The ownership structure of U.S. corporations

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Abstract

We study the ownership structure of U.S. corporations using a comprehensive database of share ownership by insiders, affiliated firms, and institutional investors. Ownership has become increasingly concentrated in recent years, especially in mid- and large-cap firms. In 2017, insiders and affiliates own 5.2% of the value-weighted average firm, while a firm's top five institutional shareholders own 27.6% of shares, its top 10 institutional shareholders own 37.1% of shares, and its top 25 institutional shareholders own 49.8% of shares. The top shareholders vary predictably across firms—most notably, small institutions match to small firms and large institutions match to large firms—and a firm's ownership is surprisingly stable from one year to the next. Our findings have a number of implications for corporate governance.

1 Introduction

Corporate ownership has changed considerably in recent decades, with the rise of institutional investors and concomitant decline in direct household investment (French 2008). This shift has potentially wide-ranging implications for both corporate governance and the capital markets. A side benefit, from a research standpoint, is that the ownership of many firms is now almost fully observable from proxy statements and 13F filings, not just the holdings of insiders and large blockholders but the full spectrum of institutional holdings that make up the bulk of a firm's owners. We use these data to provide the most comprehensive evidence on the ownership structure of U.S. firms to date.

Our analysis focuses on three aspects of ownership structure that reflect, in different ways, the ability and incentives of institutional investors to influence management: (i) the overall ownership and concentration of institutions relative to insiders; (ii) the characteristics of a firm's top institutional shareholders; and (iii) the stability of a firm's institutional ownership.

Prior studies of ownership structure typically focus on insiders and large blockholders, but those groups own a minority of most publicly traded U.S. firms. At the end of our sample (2017), insiders and affiliates own 5.2% of the value-weighted average firm and institutions own 73.7%. The firm has 2.8 institutional blockholders with stakes greater than 5% who own 20.1% of shares, 10.8 institutional blockholders with stakes of 1%–5% who own 22.1% of shares, and 1,093 smaller institutional shareholders who own 31.5% of shares. The firm's top five institutional shareholders own 27.6% of the firm, its top 10 institutional shareholders own 37.1% of the firm, and its top 25 institutional shareholders own 49.8% of the firm.

Two statistics are particularly relevant for corporate governance. First, Rule 14a–2(b)(2) of the Securities Exchange Act allows an activist to solicit proxies from up to 10 investors without being subject to the usual proxy solicitation rules. Thus, in recent years, an activist could solicit proxies from 37.1% of shares for the value-weighted average firm—the holdings of the top 10 institutional shareholders—without triggering the stringent filing and informational requirements associated with public proxy contests. Second, shareholders

can communicate freely with each other about how they intend to vote and why, and have wide latitude to distribute pre-solicitation material before filing a definitive proxy statement, as long as they do not solicit proxies from each other or coordinate their votes. This communication is easier when ownership is more concentrated and the identity of shareholders is public information. In recent years, a shareholder would need to contact only 5 institutions to reach investors holding 25% of shares and 27 institutions to reach investors holding 50% of shares. Our results suggest that the legal and logistical costs associated with corporate governance may be much more modest today than in past decades.

The shift toward concentrated institutional ownership occurs for firms of all sizes, but the role of institutions is most pronounced for mid- and large-cap firms. Insiders and affiliates own 19.7% of small firms, 9.0% of mid-cap firms, and 4.9% of large firms, while institutional blockholders (stakes > 1%) own 34.1% of small firms, 63.2% of mid-cap firms, and 45.0% of large firms. The higher concentration of institutional ownership for larger companies, and the non-linearity between size, institutional ownership, and ownership concentration, has not been noted previously in the literature. (Prior studies find a negative relation between size and large blockholdings when insiders and institutional investors are combined; see, e.g., Holderness 2009.) Our results suggest that firm size is not a barrier to concentrated institutional ownership, except perhaps for the very largest firms. The general pattern is that, as firms grow, governance shifts from what might be called 'insider governance' to 'institutional governance,' the latter characterized by a deep pool of institutional blockholders with substantial voting power.

We also study the characteristics of a firm's top institutional shareholders to better understand which institutions are most important for governance, how strong are the incentives of top shareholders to monitor management, and whether different types of institutions have a comparative advantage in monitoring different types of firms, as revealed by their holdings.

A firm's top institutional shareholders tend to be large, trade less than other institutions, and invest a disproportionate amount of their portfolios in the firm. The weight in the institution's portfolio is important because it is often taken as a proxy for investor attention (Edmans and Holderness 2017; Gilje, Gormley, and

Levit 2020). Thus, based on multiple metrics, top shareholders seem well-positioned to be effective monitors: not only do they have the most money invested in the firm and highest ownership stakes (and thus greatest ability and incentives to influence management), but they also trade less (suggesting longer horizons) and invest a large fraction of their portfolios in the firms (suggesting greater attentiveness). Interestingly, among top shareholders, the institution with the very largest stake stands out: The top institution is often smaller and invests a substantially higher fraction of AUM in the firm compared with the next-ranked shareholders. For example, the top shareholder invests 2.6% of AUM in the value-weighted average firm compared with 1.5% and 1.3%, respectively, for institutions with the second and third largest stakes. Our evidence suggests that the top institutional shareholder plays an especially large governance role.

The top institutional shareholders also vary systematically across firms. The most striking effect is the link between firm size and institution size: The top institutional shareholders in small firms are small institutions and the top institutional shareholders in large firms are large institutions. (As a benchmark, if all institutions simply held the market portfolio, large institutions would be the top shareholders in all firms.) For example, the institution with the top stake in small firms falls at the 34th percentile of the cross-sectional distribution of institution size, but the institution with the top stake in large firms falls at the 83rd percentile. Viewed through a governance lens, the results suggest that small institutions have a comparative advantage monitoring smaller firms; viewed through an investment lens, the result suggest that small institutions have a comparative advantage finding alpha among smaller firms.

It is interesting to consider what might explain this 'size matching.' Diversification and wealth constraints can explain why large institutions are the top shareholders in large firms but cannot explain the reverse, why large institutions are not the top shareholders in small firms. Large institutions could easily hold large stakes in small firms if they chose, so our evidence implies that such a choice must not be optimal. One explanation comes from the fact that, for even the smallest firms, a firm's top shareholders invest a significant fraction of AUM in the firm. This suggests that a firm's weight in the institution's portfolio is an important factor, i.e., it is not efficient to be a top shareholder if the investment is a tiny fraction of AUM. Alternatively, top shareholders may incur fixed governance costs that increase with an institution's size. A better understanding

of this phenomenon could help shed light on the economic and organizational forces that shape institutions' ownership decisions and, thus, firms' governance structures.

Our final tests study the stability of a firm's ownership. Many papers study trading volume and changes in the level of institutional ownership, but we are not aware of any direct evidence on ownership stability despite its importance for corporate governance. There is a long-standing concern in both the academic literature and financial press that 'myopic' investors cause managers to focus excessively on short-term performance at the expense of long-term profits (e.g., Stein 1988, 1989; Edmans 2009; Benmelech, Kandel, and Veronesi 2010). This concern has grown in recent decades along with trading volume, but ownership turnover only has a loose connection to share turnover (a small fraction of shares could trade frequently among investors, leaving the majority of ownership intact). Moreover, the theoretical literature shows that the threat of 'exit' can help discipline managers but there is little evidence of how often top shareholders trade.

Our results show that firms' institutional ownership is surprisingly stable. For example, while institutions own 73.7% of the value-weighted average firm, only 6.8% of shares change institutional ownership each quarter and 15.6% of shares change institutional ownership each year (comparing ownership at the beginning and end of the period). Top institutional shareholders have an even lower propensity to trade: Institutions with greater-than-1% stakes hold 42.2% of the firm but have ownership turnover of just 2.7% quarterly and 7.0% annually. (For comparison, total share turnover from CRSP is 64.6% quarterly and 258.5% annually.) Thus, the vast majority of firms' institutional ownership remains the same from one year to the next. We find cross-sectional differences in ownership turnover—related to firm size, age, volatility, and share turnover—but the basic message is similar across all groups. In addition, ownership turnover has been relatively flat or declining in the past decades even as the level of institutional ownership has risen.

In sum, our paper provides new evidence on the importance of institutions relative to insiders, the link between firm and shareholder characteristics, and the stability of corporate ownership. The picture that emerges is that institutional investors have both the ability and incentive to be active in corporate governance: Institutions

have a large, relatively concentrated stake in most firms, different types of institutions match systematically to different types of firms, and institutional ownership is quite stable from one year to the next, suggesting a vested interest in the firm's long-term performance. Moreover, the link between firm and top shareholder characteristics provides evidence that different types of institutions have a comparative advantage monitoring particular types of firms.

The remainder of the paper is organized as follows: Section 2 provides additional background for our analysis and Section 3 describes the data. Section 4 studies the concentration of corporate ownership and how it varies across firms, Section 5 studies the characteristics of firms' top institutional shareholders, and Section 6 studies ownership stability. Section 7 concludes.

2   Motivation and background

A large theoretical and empirical literature studies how corporate ownership is split among insiders, outside blockholders, and small investors. Ownership structure determines who controls a firm, how cash flow rights are distributed, and who has an incentive to gather information and monitor management. It can also affect the liquidity and price informativeness of the firm's shares in the secondary market.

