	(5.19)	(5.24)	(5.62)	(5.42)	(5.54)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	498,482	498,482	498,482	498,482	498,482	498,482	498,482
R^2	0.665	0.665	0.665	0.665	0.665	0.665	0.665

Table 5. Volatility of Firms around Mergers of Large Institutions

The table studies the effects of merger activity of large institutional investors on underlying securities. The dependent variable is the daily volatility of the stocks held by large institutional investors. *Daily volatility* is computed from daily returns during quarter q. In Panel A, we use the exogenous event of the merger between BlackRock and BGI in 2009 to test the relation between volatility and ownership by large institutions. The key independent variables are *Combined ownership* and *Combined ownership dummy*, which represent the combined ownership of the two institutional investors before and after the merger was completed, and their respective interactions with the *Post-merger dummy*. The sample in each column includes the pre-completion quarter (2009/Q4) and several quarters after the completion, as specified. Panel B provides similar analysis using a larger set of mergers. Mergers in which the average rank, by size, of merging institutions is among the largest 25 include BlackRock & BGI, Deutsche Bank & Scudder, and Mellon & The Boston Company. Mergers in which the average rank of the merging institutions is among the top 50 also include Ameriprise & Columbia Financial, Wells Fargo & Wachovia, Travelers & Citi, Chase & JPMorgan, JPMorgan & Bank One, Mellon & Dreyfus, BNY & Mellon, and First Interstate & Continental Illinois. This table presents ordinary least squares regression results. Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: BlackRock-BGI Merger

Dependent variable:	Daily volatility (q) (%)							
Window after merger	+1 qtr	+2 qtrs	+3 qtrs	+4 qtrs	+5 qtrs	+6 qtrs	+7 qtrs	+8 qtrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-merger dummy								
× Combined ownership (q-1)	1.989***	2.074***	2.288***	1.664**	1.663***	1.515***	1.615***	1.793***
	(3.28)	(3.58)	(4.56)	(2.54)	(2.98)	(3.01)	(3.39)	(3.79)
× Ownership by all institutions (q-1)	0.045	0.095*	0.202*	0.210***	0.186**	0.179***	0.244***	0.292***
	(0.66)	(1.78)	(1.95)	(2.58)	(2.53)	(2.64)	(2.99)	(3.58)
× 1 / price (q-1)	-0.010	0.081	-0.081	-0.084	-0.044	-0.050	-0.035	-0.021
	(-0.11)	(0.87)	(-0.48)	(-0.61)	(-0.35)	(-0.43)	(-0.33)	(-0.21)
× Amihud illiquidity (q-1)	-0.005	-0.153	-0.159*	-0.125	-0.154*	-0.143*	-0.249**	-0.278***
	(-0.06)	(-1.23)	(-1.71)	(-1.41)	(-1.70)	(-1.67)	(-2.11)	(-2.60)
× log(market cap) (q-1)	0.031***	0.035***	0.018	0.016	0.019*	0.021**	0.017**	0.010
	(3.52)	(4.26)	(1.29)	(1.41)	(1.78)	(2.20)	(1.99)	(1.01)
× Past 6-month return (q-3 to q-1)	-0.278***	-0.100	-0.092	-0.044	0.010	-0.027	-0.122	-0.169
	(-3.23)	(-0.94)	(-0.98)	(-0.38)	(0.10)	(-0.26)	(-0.97)	(-1.33)
× Book-to-market (q-1)	-0.139***	-0.061	-0.044	-0.069	-0.086**	-0.107**	-0.118***	-0.107***
	(-4.71)	(-1.10)	(-1.08)	(-1.50)	(-2.00)	(-2.41)	(-2.78)	(-2.98)
× Ownership by bottom institutions (q-1)	-0.897**	-0.893**	-0.557	-0.857**	-0.745**	-0.729**	-0.875***	-0.907***
	(-2.02)	(-2.31)	(-1.44)	(-2.16)	(-2.17)	(-2.26)	(-2.62)	(-2.89)
Combined ownership (q-1)	1.213	-2.242	1.618	1.564	1.183	0.618	0.797	1.245
	(0.95)	(-1.21)	(1.03)	(1.32)	(1.16)	(0.66)	(0.94)	(1.42)
Ownership by all institutions (q-1)	-0.147	-0.103	-0.224	-0.432**	-0.462***	-0.474***	-0.378***	-0.355***
	(-0.46)	(-0.40)	(-0.97)	(-2.20)	(-3.36)	(-3.78)	(-2.91)	(-3.13)
1 / price (q-1)	0.476	0.220	0.522*	0.554**	0.596**	0.558**	0.481**	0.564***
	(1.57)	(1.09)	(1.67)	(2.02)	(2.49)	(2.53)	(2.51)	(3.18)
Amihud illiquidity (q-1)	0.539***	0.740***	0.668***	0.716***	0.507***	0.519***	0.448***	0.438***
	(2.74)	(5.92)	(5.46)	(5.41)	(2.75)	(3.39)	(3.29)	(3.50)
log(market cap) (q-1)	0.400***	0.000	-0.119	-0.185	-0.180	-0.185	-0.323**	-0.344***
	(2.81)	(0.00)	(-1.05)	(-1.37)	(-1.36)	(-1.55)	(-2.33)	(-3.07)
Past 6-month return (q-3 to q-1)	0.341***	0.352***	0.298***	0.338***	0.374***	0.392***	0.408***	0.397***
	(7.30)	(9.26)	(6.81)	(6.87)	(7.42)	(8.75)	(9.65)	(10.25)
Book-to-market (q-1)	0.166*	0.199**	0.314***	0.335***	0.363***	0.389***	0.357***	0.403***
	(1.69)	(2.35)	(2.67)	(3.89)	(4.95)	(5.55)	(5.24)	(5.70)
Ownership by bottom institutions (q-1)	-0.651	0.446	0.446	0.114	0.089	0.141	-0.237	-0.234
	(-0.70)	(0.59)	(0.84)	(0.27)	(0.24)	(0.38)	(-0.49)	(-0.54)
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,540	9,859	13,115	16,385	19,627	22,861	26,067	29,226
R^2	0.168	0.165	0.129	0.175	0.167	0.172	0.280	0.303

Table 5. Volatility of Firms around Mergers of Large Institutions (Cont.)

Panel B: Multiple Mergers

Dependent variable:	Daily volatility (q) (%)							
Window after merger	+1 qtr	+2 qtrs	+3 qtrs	+4 qtrs	+5 qtrs	+6 qtrs	+7 qtrs	+8 qtrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-merger dummy	Mergers with average rank < 25							
× Combined ownership (q-1)	2.356***	1.835	1.961*	1.497	1.840*	1.959**	2.676***	3.096***
	(3.26)	(1.52)	(1.66)	(1.38)	(1.87)	(2.19)	(2.63)	(3.05)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post-merger dummy × Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,504	29,595	39,513	49,567	60,217	70,452	80,784	91,174
R^2	0.122	0.265	0.243	0.236	0.226	0.234	0.270	0.284
Post-merger dummy	Mergers with average rank < 50							
× Combined ownership (q-1)	1.509***	1.519**	1.299*	1.122	1.053	0.907	1.004	1.041
	(3.08)	(2.51)	(1.74)	(1.48)	(1.56)	(1.54)	(1.61)	(1.56)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post-merger dummy × Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,424	85,605	114,219	142,598	171,788	200,217	228,453	256,751
R^2	0.272	0.320	0.368	0.375	0.393	0.473	0.474	0.464

Table 6. Large Institutional Investors' Trades

This table reports estimates from regressions in which the dependent variable is the stock-quarter *Daily volatility*. The explanatory variables of interest are *Top inst. ownership* and stock-level *Trades by top institutions* for the largest 3, 5, 7, and 10 institutions. Absolute trades for the top institutions are the sum of the absolute value of the stock-level trade for each of the institutions in a given quarter. Panel A reports ordinary least squares estimates. Panel B reports IV estimates in which trades by top institutions are instrumented using their lagged values. The sample period is 1980/Q1–2016/Q4. Stock-quarter-institutions in which there was no trade by the top institutions are excluded. Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: OLS Estimates

Dependent variable:	Daily volatility (q) (%)							
Institutions:	Top 3		Top 5		Top 7		Top 10	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trades by top institutions (q)	8.035***	7.905***	8.522***	8.380***	8.571***	8.416***	8.357***	8.273***
	(14.45)	(14.28)	(15.78)	(15.75)	(17.26)	(17.22)	(17.63)	(17.34)
Top inst. ownership (q-1)		0.213		0.224*		0.237**		0.132
		(1.52)		(1.97)		(2.50)		(1.53)
Daily volatility (q-1)	0.438***	0.438***	0.437***	0.437***	0.436***	0.436***	0.435***	0.435***
	(44.16)	(44.15)	(44.03)	(44.05)	(44.05)	(44.03)	(43.77)	(43.75)
Ownership by all institutions (q-1)	0.263***	0.246***	0.229***	0.204***	0.188***	0.156***	0.135***	0.114***
	(6.63)	(6.40)	(5.80)	(5.06)	(4.83)	(4.09)	(3.42)	(2.84)
1 / price (q-1)	0.463***	0.464***	0.463***	0.463***	0.463***	0.463***	0.464***	0.464***
	(9.63)	(9.64)	(9.62)	(9.63)	(9.62)	(9.62)	(9.65)	(9.65)
Amihud illiquidity (q-1)	0.722***	0.722***	0.723***	0.722***	0.722***	0.721***	0.726***	0.725***
	(23.20)	(23.21)	(23.14)	(23.13)	(23.20)	(23.20)	(23.46)	(23.45)
log(market cap) (q-1)	-0.176***	-0.176***	-0.181***	-0.183***	-0.185***	-0.187***	-0.187***	-0.189***
	(-9.48)	(-9.41)	(-9.71)	(-9.70)	(-9.86)	(-9.82)	(-10.15)	(-10.18)
Past 6-month return (q-3 to q-1)	-0.121*	-0.120*	-0.122*	-0.121*	-0.123*	-0.122*	-0.122*	-0.121*
	(-1.71)	(-1.70)	(-1.72)	(-1.71)	(-1.73)	(-1.72)	(-1.72)	(-1.71)
Book-to-market (q-1)	-0.039***	-0.039***	-0.039***	-0.039***	-0.038***	-0.038***	-0.036**	-0.036**
	(-2.68)	(-2.69)	(-2.67)	(-2.70)	(-2.62)	(-2.64)	(-2.45)	(-2.46)
Ownership by bottom institutions (q-1)	-1.221***	-1.191***	-1.174***	-1.130***	-1.140***	-1.086***	-1.090***	-1.055***
	(-10.11)	(-9.74)	(-9.77)	(-9.60)	(-9.50)	(-9.12)	(-9.17)	(-9.08)
Trades by other institutions (q)	2.926***	2.935***	3.036***	3.051***	3.156***	3.177***	3.260***	3.275***
	(14.15)	(14.17)	(14.35)	(14.35)	(14.39)	(14.41)	(14.58)	(14.63)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	601,715	601,715	601,715	601,715	601,715	601,715	601,715	601,715
R-squared	0.729	0.729	0.730	0.730	0.730	0.730	0.730	0.730

Table 6. Large Institutional Investors' Trades (Cont.)

Panel B: IV Estimates, Trades Instrumented with Lagged Trades

Dependent variable:	Daily volatility (q) (%)							
Institutions:	Top 3		Top 5		Top 7		Top 10	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trades by top institutions (q)	7.823***	6.551***	7.648***	6.247***	7.362***	5.840***	6.752***	5.694***
	(4.55)	(3.12)	(4.86)	(3.32)	(5.85)	(3.84)	(6.31)	(4.52)
Top inst. ownership (q-1)		0.389*		0.413**		0.465***		0.364***
		(1.87)		(2.53)		(3.34)		(3.07)
Daily volatility (q-1)	0.440***	0.440***	0.439***	0.439***	0.439***	0.439***	0.438***	0.438***
	(43.64)	(43.62)	(43.65)	(43.61)	(43.59)	(43.56)	(43.29)	(43.28)
Ownership by all institutions (q-1)	0.271***	0.249***	0.246***	0.217***	0.215***	0.176***	0.180***	0.143***
	(6.16)	(6.10)	(5.32)	(4.96)	(4.66)	(4.17)	(3.73)	(3.20)
1 / price (q-1)	0.467***	0.468***	0.467***	0.468***	0.467***	0.467***	0.468***	0.468***
	(9.61)	(9.62)	(9.61)	(9.61)	(9.60)	(9.60)	(9.62)	(9.62)
Amihud illiquidity (q-1)	0.728***	0.726***	0.727***	0.724***	0.726***	0.722***	0.729***	0.725***
	(22.53)	(22.39)	(22.43)	(22.24)	(22.49)	(22.31)	(22.60)	(22.37)
log(market cap) (q-1)	-0.174***	-0.176***	-0.179***	-0.181***	-0.182***	-0.184***	-0.184***	-0.186***
	(-9.38)	(-9.31)	(-9.61)	(-9.61)	(-9.70)	(-9.70)	(-10.03)	(-10.07)
Past 6-month return (q-3 to q-1)	-0.121*	-0.119*	-0.121*	-0.119*	-0.122*	-0.119*	-0.121*	-0.118
	(-1.69)	(-1.66)	(-1.69)	(-1.66)	(-1.70)	(-1.66)	(-1.69)	(-1.66)
Book-to-market (q-1)	-0.039**	-0.040***	-0.039**	-0.040***	-0.038**	-0.039***	-0.037**	-0.038**
	(-2.61)	(-2.64)	(-2.61)	(-2.68)	(-2.55)	(-2.62)	(-2.42)	(-2.48)
Ownership by bottom institutions (q-1)	-1.197***	-1.145***	-1.158***	-1.085***	-1.131***	-1.040***	-1.097***	-1.014***
	(-9.68)	(-9.03)	(-9.44)	(-8.89)	(-9.26)	(-8.44)	(-9.13)	(-8.50)
Trades by other institutions (q)	2.942***	2.928***	3.025***	3.005***	3.116***	3.091***	3.177***	3.161***
	(12.94)	(12.80)	(12.44)	(12.27)	(12.34)	(12.16)	(12.86)	(12.75)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	567,558	567,558	567,558	567,558	567,558	567,558	567,558	567,558
R-squared	0.729	0.729	0.730	0.729	0.730	0.730	0.730	0.730

Table 7. Stock Comovement with the Portfolios of Large Institutional Investors

This table explores the correlation of stock returns to the portfolio of securities owned by large institutional investors. Panel A presents ordinary least squares regression results. The dependent variable is the beta of each stock-quarter within the portfolio (excluding the stock itself) of the large institution. The beta is computed using daily returns in the current quarter. The key independent variable is *Ownership* by the top institutions in the previous quarter. The sample period is 1980/Q1–2016/Q4. Panel B presents regressions in which the sample is restricted to the merger of BlackRock and BGI (December 2009). The restricted sample includes one quarter prior to the merger, and the different columns provide different windows following the merger (+1 to +8 quarters). Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Stocks' Beta and Ownership by Large Institutions