Much of the literature focuses on the decisions and governance role of large blockholders (see Edmans and Holderness 2017 for a comprehensive review). Blockholders can influence corporate decisions either through 'voice' (engagement, voting, and intervention) or 'exit' (selling). The latter comes from the price impact of trades: Admati and Pfleiderer (2009), Edmans (2009), and Edmans and Manso (2011) show that an informed blockholder, by selling shares and pushing down the stock price, can discipline managers who care about the firm's stock price not just its fundamental value.

Generically, a blockholder is simply an investor with a stake sufficient to have both the ability and incentive to monitor and influence management. For empirical purposes, blockholders are often defined as shareholders who own at least 5% of the firm. However, as Edmans and Holderness (2017) note, the 5% threshold is arbitrary and comes more from historical regulatory and reporting requirements than economic theory. Recent

studies find that many institutional investors engage with firms (McCahery, Sautner, and Starks 2016) and show that the influence of smaller blockholders can be magnified by their ability to coordinate votes, join coalitions, or from the price impact of their trades (Edmans and Manso 2011; Appel, Gormley, and Keim 2016; Wong 2019; Brav, Dasgupta, and Mathews 2021). Accordingly, we study the ownership of insiders and all institutional shareholders, including investors with less-than-5% stakes.

To be specific, our tests consider several dimensions of a firm's ownership structure:

(a) The overall share owned by insiders, affiliates (ESOPs, other firms, etc.), and institutional investors.

(b) The ownership and portfolio weights of the top 1, 3, 5, 10, 25, and 50 institutional investors.

(c) The ownership and portfolio weights of institutions with stakes larger than 1%, 2%, …, 9%.

(d) The number of institutional investors needed to achieve an ownership threshold of, say, 25% or 50%.

These measures are intended to capture different aspects of ownership structure that are relevant for corporate governance. We distinguish between the ownership of insiders, affiliates, and institutional investors based on the premise that the groups have fundamentally different objectives. Moreover, from a governance standpoint, a key role of outside shareholders is to monitor management, implying that the ownership of outside share-holders relative to management may be important.

The concentration of institutional ownership—captured by the second and fourth measures above—is important because concentrated ownership enhances communication among shareholders. This is especially true for institutional shareholders who are publicly identified in SEC filings. Securities law allows share-holders to communicate directly with each other as long as they do not coordinate their votes or solicit proxies from each other. Moreover, in the case of a proxy contest, the SEC allows an activist to approach as many or as few shareholders as they wish. When ownership is concentrated, fewer institutional shareholders are needed to reach a given fraction of votes, which likely reduces an activist's time, effort, and out-of-pocked expenses. Briggs (2007) and others note that this is most valuable in the early stages of a campaign in order to 'test the waters' before a proxy contest and, in some cases, essentially allows the activist to win the contest without

formally soliciting votes.[1]

The ownership of the top 10 institutional shareholders is especially interesting because the Securities Exchange Act allows an activist to solicit proxies from up to 10 investors without triggering the stringent filing and informational requirements associated with public proxy contests. A public proxy contest requires an activist to obtain SEC approval for proxy material before distribution to shareholders and often involves other forms of communication both before and after the proxy is filed. Public proxy contests can be expensive (Gantchev 2013) and open an activist to legal risks (Briggs 2007).

Of course, as ownership concentration increases, both activists and management enjoy lower solicitation costs, so the impact on the relative power of activists and management is not clear a priori. However, it seems likely dissidents have higher per-shareholder solicitation costs and benefit more as ownership concentration goes up. Moreover, firms must provide proxy material to all shareholders but dissidents can approach just a subset. This suggests that greater outside blockholder concentration lowers the overall costs for dissidents more, and thus, shifts power from management to outside shareholders.

It is worthwhile to note that, while our analysis is motivated by the theoretical literature, our goal is not to test specific theories. Take, for example, our evidence on ownership turnover. Theory suggests that the ability of blockholders to sell shares can help discipline managers. In addition, there is a long-standing concern among academics and the popular press about myopic investors and managers who are willing to sacrifice value in pursuit of short-term earnings or temporarily high stock prices. If such a trade-off exists, the holding period of blockholders should affect how much weight they put on stock prices relative to long-term value and how much effort they invest gathering information and monitoring management, yet we know of no systematic evidence of the stability of firm ownership (except in specific settings like 13D filings, CEO turnover, or

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[1] Since the introduction of Rule 14a–12 in 1999, activists can approach shareholders before filing a definitive proxy statement as long as the activist intends to file a proxy in the future (activists are not allowed to send proxy cards without the definitive proxy statement). After the initial filing, the activist can also send additional materials without prior approval by the SEC. Typically, the administrative tasks involved in this process are outsourced to proxy solicitor firms, who organize investor meetings, solicit votes from smaller investors, communicate with proxy advisors, and collect and tabulate investor proxies.

changes in disclosure policies). We provide novel evidence on ownership turnover, but our goal is not to test theories of whether turnover affects stock prices or firm performance.

3 Data

Our analysis merges data from Factset, Refinitiv (formerly Thomson Reuters), WRDS SEC Analytics Suite, and the Center for Research in Security Prices (CRSP).

The Factset database is compiled from firms' proxy statements from 2006–2017. It includes, for most publicly traded U.S. firms, ownership by named executive officers and directors (regardless of the size of the stake) and non-institutional investors who own at least 5% of the firm. We sum the ownership of officers and directors, treating them as a single block of 'insiders' for simplicity. Non-institutional investors are a mix of different investor types, including other firms (parent companies, joint ventures, etc.), stock ownership plans, the U.S. government, and some foundations and other nonprofits (e.g., Cedars Sinai Health System). Factset classifies these investors into various categories, but many groups are rare and their overall ownership is generally small, so we combine them into a single group of 'affiliated' shareholders.

Refinitiv and WRDS report institutional holdings based on institutions' 13F filings with the SEC. Since 1980, the SEC has required institutional investors that 'exercise investment discretion over $100 million or more' of so-called 13(f) securities to report, with some exceptions, their holdings of U.S. stocks and other exchange-traded securities every quarter. We use Refinitiv data for 1981–2013q1 and WRDS data for 2013q2–2017. We switch to WRDS for the later years because of problems with stale or missing 13F filings in the Refinitiv dataset starting in June of 2013 (see WRDS for more information).

We merge the ownership data to CRSP (by CUSIP) and aggregate the variables to the firm level using CRSP's PERMCO variable. The final dataset includes all U.S. firms on CRSP that have common stock outstanding (share codes of 10 and 11). The end result, we believe, is one of the most comprehensive databases of corporate ownership that can be constructed from publicly available data. Several features of the data are worth highlighting:

(i) Insider ownership in our data reflects the direct holdings of stakeholders identified as individuals or trusts by Factset. If a director represents, say, a private equity fund or another firm, the director's personal stake is included in insider ownership but shares held by the private equity fund or the other firm are recorded in either institutional or affiliate holdings. Family foundations are treated as either affiliates or institutions depending on whether they file a 13F or not (with a few exceptions described below). Thus, the Martha and Alexis Stewart Charitable Foundation is an affiliate of Martha Stewart Living Omnimedia, while the Bill and Melinda Gates Foundation, with $25.1 billion invested in 13 U.S. firms at the end of 2017, is an institutional investor that holds $4.1 billion of Microsoft stock.

(ii) Beneficial ownership in proxy statements may be reported multiple times if shares are jointly owned or controlled by several individuals or entities (see, e.g., Dlugosz et al. 2006). We have manually checked Factset against proxy statements on EDGAR for many firms to verify that Factset avoids double-counting by using information in the footnotes to the beneficial ownership table. We provide representative examples illustrating Factset reporting in the Appendix.

(iii) The line between affiliates and institutional investors is not always clear, as the Gates Foundation shows. Moreover, a number of private equity firms end up in both the affiliate and institutional ownership data. To avoid double counting, we manually check the merged data and remove overlap, as described in the Appendix. Separately, a few corporations and foundations that do not seem to be 'institutional investors' nonetheless have 13F filings. For example, Toronto Dominion Bank reports a large holding of TD Ameritrade in its 13F, and the Lilly Endowment files a 13F with a single holding, Eli Lilly. Again, we manually check the merged database and reclassify such cases as affiliates, as described in the Appendix.

(iv) A number of firms have multiple share classes. In some cases, all of the classes are publicly traded, with data on CRSP, so aggregating ownership data to the firm level is straightforward. In other cases, Factset reports insider holdings of shares that are not publicly traded or otherwise available on CRSP, and we use the price and shares outstanding reported by Factset to aggregate to the firm level. Factset typically reports the same price for traded and nontraded classes, which seems to reflect the fact that the classes have the same cash

flow rights (in those cases, we aggregate as if every share is equivalent).

(v) A separate issue raised by multiple share classes is the distinction between voting and cash flow rights. For example, Google has one class of nontraded shares held by insiders—class B shares with 10 votes apiece—and two classes of traded shares—class A shares with one vote apiece and class C shares with no voting rights (all shares have the same cash flow rights). Our dataset identifies firms with multiple share classes as long as the shares are either publicly traded (with data on CRSP) or at least one insider or affiliate on Factset holds shares of the nontraded class. For all such firms, we read the firm's proxy statements for the last year in our sample that each share class exists (classes are sometimes introduced or retired during the life of a firm) and record the voting rights of each class. We then repeat our analysis aggregating ownership to the firm level using voting rights rather than cash flow rights. The results based on voting and cash flow rights are very similar and, for simplicity, we focus on cash flow rights in the paper.[2]

(vi) The Refinitiv and WRDS data contain numerous errors and inconsistencies, at least some of which come from errors in the underlying 13F filings. We clean the datasets and merge them by hand as described in the Appendix (see also Lewellen and Lewellen 2022).

Despite our efforts to clean the data, it seems likely that errors remain. Therefore, as a final check, we took a random sample of 30 firms from 2017 (15 large firms and 15 small firms, defined relative to the median) and manually compare insider ownership from Factset with 'Beneficial Ownership' in the firm's proxy statements on EDGAR. In most cases, Factset data matches closely the amounts reported in the beneficial ownership table after adjusting for detailed information in the footnotes. (The most common adjustments are subtracting options exercisable within 60 days and correcting for double counting of ownership due to complex ownership arrangements by family members and trusts.) We provide two examples in the Appendix, a straightforward

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[2] Much of our analysis focuses on ownership structure at the end of the sample, 2015–2017. Our data for voting rights should be quite accurate for those years since we read recent proxy statements (and since most firms do not have multiple share classes, rendering the issue for them moot). We do not have voting rights data prior to 2006 and, because we extrapolate voting rights backward from recent proxy statements, the data prior to 2015 likely have more errors. Thus, our conclusions regarding voting rights primarily concern the 2015–2017 analysis and are more speculative for earlier years.

case (McDonald's) and one of the more complicated cases we came across (Marriott). Factset seems to incorporate the footnote disclosures carefully, though in some instances we are unable to replicate Factset's exact numbers. For the 30 firms, the average absolute deviation between insider ownership from Factset and our calculations is 0.3% of shares outstanding (median of 0.0%). The deviation is smaller than 0.1% of shares outstanding in 20 of the 30 cases and generally seems to stem from a different interpretation of the footnotes (in a few cases, Factset appears to incorporate other information as well).

3.1 Summary statistics

Table 1 provides an overview of U.S. corporate ownership from 1982–2017, breaking the sample into 3-year intervals. The data start in 1982 for institutional investors and in 2006 for insider and affiliates. Many of our tests focus on the final period, 2015–2017, for which ownership data should be the most complete and most representative of current ownership structures.

We report institutional ownership for all firms on CRSP and insider and affiliate ownership for the subset on Factset. The average number of firms in each cross section is shown in the final column ('*N*'). Observations are yearly for insiders and affiliates because they come from proxy statements (thus, *N* in the top two panels is the average number of firms per year) but quarterly for institutional investors since they come from 13F filings (*N* is the average number of firms per quarter). In tests that combine the samples, we merge insider and affiliate ownership to institutional ownership for the closest quarter-end.

Institutional ownership (IO) rises significantly over time. The value-weighted average firm in 1982–1984 has 190 institutional shareholders who own 37% of the firm, growing to 1,106 institutional shareholders who own 74% of the firm in 2015–2017. IO is lower for the equal-weighted average firm but rises more substantially, from 14% in 1982–1984 to 61% in 2015–2017. The trends reflect an increase in the number of institutions in the sample (rising from 558 to 4,180 over the 36 years) and an increase in the average institution's size (rising from $2.0 billion to $5.0 billion, in 2017 dollars, as measured by their 13F stockholdings). Nearly every firm at the end of the sample (99.7% of firms on CRSP, representing nearly 100% of market cap) has at least one institutional shareholder and most firms are majority owned by institutions.

Insider and affiliate ownership decline modestly from 2006 to 2017. Insider ownership drops from 3.8% to 3.4% for the value-weighted average firm and from 10.7% to 9.2% for the equal-weighted average firm during the sample, while affiliate ownership drops from 2.8% to 1.8% on a value-weighted basis and from 5.2% to 4.7% on an equal-weighted basis. Affiliate ownership is highly skewed: most firms have virtually no affiliate ownership, but 10% of firms have affiliates that own more than 15% of the firm.

When we merge the data, average IO for the subsample of firms on Factset is very similar to average IO in the full sample. For example, from 2015–2017, value-weighted average IO for Factset firms is 74.0%, compared to 73.7% in Table 1. In the Factset sample, insiders, affiliates, and institutions together own 79.2% of the value-weighted average firm and 76.3% of the equal-weighted average firm from 2015–2017. The three groups own more than half the equity for 82% of firms, more than 75% of equity for 61% of firms, and more than 90% of equity for 37% of firms.

As mentioned earlier, our results are similar if we measure ownership using voting or cash flow rights (Table 1 focuses on cash flow rights). The main difference is that insiders have higher voting rights than cash flow rights, though the overall percentage remains low. For the value-weighted average firm in the Factset sample from 2015–2017, insider ownership based on voting rights is 6.0% (compared with 3.4% for cash flows), affiliate ownership is 2.0% (compared with 1.8% for cash flows), and IO is 70.5% (compared with 74.0% for cash flows). Insiders' greater share of voting rights is driven by a relatively small number of firms: median insider ownership is nearly identical using either voting or cash flows, but the value-weighted 90th percentile is 18.4% based on voting rights and 11.2% based on cash flow rights.

4 Ownership structure

Ownership structure—how ownership is distributed across investors—is a key factor in corporate governance. In this section, we study both the ownership structure of U.S. firms from 2015–2017 and how ownership structure varies over time and across firms.

4.1 All firms

To begin, Table 2 reports the cross-sectional distribution of different measures of ownership structure from 2015–2017, and Fig. 1 plots the ownership of a firm's top institutional shareholders, sorted either by rank or for all institutions above a given ownership threshold (1%, 2%, …, 9%).

Four facts stand out. First, institutional ownership is often fairly concentrated. For the value-weighted average firm, the top institutional shareholder owns 8.5% of equity, the top three institutional shareholders own 20.4% of equity, and the top 10 institutional shareholders own 37.1% of equity. The value-weighted average firm has 13.6 institutional shareholders with stakes greater than 1% who collectively hold 42.2% of the firm, 4.9 institutional shareholders with stakes greater than 3% who hold 28.4% of the firm, and 2.8 institutional shareholders with stakes greater than 5% who hold 20.1% of the firm. In comparison, insiders and affiliates own just 3.4% and 1.8% of the firm, respectively. Thus, a small number of institutional shareholders often own a significant share of many firms and a much greater share than insiders. The top institutional shareholder owns more equity than insiders in more than 85% of firms, and the top three institutional shareholders together own more equity than insiders in 93% of firms (value-weighted).

An alternative measure of ownership concentration is the number of institutions an activist would need to contact to reach investors holding, say, 25% or 50% of equity. La Porta et al. (1999) suggest that relatively low ownership can impart significant control (they focus on 20% for a single investor), while a 50% threshold leads to formal control. In our sample, a median of 5.0 institutions are needed to reach 25% ownership and 27.2 institutions are needed to reach 50% ownership (both numbers are calculated for the subset of firms with IO greater than the given threshold; those firms represent more than 93% of total market cap). The means are larger (6.6 and 48.6 respectively) because the counts are highly skewed, reflecting the fact that a small number of firms have highly diffuse ownership.

A second noteworthy fact is that smaller institutional blockholders with stakes of 1%–5% collectively own more equity than the larger blockholders studied in the literature. For the value-weighted average firm, 22.1%

of shares are held by smaller blockholders (10.8 institutions per firm), compared with 20.1% of shares held by institutions with stakes greater than 5% (2.8 institutions). While a stake of 1%–5% is a small fraction of the firm, it can still create significant incentives to monitor the firm, engage with management, and work with other shareholders (e.g., Lewellen and Lewellen 2022). Collectively, small blockholders would seem to be as important as large blockholders, and including them in an analysis of ownership concentration suggests a greater governance role for institutional investors.

Third, the equal- and value-weighted averages are remarkably similar for most measures of institutional ownership concentration, including ownership by the top institutional shareholders and the number of block-holders. The main difference between the two is that the value-weighted average firm has many more small institutional shareholders. For example, the ownership of a firm's top 25 institutional shareholders is nearly identical for the two averages (50.6% vs. 49.8%), but total IO is much lower for the equal-weighted average (61.4%) than the value-weighted average (73.7%). These results are surprising because the literature suggests that ownership concentration is strongly negatively related to size. We explore the link between firm size and ownership concentration in more detail below.

The fourth key result is that ownership structure varies substantially across firms. For example, comparing the 10th and 90th percentiles of the value-weighted distribution, the ownership of the top institutional shareholder varies from 5.8% to 12.3%, the ownership of the top 3 institutional shareholders varies from 15.6% to 27.2%, and the ownership of the top 10 institutional shareholders varies from 26.1% to 50.8%. The number of greater-than-1% institutional blockholders varies from 8.0 to 20.1 and their ownership share varies from 24.9% to 63.7%. (The spreads are even greater if firms are equally weighted.) These number suggest considerable variation in the governance role of institutions. Our tests below ask whether the variation across firms is related to firm characteristics proposed in the literature.