Dependent variable:	Beta of daily returns with those of top institution's portfolio (q)									
Institutions:	Top 1	Top 2	Top 3	Top 4	Top 5	Top 6	Top 7	Top 8	Top 9	Top 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Top inst ownership (q-1)	1.288***	0.728***	1.998***	0.451***	0.741***	0.356***	0.185*	0.356**	0.563***	0.261*
	(7.68)	(4.31)	(5.76)	(2.70)	(4.31)	(2.74)	(1.70)	(2.00)	(3.37)	(1.87)
$Beta_{MKT}$	0.038***	0.036***	0.036***	0.035***	0.035***	0.034***	0.034***	0.034***	0.034***	0.033***
	(10.80)	(10.30)	(10.27)	(9.96)	(9.82)	(9.74)	(9.80)	(9.84)	(9.50)	(9.06)
$Beta_{SMB}$	0.017***	0.017***	0.018***	0.017***	0.017***	0.017***	0.017***	0.017***	0.018***	0.019***
	(7.71)	(7.58)	(8.00)	(7.85)	(7.89)	(8.00)	(8.18)	(8.30)	(8.15)	(8.95)
$Beta_{HML}$	-0.013***	-0.013***	-0.013***	-0.012***	-0.012***	-0.012***	-0.011***	-0.012***	-0.012***	-0.012***
	(-8.06)	(-7.59)	(-7.74)	(-7.33)	(-7.61)	(-7.40)	(-7.09)	(-7.32)	(-7.40)	(-7.46)
$Beta_{UMD}$	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.000
	(1.11)	(1.16)	(0.88)	(0.47)	(0.31)	(0.54)	(0.65)	(0.28)	(0.05)	(0.16)
Ownership by all institutions (q-1)	0.230***	0.256***	0.281***	0.290***	0.303***	0.309***	0.317***	0.330***	0.328***	0.336***
	(9.48)	(10.86)	(11.18)	(11.57)	(12.82)	(12.83)	(13.34)	(13.16)	(13.47)	(13.60)
1 / price (q-1)	0.001	0.001	-0.002	-0.012*	-0.006	-0.008	-0.009	-0.013**	-0.016***	-0.016***
	(0.25)	(0.09)	(-0.41)	(-1.95)	(-1.05)	(-1.39)	(-1.55)	(-2.29)	(-2.68)	(-2.84)
Amihud illiquidity (q-1)	-0.063***	-0.072***	-0.077***	-0.082***	-0.078***	-0.090***	-0.084***	-0.095***	-0.100***	-0.100***
	(-5.82)	(-6.43)	(-6.90)	(-7.23)	(-7.03)	(-8.12)	(-7.32)	(-8.37)	(-8.84)	(-8.97)
log(market cap) (q-1)	0.065***	0.057***	0.042***	0.038***	0.035***	0.025***	0.027***	0.019**	0.013*	0.011
	(9.04)	(7.73)	(5.89)	(5.22)	(4.76)	(3.61)	(3.58)	(2.57)	(1.73)	(1.54)
Past 6-month return (q-3 to q-1)	0.073***	0.067***	0.066***	0.069***	0.068***	0.069***	0.067***	0.067***	0.066***	0.062***
	(3.51)	(3.20)	(3.17)	(3.30)	(3.31)	(3.44)	(3.58)	(3.29)	(3.15)	(3.83)
Book-to-market (q-1)	0.004	0.003	0.002	0.000	0.000	-0.003	-0.006	-0.003	-0.001	-0.005
	(0.46)	(0.32)	(0.27)	(0.01)	(0.07)	(-0.42)	(-0.75)	(-0.39)	(-0.11)	(-0.53)
Ownership by bottom institutions (q-1)	-0.602***	-0.640***	-0.694***	-0.723***	-0.718***	-0.709***	-0.732***	-0.770***	-0.788***	-0.776***
	(-9.02)	(-9.62)	(-9.75)	(-10.58)	(-10.70)	(-10.27)	(-10.89)	(-11.07)	(-11.32)	(-11.06)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	637,502	637,354	637,313	637,321	637,237	637,272	637,440	637,291	637,286	637,275
R^2	0.331	0.320	0.325	0.317	0.324	0.323	0.329	0.332	0.327	0.324

Table 7. Stock Comovement with the Portfolios of Large Institutional Investors (Cont.)

Panel B: Stocks' Beta around the Merger of BlackRock and BGI

Dependent variable:	Beta of daily returns with those of top institution's portfolio (q)							
Window after merger:	+1 qtr	+2 qtrs	+3 qtrs	+4 qtrs	+5 qtrs	+6 qtrs	+7 qtrs	+8 qtrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-merger dummy								
× Combined ownership (q-1)	0.905***	0.855**	1.263***	1.146***	1.183***	1.185***	1.220***	1.260***
	(2.65)	(2.10)	(3.04)	(2.75)	(2.86)	(2.91)	(3.02)	(3.08)
× Ownership by all institutions (q-1)	0.110	0.120	0.061	-0.039	0.032	0.038	0.114	0.144**
	(0.69)	(0.87)	(0.46)	(-0.36)	(0.36)	(0.49)	(1.56)	(2.01)
× 1 / price (q-1)	0.067	0.148	0.201**	0.089	0.096	0.020	-0.019	-0.038
	(0.45)	(1.36)	(2.46)	(1.08)	(1.25)	(0.28)	(-0.29)	(-0.58)
× Amihud illiquidity (q-1)	0.032	0.153	0.186*	0.181*	0.203**	0.189**	0.120	0.144*
	(0.29)	(1.30)	(1.80)	(1.83)	(2.33)	(2.26)	(1.46)	(1.78)
× log(market cap) (q-1)	0.360***	0.228***	0.110***	0.079**	0.122***	0.129***	0.044**	-0.008
	(6.45)	(4.86)	(2.98)	(2.43)	(4.25)	(5.39)	(2.07)	(-0.37)
× Past 6-month return (q-3 to q-1)	-0.020	-0.016	-0.006	-0.000	0.003	0.013	0.036	0.039
	(-0.83)	(-0.64)	(-0.23)	(-0.00)	(0.11)	(0.52)	(1.43)	(1.51)
× Book-to-market (q-1)	-0.132**	-0.100***	-0.095***	-0.060*	-0.025	-0.015	-0.040	-0.003
	(-2.45)	(-2.82)	(-3.05)	(-1.89)	(-0.79)	(-0.52)	(-1.52)	(-0.13)
× Bid-ask spread (q-1)	0.670	0.161	-1.654	-1.881	-3.193	-1.976	-1.918	-2.416
	(0.27)	(0.05)	(-0.57)	(-0.65)	(-1.20)	(-0.79)	(-0.79)	(-1.02)
× BetaMKT (q-1)	-0.196***	-0.001	0.077***	0.124***	0.144***	0.153***	0.158***	0.154***
	(-9.98)	(-0.03)	(4.02)	(6.49)	(7.70)	(8.44)	(8.89)	(8.72)
× BetaSMB (q-1)	-0.109***	-0.041***	-0.009	0.009	0.021	0.026*	0.032**	0.033**
	(-8.91)	(-2.95)	(-0.64)	(0.67)	(1.46)	(1.87)	(2.40)	(2.49)
× BetaHML (q-1)	-0.101***	-0.010	0.033**	0.057***	0.069***	0.075***	0.073***	0.070***
	(-8.11)	(-0.77)	(2.54)	(4.40)	(5.38)	(5.98)	(6.00)	(5.75)
× BetaUMD (q-1)	-0.062***	0.053***	0.085***	0.101***	0.100***	0.103***	0.107***	0.110***
	(-5.64)	(4.61)	(7.53)	(8.69)	(8.71)	(9.05)	(9.62)	(9.97)
Combined ownership (q-1)	1.620**	2.765***	2.801***	2.701***	2.337***	2.712***	3.129***	3.172***
	(2.07)	(3.34)	(4.35)	(4.67)	(4.45)	(5.58)	(6.49)	(6.52)
Ownership by all institutions (q-1)	0.110	0.120	0.061	-0.039	0.032	0.038	0.114	0.144**
	(0.69)	(0.87)	(0.46)	(-0.36)	(0.36)	(0.49)	(1.56)	(2.01)
1 / price (q-1)	0.067	0.148	0.201**	0.089	0.096	0.020	-0.019	-0.038
	(0.45)	(1.36)	(2.46)	(1.08)	(1.25)	(0.28)	(-0.29)	(-0.58)
Amihud illiquidity (q-1)	0.032	0.153	0.186*	0.181*	0.203**	0.189**	0.120	0.144*
	(0.29)	(1.30)	(1.80)	(1.83)	(2.33)	(2.26)	(1.46)	(1.78)
log(market cap) (q-1)	0.360***	0.228***	0.110***	0.079**	0.122***	0.129***	0.044**	-0.008
	(6.45)	(4.86)	(2.98)	(2.43)	(4.25)	(5.39)	(2.07)	(-0.37)
Past 6-month return (q-3 to q-1)	-0.020	-0.016	-0.006	-0.000	0.003	0.013	0.036	0.039
	(-0.83)	(-0.64)	(-0.23)	(-0.00)	(0.11)	(0.52)	(1.43)	(1.51)
Book-to-market (q-1)	-0.132**	-0.100***	-0.095***	-0.060*	-0.025	-0.015	-0.040	-0.003
	(-2.45)	(-2.82)	(-3.05)	(-1.89)	(-0.79)	(-0.52)	(-1.52)	(-0.13)
Bid-ask spread (q-1)	0.670	0.161	-1.654	-1.881	-3.193	-1.976	-1.918	-2.416
	(0.27)	(0.05)	(-0.57)	(-0.65)	(-1.20)	(-0.79)	(-0.79)	(-1.02)
$Beta_{MKT}$ (q-1)	-0.196***	-0.001	0.077***	0.124***	0.144***	0.153***	0.158***	0.154***
	(-9.98)	(-0.03)	(4.02)	(6.49)	(7.70)	(8.44)	(8.89)	(8.72)
$Beta_{SMB}$ (q-1)	-0.109***	-0.041***	-0.009	0.009	0.021	0.026*	0.032**	0.033**
	(-8.91)	(-2.95)	(-0.64)	(0.67)	(1.46)	(1.87)	(2.40)	(2.49)
$Beta_{HML}$ (q-1)	-0.101***	-0.010	0.033**	0.057***	0.069***	0.075***	0.073***	0.070***
	(-8.11)	(-0.77)	(2.54)	(4.40)	(5.38)	(5.98)	(6.00)	(5.75)
$Beta_{UMD}$ (q-1)	-0.062***	0.053***	0.085***	0.101***	0.100***	0.103***	0.107***	0.110***
	(-5.64)	(4.61)	(7.53)	(8.69)	(8.71)	(9.05)	(9.62)	(9.97)
Calendar quarter FE	No	No	No	No	No	No	No	No
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,428	9,790	12,981	16,211	19,429	22,656	25,860	28,844
R^2	0.890	0.752	0.696	0.655	0.630	0.619	0.620	0.602

Table 8. Liquidity Comovement with the Portfolios of Large Institutional Investors

The table explores the liquidity comovement of stocks with the portfolio of securities owned by large institutional investors. Panel A presents ordinary least squares regression results. The dependent variable is the beta of each stock-quarter within the portfolio (excluding the stock itself) of the large institution. Liquidity comovement is computed following the methodology of Koch, Ruenzi, and Starks (2017). The key independent variable is *Ownership* by the top institutions in the previous quarter. The sample period is 1980/Q1–2016/Q4. Panel B presents regressions in which the sample is restricted to the merger of BlackRock and BGI (December 2009). The sample includes one quarter prior to the merger, and the different columns provide different windows following the merger (+1 to +8 quarters). Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Liquidity Comovement and Ownership by Large Institutions

Dependent variable:	Liquidity comovement with top institution's portfolio (q)									
Institutions:	Top 1	Top 2	Top 3	Top 4	Top 5	Top 6	Top 7	Top 8	Top 9	Top 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Top inst ownership (q-1)	5.170***	6.166***	2.308	3.638***	2.092**	2.570*	1.976***	1.948**	2.095***	2.958***
	(5.272)	(5.370)	(1.434)	(6.845)	(2.610)	(1.818)	(3.718)	(2.192)	(2.671)	(3.199)
Ownership by all institutions (q-1)	0.126	0.0227	-0.591***	-0.367**	-0.520***	-0.177*	0.00816	0.0482	-0.0879	-0.411***
	(0.758)	(0.112)	(-4.174)	(-2.457)	(-3.240)	(-1.671)	(0.0845)	(0.377)	(-0.574)	(-3.089)
1 / price (q-1)	0.0104	0.0441	0.118*	0.0209	0.0387	0.0563	0.0142	0.0289	-0.0204	-0.0433
	(0.171)	(0.526)	(1.972)	(0.423)	(0.904)	(1.139)	(0.313)	(0.539)	(-0.339)	(-1.185)
Amihud illiquidity (q-1)	0.471*	1.307***	0.810***	0.315**	0.420**	0.685***	0.320**	0.588***	0.386**	0.129
	(1.930)	(4.813)	(4.455)	(2.222)	(2.389)	(3.929)	(2.533)	(3.655)	(2.613)	(0.833)
log(market cap) (q-1)	0.194***	0.113	-0.0961**	0.0643*	0.124***	0.0381	0.0122	0.0469	0.00253	-0.0180
	(4.105)	(1.548)	(-2.288)	(1.803)	(3.904)	(0.940)	(0.322)	(1.077)	(0.0522)	(-0.421)
Bid-ask spread (q-1)	2.456*	0.997	-3.068***	0.895	-0.739	-2.116**	0.760	0.269	0.133	0.043
	(1.777)	(0.690)	(-2.818)	(0.843)	(-0.696)	(-2.340)	(0.872)	(0.246)	(0.155)	(0.057)
Beta (Pastor-Stambaugh) (q-1)	0.038*	-0.010	-0.039**	0.005	-0.019	-0.001	0.008	-0.020	-0.014	-0.004
	(1.725)	(-0.412)	(-2.265)	(0.333)	(-0.882)	(-0.040)	(0.794)	(-1.257)	(-0.795)	(-0.246)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	444,358	444,358	444,358	444,358	444,358	444,358	444,358	444,358	444,358	444,358
R^2	0.047	0.061	0.062	0.065	0.050	0.063	0.060	0.049	0.052	0.059

Table 8. Liquidity Comovement with the Portfolios of Large Institutional Investors (Cont.)