Fig. 2 shows that ownership by a firm's top institutional shareholders rises steadily during the sample. The top institutional shareholder held 5.1% of shares and the top 10 institutional shareholders held 16.7% of shares of the value-weighted average firm in 1981, growing to 8.7% and 37.4%, respectively, in 2017. The number of

greater-than-1% blockholders increases from 6.6 to 13.5 and their ownership increases from 15.4% to 42.2%. In parallel, the number of institutional shareholders needed to reach 25% ownership declines from 27.3 to 6.3 and the number needed to reach 50% ownership declines from 93.1 to 44.2. In short, the concentration of institutional ownership has risen steadily over the last decades.

Several studies report that activist campaigns, proxy fights, and shareholder-sponsored proposals have all increased in recent decades. For example, Fos (2017) documents a rise in the frequency of proxy contests in the 1980s and 1990s and reports that their incidence positively correlated with the firm's institutional ownership. While correlated trends obviously do not imply causality, they raise the possibility that an increase in ownership concentration has contributed to the rise in shareholder activism.

4.2 The cross section of ownership structure

We noted above that ownership structure varies substantially across firms. Here, we study how much of the variation can be linked to firm characteristics that theoretically should affect ownership. Our goal is not to test specific theories but, rather, simply to understand how ownership varies across different types of firms, focusing on four characteristics discussed in the literature: firm size, age, turnover, and volatility.

4.2.1 Background

Firm size. Demsetz and Lehn (1985) argue that larger firms should have more diffuse ownership, in part because firms sell equity as they grow and in part because a larger firm's risk is optimally shared by a greater number of investors. Of course, firm size likely correlates with many factors that might influence ownership structure, including stock liquidity, information costs, regulation, and institutional arrangements like indexing. Demsetz and Lehn, Holderness (2009), Edmans and Holderness (2017), and Hadlock and Schwartz-Ziv (2019) find a strong negative relation between size and ownership concentration.

Firm age. Helwege, Pirinsky, and Stulz (2007) observe that newly listed firms typically have high insider ownership but become more widely held over time as insiders sell stock and firms issue new shares (see also Franks, Mayer, and Rossi 2009). Holderness (2016) and Edmans and Holderness (2017) find that firm age,

like size, is strongly negatively related to large blockholder ownership.

Share turnover. The relation between ownership structure and stock liquidity is complex. The traditional view is that greater liquidity worsens governance because it allows blockholders to exit more easily, reducing the incentive to intervene and, presumably, inducing a negative relation between liquidity and blockholdings. Blockholdings could also directly affect liquidity by changing the number of shares held by small investors. On the other hand, Maug (1998), Edmans (2009), Edmans and Manso (2011), and others point out that (i) greater liquidity lowers the costs to acquire a larger block in the first place, and (ii) greater liquidity and informed trading can make the threat of exit more effective. Edmans and Manso show that liquidity can also affect the optimal the number of blockholders.

Volatility. Demsetz and Lehn (1985) argue that volatility will be positively related to ownership concentration because noisier environments make monitoring more difficult, providing stronger incentives for tighter control. Conversely, a stable or highly regulated firm has less 'control potential' and can support more diffuse ownership. A counterargument would be that high idiosyncratic volatility raises the benefits of risk sharing, which should lead to more diffuse ownership.

Clearly, a firm's ownership structure might affect, and be affected by, many different factors, none of which is likely to be captured perfectly by size, age, turnover, or volatility. Our analysis highlights systematic patterns in the data but does not try to establish causation.

4.2.2 Portfolios

Table 3 provides an initial look at the link between firm characteristics and ownership structure. In panel A, we report the ownership structure of firms sorted into size (market cap) quintiles based on NYSE breakpoints. In panels B, C, and D, we report the ownership structure of firms sorted into quintiles based on age, share turnover, and return volatility *within each size quintile* (e.g., the 'low-turnover' group includes firms with low turnover relative to similar-sized firms). The double-sorting approach provides a simple way to control for size yet maintains the interpretability of portfolio averages (we report regressions below). Age is measured as

the number of months the firm has been on CRSP (a proxy for time since listing, consistent with Helwege, Pirinsky, and Stulz 2007). Turnover equals shares traded divided by shares outstanding during the prior 12 months. Volatility equals the sum of squared daily returns during the prior 12 months.

Size. Nearly every dimension of ownership structure varies with firm size. The general picture that emerges is (i) larger firms have less insider and affiliate ownership; and (ii) institutional ownership typically increases with size but is highest and most-concentrated for *mid-cap* firms. Insider and affiliate ownership decline from 13.0% and 6.7%, respectively, for the smallest firms to 3.0% and 1.9% for the largest firms. In contrast, institutional ownership is 41.6% for quintile 1, doubles to 84.4% for quintile 3, and drops back to 77.5% for quintile 5. The top institutional shareholder owns 12.1% of shares in quintile 3, compared with about 9.0% in the top and bottom quintiles, and the top 10 institutional shareholders own 49.1% of shares in quintile 3 but 31.9% of shares in quintile 1 and 39.0% of shares in quintile 5. Mid-cap firms also have the most blockholders and highest block ownership using any block threshold (1%, 3%, etc.). We will see later that the top institutional shareholders in mid-cap firms also invest a relatively large fraction of their portfolios in the firm, reinforcing their incentives to be engaged.

The non-monotonic link between ownership concentration and firm size has not been previously reported— indeed, our results run counter to the general conclusion in the literature that size and ownership concentration are negatively related. Diversification and wealth constraints, while important for individuals, do not seem to be barriers to institutional ownership concentration, except perhaps for the very largest firms.

It is useful to compare insider and institutional ownership within each quintile: Insiders and affiliates own 19.7% of small firms while institutional blockholders (stakes > 1%) own 34.1%; insiders and affiliates own 9.0% of mid-cap firms while institutional blockholders own 63.2%; insiders and affiliates own 4.9% of large firms while institutional blockholders own 45.0%. These numbers suggest a shift from 'insider governance' to 'institutional governance' as firms grow, reflected in a deep pool of institutional blockholders with substantial voting power in mid- and large-cap firms. The higher ownership of insiders in small firms better aligns their

interests with other shareholders but may also insulate them from discipline.

In untabulated results, we find that institutional ownership concentration has risen the most for mid-cap firms in recent decades. For example, firms in size quintile 3 had fewer institutional blockholders (stakes > 1%) than large-cap firms in 1999 (12.3 vs. 13.8), and those blockholders owned less of the firm (35.1% vs. 35.9%), opposite the pattern in Table 3 for 2015–2017. The increasing role of institutional investors in mid-cap firms is consistent with Pavlova and Sikorskaya's (2022) finding that mid-cap stocks are now more likely to be included in mutual fund benchmarks.

Age. Affiliate ownership is highest for young firms but, otherwise, the ownership structures of young and old firms are surprisingly similar. Affiliates own 8.3% of young firms and 3.6% of old firms, while insiders and institutions own roughly 9% and 60%, respectively, of firms in all age quintiles. Young firms have fewer institutional blockholders, but the ownership of those blockholders is actually greater than average (as are the holdings of a firm's top 1, 3, and 10 institutional shareholders). The results suggest that institutions are an important part of the ownership structure of even recently listed firms.[3]

Turnover. In panel C, low-turnover firms have the highest insider ownership but the lowest and the least-concentrated institutional ownership. Insiders and affiliates own 22.7% of shares in quintile 1 but 9.7% of shares in quintile 5, while institutions own 46.2% of shares in quintile 1 and 67.9% of shares in quintile 5. Low-turnover firms have 9.6 institutional blockholders with stakes greater than 1%, compared to 15.0 for high-turnover firms, and a firm's top 10 institutional shareholders own 31.7% of low-turnover firms but 41.8% of high-turnover firms. The results are consistent with the idea that institutions in general prefer liquid stocks and that higher liquidity facilitates block ownership.

Volatility. In panel D, stock volatility has a weak or non-monotonic relation to most measures of ownership

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[3] Firms in the youngest quintile have been on CRSP for 30.6 months on average. Institutional investors play a smaller role for firms in their first year on CRSP. For that group, total institutional ownership (45.6%), the ownership of institutional blockholders with greater-than-1% (38.1%) or 5% (22.5%) stakes, and the ownership of the top 10 institutional shareholders (35.8%) are all significantly below average.

structure. Insider ownership is about the same for all quintiles, while institutional ownership is highest and most concentrated for medium-volatility firms. For example, firms in quintile 3 have 14.7 institutional block-holders with stakes greater than 1% (who own 50.3% of shares), compared to 13.3 blockholders in quintile 1 (who own 43.9% of shares) and 11.2 blockholders in quintile 5 (who own 41.0% of shares). Institutional shareholders overall seem to be least important for the most-volatile firms.

4.2.3 Regressions

Table 4 reports regressions with all four characteristics, for both the full sample (Panel A) or just firms larger than the NYSE median (Panel B). The characteristics are scaled by their standard deviations, so the slopes can be interpreted as the predicted effect of a one-standard-deviation change in the variables.

The regressions are largely consistent with the portfolio results, but a few interesting results emerge from Table 4. First, size tends to have the strongest relation to most measures of ownership structure, though the slopes on turnover and volatility are often only slightly smaller and occasionally larger (for example, in the blockholder regressions in panel A). Second, firm age is negatively related to institutional ownership and the number of institutional blockholders in the regressions even though it was not in the portfolio sorts. Third, the four characteristics together explain a sizable fraction of the cross-sectional variation in many measures of ownership structure, with an R^2 of 17–52% for over half the measures in panel A and 10–28% for over half the measures in panel B. This suggests that the effects captured by size, age, turnover, and volatility are of first-order importance for ownership structure.

It is interesting to note that firm characteristics are *not* strongly related to the ownership share of a firm's very top institutional shareholder, explaining just 3.9% of the cross-sectional variation in the full sample and 10.7% among larger firms. Those compare, for example, with R^2s of 33.1% and 24.1%, respectively, in regressions for the ownership share of the top 25 institutional shareholders. The slopes on turnover and volatility also have a different sign in the regression for the top shareholder compared with the regression for the top 25 shareholders. Thus, the ownership shares of a firm's top vs. next largest institutional shareholders seem to be driven by different effects. This observation suggests that the very top institutional shareholder is special in

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some sense, which tends to complicate any generic explanation for the importance of 'blockholders' overall. We discuss these observations further below.

5 Top institutional shareholders

Ownership concentration is informative about institutions' ability to influence the firm, but whether (and how) they actually do so depends on their incentives. In this section, we examine the characteristics of a firms' top institutional shareholders to shed light on their incentives. We are particularly interested in how the top shareholders vary across firms in order to understand whether different types of institutions have a comparative advantage monitoring different types of firms, as revealed by their holdings.

Institutions can be classified many different ways. The attributes we examine capture an institution's size, diversification, turnover, and the degree to which the institution is vested in the firm. Specifically, we look at five characteristics: *AUM rank* is the institution's value-weighted rank in the distribution of AUM (defined as the fraction of total AUM held by institutions of equal or lesser size); *Firms owned* is the number of firms in the institution's portfolio; *Turnover* is the institution's quarterly turnover, based on the change in its portfolio holdings from the beginning to the end of the prior quarter; *Portfolio R^2* is the R^2 when weekly returns on the institution's portfolio are regressed on market returns over the prior 6 months; and *Portfolio weight* equals a firm's weight in the institution's portfolio. Following prior studies, we use *Portfolio weight* as a proxy for investor attentiveness torward the firm (Fich, Harford, and Tian 2015; Edmans and Holderness 2017; Kempf, Manconi, and Spalt 2017; Gilje, Gormley, and Levit 2020).

5.1 All firms

Table 5 reports the characteristics of firms' top institutional shareholders, specifically, institutions with the 1st, 3rd, 5th, 10th, and 25th largest stakes in a firm or blockholders with stakes larger than 1%, 3%, 5%, or 7%. Fig. 3 plots characteristics of the full set of top shareholders ranked 1 to 40 and of blockholders above multiple thresholds. The sample period is 2015–2017 (we extend the sample later).

The analysis reveals several key patterns. First, a firm's top institutional shareholders tend to be large, trade

less than other institutions, and invest a disproportionate amount of their portfolios in the firm. For example, focusing on value-weighted averages, blockholders with greater-than-1% stakes fall at the 62nd percentile of the AUM distribution (compared to roughly the 50th percentile for the value-weighted average institution), have quarterly turnover of 6.6% of their portfolio (compared with 8.2% for the average institution), and invest 1.9% of their portfolio in the firm (compared with the firm's weight of 0.49% in the market portfolio). Thus, based on multiple metrics, top shareholders seem well-positioned to be effective monitors: not only do they have the most money invested in the firm and highest ownership stakes (and thus greatest ability and incentives to influence management), but they also trade less (suggesting longer horizons) and invest a large fraction of their portfolios in the firms (suggesting greater attentiveness).

Second, the top shareholders of the equal-weighted average firm are much smaller than the top shareholders of the value-weighted average firm, based on either AUM or number of firms held. For example, blockholders with greater-than-1% stakes in the equal-weighted average firm fall at the 43rd percentile of the AUM distribution, substantially below the 62nd percentile for the value-weighted average firm. The top shareholders of the equal-weighted average firm also overweight the firm much more relative to the market: blockholders with greater-than-1% stakes invest 1.3% of AUM in the firm and blockholders with greater-than-5% stakes invest 2.7% of AUM, more than 50 times the firm's weight in the market portfolio (0.02%). The differences between the equal- and value-weighted averages suggest a tendency for institutions to match with firms on size, a phenomenon we explore in more detail below.

Third, within the set of top shareholders, the institution with the very largest stake stands out as unusual. The very top institution is often smaller, trades less, and invests a substantially higher fraction of AUM in the firm compared with the next-ranked shareholders (the patterns are easiest to see in Fig. 3). The last effect is especially strong: The portfolio weight of the top shareholder is 2.6% for the value-weighted average firm and 3.5% for the equal-weighted average firm, compared with 1.5% and 1.6% respectively, for the institution with the second-largest stake and 1.3% and 1.2%, respectively, for the institution with the third largest stake. The top institution also holds a more-concentrated portfolio overall, as indicated by a lower portfolio R^2 compared with the next-ranked shareholders. The high portfolio weight and ownership share suggests the very top

shareholder plays an outsized role in governance. The results also imply that the very largest institutions choose not to be the very largest shareholders in many firms.

Fig. 4 explores how the characteristics of firms' top institutional shareholders have changed through time. The observations above for 2015–2017 largely apply to earlier years as well, but the graphs show two interesting trends. First, Panel A reveals a steep increase in the top shareholder's portfolio weight for the equal-weighted average firm and a steep decrease for the value-weighted average firm. The former more than doubles from roughly 1.5% in the 1980s to 3.5% in the last few years, while the latter drops from 7.8% to 2.6%. The trends in Figs. 2 and 4 for the equal-weighted average firm suggests that the top shareholder in smaller firms has become both more powerful and more attentive through time, leading to stronger monitoring incentives. The top shareholder of the value-weighted average firm has a larger stake today (Fig. 2) but the investment makes up a much smaller fraction of the portfolio (Fig. 4), providing a contrasting image of how the institution's monitoring incentives have changed for larger firms.

The second interesting pattern, in Panel D, is that the turnover of top institutional shareholders trends downward in the last 8 or 9 years. For the value-weighted average firm, the portfolio turnover of a firm's top shareholder was 10.2% in the 1980s, 8.9% in the 2000s, and 5.0% in the 2010s. The trend provide no evidence that top shareholders have become more short-term oriented during the last decades, despite the substantial rise in aggregate stock trading volume during this period.

5.2 Matching: top shareholders as a function of firm characteristics

The equal- and value-weighted results above suggest that the top shareholders of small firms and large firms differ. In this section, we study the match between top shareholders and firm characteristics in greater detail. The goal is to shed light on whether different types of institutions have a comparative advantage monitoring different types of firms.

Table 6 reports characteristics of the top shareholders of firms in size, age, turnover, and volatility quintiles. Again, size portfolios are determined by NYSE breakpoints, and the age, turnover, and volatility portfolios are

based on double-sorted portfolios controlling for size.

Panel A shows that the top institutional shareholders of small and large stocks are, indeed, very different: The top shareholders of smaller firms are significantly smaller, hold fewer firms, and have higher portfolio turnover than the top shareholders of large firms. For example, for firms in quintile 1, the top shareholder has an AUM rank of 34.5%, holds 331 firms, and has quarterly portfolio turnover of 11.0%, compared with an AUM rank of 82.8%, a portfolio of 1,732 firms, and quarterly turnover of 4.1% for the top shareholder of firms in quintile 5. (The differences are all statistically significant.) The cross-sectional patterns are similar for institutions with the 3rd, 5th, and 10th , and 25th largest stakes (with the exception that the 25th ranked shareholder in quintile 1 holds more firms than the 25th ranked shareholder in quintile 5).

The portfolio weights in the top row of Panel A exhibit a non-monotonic pattern across quintiles. The top shareholder of firms in quintile 1 invests 3.4% of AUM in the firm, jumping to 4.3% for quintile 2, and then declining monotonically to 1.8% for large firms in quintile 5. The high portfolio weight invested in small- and mid-cap firms is especially striking given the firms' size and in comparison to the next-ranked shareholders. For lower-ranked shareholders outside the top five, portfolio weights increase monotonically with size and line up more closely with the firms' weights in the market portfolio.

The results suggest that (i) small institutions have a comparative advantage monitoring smaller firms, and (ii) the top shareholders of small- to mid-cap firms hold especially sizable stakes, both as a fraction of shares outstanding (Table 3) and as a fraction of their portfolios (Table 6). The top shareholders of firms in quintiles 2 and 3 seem to have a particularly strong incentive to be engaged.

It is interesting to consider what might explain the 'size matching' we observe (we are not aware of existing theory). Diversification and wealth constraints may explain why small institutions are not the top shareholders in large firms but cannot explain the reverse, why large institutions are not the top shareholders in small firms. One clue for an explanation can be found in Table 6: across all size quintiles, a firm's top shareholders have a significant fraction of AUM invested in the firm, suggesting that portfolio weight is an important factor for

monitoring and governance. It would be easy for large institutions to hold a large stake in smaller firms, while committing only a tiny fraction of their capital to the firm, but the evidence implies that this structure must not be optimal or efficient.