Panel B: Liquidity Comovement around the Merger of BlackRock and BGI

Dependent variable:	Liquidity comovement with top institution's portfolio (q)							
Window after merger:	+1 qtr	+2 qtrs	+3 qtrs	+4 qtrs	+5 qtrs	+6 qtrs	+7 qtrs	+8 qtrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-merger dummy								
× Combined ownership (q-1)	7.381	12.959	9.910	17.961**	14.974*	15.980**	14.153*	14.932**
	(0.73)	(1.51)	(1.22)	(2.23)	(1.90)	(2.10)	(1.86)	(1.98)
× Ownership by all institutions (q-1)	3.618***	1.422	1.946**	1.623*	2.018**	2.057**	1.789*	1.661*
	(3.01)	(1.37)	(1.97)	(1.68)	(2.12)	(2.20)	(1.92)	(1.79)
× 1 / price (q-1)	0.267	-0.161	0.083	-0.005	0.215	0.211	-0.039	-0.088
	(0.28)	(-0.20)	(0.11)	(-0.01)	(0.29)	(0.29)	(-0.05)	(-0.12)
× Amihud illiquidity (q-1)	-3.519	-6.270**	-6.342**	-6.139***	-5.660**	-6.918***	-7.130***	-6.903***
	(-1.06)	(-2.27)	(-2.50)	(-2.62)	(-2.47)	(-3.11)	(-3.27)	(-3.21)
× log(market cap) (q-1)	-0.003	-0.289**	-0.271*	-0.432***	-0.284**	-0.289**	-0.265**	-0.294**
	(-0.02)	(-1.97)	(-1.90)	(-3.11)	(-2.09)	(-2.16)	(-2.00)	(-2.23)
× Bid-ask spread (q-1)	41.265	72.461*	64.971*	55.143*	65.079**	79.945**	92.925***	83.055***
	(0.76)	(1.77)	(1.80)	(1.70)	(2.00)	(2.53)	(3.04)	(2.78)
× Beta (Pastor-Stambaugh) (q-1)	0.573*	0.078	0.008	0.023	0.165	0.108	0.166	0.074
	(1.73)	(0.28)	(0.03)	(0.08)	(0.63)	(0.42)	(0.65)	(0.29)
Combined ownership (q-1)	-20.944	-0.108	-8.299	-6.683	-15.641	-8.028	-6.632	-7.310
	(-0.85)	(-0.01)	(-0.68)	(-0.63)	(-1.64)	(-0.99)	(-0.83)	(-0.95)
Ownership by all institutions (q-1)	-1.120	2.548	-0.412	-1.374	-1.218	-1.370	-1.759	-1.566
	(-0.26)	(0.96)	(-0.20)	(-0.77)	(-0.80)	(-1.01)	(-1.37)	(-1.26)
1 / price (q-1)	3.773	2.062	2.314**	1.703*	1.894**	1.488*	0.722	0.463
	(1.53)	(1.59)	(2.05)	(1.75)	(2.11)	(1.82)	(0.90)	(0.58)
Amihud illiquidity (q-1)	13.115**	7.766**	7.007**	6.520**	4.677*	5.563**	4.783**	5.032**
	(2.53)	(2.22)	(2.35)	(2.48)	(1.88)	(2.33)	(2.06)	(2.21)
log(market cap) (q-1)	2.260**	1.783**	0.753	1.247***	0.802**	1.198***	0.603**	0.580**
	(2.11)	(2.54)	(1.39)	(2.80)	(2.17)	(3.78)	(2.09)	(2.18)
Bid-ask spread (q-1)	-34.899	-35.785	-65.408	-47.220	-44.328	-41.426	-34.130	-37.057
	(-0.55)	(-0.77)	(-1.59)	(-1.45)	(-1.41)	(-1.43)	(-1.21)	(-1.36)
Beta (Pastor-Stambaugh) (q-1)	4.471**	3.745***	2.149***	2.043***	2.110***	1.238***	1.377***	0.583*
	(2.24)	(3.42)	(2.94)	(3.22)	(3.78)	(2.60)	(3.17)	(1.65)
Calendar quarter FE	No	No	No	No	No	No	No	No
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,496	10,047	13,259	16,399	19,603	22,772	25,855	28,962
R^2	0.528	0.364	0.282	0.227	0.206	0.184	0.169	0.156

Table 9. Impact of Large Institutional Ownership during Times of Market Stress

The table explores the relationship between ownership by the largest institutional investors and asymmetric return behavior. All panels use the *Top institutional ownership* of the largest institutional investors in a given stock as the key independent variable. The dependent variable is the stock's monthly DGTW excess returns. All independent variables are measured during quarter *q*-1. We restrict our sample to times of market stress. Specifically, we use only the days with the 5% worst VIX (Columns (1) to (4)), TED spread (Columns (5) to (8)), or market return values (Columns (9) to (12)). The sample period is 1980/Q1–2016/Q4. All regressions include stock and time fixed effects, and *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	DGTW Excess Returns (Monthly)											
Sample restriction:	Worst VIX				Worst TED				Worst Market Days			
Institutions:	Top 3	Top 5	Top7	Top 10	Top 3	Top 5	Top7	Top 10	Top 3	Top 5	Top7	Top 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Top inst. ownership (t-1)	-0.080	-0.090*	-0.111**	-0.075**	-0.100*	-0.130***	-0.105***	-0.069***	-0.086**	-0.146***	-0.128***	-0.100***
	(-1.58)	(-1.81)	(-2.80)	(-2.18)	(-1.98)	(-3.31)	(-3.41)	(-3.14)	(-2.30)	(-3.78)	(-4.56)	(-3.35)
Returns (t-1)	-0.238***	-0.238***	-0.238***	-0.238***	-0.191***	-0.191***	-0.191***	-0.191***	-0.097***	-0.097***	-0.097***	-0.096***
	(-15.49)	(-15.50)	(-15.50)	(-15.49)	(-10.62)	(-10.61)	(-10.61)	(-10.63)	(-4.63)	(-4.64)	(-4.64)	(-4.64)
Ownership by all institutions (t-1)	-0.080***	-0.076***	-0.071***	-0.073***	-0.064***	-0.058***	-0.058***	-0.060***	-0.079***	-0.069***	-0.068***	-0.069***
	(-7.05)	(-6.95)	(-6.49)	(-6.75)	(-5.41)	(-5.35)	(-5.23)	(-4.96)	(-5.58)	(-5.31)	(-5.09)	(-4.95)
1 / price (t-1)	0.011*	0.011*	0.011*	0.011*	0.009**	0.009**	0.009**	0.009**	0.019***	0.019***	0.019***	0.019***
	(1.94)	(1.94)	(1.95)	(1.94)	(2.32)	(2.34)	(2.35)	(2.35)	(4.91)	(4.90)	(4.89)	(4.89)
Amihud illiquidity (t-1)	0.011**	0.011**	0.011**	0.011**	0.009	0.009*	0.010*	0.010*	0.035***	0.035***	0.036***	0.036***
	(2.17)	(2.19)	(2.21)	(2.22)	(1.71)	(1.76)	(1.78)	(1.78)	(6.08)	(6.17)	(6.14)	(6.12)
log(market cap) (t-1)	0.052***	0.053***	0.053***	0.053***	0.053***	0.053***	0.053***	0.053***	0.053***	0.054***	0.054***	0.054***
	(6.98)	(7.01)	(7.06)	(7.02)	(6.56)	(6.57)	(6.61)	(6.63)	(6.13)	(6.17)	(6.16)	(6.18)
Past 6-month return	0.159***	0.158***	0.158***	0.158***	0.135***	0.135***	0.135***	0.135***	0.104***	0.104***	0.103***	0.103***
	(10.07)	(10.06)	(10.04)	(10.03)	(8.77)	(8.77)	(8.77)	(8.76)	(3.35)	(3.34)	(3.33)	(3.32)
Book-to-market (t-1)	0.055***	0.055***	0.055***	0.055***	0.070***	0.070***	0.070***	0.070***	0.051***	0.051***	0.051***	0.051***
	(12.24)	(12.23)	(12.26)	(12.29)	(7.34)	(7.34)	(7.32)	(7.31)	(8.29)	(8.28)	(8.25)	(8.24)
Ownership by bottom institutions (t-1)	0.093**	0.085**	0.079*	0.083**	0.107***	0.094**	0.096**	0.099**	0.187***	0.170***	0.170***	0.172***
	(2.24)	(2.17)	(1.97)	(2.11)	(2.94)	(2.70)	(2.70)	(2.83)	(3.58)	(3.42)	(3.32)	(3.37)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	154,102	154,102	154,102	154,102	145,473	145,473	145,473	145,473	86,523	86,523	86,523	86,523
R^2	0.187	0.187	0.187	0.187	0.184	0.184	0.184	0.184	0.230	0.231	0.231	0.231

Appendix A. Variable Definitions

Variable	Description	Source
Daily volatility	Standard deviation of the daily log of stock returns within the quarter.	CRSP
Weekly volatility	Standard deviation of the weekly stock returns within the quarter.	CRSP
Monthly volatility	Standard deviation of the monthly stock returns within the year.	CRSP
Quarterly range	Maximum of the daily high price during the quarter minus the lowest of daily low price during the quarter, divided by the average of these two numbers.	CRSP
Non-parametric skewness	Skewness of daily returns using the approach in Ghysels, Plazzi, and Valkanov (2016), and using the 25^{th} and 75^{th} percentiles as cutoffs.	
log(market cap)	The logged market capitalization of the stock (in $ millions) at the end of the month.	CRSP
1/Price	The inverse of the stock price at the end of the quarter.	CRSP
Amihud ratio	Absolute return scaled by daily dollar volume in $ million, averaged within the quarter. Based on Amihud (2002).	CRSP
Illiquidity Change	Logarithm of (Amihud(t)/Amihud(t-1)).	CRSP
Top inst ownership	The percentage ownership of the large institution, computed as the number of shares owned at the end of the quarter divided by the number of shares outstanding for that company.	13F, CRSP
Ownership by all institutions	The percentage ownership by all institutions, computed as the total number of shares owned by all 13F institutional investors at the end of the quarter, divided by the number of shares outstanding.	13F, CRSP
Past 6-month return (q-3 to q-1)	The stock's six-month momentum return over the two quarters prior to analysis.	CRSP
Book-to-market (q-1)	The stock's book value of equity relative to its market value of equity.	CRSP, Compustat
Ownership by bottom institutions	Institutional ownership of the set of the smallest institutions that in aggregate have equity holdings equal to the top 10 institutions.	13F
Greenwood and Thesmar (2011) fragility	The effective concentration of ownership of a financial asset, weighted by the volatility and correlation of the trading needs of its investors (Greenwood and Thesmar 2011).	13F, CRSP
Combined ownership	Ownership of the large institution that resulted from the 2009 BlackRock-BGI merger.	13F
Post-merger dummy	An indicator for whether the quarter in consideration is in 2010/Q1 or later.	-
Beta of daily returns with those of top inst. portfolio	Sensitivity of the stock's daily returns to the portfolio of the largest institutional investors, excluding the holdings of the stock.	CRSP, 13F

Beta of daily liquidity comovement with top inst. portfolio	Sensitivity of the stock's daily illiquidity changes on the illiquidity of the portfolio of the largest institutional investors, excluding the holdings of the stock, after controlling for the market liquidity and return factors, following the specification in Koch, Ruenzi, and Starks (2017).	CRSP, 13F
Mutual fund flow correlation (i, j)	The correlation between the flows (scaled by total net assets) of two funds over a calendar year.	CRSP Mutual Fund Database
Mutual fund active holdings correlation (i, j)	The correlation between the active holding weights (adjusted for benchmark holding weight) of two funds over a calendar year, after matching each fund to its best-fit index among 34 Russell and S&P indices.	CRSP Mutual Fund Database, Thomson
Mutual fund active trade correlation (i, j)	The correlation between the active trades (adjusted for flow-motivated trades) of two funds over a calendar year.	CRSP Mutual Fund Database, Thomson

Appendix B. Top Institutional Investors

This table lists all the institutional investors that enter the top-10-institution ranking during our sample period. *First Quarter* and *Last Quarter* indicate the first and last quarter in which the firm is part of the ranking, respectively. *Avg Long Equity Assets* is the average assets managed by the institution over the time that the institution is in our sample, defined in 2016 dollars. *Avg Quarterly Turnover* measures the percentage of assets under management that are bought and sold within the average quarter. *Top Rank* is the average ranking of the firm's size relative to all other institutional investors while it is among the top 10 institutions.

13F Institution Name	13F Institution Number	Zip Code	State	Number of Quarters	First Quarter	Last Quarter	Avg Long Equity Assets ($m)	Avg Quarterly Turnover	Top Rank
Bzw Barclays Glbl Invts	92040	94105	CA	24	6-1990	3-1996	$78,571.35	2.17%	1.3
Barclays Bank Plc	7900	94104	CA	51	3-1997	9-2009	$480,174.61	5.02%	1.6
Blackrock Inc	9385	94105	CA	29	12-2009	12-2016	$1,135,744.36	5.12%	1.6
Fidelity Mgmt & Research Co	27800	02109	MA	101	12-1991	12-2016	$439,065.33	12.08%	2.2
Fmr Corp	26590	02109	MA	20	3-1986	12-1990	$27,215.97	18.63%	3.7
Bankers Tr N Y Corp (Deutsche Bk)	7800	10017	NY	95	3-1980	6-2005	$75,098.19	5.93%	3.8
State Str Corporation	81540	02111	MA	111	6-1988	12-2016	$361,727.25	4.49%	4.1
Vanguard Group, Inc.	90457	19482	PA	72	3-1999	12-2016	$563,593.76	2.28%	4.3
Wells Fargo Bank N.A.	92035	94104	CA	37	6-1980	3-1990	$22,942.46	5.59%	4.5
Prudential Ins Co/Amer	72280	07102	NJ	15	3-1980	9-1983	$6,962.83	10.73%	4.7
College Retire Equities	18265	10017	NY	74	3-1980	6-1998	$32,609.23	4.51%	4.7
Capital Research & Mgmt Co	12740	90071	CA	72	9-1990	6-2008	$214,521.95	7.93%	4.9
Manufacturers Natl	53690	48226	MI	1	3-1980	3-1980	$4,623.67	.	5.0
Batterymarch Finl Mgmt	8190	02116	MA	18	12-1981	3-1986	$9,479.47	10.97%	5.7
Equitable Companies Inc (Axa)	25610	10014	NY	63	6-1994	12-2009	$199,440.25	11.83%	6.0
T. Rowe Price Associates, Inc.	71110	21202	MD	48	3-1980	12-2016	$253,372.00	8.18%	6.2
Donaldson Lufkin & Jen	23375	10172	NY	13	12-1982	12-1985	$10,347.28	18.18%	6.2
Citicorp	16260	10022	NY	28	3-1980	3-1988	$8,883.59	10.96%	6.3
Alliance Capital Mgmt	1250	10105	NY	27	12-1986	6-1993	$23,161.08	13.11%	6.4
JP Morgan Chase & Company	58835	10017	NY	86	3-1980	12-2016	$93,986.95	10.15%	6.5
Capital World Investors	11836	90071	CA	37	12-2007	12-2016	$290,515.76	7.81%	6.6
Mellon National Corp (Mellon Bank)	55390	15219	PA	117	3-1980	3-2013	$118,351.34	7.03%	6.7
Putnam Investment Mgmt, L.L.C.	72400	02266	MA	42	9-1980	9-2003	$122,707.37	14.41%	7.4
First Interstate Bancorp	29800	90017	CA	19	6-1981	3-1987	$10,720.55	7.32%	7.5
Sarofim Fayez	76045	77010	TX	10	12-1980	3-1983	$6,013.41	7.12%	7.7
BANK OF AMERICA CORP /DE/	62890	28255	NC	5	12-2015	12-2016	$360,834.33	6.65%	7.8
State Street Resr & Mgmt	81575	02111	MA	12	6-1982	3-1985	$7,741.61	7.89%	7.8
Wellington Management Co, LLP	91910	02210	MA	102	6-1985	12-2016	$170,432.81	10.97%	8.0
Bank of New York Mellon Corp	12276	10286	NY	12	3-2014	12-2016	$330,441.69	5.02%	8.2
New York St Common Ret.	63850	10038	NY	30	12-1986	3-1994	$21,270.73	3.99%	8.2
Calif Public Emp. Ret.	12000	95811	CA	4	12-1988	9-1989	$16,805.40	8.20%	8.3
Capital Research Gbl Investors	11835	90071	CA	24	12-2007	12-2013	$224,601.66	8.52%	8.5
Harris Trust & Sav Bank	43680	60640	IL	3	3-1980	9-1980	$4,557.99	8.37%	8.7
Janus Capital Corporation	48170	80206	CO	5	3-2000	3-2001	$189,638.67	15.17%	8.8
Calif Public Empl Retirm	12090	95811	CA	5	6-1986	12-1987	$15,388.04	5.87%	9.4
Morgan Stanley D Witter	58950	10036	NY	22	12-1997	3-2011	$172,554.96	10.59%	9.4
Travelers (Citigroup Inc)	84900	55102 (10022)	MN (NY)	17	6-1996	9-2005	$144,162.92	9.35%	9.4
Legg Mason Inc	50160	21202	MD	4	9-2006	6-2007	$211,065.84	7.09%	9.5
Northern Trust Corp	65260	60603	IL	22	12-2003	9-2015	$234,466.52	3.02%	9.7
Chase Manhattan Corp	15230	10017	NY	2	3-1980	6-1980	$4,221.70	4.20%	10.0
Goldman Sachs & Company	41260	10282	NY	1	9-2007	9-2007	$236,162.71	17.58%	10.0

Appendix C. Correcting Thomson-Reuters Data Problems and Sample Construction

After June 2013, we use the 13F data parsed directly from the SEC EDGAR filings system to supplement the Thomson-Reuters 13F data, which has serious data quality issues—most notably omitted institutions and excluded securities. To remedy these data quality issues, we use the original 13F filings provided on the SEC website as the source of our 13F data on and after June 2013. The sample we use is currently available on the WRDS website as the WRDS SEC 13F Holdings database, along with the code used to clean the data. Our methodology consists of the following steps:

1. Because there are multiple filings per holding report period, due to amendments, corrections, and confidential treatment–related reporting, we first divide the sample into subsets that include only one report per holding period at calendar quarter ends. We choose the first reported filing to ensure that we avoid backfilling bias, especially due to amendments that might contain confidentially treated securities. We identify one filing per holding report date (calendar quarter end date, or rdate variable) from which to extract the holdings. However, in a few instances, institutional investors attempt to fix errors and correct their holding reports a few days after the original filings were submitted with the SEC20. Therefore, for each reporting period, we extract the most updated filing within one month of the original filing date.

2. Then, we aggregate holding information at the CIK registrant level, because we want to capture ownership at the parent level. In the case of BlackRock, which has seven reporting entities, we aggregate holdings across all seven reporting entities as described in the next section.

3. After that, we use shares outstanding from CRSP to winsorize extreme holding information that we suspect is due to reporting errors or to erroneous CUSIP information. Whenever any holding by a single SIC registrant exceeds 50% of shares outstanding, we winsorize this observation to 50%.

[20] See for example, Acadian Asset Management (CIK= 0000916542), which filed a corrected filing (https://www.sec.gov/Archives/edgar/data/916542/000114036113030478/0001140361-13-030478-index.htm) on August 6, 2013, one day after the original filing was reported to the SEC (https://www.sec.gov/Archives/edgar/data/916542/000114036113030262/0001140361-13-030262-index.htm). The original filing has substantial double-counting errors that overstated Acadian's holdings in every security by a factor of 2-to-1.

4. Finally, we use historical holdings to map each CIK entity to its corresponding Thomson-Reuters' mgrno. If a CIK entity in the SEC data has the same number of securities that are matched to a mgrno for an institutional entity in Thomson-Reuters, and has the identical shares held in 10 or more holdings, or more than 80% of the holdings, then we consider them as a match. We additionally flag this match using the spelling distance between names of both entities in SEC filings and the Thomson-Reuters database.[21] The link table is provided on the WRDS server as WRDS_13FLink dataset. When linking the SEC data to Thomson's mgrno, we find that many newly filing SEC 13F entities do not have a corresponding entity in Thomson, which is one of the data quality problems in the Thomson-Reuters database. We assign new mgrnos for those entities using the negative number portion of the CIK. We then insert the linked post-June 2013 holdings data[22] sourced from SEC filings into the Thomson-Reuters ownership data prior to June 2013 using the holdings report date variable (rdate). This dataset is then used to derive consistent measures of institutional trades over time. All trades and holdings datasets are constructed based on this cleaned dataset.

C1. Blackrock Inc. Company Aggregation

In 13F filings, BlackRock discloses the holdings of its various subsidiaries in seven different CIK reporting entities or registrants, reflecting various affiliated entities and financial management arms in several geographic areas. The Thomson-Reuters database merges these seven CIKs into the following mgrno identifiers: 9385, 11386, 39539, 56790, 91430, and 12588. We manually verified that all BlackRock entities, as well as the top 10 13F institutional investors do not have stale data in the Thomson-Reuters 13F ownership database.[23] When reporting its beneficial

[21] We were able to match 3,224 out of the 3,271 mgrnos in Thomson with holdings data in June 2013 to a valid CIK (98.6%). We also made sure to manually verify that the remaining 47 institutions are in the SEC 13F sample.

[22] Thomson-Reuters carries forward the data from one quarter to another, causing stale holdings data to be populated for multiple quarters. One can easily detect carry-forward practices in Thomson by comparing the vintage date, fdate, with the holdings report, rdate, in the s34type1 dataset in the Thomson-Reuters database. Carry-forward quarters occur when multiple fdate reports are sourced and "carried forward" from the same holding period (rdate). We notice that several top institutions in our sample have stale data in sporadic quarters prior to June 2013 in our sample (for example, Blackrock Inc. in March 2010). To avoid problems arising from stale data, we download, parse, and merge the SEC's 13F-sourced data for those institutions during the quarters when their data are stale in Thomson.

[23] Whenever we notice that Thomson carried forward previous quarter holdings for a top institution, we manually downloaded and parsed the holdings from the 13F report source on SEC's EDGAR.

ownership positions (13G and 13D filings[24]), BlackRock's parent company reports the ownership of all its seven 13F entities into one report reflecting the aggregate holding at the parent institution level. In a similar fashion, we aggregate the holdings by these separate BlackRock entities to reflect the overall ownership by any affiliated BlackRock entity in our paper.

If we take the reporting quarter of December 2014 for example, BlackRock has its seven distinct 13F registrants, i.e., separate filing entities, with each reporting separate 13F holdings for a total of more than $1,488 billion worth of U.S. assets.[25] Only the long portion of the equity assets traded on U.S. exchanges are reported on 13Fs. The filings also show 38 different sub-advisors reporting within the seven BlackRock entities. See Table A.2 for the complete list of BlackRock subsidiaries.

According to BlackRock 13G and 13D filings, the beneficial reporting owner in all BlackRock holdings is the parent entity of all 38 BlackRock subsidiaries reporting under the seven BlackRock 13F reporting registrants. Because of the requirements of the 13G filing, all affiliated subsidiaries with shared economic and voting interest should submit a single holdings report for each security in which they maintain beneficial ownership of 5% or more. Comparing the holdings of BlackRock in 13G filings to 13F filings can be done only after aggregating across all seven 13F BlackRock entities. For example, Table A.3 illustrates the holdings of Coca Cola Co., Apple Inc., and other Dow 30 companies by each of the seven BlackRock registrants that have 13F filings in December 2014. Each advisor's holdings are reported on a separate record with its respective CIK,

[24] 13G filings require entities that acquire ownership in a public company of more than 5% but less than 10% of the outstanding stock to file a report with their beneficial ownership within 45 days after the end of the calendar year in which the Exchange Act registration becomes effective. If the security holder holds more than 10%, then the holder must file within 10 business days once the threshold is met.

[25] Anderson and Brockman (2016) present recent evidence showing the lack of reliability of Form 13F filings, and they document the widespread presence of significant reporting errors, even among a select group of high-profile bank holding companies. The authors conclude that "widespread reliance on 13F filings for institutional ownership figures is unwarranted." In our attempt to investigate this claim, we focus on their Table 10, which is instrumental in showing the inaccuracy in the 13F data. The authors compare institutional holdings of Dow 30 firms based on institutions' 13F filings as of December 2014, mainly for Blackrock and State Street, versus the underlying firms' DEF14A filings (i.e., annual proxy statements), and conclude that "any reliance on 13F-reported figures is fraught with problems." Unfortunately, the authors' analysis reflects weak understanding of the nature of the 13F filings and DEF14A schedule. The authors should aggregate the ownership of various Blackrock 13F entities before comparing them to DEF14A schedule positions, which are typically based on 13G or 13D filings reported at the beginning of the calendar year preceding the mailing date of proxy statements to shareholder.

and then the total ownership of all BlackRock entities is reported along with the beneficial ownership reported at the parent company level in proxy statements (DEF 14A filings) as well as the 13G or 13D reports. As the table illustrates, the reported holdings by the BlackRock parent company are approximately equal to, if not exactly the same as, the sum of the positions in each stock reported by BlackRock-affiliated subsidiaries on their respective 13F filings. Therefore, in order to reconstruct the ownership at the BlackRock parent entity level, one needs to sum up for each stock the ownership positions reported under all seven 13F registrants.

C2. Comparing the SEC 13F Sample to Other 13F Databases

We compared the SEC 13F sample with more accurate feeds of institutional ownership, namely the Thomson-Reuters Global Ownership feed (also called the OP feed), which is a separate feed from the legacy Thomson Institutional Ownership feed (Spectrum or SP feed) provided through WRDS. We find that while the SP feed understates overall institutional ownership due to the aforementioned data quality problems, the Thomson-Reuters OP feed is more in-sync with the original 13F filings reported on the SEC website. We decide to use the SEC filings instead of the Thomson-Reuters OP for two reasons.

First, the holdings data in the Thomson-Reuters Global Ownership database (OP) is retroactively "refreshed" in every update to reflect entities and holdings information as of the date of the data refresh. Therefore, the database is not as historical as the true SEC filings. This problem is more pronounced for entities that change due to mergers and acquisitions, etc. We do not know the full extent of this bias, however, because we did not compare vintages across time.

Additionally, the Thomson-Reuters Global Ownership database (OP) makes many assumptions that are not transparent in disaggregating the holdings from the CIK registrant level to entities at the subadvisor level. For example, using the BlackRock example, the legacy Thomson SP feed aggregates the seven BlackRock CIK filing entities, as discussed earlier, into three mgrnos. The newer Thomson OP feed, on the other hand, disaggregates them into their subadvisor entities, and makes several assumptions in splitting individual holdings between those mutually exclusive subentities. Thomson does not currently provide historical mappings between the subadvisor and

the parent entities. For this reason, we believe that the original SEC 13F filings are more reliable for the purposes of our study.

Table C.1. Blackrock Registrants as of December 2014

According to the SEC, the following are the seven distinct BlackRock registrants with available holdings reports on the quarter ending in December 2014.

1. BlackRock Institutional Trust
    a. CIK: 0000913414
    b. Address: San Francisco, CA
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/913414/0001086364-15-002005-index.htm
    d. Other Included Managers: None
    e. AUM: $626 Billion
2. BlackRock Group LTD
    a. CIK: 0001003283
    b. Address: London, UK
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/1003283/0001086364-15-002004-index.htm
    d. Other Included Managers: 15 sub-advisors included in the 13F, https://www.sec.gov/Archives/edgar/data/1003283/000108636415002004/xslForm13F_X01/primary_doc.xml (bottom of page)
    e. AUM: $187 Billion
3. BlackRock Fund Advisors
    a. CIK: 0001006249
    b. Address: San Francisco, CA
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/1006249/0001086364-15-002003-index.htm
    d. Other Included Managers: None
    e. AUM: $404.6 Billion
4. BlackRock Japan Co. Ltd
    a. CIK: 0001085635
    b. Address: Tokyo, Japan
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/1085635/0001086364-15-002006-index.htm
    d. Other Included Managers: None
    e. AUM: $26 billion

Table C.1. BlackRock Registrants as of December 2014 (Cont.)

5. BLACKROCK ADVISORS LLC
    a. CIK: 0001086364
    b. Address: Wilmington, DE
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/1086364/0001086364-15-002000-index.htm
    d. Other Included Managers: Just one more advisor is included, "BlackRock Capital Management, Inc."
    e. AUM: $99 billion
6. BlackRock Investment Management, LLC
    a. CIK: 0001305227
    b. Address: Princeton, NJ
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/1305227/0001086364-15-002001-index.htm
    d. Other Included Managers: None
    e. AUM: $75.5 billion
7. BlackRock Inc.
    a. CIK: 0001364742
    b. Address: New York, NY
    c. Dec 2014 Filing: https://www.sec.gov/Archives/edgar/data/1364742/0001086364-15-002009-index.htm
    d. Other Included Managers: 15 other distinct sub-advisors are included in this 13F filing https://www.sec.gov/Archives/edgar/data/1364742/000108636415002009/xslForm13F_X01/primary_doc.xml (bottom of page)
    e. AUM: $70 billion

Table C.2: Complete List of BlackRock Subsidiaries Reporting Under the Seven 13F Registrants as of December 2014

	Blackrock Registrant (Reporting) Entity	Reporting Entity CIK	Other Included Managers		Other Blackrock Subsidiaries Reporting under Registrant	Number of Holdings	Holdings Total Value ($1000)
1	BlackRock Institutional Trust Company, N.A.	0000913414	0			3,922	$626,027,770
2	BlackRock Group LTD	0001003283	15	1	BlackRock Fund Managers Limited	12,443	$186,818,691
				2	BlackRock Investment Management (UK) Limited		
				3	BlackRock Pensions Limited		
				4	BlackRock (Netherlands) B.V.		
				5	BlackRock International Limited		
				6	BlackRock Asset Management Ireland Limited		
				7	BlackRock Advisors (UK) Limited		
				8	BlackRock Asset Management Deutschland AG		
				9	BlackRock Asset Management Pensions Limited		
				10	BlackRock (Luxembourg) S.A.		
				11	IShares (DE) I InvAG Mit Teilgesellschaftsvermogen		
				12	BlackRock Life Limited		
				13	BlackRock Fund Management Company S.A.		
				14	BlackRock Private Equity Partners AG		
				15	BlackRock Investment Management (Korea) Ltd.		
3	BlackRock Fund Advisors	0001006249	0			3,767	$404,623,550
4	BlackRock Japan Co. Ltd	0001085635	0			1,326	$26,137,286
5	Blackrock Advisors LLC	0001086364	1	1	BlackRock Capital Management, Inc.	4,328	$99,336,078
6	BlackRock Investment Management, LLC	0001305227	0			4,136	$75,499,302
7	BlackRock Inc.	0001364742	15	1	BlackRock Financial Management, Inc.	7,296	$69,935,124
				2	BlackRock Investment Management (Taiwan) Limited		
				3	BlackRock Investment Management (Australia) Limited		
				4	BlackRock (Channel Islands) Limited		
				5	BlackRock Asset Management Australia Limited		
				6	BlackRock Asset Management Canada Limited		
				7	BlackRock (Isle of Man) Limited		
				8	BlackRock Fund Managers (Isle of Man) Limited		
				9	BlackRock Investments Canada, Inc.		
				10	BlackRock Asset Management International Inc.		
				11	BlackRock Hong Kong Ltd		
				12	BlackRock (Singapore) Limited		
				13	Blackrock Realty Advisors, Inc.		
				14	BlackRock Asset Management North Asia Ltd		
				15	BlackRock Brasil Gestora de Investimentos Ltd		
		31+7=38 Total Entities				Total AUM	$1,488,377,801

Table C.3: Comparison of BlackRock 13F Holdings and Beneficial Ownership Reports (DEF 14A)

Many of the various BlackRock beneficial ownership filings are reported under CIK 0001364742, such as the beneficial ownership in Apple Inc. reported in the 13G/A filed on February 2, 2015: https://www.sec.gov/Archives/edgar/data/320193/0001086364-15-001457-index.htm