An alternative version of the argument is that being a top shareholder entails significant fixed costs that increase with an institution's size, which makes small dollar blockholdings unprofitable for large institutions. Fixed costs might arise if, conditional on being a top shareholder, it is in the institution's interest to be well-informed and to play a more active role in governance. Such involvement requires spending resources to learn about the firm, to establish a relationship with management, or to fulfill costly disclosure requirements. These costs might increase with institution size if larger institutions face organizational frictions that make it more difficult for them to incentivize their employees to engage with firms. A better understanding of these effects would be worthwhile for future research.

Other firm characteristics. The top institutional shareholders also vary with a firm's age, turnover, and volatility (Panels B, C, and D), but the effects are more modest than for size portfolios. Older, higher-turnover, and less-volatile firms have larger top shareholders than firms at the other ends of the spectrum. Firms with higher share turnover have top shareholders that trade more, but older and less-volatile firms have top shareholders that trade less. The patterns reinforce our finding that different types of institutions systematically match to different types of firms.

Regressions. Table 7 reports regressions that explore the joint explanatory power of firm size, age, turnover, and volatility for the characteristics of top institutional shareholders. The results are largely consistent with the portfolio results above: the characteristics of top shareholders vary significantly with firm size and age and, to a lesser extent, share turnover and volatility. The main new result in Table 7 is that share turnover and, in some instances, volatility are linked differently to the characteristics of the very top shareholders than the characteristics of lower-ranked shareholders. In the regressions, firms with higher share turnover have top shareholders (ranks 1 and 3) that are larger and trade less but lower-ranked shareholders (ranks 10 and 25) that are smaller and trade more. The results again suggest that the very top shareholders of a firm are 'special'

compared to other shareholders.

5.3 The role of the Big 3

The analysis above shows (i) the top shareholders of small firms and large firms are quite different and (ii) a firm's top-ranked shareholder is often smaller than its next-ranked shareholders. Both facts potentially reflect the investment choices of the very largest institutions, in particular, the 'Big 3' of Vanguard, Blackrock, and State Street. Each owns more than $1 trillion of U.S. common stock at the end of 2017 and, together, the three institutions hold more than 16% of the equity in our sample. As such, it is interesting to study their incidence among top shareholders in general and how their ownership varies with the size of the firm.

Table 8 provides an overview of the three institutions' ownership of U.S. firms. The institutions are large shareholders in most firms, with a bias toward larger stocks: Vanguard, Blackrock, and State Street own 6.4%, 6.1%, and 3.9%, respectively, of the value-weighted average firm and 4.5%, 5.0%, and 1.7%, respectively, of the equal-weighted average firm (medians are similar). Vanguard and Blackrock are among the top three shareholders of more than 50% of firms and among the top 10 shareholders of more than 85% of firms (State Street is a top-3 shareholder in 4.8% of firms and a top-10 shareholder in 43.4% of firms). Their ownership stakes vary substantially across firms—they certainly do not simply hold the market portfolio—but all three institutions are greater-than-1% blockholders for most firms in the sample (85.4% for Vanguard, 77.8% for Blackrock, and 60.7% for State Street).

Table 9 looks in detail at how each institution's ownership varies with firm size. We report the fraction of firms in each size quintile that are held more or less by each institution, measured either by their ownership stakes or ownership rank among institutional shareholders. The numbers again show the strong size tilt of the three institutions. Vanguard is a top-three institutional shareholder for 26.7% of small firms and 90.1% of large firms and a greater-than-5% blockholder in 8.3% of small firms and 90.3% of large firms. Similarly, Blackrock is a top-three shareholder for 34.4% of small firms and 82.8% of large firms and a greater-than-5% blockholder in 24.3% of small firms and 85.0% of large firms. State Street, the smallest of the three, owns less than 5% of shares for most firms in all size quintiles and is typically between the 4th and 10th largest

shareholder (except in the smallest firms where it often holds no shares (45.7% of firms) or falls outside the top 10 shareholders (33.8% of firms)).

It is also interesting to note that, although Vanguard and Blackrock are easily the largest insititutions in our sample, they are more likely to be a firm's second-ranked shareholder than its very top shareholder. For example, for small-cap firms, either Vanguard or Blackrock is the top shareholder in 16.1% of firms and the second-ranked shareholder in 21.5% of firms. The same numbers are 48.5% and 60.0%, respectively, for mid-cap stocks and 55.1% and 73.0% for large-cap stocks.

In short, Vanguard and Blackrock, and to a lesser extent State Street, are typically among the top shareholders of mid- and large-cap firms and, for those firms, have an especially important role in corporate governance. They are also significant shareholders in smaller firms but are less likely to be large blockholders or among the very top institutional shareholders, consistent with our earlier evidence that smaller institututions tend to be the top shareholders of smaller firms.

6 Ownership stability

Our tests so far focus on a firm's ownership at a given point in time. Of course, ownership changes through time, as recognized by the large literatures on trading volume, mutual fund turnover, and the trading decisions of institutional investors. However, we do not know of any direct evidence on the stability of a firm's ownership—what fraction of a firm's owners remain the same from one date to another—which has only a loose connection to trading volume.

The stability of a firm's ownership is interesting for several reasons. There is a long-standing concern in both the academic literature and financial press that 'myopic' investors cause managers to focus excessively on short-term performance at the expense of long-term profits (e.g. Stein 1988, 1989; Edmans 2009; Benmelech Kandel, and Veronesi 2010). This concern has grown in recent decades along with trading volume but, as noted above, share turnover and ownership turnover may be quite different (a small fraction of shares could trade frequently among investors, leaving the majority of ownership intact). Second, the theoretical literature

shows that the threat of 'exit' can help discipline managers but there is little evidence of how often large shareholders trade in practice.

We measure ownership turnover as the fraction of shares that change institutional owners from one quarter or year to the next (from date t-1 to t). In particular, for each firm i and institution j, we calculate the change in the institution's ownership as $dFrac_{ij,t} = Frac_{ij,t} - Frac_{ij,t-1}$, where $Frac_{ij,t}$ is the ownership share on date t. Total purchases by institutional investors in firm i equal the sum of $\max(0, dFrac_{ij,t})$ and total sales equal the sum of $-\min(0, dFrac_{ij,t})$ (summing over all institutions). Ownership turnover is then defined as the maximum of total purchases and total sales. This calculation avoids double counting when one institution trades with another. If total institutional ownership is constant, total purchases equal total sales, and ownership turnover just equals the fraction of shares that change institutional hands during the period. If total institutional ownership increases or decreases, ownership turnover equals the fraction of shares that change institutional hands during the period (implicitly the smaller of total purchases and total sales) plus net trades with non-institutional investors. We also calculate ownership turnover just for blockholders that own more than 1% of the firm at the start of the period (conditional on $Frac_{ij,t-1} > 1.0\%$).

6.1 All firms

Table 10 summarizes the cross-sectional distribution of institutional turnover and, for comparison, the level of institutional ownership reported earlier in Table 2.

Institutional ownership is surprisingly stable, at least in comparison to aggregate trading volume. While institutions own 73.7% of the value-weighted average firm, only 6.8% of shares change institutional ownership each quarter and 15.6% of shares change institutional ownership each year. A firm's top institutional shareholders have an even lower propensity to trade: Institutions with greater-than-1% stakes hold 42.2% of the firm but have ownership turnover of just 2.7% quarterly and 7.0% annually. (For comparison, total share turnover from CRSP is 64.6% quarterly and 258.5% annually.) Thus, the vast majority of a firm's institutional ownership remains the same from one year to the next. The results provide little support for the idea that the typical institutional owner has a short horizon.

Ownership turnover is somewhat higher for the equal-weighted average firm, but the basic picture is similar. Institutions own 61.4% of the equal-weighted average firm, but only 8.8% of shares change institutional ownership each quarter and 20.9% of shares change institutional ownership each year. Among top shareholders, institutions with greater-than-1% stakes own 46.0% of the firm but have ownership turnover of 4.9% quarterly and 12.3% annually.

Fig. 5 shows how ownership turnover has changed through time. Ownership turnover trends upward until the late 2000s, along with an increase in overall institutional ownership. However, while institutional ownership continues to rise in the last decade, ownership turnover generally declines. For the value-weighted average firm, IO rises from 63.6% in the 2000s to 72.2% from 2010–2017, while ownership turnover drops from 9.8% to 7.6% quarterly. In recent years, a larger proportion of institutional ownership remains the same from one quarter to the next, suggesting an increase in investor horizon.

6.2 Cross section of ownership turnover

Table 11 repeats the analysis for size, age, turnover, and volatility portfolios. Relatively low ownership turnover is universal across all types of firms, though the cross-sectional patterns are somewhat obscured by the different level of IO for different firms. Ownership turnover is less than 13.4% quarterly and 30.3% annually across all of the portfolios, hitting its maximum, quite intuitively, for firms with the highest share turnover (though it is useful to note that ownership turnover makes up only a small fraction of total trading volume for these firms, which equals 158% quarterly). Ownership turnover compares with total IO of 67.9% for that group of firms. Thus, even at the high end, the majority of institutional ownership remains the same from one year to the next.

In terms of the cross-sectional patterns, it seems most useful to focus on the ratio of ownership turnover to IO rather than the simple level of ownership turnover. Based on this metric, ownership turnover is highest for small, young, high share turnover, and high volatility firms. The ratio of quarterly ownership turnover to IO equals 16.6% for the smallest firms (6.9% ownership turnover divided 41.6% IO), 18.6% for the youngest firms (11.1/59.6), 19.7% for firms with the highest share turnover (13.4/67.9), and 19.6% for the most-volatile

firms (10.6/54.2). Ownership turnover to IO is about half as large, ranging from 8.4% to 11.8%, for large, old, low-share-turnover, and low-volatility firms.

Table 12 considers the joint explanatory power of firm characteristics for the cross section of ownership turnover. We report two regression models, one with just the four characteristics as explanatory variables and a second controlling for the level of institutional ownership. Focusing on the latter, the results are consistent with the portfolio analysis above, with a strong negative relation between ownership turnover and firm size and age, and a strong positive relation between ownership turnover and share turnover and volatility. (The slopes on size, age, and turnover are of similar magnitude, while the slopes on volatility are smaller.) Overall, firm characteristics explain 24.5%–45.5% of the cross-sectional variation in ownership turnover used alone and 38.3%–56.5% together with the level of IO. Thus, the characteristics again seem to capture effects of first-order importance.

The bottom line is that ownership turnover is relatively low overall but especially for larger, older, low volatility, and low share turnover firms. The results are reliable in the full sample and among larger firms, and similar for institutional shareholders overall and among a firm's top institutional blockholders.

7 Conclusions

Our paper studies the ownership structure of U.S. firms using a comprehensive database of insider, affiliate, and institutional holdings that captures nearly 80% of U.S. corporate ownership. Prior studies typically focus on insiders and large blockholders, but those groups own a minority of U.S. publicly traded firms—just 25.3% of the value-weighted average firm in our sample (see also Dlugosz et al. 2006; Holderness 2009; Hadlock and Schwartz-Ziv 2019). Our data allow us to study ownership structure in greater detail, using more complete measures of ownership concentration, and to provide novel evidence on the link between firm and shareholder characteristics and the stability of institutional ownership.

Corporate ownership has shifted significantly toward institutional investors in the last decades. By the end of our sample, insiders and affiliated entities own just 5.2% of the value-weighted average firm. In comparison,

the firm's top five institutional shareholders own 27.6% of shares, its top 10 institutional shareholders own 37.1% of shares, and its top 25 institutional shareholders own 49.8% of shares. The high concentration of institutional ownership, and the low holdings of insiders, suggests that institutional investors play a central role in corporate governance and have both an incentive and ability to monitor management. The concentration of institutional ownership is especially important given changes in SEC rules that make it easier for shareholders to communicate with each other, to share pre-solicitation material prior to a formal proxy contest, and to solicit proxies from up to 10 other shareholders without triggering the rules associated with public proxy contests. These actions are less costly and more effective when ownership is concentrated and the identity of shareholders is public information.

The shift toward concentrated institutional ownership occurs for firms of all sizes, but the governance role of institutions is most pronounced for mid- and large-cap firms. Insiders and affiliates own 19.7% of small firms, 9.0% of mid-cap firms, and 4.9% of large firms, while institutional blockholders (stakes > 1%) own 34.1% of small firms, 63.2% of mid-cap firms, and 45.0% of large firms. The higher concentration of institutional ownership for larger companies, and the non-linearity between size, institutional ownership, and ownership concentration, has not been noted previously in the literature. Our results suggest that firm size is not a barrier to concentrated institutional ownership, except perhaps for the very largest firms. In general, as firms grow, control seems to shift from 'insider governance' to 'institutional governance,' the latter characterized by a deep pool of institutional blockholders with substantial voting power.

One of our most interesting findings in the link between firm and shareholder characteristics, most notably, that smaller institutions are the top shareholders of smaller firms and larger institutions are the top shareholders of larger firms. The results suggest that the different institutions have a comparative advantage monitoring different types of firms, presumably due to the costs associated with corporate governance. Understanding the patterns is an interesting topic for future research and could help shed light on the economic and organizational forces that shape ownership decisions and, thus, governance structures.

We also find that a firm's very top institutional shareholder seems to be special relative to other shareholders.

The top institutional shareholder is often smaller, trades less, and invests a substantially higher fraction of AUM in the firm compared with the next-ranked shareholders. Moreover, the top shareholder's ownership share is not related to the same firm characteristics that correlate with other measures of ownership structure, such as overall institutional ownership or the stakes held by other large blockholders. Our findings suggests that the top shareholder is different and plays an outsized role in governance.

The governance role of institutional investors is likely enhanced by the stability of institutional ownership. Institutions own 73.7% of the value-weighted average firm but only 15.6% of shares change institutional hands from one year to the next. Among a firm's top shareholders, institutions with greater-than-1% stakes hold 42.2% of the firm but have ownership turnover of just 7.0% annually. Thus, a firm's institutional owners largely remain the same from one year to the next. The results provide little support for the idea that the typical institutional shareholder has a short horizon.

Overall, the picture that emerges is that public U.S. firms have a stable, concentrated set of institutional share-holders with an incentive to be attentive, engaged, and focused on shareholder value. An institution's decision to become a top shareholder in a firm is likely driven by many factors, including the risks and perceived mispricing of the stock, the expectations and interests of the institution's investors, the institution's ability to monitor and influence management, and organizational frictions within the institution. Ownership structures in equilibrium vary systematically across firms and different types of institutions seem to specialize in monitoring different types of firms. Put differently, ownership structures adapt along multiple dimensions, leading to a range of observed governance mechanisms.

Appendix

We group shareholders into three broad categories: institutions, insiders, and affiliates. Institutions are entities that manage investments on behalf of others, such as mutual funds, pension funds, endowments, private equity funds, and hedge funds. Insiders are primarily a firm's officers and directors but also include other individuals with greater-than-5% stakes.[4] Affiliates are all other investors in the data, such as parent corporations, joint ventures, ESOPs, nonprofits, and the U.S. government.

As a general rule, institutions are entities with 13F filings (data from Refinitiv and WRDS), while insiders and affiliates are beneficial owners identified in proxy statements (data from Factset). However, our data sources do not perfectly map into the three categories described above, so we manually check the data to reclassify some investors and to remove duplication.

Duplication

Factset drops institutions from the 'stakeholder' file we use, so the Factset dataset mostly includes individuals and entities that are not in our 13F file. As a check, we manually compare Factset stakeholders and large 13F investors in our main 2015–2017 sample. Specifically, we focus on 13F investors that have at least a 4% stake in the firm (we use a 4% cutoff rather than the proxy statement's 5% cutoff as a precaution), which yields 38,798 investor-firm-quarter observations. For each observation, we search for matches among Factset stakeholders other than individuals and trusts (who are unlikely to be 13F filers). The search is done using a combination of fuzzy matching based on shareholders' names and manual checks. Overall, of the 38,798 investor-firm-quarters, we find only 291 cases of overlap, which we drop from the Factset data. The low incidence of overlap suggests that Factset's initial split into 'primary' and 'institutional' stakeholders does a good job of eliminating 13F filers from the primary file.

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[4] Specifically, proxy statements report ownership by executive officers, directors, and greater-than-5% blockholders. Factset identifies each 'stakeholder' as an individual, trust, company, joint venture, nonprofit, etc., but does not specifically say whether they are officers/directors or blockholders. Our insider group includes all individuals and trusts in the dataset, so an individual blockholder is counted as an insider even if the individual is not an officer or director. It seems likely that most such cases are family members or former executives who have a strong personal connection to the firm's management or board and, thus, might reasonably be described as 'insiders' even if it were possible to separately identify them in the data.

Affiliates vs. institutions

The distinction between institutions and afflilates is not always clear, and some entities that do not seem to be institutional investors nonetheless have 13F filings. These cases are typically corporate investments in other firms but also include a few foundations that are closely affiliated with a specific firm. Examples are Cisco Systems investments in Mulesoft and VMWare, Qualcomm's investment in Fitbit, Banco Santander's investment in Santander Consumer USA, Mitsubishi UFJ Financial Group's investment in Morgan Stanley, Hershey Trust's investment in Hershey Co., and Lilly Endowment's investment in Eli Lilly. All of these holdings are reported in 13F filings yet seem better classified as 'affiliated' investments.

To identify these cases (and keep the task manageable), we focus on large, highly concentrated shareholders in the 13F data from 2015–2017. Specifically, for each firm-quarter, we first identify the firm's top five 13F shareholders and, from that group, keep investors that (i) have at least 30% of their portfolio in the firm or (ii) have a stake of at least 5% in the firm and a portfolio weight of at least 5%. From this list, we flag potential non-institutional shareholdings based on (i) names that contain specific strings ('corp,' 'co,' 'inc,' 'bank,' 'trust,' 'insurance,' 'holding group,' and 'founda'); (ii) names that overlap with the company name (one of the first two words in the firm's name is the same as one of the first two words in the shareholder's name), or (iii) names suggesting the investor is an individual (the name does not contain strings such as 'corp,' 'inc,' 'management,' 'wealth,' 'venture,' 'lp,' etc.). We then manually screen each flagged observation to identify non-institutional shareholders. Overall, this process generates a list of 75 firm-investor combinations (620 firm-investor-quarter observations from 2015–2017) that we reclassify as affiliates rather than institutional investors.