Selected DOW 30 Holdings by Blackrock 13F Entities					DEF 14A	13G or 13D
Blackrock 13F Entity CIK	Company Name Header	Ticker	Shares	Sum	*Total Blackrock's Beneficial Ownership*	*Total Blackrock's Beneficial Ownership*
0000913414	COCA COLA CO	KO	103,282,137			
0001003283	COCA COLA CO	KO	34,217,107			
0001006249	COCA COLA CO	KO	50,884,796			
0001085635	COCA COLA CO	KO	4,734,543			
0001086364	COCA COLA CO	KO	11,640,414			
0001305227	COCA COLA CO	KO	10,343,319			
0001364742	COCA COLA CO	KO	10,820,928	**225,923,244**	*236,175,490*	*236,175,490*
0000913414	INTERNATIONAL BUS	IBM	24,239,164			
0001003283	INTERNATIONAL BUS	IBM	7,499,285			
0001006249	INTERNATIONAL BUS	IBM	11,479,988			
0001085635	INTERNATIONAL BUS	IBM	1,139,231			
0001086364	INTERNATIONAL BUS	IBM	2,215,934			
0001305227	INTERNATIONAL BUS	IBM	2,374,827			
0001364742	INTERNATIONAL BUS	IBM	2,282,649	**51,231,078**	*53,231,078*	*53,231,078*
0000913414	CHEVRON CORP NEW	CVX	49,929,564			
0001003283	CHEVRON CORP NEW	CVX	17,900,762			
0001006249	CHEVRON CORP NEW	CVX	28,619,521			
0001085635	CHEVRON CORP NEW	CVX	2,582,909			
0001086364	CHEVRON CORP NEW	CVX	8,783,493			
0001305227	CHEVRON CORP NEW	CVX	5,602,483			
0001364742	CHEVRON CORP NEW	CVX	5,335,652	**118,754,384**	*118,754,384*	*118,754,384*
0000913414	APPLE INC	AAPL	154,653,443			
0001003283	APPLE INC	AAPL	46,032,985			
0001006249	APPLE INC	AAPL	72,534,355			
0001085635	APPLE INC	AAPL	7,475,488			
0001086364	APPLE INC	AAPL	5,287,045			
0001305227	APPLE INC	AAPL	14,712,569			
0001364742	APPLE INC	AAPL	15,236,776	**315,932,661**	*317,321,796*	*315,936,494*
0000913414	MCDONALDS CORP	MCD	26,184,328			
0001003283	MCDONALDS CORP	MCD	9,931,224			
0001006249	MCDONALDS CORP	MCD	15,688,850			
0001085635	MCDONALDS CORP	MCD	1,176,091			
0001086364	MCDONALDS CORP	MCD	7,067,676			
0001305227	MCDONALDS CORP	MCD	3,956,257			
0001364742	MCDONALDS CORP	MCD	3,168,689	**67,173,115**	*67,173,115*	*67,173,115*
0000913414	GOLDMAN SACHS	GS	11,208,242			
0001003283	GOLDMAN SACHS	GS	3,406,643			
0001006249	GOLDMAN SACHS	GS	4,790,266			
0001085635	GOLDMAN SACHS	GS	482,362			
0001086364	GOLDMAN SACHS	GS	1,937,495			
0001305227	GOLDMAN SACHS	GS	1,458,803			
0001364742	GOLDMAN SACHS	GS	1,037,903	**24,321,714**	*25,071,873*	*25,071,873*

The Granular Nature of Large Institutional Investors

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Internet Appendix

In this Internet Appendix, we expand the analysis of the paper along several directions:

(1) The first section provides a simple theoretical framework to support the empirical analysis.
(2) Table IA.1 studies the relation between volatility and ownership at various frequencies.
(3) Table IA.2 studies institutional ownership and return asymmetries, focusing on skewness.
(4) Table IA.3 differentiates between active and passive top institutional owners, and studies their relation to daily volatility.
(5) Table IA.4 studies the relation between daily volatility and ownership separating quarters of good, bad, and neutral earnings announcements.
(6) Table IA.5 splits the sample and studies the effects top institutional owners on stock volatility for crisis and non-crisis periods.
(7) Table IA.6 replaces the control variable *Ownership by all institutions* by *Alternative ownership by all institutions*, which excludes the relevant top institutions from the total of institutional ownership.
(8) Table IA.7 studies the effects top institutional owners on stock volatility for the sample of S&P 500 stocks.
(9) Table IA.8 provides the entire set of regressions coefficients for the merger analysis that is presented in a brief form in the main study.
(10) Table IA.9 provides the results of a 2SLS model in which we instrument for ownership using a local bias variable.

Theoretical Framework

To give structure to our empirical analysis, we develop a simple theoretical framework. We emphasize that this framework consists of a set of reduced-form equations that are meant to provide guidance for the empirical analysis. Our intention is not to develop a full-fledged theory.

We draw inspiration from Greenwood and Thesmar (2011), but we differ from their work in highlighting the effect of large institutional ownership as a distinct channel for price fragility. The structure of the theoretical framework is similar to that of Landier, Sraer, and Thesmar (2017), which is, however, a theory studying the concentration in the bank lending market and therefore does not overlap with our focus.

We start by assuming that the dollar demand of a stock that a manager submits to the market depends positively on the dollar size of the manager's portfolio. This reduced-form equation can be the outcome of an optimization procedure whose inputs are publicly observable signals and idiosyncratic institutional shocks, such as unexpected redemptions by the institution's clients. Formally, the market demand for stock *i* by manager *k* at time *t* is a function of the manager's investment in the stock in the prior period (A_{ikt-1}):

$$\Delta A_{ikt} = a_t A_{ikt-1} + \eta_{kt} w_{ikt-1} f(A_{ikt-1}), \quad (1)$$

where a_t is a component common to all managers (e.g., driven by aggregate market news), with variance σ_a^2, and η_{kt} is an idiosyncratic component (e.g., driven by the institution's flows), with variance σ_η^2. The two components are uncorrelated. Also, η_{kt} is uncorrelated across managers. w_{ikt-1} is the weight of the stock in the institution's portfolio. Intuitively, if the manager does not hold the stock, idiosyncratic shocks, such as unexpected redemptions, do not affect the demand for the stock.

The function $f \geq 0$ is such that $f(0) = 0$, and $f'(0) = 1$. That is, when institutions experience an idiosyncratic shock, their dollar demand for a given stock is a positive function of their prior holdings in the stock. Intuitively, when they experience unexpected flows, institutions scale up and down their portfolios as a function of their existing holdings. Two situations are interesting. If f is linear, i.e., $f'' = 0$, idiosyncratic shocks scale proportionally to the size of the institution's assets under management. This occurs if institutions are not able to net their trading

needs internally across the different units within the firm. This scenario is an extreme case of granularity (Gabaix 2011). In this case, shocks to the different units within a large institution are more correlated than shocks occurring to independent firms and are not easily diversifiable. Instead, if $f'' < 0$, idiosyncratic shocks scale less than proportionally to the size of the institution's assets under management. At the limit, as $f' \approx 0$, a large institution is closer to a collection of many independent firms that are exposed to shocks that can be fully diversified.

Based on the empirical evidence in Gaspar, Massa, and Matos (2006) and Bhattacharya, Lee, and Pool (2013), one can infer that large institutions make efforts to smooth shocks internally. On the other hand, the empirical evidence in Sections 3.1-3.2 of this paper on correlated flows and investment strategies suggests that different entities within a large firm are exposed to correlated shocks. Hence, one can reasonably conclude that, while the size of the shock may not grow linearly with the size of the institution, the reality is far from a situation in which shocks are fully diversified internally. Furthermore, Section 3.3 of the paper shows that large institutions trade in bigger amounts than a collection of small investors, suggesting that internal diversification, even if takes place, does not undo the effect of correlated shocks stemming from a large firm.

As in Greenwood and Thesmar (2011), we assume a reduced-form equation for the price impact of trading. This equation can be obtained in models with asymmetric information (e.g. Kyle 1985) or risk averse market makers (e.g., Grossman and Miller 1988). Specifically,

$$R_{it} = \mu \sum_{k \epsilon K} \frac{\Delta A_{ikt}}{m_{it-1}} + e_{it} \,, \tag{2}$$

where m_{it-1} is the market capitalization of the stock at time $t-1$. e_{it} can be thought of as a fundamental shock to stock prices, with a variance-covariance matrix across stocks given by $\Sigma_e = \sigma_e^2(\rho J + (1-\rho)I)$, where J is a square matrix of ones and I is the identity matrix, and both matrices have size equal to the number K of managers in the market. For simplicity, we assume the price impact parameter μ is the same across stocks. Without this assumption, the next derivations would be more cumbersome, but the main intuition would remain unaltered. Empirical support for equation (2) comes, for example, from Campbell, Ramadorai, and Schwartz (2009).

Combining equations (1) and (2), and assuming the K investors hold all the outstanding shares of stock i, we derive the expression for the variance of stock returns:

$$Var(R_{it}) = \sigma_e^2 + \mu^2\sigma_a^2 + \mu^2\sigma_\eta^2 \sum_{k\epsilon K} \left(\frac{w_{ikt-1} f(A_{ikt-1})}{m_{it-1}} \right)^2 . \quad (3)$$

Hence, the variance of returns has an idiosyncratic fundamental component, a systematic component due to aggregate shocks driving institutional trades, and a third component that depends on the shape of the function f and the structure of ownership. If f is linear, the third term corresponds to the Herfindahl index of the managers' ownership shares in the stock. Intuitively, if the stock ownership is more concentrated, the shocks of individual managers are a bigger fraction of the stock demand and are less easily diversified across managers. Hence, these shocks translate into stronger price pressure and higher variance.

To gain further intuition on equation (3), we divide and multiply $f(A_{kt-1})$ by A_{kt-1}. Then, we can rewrite the stock price variance as

$$Var(R_{it}) = \sigma_e^2 + \mu^2\sigma_a^2 + \mu^2\sigma_\eta^2 \sum_{k\epsilon K} \left[\frac{A_{kt-1}}{M_{t-1}} \cdot \frac{f(A_{kt-1})}{A_{kt-1}} \cdot w_{ikt-1} \right]^2 . \quad (4)$$

The first term in brackets, $\frac{A_{kt-1}}{M_{t-1}}$, captures the size of an institution's equity portfolio relative to the stock market. Because of this term, return volatility depends on the asset management industry concentration. Intuitively, the more concentrated the industry, the greater the difficulty in diversifying idiosyncratic institutional shocks when they reach the market through institutional trades. The second term may attenuate the effect of institutional size. That is, institutions that manage to diversify shocks internally, even if they are very large, do not have a large price impact and, consequently, they have a smaller effect on volatility. Finally, the third term, w_{ikt-1}, modulates the impact of a given manager on return volatility as a function of the manager's holding of that stock. For example, if a stock is not part of an institution's portfolio, that is, $w_{ikt-1} = 0$, that manager does not contribute to return volatility.

As a limit case, consider the situation in which the function f is linear. Further, set w_{ikt-1} to a positive constant for all institutions. In this scenario, the variance depends on the Herfindahl index of the asset management industry. In such a case, when an asset management sector is populated by atomistic managers, each owning a very small portfolio (i.e., $A_{kt-1} \approx 0$ for all managers k), the effect on volatility of institutional shocks disappears. On the other extreme, if

only two institutions are present in the market, the effect of those institutions on return volatility is maximized.[1]

Equation (4), therefore, contains the main testable prediction of the model:

Stock return volatility is positively related to the amount of ownership of large asset managers in that stock.

The empirical evidence in Table 4 supports this prediction.

Next, we discuss the similarities and departures of this model from the theory in Greenwood and Thesmar (2011). As noted above, the present model allows institutions' demand for stocks to depend on total assets under management, whereas in Greenwood and Thesmar (2011), the demand depends exclusively on flows. From this point of view, our model has a broader focus on the role large asset managers play in volatility. Of course, if dollar flows are exactly proportional to the size of the portfolio, the two theories make identical predictions for volatility. On the other hand, to put more emphasis on the role played by the asset managers' size and industry concentration, we do not model the correlation of investor flows and its effect on the institutions' demand for stocks. In particular, we allow for a perfectly correlated component in asset managers' demand, a_t in equation (1), without further specifying its origin. Overall, although related, the two theories emphasize two separate channels for the effect of institutional trading on volatility. These channels are the correlated demands for stocks originating from correlated flows, in Greenwood and Thesmar (2011), and the concentration of the asset management industry, in our model. Therefore, we expect the two theories to find independent support in the data. The results in Table 4, Panel B, confirm this conjecture.

Following similar steps to those that lead to equation (4), we can derive the covariance of returns for two different stocks:

$$Cov(R_{it}, R_{jt}) = \sigma_e^2 \rho + \mu^2 \sigma_a^2 + \mu^2 \sigma_\eta^2 \sum_{k \epsilon K} \left[\left(\frac{A_{kt-1}}{M_{t-1}} \right)^2 \cdot \frac{f(A_{kt-1})}{A_{kt-1}} \cdot w_{ikt-1} \cdot w_{jkt-1} \right]. \quad (5)$$

[1] In fact, the effect on variance would be maximized with only one institution owning the entire market. This is not a realistic scenario because in this case the institution would not find a trading counterparty and there would be no foundation for equation (2), which assumes that price concessions derive from trading activity.

From Equation (5), we note that a large asset manager's ownership of two separate stocks increases the non-fundamental covariance of their returns. Therefore, we can formulate the second testable prediction of the model:

The covariance of returns of two stocks is positively related to the amount of ownership by large asset managers.

The literature has shown convincingly that common institutional ownership modifies the correlation structure of returns (Greenwood and Thesmar 2011, Anton and Polk 2014). Our framework suggests that this effect can be generated by a single large investor and that the magnitude is increasing in the size of the institution and the concentration of the asset management sector. The empirical evidence in Table 7 supports this prediction.

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Table IA.1. Additional Dimensions of Return Distribution

The table explores the effects of ownership by the largest institutional investors on volatility calculated at different frequencies and on skewness. In this table, the dependent variables are additional dimensions of the stock return distribution. All measures are computed from daily returns during quarter *q*. All independent variables are measured during quarter *q*-1. All panels use the *Top inst. ownership* of the largest institutional investors in a given stock as the key independent variable. Panel A uses weekly volatility (Columns (1)–(4)) and monthly volatility (Columns (5)–(8)). Panel B uses a quarterly range. The sample period is 1980/Q1–2015/Q4. This table presents ordinary least squares regression results. All regressions include stock and calendar quarter fixed effects, and t-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Volatility Calculated at Different Frequencies

Dependent variable:	Weekly Volatility				Monthly Volatility			
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 3	Top 5	Top 7	Top 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top inst. ownership (q-1)	1.104**	1.243***	1.414***	1.100***	2.536***	2.201***	2.516***	2.419***
	(2.29)	(3.07)	(4.10)	(3.83)	(2.86)	(2.93)	(4.13)	(4.53)
Ownership by all institutions (q-1)	0.327***	0.279**	0.225*	0.232*	-1.596***	-1.629***	-1.728***	-1.795***
	(2.71)	(2.27)	(1.91)	(1.90)	(-6.31)	(-6.34)	(-6.92)	(-6.87)
1 / price (q-1)	1.289***	1.288***	1.287***	1.288***	2.320***	2.319***	2.317***	2.317***
	(13.29)	(13.29)	(13.27)	(13.29)	(14.14)	(14.14)	(14.12)	(14.13)
Amihud illiquidity (q-1)	1.316***	1.313***	1.311***	1.311***	0.018	0.014	0.010	0.008
	(14.20)	(14.15)	(14.12)	(14.14)	(0.09)	(0.07)	(0.05)	(0.04)
log(market cap) (q-1)	-0.658***	-0.662***	-0.666***	-0.665***	-1.130***	-1.135***	-1.142***	-1.145***
	(-10.34)	(-10.37)	(-10.39)	(-10.50)	(-8.63)	(-8.62)	(-8.66)	(-8.76)
Past 6-month return (q-3 to q-1)	-0.080	-0.078	-0.077	-0.076	1.678***	1.680***	1.683***	1.686***
	(-0.27)	(-0.27)	(-0.26)	(-0.26)	(4.56)	(4.57)	(4.58)	(4.59)
Book-to-market (q-1)	0.129*	0.128*	0.128*	0.129*	0.822***	0.821***	0.821***	0.822***
	(1.83)	(1.82)	(1.82)	(1.82)	(4.02)	(4.01)	(4.01)	(4.01)
Ownership by bottom institutions (q-1)	-2.761***	-2.667***	-2.586***	-2.608***	-2.786***	-2.703***	-2.556***	-2.465***
	(-6.11)	(-5.97)	(-5.77)	(-5.97)	(-3.10)	(-3.00)	(-2.83)	(-2.75)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	650,712	650,712	650,712	650,712	650,286	650,286	650,286	650,286
R^2	0.544	0.544	0.544	0.544	0.617	0.617	0.617	0.617

Table IA.1. Additional Dimensions of Return Distribution (Cont.)

Panel B: Quarterly Range

Dependent variable:	Quarterly Range			
Institutions:	Top 3	Top 5	Top 7	Top 10
	(1)	(2)	(3)	(4)
Top inst. ownership (q-1)	1.065	2.104	4.339**	3.457**
	(0.42)	(1.00)	(2.55)	(2.34)
Ownership by all institutions (q-1)	0.935	0.784	0.419	0.427
	(1.32)	(1.07)	(0.60)	(0.58)
1 / price (q-1)	6.725***	6.724***	6.719***	6.720***
	(15.97)	(15.96)	(15.95)	(15.96)
Amihud illiquidity (q-1)	3.166***	3.161***	3.150***	3.149***
	(11.33)	(11.30)	(11.27)	(11.27)
log(market cap) (q-1)	-3.526***	-3.537***	-3.560***	-3.558***
	(-10.90)	(-10.90)	(-10.95)	(-11.07)
Past 6-month return (q-3 to q-1)	-0.714	-0.710	-0.701	-0.699
	(-0.65)	(-0.64)	(-0.63)	(-0.63)
Book-to-market (q-1)	0.656*	0.654*	0.652*	0.654*
	(1.79)	(1.79)	(1.78)	(1.78)
Ownership by bottom institutions (q-1)	-15.296***	-15.022***	-14.426***	-14.471***
	(-7.03)	(-7.01)	(-6.63)	(-6.65)
Stock FE	Yes	Yes	Yes	Yes
Calendar quarter	Yes	Yes	Yes	Yes
Observations	650,236	650,236	650,236	650,236
R^2	0.554	0.554	0.554	0.554

Table IA.2. Large Institutional Ownership and Return Asymmetries

The table explores the relationship between ownership by the largest institutional investors and asymmetric return behavior. *Top inst. ownership* of the largest institutional investors in a given stock is the key explanatory variable. Non-parametric skewness and the absolute value of Non-parametric skewness computed during the quarter from daily returns are dependent variables. All independent variables are measured during quarter *q*-1. The sample period is 1980/Q1–2015/Q4. All regressions include stock and time fixed effects, and *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Non-Parametric Daily Skewness				Abs(Non-Parametric Daily Skewness)			
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 3	Top 5	Top 7	Top 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top inst. ownership (q-1)	-0.949***	-0.855***	-0.782***	-0.745***	0.627***	0.573***	0.511***	0.391***
	(-5.492)	(-6.084)	(-6.154)	(-6.155)	(5.698)	(6.382)	(5.773)	(4.908)
Ownership by all institutions (q-1)	0.0342	0.0500	0.0609	0.0806**	-0.0338	-0.0453*	-0.0507*	-0.0468*
	(0.928)	(1.324)	(1.541)	(2.040)	(-1.360)	(-1.794)	(-1.942)	(-1.713)
1 / price (q-1)	-0.0761***	-0.0755***	-0.0750***	-0.0753***	0.0837***	0.0833***	0.0829***	0.0830***
	(-2.943)	(-2.924)	(-2.908)	(-2.920)	(3.484)	(3.472)	(3.463)	(3.468)
Amihud illiquidity (q-1)	0.0245	0.0263	0.0272	0.0281	0.0352**	0.0339*	0.0334*	0.0336*
	(0.892)	(0.957)	(0.987)	(1.022)	(2.059)	(1.976)	(1.946)	(1.949)
log(market cap) (q-1)	-0.0285**	-0.0262**	-0.0254*	-0.0245*	-0.0562***	-0.0578***	-0.0582***	-0.0577***
	(-2.218)	(-2.017)	(-1.956)	(-1.873)	(-7.016)	(-7.134)	(-7.148)	(-7.115)
Past 6-month return (q-3 to q-1)	0.136***	0.135***	0.134***	0.133***	0.00666	0.00722	0.00750	0.00773
	(7.204)	(7.188)	(7.160)	(7.151)	(0.708)	(0.768)	(0.798)	(0.822)
Book-to-market (q-1)	0.0312**	0.0315**	0.0311**	0.0309**	-0.0112	-0.0114	-0.0111	-0.0109
	(2.438)	(2.460)	(2.430)	(2.412)	(-1.601)	(-1.630)	(-1.592)	(-1.558)
Ownership by bottom institutions (q-1)	0.766***	0.729***	0.718***	0.692***	0.0962	0.123	0.126	0.116
	(5.775)	(5.615)	(5.499)	(5.314)	(1.084)	(1.372)	(1.420)	(1.299)
Non-Parametric Quarterly Skewness (q-	0.000587	0.000550	0.000534	0.000509	0.0610***	0.0610***	0.0610***	0.0610***
	(0.157)	(0.147)	(0.143)	(0.136)	(11.09)	(11.09)	(11.10)	(11.10)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	620,370	620,370	620,370	620,370	620,370	620,370	620,370	620,370
R^2	0.111	0.111	0.111	0.111	0.126	0.126	0.126	0.126

Table IA.3. Active and Passive Investment

This table splits institutional ownership into passive and active ownership. This table presents ordinary least squares regression results. The dependent variable is the stock's *Daily volatility*. *Daily volatility* is computed from daily returns during quarter q. All independent variables are measured during quarter q-1. The key independent variable is the *Top inst. ownership* of the largest institutional investors in a given stock. In this table, we split the sample by active and passive ownership by the institutional investor. We standardize the measures of active and passive ownership at the stock-quarter level. All regressions include stock and calendar quarter fixed effects, and t-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. The sample period is 1980/Q1–2015/Q4.

Dependent variable:	Daily volatility (q)			
Institutions:	Top 3	Top 5	Top 7	Top 10
	(1)	(2)	(3)	(4)
Top inst. active ownership (q-1)	0.024***	0.019***	0.022***	0.027***
	(4.33)	(3.56)	(4.02)	(5.45)
Top inst. passive ownership (q-1)	0.018**	0.027***	0.027***	0.026***
	(2.40)	(3.66)	(3.78)	(3.97)
Ownership by all institutions (q-1)	0.035***	0.025***	0.022***	0.016***
	(4.44)	(3.76)	(3.57)	(2.78)
1 / price (q-1)	1.130***	1.266***	1.295***	1.321***
	(10.62)	(10.99)	(11.17)	(11.31)
Amihud illiquidity (q-1)	0.966***	1.001***	1.016***	1.009***
	(23.01)	(25.98)	(26.86)	(27.08)
log(market cap) (q-1)	-0.279***	-0.264***	-0.259***	-0.250***
	(-7.37)	(-7.94)	(-8.29)	(-8.30)
Past 6-month return (q-3 to q-1)	-0.046	-0.063	-0.063	-0.065
	(-0.35)	(-0.49)	(-0.50)	(-0.53)
Book-to-market (q-1)	0.061*	0.053*	0.046	0.038
	(1.92)	(1.82)	(1.61)	(1.35)
Ownership by bottom institutions (q-1)	-2.086***	-1.925***	-1.863***	-1.798***
	(-9.75)	(-9.32)	(-9.19)	(-8.90)
Stock FE	Yes	Yes	Yes	Yes
Calendar Quarter FE	Yes	Yes	Yes	Yes
Observations	448,989	511,910	545,602	567,809
R^2	0.668	0.668	0.668	0.669

Table IA.4. Institutional Ownership in Good, Bad, and Neutral News Environments

The table splits the sample into quarters in which there is good news, bad news, and neutral news. This table presents ordinary least squares regression results. The dependent variable is the stock's *Daily volatility*. *Daily volatility* is computed from daily returns during quarter q. All independent variables are measured during quarter q-1. Panel A uses the *Top inst. ownership* of the largest institutional investors in a given stock as the key independent variable. In this table, we split the sample by good news, bad news, and neutral news quarters, using the previous year's earnings per share (EPS) as a benchmark. All regressions include stock and calendar quarter fixed effects, and *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. The sample period is 1980/Q1–2015/Q4.

Panel A: Quarters with Good News, Defined as SUE (EPS Relative to Previous Year EPS)

Dependent variable:	Daily Volatility (q)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst. ownership (q-1)	0.475**	0.503***	0.617***	0.525***	0.837***	0.519***	0.089
	(2.31)	(3.10)	(4.25)	(3.84)	(4.49)	(3.27)	(0.58)
Ownership by all institutions (q-1)	0.105**	0.089*	0.061	0.056	0.069	0.116**	0.139**
	(1.98)	(1.66)	(1.19)	(1.06)	(1.16)	(2.07)	(2.37)
1 / price (q-1)	0.636***	0.636***	0.636***	0.636***	0.636***	0.636***	0.636***
	(9.79)	(9.79)	(9.78)	(9.78)	(9.79)	(9.79)	(9.79)
Amihud illiquidity (q-1)	1.515***	1.514***	1.513***	1.513***	1.514***	1.516***	1.516***
	(25.80)	(25.76)	(25.75)	(25.71)	(25.78)	(25.79)	(25.81)
log(market cap) (q-1)	-0.240***	-0.242***	-0.244***	-0.244***	-0.240***	-0.238***	-0.238***
	(-9.21)	(-9.29)	(-9.31)	(-9.42)	(-9.42)	(-9.29)	(-9.29)
Past 6-month return (q-3 to q-1)	-0.005	-0.004	-0.003	-0.003	-0.003	-0.005	-0.005
	(-0.05)	(-0.04)	(-0.03)	(-0.03)	(-0.03)	(-0.05)	(-0.05)
Book-to-market (q-1)	-0.058**	-0.058**	-0.058**	-0.058**	-0.057**	-0.058**	-0.057**
	(-2.10)	(-2.10)	(-2.10)	(-2.09)	(-2.05)	(-2.09)	(-2.07)
Ownership by bottom institutions (q-1)	-1.534***	-1.499***	-1.454***	-1.451***	-1.505***	-1.575***	-1.596***
	(-7.03)	(-7.00)	(-6.73)	(-6.81)	(-7.25)	(-7.39)	(-7.45)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	421,329	421,329	421,329	421,329	421,329	421,329	421,329
R^2	0.686	0.686	0.686	0.686	0.686	0.686	0.686

Table IA.4. Institutional Ownership in Good, Bad, and Neutral News Environments (Cont.)

Panel B: Quarters with Bad News, Defined as SUE (EPS Relative to Previous Year EPS)

Dependent variable:	Daily Volatility (q)						
	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst. ownership (q-1)	1.490***	1.413***	1.353***	1.192***	1.400***	0.239	-0.317
	(4.54)	(5.08)	(6.19)	(6.88)	(6.22)	(1.12)	(-1.32)
Ownership by all institutions (q-1)	0.214***	0.178**	0.152*	0.134*	0.214**	0.334***	0.370***
	(2.72)	(2.19)	(1.94)	(1.69)	(2.58)	(4.15)	(4.29)
1 / price (q-1)	0.760***	0.759***	0.758***	0.759***	0.759***	0.760***	0.760***
	(10.59)	(10.58)	(10.57)	(10.58)	(10.60)	(10.60)	(10.61)
Amihud illiquidity (q-1)	1.360***	1.358***	1.356***	1.356***	1.359***	1.361***	1.361***
	(19.67)	(19.60)	(19.57)	(19.57)	(19.57)	(19.61)	(19.61)
log(market cap) (q-1)	-0.354***	-0.358***	-0.359***	-0.360***	-0.351***	-0.348***	-0.348***
	(-11.03)	(-11.04)	(-11.10)	(-11.28)	(-11.19)	(-11.07)	(-11.06)
Past 6-month return (q-3 to q-1)	-0.264*	-0.262*	-0.261*	-0.260*	-0.262*	-0.265*	-0.266*
	(-1.69)	(-1.68)	(-1.68)	(-1.67)	(-1.68)	(-1.70)	(-1.70)
Book-to-market (q-1)	0.044	0.044	0.044	0.045	0.046	0.045	0.046
	(1.59)	(1.57)	(1.58)	(1.59)	(1.63)	(1.61)	(1.62)
Ownership by bottom institutions (q-1)	-1.459***	-1.392***	-1.362***	-1.344***	-1.506***	-1.652***	-1.686***
	(-5.50)	(-5.30)	(-5.16)	(-5.09)	(-5.63)	(-6.09)	(-6.22)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	209,773	209,773	209,773	209,773	209,773	209,773	209,773
R^2	0.684	0.684	0.684	0.684	0.684	0.684	0.684

Table IA.4. Institutional Ownership in Good, Bad, and Neutral News Environments (Cont.)

Panel C: Quarters with Neutral News, Defined as SUE (EPS Relative to Previous Year EPS)

Dependent variable:	Daily Volatility (q)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst. ownership (q-1)	1.548**	1.369**	1.821***	1.486***	-0.102	1.145	-0.597
	(2.15)	(2.24)	(3.14)	(2.96)	(-0.14)	(1.57)	(-0.75)
Ownership by all institutions (q-1)	0.380*	0.350	0.250	0.255	0.537**	0.469**	0.563***
	(1.74)	(1.56)	(1.11)	(1.13)	(2.58)	(2.27)	(2.66)
1 / price (q-1)	0.355***	0.354***	0.353***	0.353***	0.355***	0.355***	0.356***
	(4.32)	(4.31)	(4.29)	(4.30)	(4.33)	(4.33)	(4.33)
Amihud illiquidity (q-1)	1.784***	1.782***	1.781***	1.781***	1.784***	1.783***	1.784***
	(14.10)	(14.07)	(14.07)	(14.06)	(14.10)	(14.09)	(14.10)
log(market cap) (q-1)	-0.324***	-0.326***	-0.329***	-0.328***	-0.317***	-0.318***	-0.317***
	(-5.72)	(-5.74)	(-5.79)	(-5.76)	(-5.65)	(-5.65)	(-5.64)
Past 6-month return (q-3 to q-1)	0.105	0.104	0.105	0.105	0.103	0.103	0.103
	(1.13)	(1.12)	(1.14)	(1.14)	(1.11)	(1.11)	(1.11)
Book-to-market (q-1)	-0.149**	-0.150**	-0.150**	-0.149**	-0.150**	-0.151**	-0.150**
	(-2.10)	(-2.11)	(-2.10)	(-2.09)	(-2.11)	(-2.12)	(-2.11)
Ownership by bottom institutions (q-1)	-1.255	-1.206	-1.090	-1.104	-1.480*	-1.410*	-1.495*
	(-1.52)	(-1.45)	(-1.32)	(-1.33)	(-1.76)	(-1.69)	(-1.79)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,105	14,105	14,105	14,105	14,105	14,105	14,105
R^2	0.733	0.733	0.733	0.733	0.733	0.733	0.733

Table IA.5. The Effect of Ownership by Large Institutional Investors during Crisis and Non-Crisis Periods

The table explores the effect of ownership of large institutional investors on stock volatility during crises and outside crisis periods. This table presents ordinary least squares regression results. The dependent variable is the stock's *Daily volatility*. *Daily volatility* is computed from daily returns during quarter q. All independent variables are measured during quarter q-1. The table uses the *Top inst. ownership* of the largest institutional investors in a given stock as the key independent variable. Crisis periods (Panel A) are the stock market crash in the fourth quarter of 1987; the credit crunch from the first quarter of 1990 until the fourth quarter of 1992; the Russian debt and long-term capital management (LTCM) crisis in the third and fourth quarters of 1998; the dot-com bubble and the September 11 crisis, from the second quarter of 2000 until the third quarter of 2002; and the subprime lending crisis from the third quarter of 2007 until the fourth quarter of 2009. Panel B, focuses on non-crisis quarters. The sample period is 1980/Q1–2015/Q3. Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Ownership by Large Institutional Investors and Daily Volatility during Crises

Dependent variable:	Daily volatility (q) (%)							
Sample:	All Crises				2008-2009			
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 3	Top 5	Top 7	Top 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top inst ownership (q-1)	0.941*	1.203***	1.363***	1.133***	2.032**	1.798*	1.856**	0.640*
	(1.76)	(2.85)	(3.77)	(4.02)	(2.43)	(2.30)	(3.25)	(1.98)
Ownership by all institutions (q-1)	0.397***	0.341**	0.292**	0.280**	0.730*	0.690	0.629	0.804*
	(3.10)	(2.45)	(2.26)	(2.13)	(1.94)	(1.83)	(1.73)	(2.27)
1 / price (q-1)	0.462***	0.462***	0.462***	0.461***	0.091	0.091	0.091	0.090
	(5.86)	(5.86)	(5.85)	(5.85)	(0.52)	(0.52)	(0.52)	(0.51)
Amihud illiquidity (q-1)	1.400***	1.399***	1.398***	1.397***	0.989***	0.987***	0.988***	0.982***
	(13.73)	(13.74)	(13.73)	(13.71)	(8.77)	(8.83)	(8.82)	(8.70)
log(market cap) (q-1)	-0.391***	-0.394***	-0.397***	-0.397***	-1.042***	-1.040***	-1.043***	-1.041***
	(-5.83)	(-5.91)	(-5.90)	(-5.97)	(-3.79)	(-3.77)	(-3.77)	(-3.77)
Past 6-month return (q-3 to q-1)	-0.486***	-0.485***	-0.483***	-0.482***	-0.177	-0.176	-0.176	-0.175
	(-4.14)	(-4.14)	(-4.12)	(-4.12)	(-1.19)	(-1.18)	(-1.18)	(-1.18)
Book-to-market (q-1)	-0.011	-0.011	-0.011	-0.010	-0.145*	-0.145*	-0.144*	-0.144*
	(-0.31)	(-0.32)	(-0.32)	(-0.30)	(-2.02)	(-2.03)	(-2.02)	(-2.01)
Ownership by bottom institutions (q-1)	-1.953***	-1.852***	-1.775***	-1.767***	-1.058	-1.030	-0.956	-1.114
	(-4.39)	(-4.31)	(-4.01)	(-4.03)	(-1.32)	(-1.27)	(-1.19)	(-1.43)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	170,077	170,077	170,077	170,077	34,853	34,853	34,853	34,853
R^2	0.684	0.684	0.684	0.684	0.789	0.789	0.789	0.789

Table IA.5. The Effect of Ownership by Large Institutional Investors during Crisis and Non-Crisis Periods (Cont.)

Panel B: Ownership by Large Institutional Investors and Daily Volatility during Non-Crisis Quarters

Dependent variable:	Daily volatility (q) (%)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst ownership (q-1)	0.609***	0.631***	0.698***	0.605***	0.634***	0.283*	0.134
	(3.30)	(4.31)	(5.21)	(4.58)	(3.86)	(1.76)	(1.01)
Ownership by all institutions (q-1)	0.097*	0.077	0.052	0.046	0.093	0.134**	0.141***
	(1.96)	(1.55)	(1.06)	(0.91)	(1.65)	(2.58)	(2.63)
1 / price (q-1)	0.640***	0.640***	0.639***	0.639***	0.640***	0.640***	0.640***
	(8.74)	(8.73)	(8.73)	(8.74)	(8.74)	(8.74)	(8.74)
Amihud illiquidity (q-1)	1.427***	1.425***	1.424***	1.424***	1.426***	1.428***	1.428***
	(22.86)	(22.81)	(22.78)	(22.74)	(22.87)	(22.89)	(22.89)
log(market cap) (q-1)	-0.258***	-0.260***	-0.261***	-0.262***	-0.256***	-0.255***	-0.255***
	(-11.47)	(-11.61)	(-11.60)	(-11.72)	(-11.64)	(-11.48)	(-11.49)
Past 6-month return (q-3 to q-1)	0.096	0.097	0.098	0.098	0.096	0.095	0.095
	(0.87)	(0.88)	(0.88)	(0.89)	(0.87)	(0.86)	(0.86)
Book-to-market (q-1)	-0.072**	-0.072**	-0.072**	-0.072**	-0.071**	-0.072**	-0.072**
	(-2.52)	(-2.53)	(-2.53)	(-2.53)	(-2.49)	(-2.53)	(-2.52)
Ownership by bottom institutions (q-1)	-1.526***	-1.483***	-1.446***	-1.442***	-1.545***	-1.602***	-1.605***
	(-7.86)	(-7.70)	(-7.49)	(-7.47)	(-8.21)	(-8.27)	(-8.29)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	474,697	474,697	474,697	474,697	474,697	474,697	474,697
R^2	0.684	0.684	0.684	0.684	0.684	0.684	0.684

Table IA.6. Alternative Institutional Ownership Definition

The table explores the robustness of the results when using an alternative definition of institutional ownership. This table presents ordinary least square regression results. The dependent variable is stock-level *Daily volatility*. *Daily volatility* is computed from daily returns during quarter q. The explanatory variable of interest is the stock-level ownership by the top 3, 5, 7, and 10 institutions. *Alternative ownership by all institutions* excludes the ownership by the top institutions. All regressions include calendar quarter fixed effects, and *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. The sample period is 1980/Q1–2015/Q3.

Dependent variable:	Daily Volatility (q)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst. ownership (q-1)	1.007***	1.013***	1.029***	0.913***	1.115***	0.657***	0.196
	(4.18)	(5.11)	(5.98)	(6.30)	(6.32)	(3.84)	(1.29)
Alternative ownership by all institutions (q-1)	0.151***	0.123**	0.095*	0.082	0.135**	0.201***	0.229***
	(2.70)	(2.13)	(1.73)	(1.44)	-2.16	(3.32)	(3.60)
1 / price (q-1)	0.602***	0.601***	0.601***	0.601***	0.601***	0.602***	0.602***
	(9.62)	(9.61)	(9.61)	(9.61)	(9.62)	(9.63)	(9.63)
Amihud illiquidity (q-1)	1.481***	1.479***	1.478***	1.477***	1.480***	1.481***	1.482***
	(23.54)	(23.49)	(23.47)	(23.45)	(23.49)	(23.52)	(23.53)
log(market cap) (q-1)	-0.287***	-0.290***	-0.292***	-0.292***	-0.285***	-0.284***	-0.283***
	(-10.68)	(-10.76)	(-10.78)	(-10.96)	(-10.88)	(-10.76)	(-10.76)
Past 6-month return (q-3 to q-1)	-0.115	-0.114	-0.113	-0.112	-0.113	-0.115	-0.116
	(-0.98)	(-0.98)	(-0.97)	(-0.96)	(-0.97)	(-0.99)	(-0.99)
Book-to-market (q-1)	0.010	0.009	0.009	0.010	0.011	0.010	0.010
	(0.36)	(0.34)	(0.35)	(0.36)	(0.41)	(0.37)	(0.39)
Ownership by bottom institutions (q-1)	-1.568***	-1.510***	-1.470***	-1.456***	-1.577***	-1.666***	-1.693***
	(-7.36)	(-7.23)	(-6.97)	(-7.00)	(-7.65)	(-7.83)	(-7.97)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	650,002	650,002	650,002	650,002	650,002	650,002	650,002
R^2	0.669	0.669	0.669	0.669	0.669	0.669	0.669

Table IA.7. The Effect of Ownership by Large Institutional Investors on S&P 500 Stocks

The table explores the effect of ownership by large institutional investors on stock volatility in a sample of S&P 500 stocks. This table presents ordinary least squares regression results. The dependent variable is the stock's *Daily volatility*. *Daily volatility* is computed from daily returns during quarter q. All independent variables are measured during quarter q-1. The table uses the *Top inst. ownership* of the largest institutional investors in a given stock as the key independent variable. The table restricts the sample to only S&P 500 stocks. The sample period is 1980/Q1–2015/Q3. Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Daily volatility (q) (%)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Top inst ownership (q-1)	0.868***	0.919***	0.975***	0.777***	0.245	-0.193	-0.702***
	(2.90)	(3.95)	(4.71)	(4.28)	(1.28)	(-0.84)	(-3.82)
Ownership by all institutions (q-1)	-0.065	-0.111	-0.153	-0.151	-0.013	0.032	0.091
	(-0.64)	(-1.04)	(-1.50)	(-1.44)	(-0.12)	(0.30)	(0.86)
1 / price (q-1)	5.489***	5.484***	5.481***	5.494***	5.522***	5.526***	5.520***
	(10.86)	(10.90)	(10.92)	(10.92)	(10.88)	(10.87)	(10.88)
Amihud illiquidity (q-1)	0.253	0.244	0.226	0.219	0.237	0.241	0.243
	(0.72)	(0.69)	(0.64)	(0.62)	(0.68)	(0.68)	(0.69)
log(market cap) (q-1)	-0.077**	-0.080**	-0.082**	-0.082**	-0.077**	-0.076**	-0.076**
	(-2.18)	(-2.26)	(-2.31)	(-2.32)	(-2.19)	(-2.15)	(-2.14)
Past 6-month return (q-3 to q-1)	-0.140	-0.141	-0.140	-0.136	-0.131	-0.133	-0.138
	(-1.45)	(-1.46)	(-1.44)	(-1.42)	(-1.36)	(-1.38)	(-1.43)
Book-to-market (q-1)	0.047	0.047	0.048	0.048	0.047	0.047	0.050
	(1.10)	(1.08)	(1.12)	(1.13)	(1.08)	(1.09)	(1.15)
Ownership by bottom institutions (q-1)	-0.925	-0.749	-0.594	-0.623	-0.979	-1.101	-1.217
	(-0.71)	(-0.58)	(-0.45)	(-0.48)	(-0.76)	(-0.85)	(-0.94)
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	68,113	68,113	68,113	68,113	68,113	68,113	68,113
R^2	0.623	0.623	0.623	0.623	0.623	0.623	0.623

Table IA.8. Volatility of Firms around Mergers of Large Institutions – Full Specifications

The table presents results about the effects of merger activity of large institutional investors on the underlying securities. The dependent variable is the *Daily volatility* of the stocks held by large institutional investors. *Daily volatility* is computed from daily returns during quarter q. Panel A presents results corresponding to mergers in which the average rank of the merging institutions is among the 25 largest. The sample includes BlackRock & BGI, Deutsche Bank & Scudder, and Mellon & The Boston Company. Panel B presents results corresponding to mergers in which the average rank of the merging institutions is among the 50 largest. This sample additionally includes Ameriprise & Columbia Financial, Wells Fargo & Wachovia, Travelers & Citi, Chase & JPMorgan, JPMorgan & Bank One, Mellon & Dreyfus, BNY & Mellon, and First Interstate & Continental Illinois. The key independent variables are *Combined ownership* and *Combined ownership dummy*, which represent the combined ownership of the two institutional investors before and after the merger completion, and their respective interactions with the *Post-merger dummy*. The sample in each column includes the pre-completion quarter and several quarters after the completion, as specified. This table presents ordinary least squares regression results. Appendix A provides variable descriptions. *t*-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table IA.8. Volatility of Firms around Mergers of Large Institutions (Cont.)

Panel A: Mergers with Average Size Rank <25

Dependent variable:	Daily volatility (q) (%)							
Window after merger:	+1 qtr	+2 qtrs	+3 qtrs	+4 qtrs	+5 qtrs	+6 qtrs	+7 qtrs	+8 qtrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-merger dummy	Mergers with average rank < 25							
× Combined ownership (q-1)	2.356***	1.835	1.961*	1.497	1.840*	1.959**	2.676***	3.096***
	(3.26)	(1.52)	(1.66)	(1.38)	(1.87)	(2.19)	(2.63)	(3.05)
× Ownership by all institutions (q-1)	-0.067	0.105	0.185*	0.174**	0.099	0.053	0.047	0.039
	(-0.76)	(0.90)	(1.92)	(2.04)	(0.97)	(0.49)	(0.39)	(0.30)
× 1 / price (q-1)	-0.002	-0.035	-0.122	-0.151	-0.138	-0.150	-0.169	-0.178
	(-0.02)	(-0.32)	(-0.98)	(-1.33)	(-1.21)	(-1.41)	(-1.43)	(-1.55)
× Amihud illiquidity (q-1)	0.098	0.105	0.137	0.138	0.120	0.105	0.088	0.075
	(1.58)	(1.22)	(1.43)	(1.53)	(1.42)	(1.36)	(1.00)	(0.86)
× log(market cap) (q-1)	0.024**	0.024**	0.026*	0.029	0.023	0.017	0.010	0.004
	(2.07)	(1.97)	(1.65)	(1.63)	(1.58)	(1.42)	(0.88)	(0.40)
× Past 6-month return (q-3 to q-1)	0.023	-0.039	-0.009	-0.113	-0.076	-0.103	-0.113	-0.125
	(0.18)	(-0.35)	(-0.10)	(-0.93)	(-0.67)	(-0.88)	(-0.91)	(-1.03)
× Book-to-market (q-1)	-0.057	-0.050*	-0.012	-0.022	-0.045	-0.052	-0.060	-0.055
	(-1.46)	(-1.74)	(-0.28)	(-0.40)	(-0.83)	(-0.83)	(-0.88)	(-0.78)
× Ownership by bottom institutions (q-1)	-0.857**	-1.077***	-1.081**	-1.327***	-1.237***	-1.228***	-1.314***	-1.347***
	(-1.99)	(-2.68)	(-2.23)	(-2.63)	(-2.60)	(-2.87)	(-3.11)	(-3.30)
Combined ownership (q-1)	-1.457	-1.440	-0.476	-0.273	-0.359	-0.158	-0.431	-0.701
	(-1.28)	(-0.87)	(-0.44)	(-0.26)	(-0.43)	(-0.20)	(-0.54)	(-0.89)
Ownership by all institutions (q-1)	-1.046***	-0.881***	-0.827***	-0.585***	-0.584***	-0.447***	-0.274**	-0.203
	(-3.24)	(-3.34)	(-3.62)	(-3.05)	(-4.69)	(-3.35)	(-2.01)	(-1.61)
1 / price (q-1)	0.597***	0.498***	0.841***	0.860***	0.972***	1.018***	1.129***	1.197***
	(2.79)	(3.80)	(4.41)	(4.54)	(5.16)	(5.27)	(5.43)	(5.99)
Amihud illiquidity (q-1)	1.000***	1.009***	0.879***	0.906***	0.885***	0.984***	0.934***	0.934***
	(4.67)	(4.86)	(5.27)	(5.07)	(4.75)	(5.23)	(5.21)	(5.57)
log(market cap) (q-1)	-0.801***	-0.987***	-0.966***	-0.782***	-0.668***	-0.575***	-0.579***	-0.533***
	(-2.68)	(-4.30)	(-4.80)	(-4.57)	(-4.41)	(-4.40)	(-5.48)	(-5.92)
Past 6-month return (q-3 to q-1)	0.173**	0.179*	0.139*	0.136	0.148	0.161*	0.167*	0.171*
	(1.98)	(1.93)	(1.67)	(1.51)	(1.61)	(1.70)	(1.66)	(1.74)
Book-to-market (q-1)	0.226***	-0.013	0.104	0.105	0.149*	0.167**	0.167**	0.174**
	(2.89)	(-0.11)	(1.15)	(1.16)	(1.83)	(2.08)	(2.12)	(2.18)
Ownership by bottom institutions (q-1)	0.699	1.091	1.396**	1.109**	1.257**	1.050**	0.949*	0.959*
	(0.69)	(1.60)	(2.23)	(1.96)	(2.47)	(2.17)	(1.89)	(1.93)
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,504	29,595	39,513	49,567	60,217	70,452	80,784	91,174
R^2	0.122	0.265	0.243	0.236	0.226	0.234	0.270	0.284

Table IA.8. Volatility of Firms around Mergers of Large Institutions (Cont.)

Panel B: Mergers with Average Size Rank <50

Dependent variable:	Daily volatility (q) (%)							
Window after merger	+1 qtr	+2 qtrs	+3 qtrs	+4 qtrs	+5 qtrs	+6 qtrs	+7 qtrs	+8 qtrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-merger dummy	Mergers with average rank < 50							
× Combined ownership (q-1)	1.509***	1.519**	1.299*	1.122	1.053	0.907	1.004	1.041
	(3.08)	(2.51)	(1.74)	(1.48)	(1.56)	(1.54)	(1.61)	(1.56)
× Ownership by all institutions (q-1)	0.047	0.055	0.092	0.081	0.042	0.051	0.056	0.052
	(0.48)	(0.62)	(1.04)	(0.92)	(0.48)	(0.62)	(0.73)	(0.69)
× 1 / price (q-1)	-0.152	-0.051	-0.096	-0.121	-0.139*	-0.149**	-0.167**	-0.178**
	(-1.48)	(-0.61)	(-1.31)	(-1.63)	(-1.89)	(-2.30)	(-2.47)	(-2.56)
× Amihud illiquidity (q-1)	0.125**	0.175**	0.202**	0.203**	0.192*	0.185*	0.188	0.185
	(2.23)	(2.10)	(2.21)	(2.10)	(1.83)	(1.75)	(1.52)	(1.39)
× log(market cap) (q-1)	-0.008	0.001	0.004	0.005	0.004	0.002	0.006	0.005
	(-0.63)	(0.06)	(0.55)	(0.71)	(0.66)	(0.27)	(0.72)	(0.52)
× Past 6-month return (q-3 to q-1)	0.035	-0.042	-0.097	-0.087	-0.024	0.083	0.011	0.040
	(0.32)	(-0.39)	(-0.74)	(-0.61)	(-0.15)	(0.44)	(0.06)	(0.23)
× Book-to-market (q-1)	-0.094**	-0.077**	-0.082**	-0.081*	-0.083*	-0.077	-0.068	-0.061
	(-2.51)	(-2.10)	(-2.44)	(-1.93)	(-1.69)	(-1.43)	(-1.05)	(-0.88)
× Ownership by bottom institutions (q-1)	-0.274	-0.209	-0.357	-0.569	-0.753*	-0.881**	-0.770*	-0.787*
	(-0.65)	(-0.58)	(-0.91)	(-1.44)	(-1.84)	(-2.42)	(-1.85)	(-1.89)
Combined ownership (q-1)	-1.212	-1.572	-1.055	-0.906	-1.017	-0.837	-0.442	-0.300
	(-1.04)	(-1.44)	(-1.17)	(-1.07)	(-1.38)	(-1.34)	(-0.73)	(-0.48)
Ownership by all institutions (q-1)	-1.222***	-0.818***	-0.700***	-0.530***	-0.501***	-0.412***	-0.376***	-0.363***
	(-5.37)	(-3.76)	(-4.22)	(-3.72)	(-3.65)	(-3.00)	(-3.01)	(-3.13)
1 / price (q-1)	0.948***	0.656***	0.777***	0.801***	0.869***	1.009***	1.029***	1.042***
	(3.66)	(4.67)	(5.86)	(7.03)	(7.93)	(8.98)	(9.09)	(9.24)
Amihud illiquidity (q-1)	1.098***	0.855***	0.686***	0.687***	0.619***	0.686***	0.647***	0.647***
	(4.83)	(4.85)	(4.89)	(5.24)	(4.09)	(4.38)	(4.16)	(3.98)
log(market cap) (q-1)	-1.261***	-0.968***	-0.850***	-0.675***	-0.645***	-0.639***	-0.603***	-0.566***
	(-5.36)	(-6.03)	(-6.48)	(-6.77)	(-7.68)	(-5.59)	(-5.03)	(-5.78)
Past 6-month return (q-3 to q-1)	0.108	0.083	0.045	0.013	-0.006	-0.014	0.006	0.002
	(1.15)	(0.67)	(0.33)	(0.09)	(-0.03)	(-0.08)	(0.03)	(0.01)
Book-to-market (q-1)	0.209**	0.016	0.088	0.135	0.211***	0.233***	0.240***	0.261***
	(2.45)	(0.26)	(1.25)	(1.61)	(2.62)	(3.16)	(3.50)	(3.58)
Ownership by bottom institutions (q-1)	1.541**	1.698***	1.324***	0.629	0.393	0.422	0.297	0.305
	(2.51)	(3.45)	(3.00)	(1.39)	(0.86)	(1.14)	(0.69)	(0.71)
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,424	85,605	114,219	142,598	171,788	200,217	228,453	256,751
R^2	0.272	0.320	0.368	0.375	0.393	0.473	0.474	0.464

Table IA.9. Instrumenting Large Institutional Ownership with Local Bias

This table presents two-stage least square regression results. The dependent variable is stock-level *Daily volatility*. *Daily volatility* is computed from daily returns during quarter q. The explanatory variable of interest is the stock-level ownership by the top 3, 5, 7, and 10 institutions. The instrument is the *Same state score.* This score is the sum of X indicator variables, each of them denoting whether the stock's headquarters are located in the same state as that of one of the top institutions included in the regression. Panel A reports the first stage, and Panel B shows the second stage. At the bottom of the tables, we report the p-value for the Angrist and Pischke (2009) F-test for the null hypothesis of weak instruments. Panel C presents the second set of results from an analysis containing the fragility measure (G) from Greenwood and Thesmar (2011). The sample period is 1980/Q1–2015/Q3. Appendix A provides variable descriptions. t-statistics based on standard errors clustered at the stock and quarter level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: First Stage: Ownership by Large Institutional Investors and Local Bias

Dependent variable:	Top Inst. Ownership (q-1)			
Institution:	Top 3 insts	Top 5 insts	Top 7 insts	Top 10 insts
	(1)	(2)	(3)	(4)
Same state score	0.001***	0.001***	0.001***	0.001***
	(3.57)	(4.04)	(4.67)	(4.81)
Daily volatility (q-1) (%)	0.000***	0.000***	0.001***	0.001***
	(3.17)	(3.36)	(3.40)	(4.35)
Ownership by all institutions (q-1)	0.089***	0.118***	0.143***	0.179***
	(34.43)	(28.92)	(34.14)	(41.56)
1 / price (q-1)	0.001**	0.001***	0.002***	0.002***
	(2.53)	(3.80)	(5.98)	(5.52)
Amihud illiquidity (q-1)	0.002**	0.004***	0.007***	0.009***
	(2.31)	(5.07)	(6.87)	(8.41)
log(market cap) (q-1)	0.004***	0.007***	0.009***	0.010***
	(11.09)	(14.35)	(16.92)	(15.30)
Past 6-month return (q-3 to q-1)	-0.001**	-0.002***	-0.002***	-0.004***
	(-2.27)	(-4.20)	(-5.61)	(-6.39)
Book-to-market (q-1)	0.001**	0.001**	0.000	-0.000
	(2.59)	(2.22)	(0.94)	(-0.77)
Ownership by bottom institutions (q-1)	-0.177***	-0.251***	-0.298***	-0.359***
	(-25.29)	(-23.93)	(-28.31)	(-30.40)
Piotroski F-score	0.000***	0.000***	0.000***	0.000***
	(4.94)	(5.64)	(4.96)	(5.07)
O-score	-0.000***	-0.000***	-0.000***	-0.000***
	(-3.79)	(-4.38)	(-4.33)	(-4.19)
Altman's Z	-0.000	-0.000	-0.000	-0.000*
	(-0.42)	(-1.07)	(-1.43)	(-1.70)
CHS	-0.000	-0.000**	-0.000	-0.000**
	(-1.62)	(-2.07)	(-1.66)	(-2.13)
Fraction of qtrs with negative income	-0.003***	-0.001	-0.000	-0.001
	(-4.32)	(-1.40)	(-0.28)	(-0.83)
State-level dGDP (q)	-0.006	-0.005	-0.003	-0.005
	(-1.07)	(-0.76)	(-0.46)	(-0.60)
State-level dGDP (q-1)	-0.002	-0.004	-0.004	0.000
	(-0.47)	(-0.61)	(-0.56)	(0.01)
State-level dGDP (q-2)	0.008*	0.001	0.001	0.011
	(1.68)	(0.15)	(0.19)	(1.42)
Calendar quarter FE	Yes	Yes	Yes	Yes
Observations	440,773	440,773	440,773	440,773
Adj R^2	0.605	0.668	0.694	0.721
Angrist and Pischke (2009) p-value	0.00	0.00	0.00	0.00

Table IA.9. Instrumenting Large Institutional Ownership (Cont.)

Panel B: Second Stage: Instrumented Ownership by Large Institutional Investors and Stock Volatility

Dependent variable:	Daily volatility (q) (%)			
Institution:	Top 3 insts	Top 5 insts	Top 7 insts	Top 10 insts
	(1)	(2)	(3)	(4)
Top Inst. Ownership (IV) (q-1)	36.646***	24.865***	17.062***	11.452***
	(2.79)	(3.05)	(3.04)	(2.67)
Daily volatility (q-1) (%)	0.596***	0.597***	0.601***	0.602***
	(45.83)	(47.81)	(49.87)	(50.23)
Ownership by all institutions (q-1)	-3.068***	-2.740***	-2.231***	-1.840**
	(-2.65)	(-2.91)	(-2.85)	(-2.42)
1 / price (q-1)	0.209***	0.202***	0.196***	0.208***
	(4.88)	(4.84)	(4.73)	(5.18)
Amihud illiquidity (q-1)	0.435***	0.379***	0.377***	0.387***
	(10.60)	(7.47)	(7.38)	(7.73)
log(market cap) (q-1)	-0.233***	-0.266***	-0.248***	-0.216***
	(-4.62)	(-4.64)	(-4.84)	(-4.72)
Past 6-month return (q-3 to q-1)	-0.154**	-0.143*	-0.144*	-0.141*
	(-1.98)	(-1.93)	(-1.87)	(-1.89)
Book-to-market (q-1)	-0.215***	-0.211***	-0.197***	-0.186***
	(-9.67)	(-9.46)	(-10.31)	(-10.71)
Ownership by bottom institutions (q-1)	5.477**	5.229***	4.065**	3.104**
	(2.42)	(2.63)	(2.52)	(2.06)
Piotroski F-score	-0.045***	-0.044***	-0.041***	-0.039***
	(-6.64)	(-7.54)	(-8.03)	(-8.71)
O-score	0.004	0.004	0.002	0.000
	(0.98)	(1.14)	(0.66)	(0.15)
Altman's Z	0.000	0.000	0.000	0.000
	(1.00)	(1.25)	(1.23)	(1.23)
CHS	-0.002*	-0.002*	-0.003**	-0.003**
	(-1.70)	(-1.72)	(-2.13)	(-2.15)
Fraction of qtrs with negative income	0.816***	0.746***	0.723***	0.731***
	(12.69)	(15.70)	(16.89)	(17.86)
State-level dGDP (q)	0.983***	0.898***	0.857***	0.837***
	(3.47)	(3.62)	(3.67)	(3.81)
State-level dGDP (q-1)	0.942***	0.973***	0.939***	0.873***
	(3.60)	(3.87)	(3.82)	(3.70)
State-level dGDP (q-2)	0.206	0.489**	0.490**	0.386*
	(0.77)	(2.12)	(2.26)	(1.82)
Calendar quarter FE	Yes	Yes	Yes	Yes
Observations	440,773	440,773	440,773	440,773

Table IA.9. Instrumenting Large Institutional Ownership (Cont.)

Panel C: Second Stage: Instrumented Ownership by Large Institutional Investors and Stock Volatility and Including Greenwood and Thesmar's (2011) Fragility Measure

Dependent variable:	Daily volatility (q) (%)			
Institution:	Top 3 insts	Top 5 insts	Top 7 insts	Top 10 insts
	(1)	(2)	(3)	(4)
Top Inst. Ownership (IV) (q-1)	55.254**	29.182**	18.628**	13.075**
	(2.07)	(2.53)	(2.53)	(2.13)
Daily volatility (q-1) (%)	0.588***	0.594***	0.597***	0.597***
	(38.94)	(46.60)	(48.81)	(48.67)
Ownership by all institutions (q-1)	-4.286**	-2.962**	-2.277**	-2.029**
	(-2.02)	(-2.46)	(-2.42)	(-2.00)
1 / price (q-1)	0.233***	0.226***	0.217***	0.227***
	(5.40)	(5.58)	(5.46)	(5.79)
Amihud illiquidity (q-1)	0.520***	0.458***	0.445***	0.442***
	(11.48)	(12.03)	(12.10)	(11.90)
log(market cap) (q-1)	-0.243***	-0.244***	-0.220***	-0.194***
	(-3.52)	(-4.28)	(-4.64)	(-4.45)
Past 6-month return (q-3 to q-1)	-0.174**	-0.176**	-0.181**	-0.179**
	(-2.18)	(-2.34)	(-2.39)	(-2.36)
Book-to-market (q-1)	-0.235***	-0.221***	-0.204***	-0.191***
	(-7.55)	(-8.91)	(-10.26)	(-10.81)
Ownership by bottom institutions (q-1)	7.290*	5.105**	3.691**	3.026*
	(1.87)	(2.20)	(2.08)	(1.67)
Piotroski F-score	-0.050***	-0.046***	-0.042***	-0.040***
	(-5.27)	(-7.00)	(-8.01)	(-8.44)
O-score	0.003	0.002	-0.000	-0.002
	(0.63)	(0.52)	(-0.02)	(-0.56)
Altman's Z	0.000	0.000	0.000	0.000
	(0.35)	(0.77)	(0.64)	(0.59)
CHS	-0.002	-0.003*	-0.003**	-0.003**
	(-1.44)	(-1.70)	(-2.04)	(-2.01)
Fraction of qtrs with negative income	0.874***	0.773***	0.750***	0.757***
	(9.23)	(14.50)	(16.14)	(17.00)
State-level dGDP (q)	1.243***	0.983***	0.875***	0.819***
	(2.95)	(3.53)	(3.62)	(3.57)
State-level dGDP (q-1)	0.886***	0.856***	0.807***	0.749***
	(2.87)	(3.18)	(3.25)	(3.11)
State-level dGDP (q-2)	0.238	0.461*	0.491**	0.336
	(0.69)	(1.72)	(2.01)	(1.41)
Greenwood and Thesmar Fragility (q-1)	-0.944*	-0.480*	-0.275	-0.136
	(-1.66)	(-1.82)	(-1.59)	(-0.95)
	1.219***	1.471***	1.632***	1.644***
Calendar quarter FE	(7.42)	(12.75)	(12.28)	(10.82)
Observations	347,409	347,409	347,409	347,409