Examples of Factset data

Beneficial ownership in proxy statements may be reported multiple times if the same shares are jointly owned or controlled by several individuals or entities, as indicated in the footnotes to the beneficial ownership table. More generally, the footnotes often describe in detail an individual's direct and indirect holdings (via trusts, partnerships, or other legal entities). We manually reviewed proxy statements for many firms to understand Factset's reporting and, for illustration, provide examples in Tables A1 and A2 that reconcile Factset's data

with numbers from the proxy statement. The first example (McDonald's) is relatively straightforward, while the second example (Marriott Vacations Worldwide) is much more complex.

Cleaning the 13F data

Refinitiv provides 13F data since 1980. However, WRDS documents a number of significant problems with the data after 2013q1 and provides a supplemental dataset for June 2013–December 2017 based on institutions' original 13F filings on EDGAR. Below, we summarize how we clean the data and merge the two datasets (see also Lewellen and Lewellen 2022).

First, to mitigate a potential problem related to split adjustments in the Refinitiv data (see WRDS' *User Guide*), we adjust holdings for stock splits that occur between the 'filing' and 'report' dates using CRSP's adjustment factors.

Second, Refinitiv reports the 13F holdings of Blackrock and Capital Group under multiple entities. We aggregate the holdings of each firm to be consistent with the usual way holdings are reported (at the institution level; see also Ben-David et al. 2021). In addition, we download from EDGAR two quarters of 13F data for Blackrock that are missing from Refinitiv (March and June 2010).

Third, we fix a variety of errors in the raw 13F filings provided by WRDS, including (i) errors in CUSIP numbers; (ii) transposed 'share' and 'value' columns; (iii) inconsistent reporting of Berkshire Hathaway shares (some institutions multiply their holdings of BRK.A by 100 and, implicitly, divide the share price by 100, presumably due to the unusually high price of BRK.A shares); (iv) inconsistent treatment of stock splits that occur between the reporting and filing dates; and (v) inconsistent labeling of whether an amended filing 'adds new holdings' or 'is a restatement.' We identified errors by comparing the reported value of holdings in the 13F file to the value calculated using CRSP stock prices or looking for anomalous changes in holdings or portfolio value from one quarter to the next.[5]

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[5] Institutions report both 'value' and 'shares' for each CUSIP. We rely exclusively on the 'shares' number, using 'value' only to help identify and fix errors. Our filters flagged many filings as having potential errors that we ultimately judged to be fine (in terms of 'shares') because (i) an institution seems to have reported 'value' using prices that were not end-of-

Fourth, we set institutional ownership to 100% of shares outstanding in the small number of cases that institutions appear to hold more than 100% of the firm.

Finally, we link institutions in the Refinitiv and WRDS datasets by name, using AUM and number of holdings as secondary checks. (Much of the matching was done by hand, given the variety of abbreviations and naming conventions used by Refinitiv.) In many cases where an initial match was not found, we traced the issue (via EDGAR or an internet search) to name changes in 13F filings not reflected in the Refinitiv database. In a relatively small number of cases, Refinitiv appears to aggregate or disaggregate 13F filings, i.e., some institutions file under multiple CIKs that Refinitiv combines, and some institutions have holdings reported by another institution that Refinitiv reports separately. In the end, we are able to link the vast majority of institutions in the two databases.

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quarter (i.e., the reported 'value' for each holding is similar to, but randomly different from, our calculated value) or (ii) some non-U.S. institutions appear to report 'value' in foreign currency (i.e., the reported 'value' for every holding deviates from our calculated value by the same percentage amount, consistent with the exchange rate at the time for the country identified in the institution's business address). On a few occasions, where our filters flagged a possible error, we also used 'name of issuer' to fix mistakes with a reported CUSIP number. Finally, in a few instances where our filters flagged an error that we could not explain and fix, we dropped the institution-quarter observation from the sample. However, our approach was to assume 'shares' were correct unless there was a clear, material error.

Table A1: **McDonald's Corp. insider ownership, 2017**
The left-most columns, together with the footnotes below the table, report insider ownership from McDonald's April 13 2017 proxy statement (DEF 14A). The right-most columns show adjustments based on the footnotes (highlighted in bold) that produce the ownership numbers reported by Factset.

Name	Common stock (1)(2)(3)(4)	Stock equivalents (5)	Total	Adjustment, Footnote (2)	Factset
"Security ownership of management"					
Directors					
Lloyd Dean	0	2,981	2,981		--
Robert Eckert	5,000	52,151	57,151		5,000
Margaret Georgiadis	2,130	2,369	4,499		2,130
Enrique Hernandez, Jr.	2,000	72,573	74,573		2,000
Jeanne Jackson	1,666	63,619	65,285		1,666
Richard Lenny	2,288	29,382	31,670		2,288
Walter Massey	5,045	38,502	43,547		5,045
John Mulligan	0	1,743	1,743		0
Sheila Penrose	3,000	22,167	25,167		3,000
John Rogers, Jr.	87,500	48,656	136,156		87,500
Miles White	5,000	12,335	17,335		5,000
Named executive officers					
Michael Andres(6)	62,137	3,752	65,889	-55,264	6,873
Peter Bensen(6)	324,687	23,663	348,350	-308,802	15,885
Stephen Easterbrook	234,020	0	234,020	-231,221	2,799
Douglas Goare	179,213	5,873	185,086	-153,470	25,743
David Hoffmann(6)	63,638	2,380	66,018	-56,023	7,615
Silvia Lagnado	20,611	0	20,611	-11,630	8,981
Kevin Ozan	127,236	2,415	129,651	-112,512	14,724
All directors and executive officers as a group (26 persons)	1,608,041	387,925	1,995,966		

Footnotes from the proxy statement:

(1) Includes unallocated shares held in the Company's 401k Plan as follows: Messrs. Bensen: 7; Goare: 427; Hoffmann: 187; Ozan: 74; and the Group: 736.

(2) Includes shares that could be purchased by exercise of stock options on or within 60 days after March 1, 2017 under the Company's equity plans as follows: Messrs. Easterbrook: **231,221**; Goare: **153,470**; and Ozan: **112,512**; Ms. Lagnado: **11,630** and the Group:**1,326,043**. Includes **55,264 shares** for Mr. Andres: **308,802 shares** for Mr. Bensen and **56,023 shares** for Mr. Hoffmann that could be purchased by exercise of stock options on or within 60 days after the date last served with the Company.

(3) Directors and executive officers as a group have sole voting and investment power over shares of common stock listed in the above table except as follows: (i) shared voting and investment powers for shares held by Messrs. Hernandez: 2,000; Lenny: 2,288; Ms. Georgiadis: 2,130; and Ms. Jackson: 1,174; and (ii) for the benefit of children, shares held by Ms. Jackson: 492.

(4) For Mr. Rogers, includes 87,500 shares of common stock held in a margin account, which amount was pledged prior to the adoption of the Company's current policy with respect to hedging and pledging McDonald's stock.

(5) Includes common stock equivalent units credited under certain of the Company's retirement plans and the Directors' Plan, which are payable in cash.

(6) Amounts for Messrs. Andres and Bensen are as of December 31, 2016 and September 2, 2016, their respective retirement dates and for Mr. Hoffman are as of September 30, 2016, when he resigned from the Company.

Table A2: Marriott Vacations Worldwide Corp. insider ownership, 2017

The left-most columns, together with the footnotes below the table, report insider ownership from Marriott Vacations Worldwide's March 28 2017 proxy statement (DEF 14A). The right-most columns show adjustments based on information in the footnotes (highlighted in bold) that produce the ownership numbers reported by Factset.

Name	"Stock Ownership of Certain Beneficial Owners" Amount and Nature of Beneficial Ownership	Adjustments from footnotes Fn (3)	Fn (7)	Fn (8)	Fn (9)	Fn (10)	Fn (11)	Fn (12)	Fn (15)	Factset
Directors and Nominees:										
C.E. Andrews	7,687 (2)									7,687
Raymond L. Gellein, Jr.	14,976 (2)									14,976
Thomas J. Hutchison III	21,559 (2)(3)	-3,244								18,315
Melquiades R. Martinez	14,976 (2)									14,976
William W. McCarten	16,942 (2)(4)									16,942
Dianna F. Morgan	7,687 (2)									7,687
William J. Shaw	161,940 (2)									161,940
Stephen P. Weisz	295,163 (3)(5)	-114,757								180,406
Named Executive Officers:										
R. Lee Cunningham	64,502 (3)	-25,655								38,847
John E. Geller, Jr.	104,485 (3)	-34,968								69,517
Lizabeth Kane-Hanan	47,633 (3)	-20,445								27,188
Brian E. Miller	42,385 (3)	-19,827								22,558
All directors and executive officers as a group: (16 persons)	903,186 (6)									
Marriott Family:										
J.W. Marriott, Jr.*	2,710,168 (7)(8)(9)		-2,002,797	-334,228	-90,605					282,538
John W. Marriott III*	2,107,642 (7)(10)		-2,002,797			-104,845				--
David S. Marriott	2,097,707 (7)(11)		-2,002,797				-25,900			69,010
Deborah M. Harrison	2,085,107 (7)(12)		-2,002,797					-45,675		36,635
Juliana B. Marriott	2,023,616 (7)(13)		-2,002,797							20,819
Richard E. Marriott	2,016,929 (8)(14)			-334,228						1,682,701
The Juliana B. M. Marital Trust	2,010,810 (7)(15)		-2,002,797						-8,013	--
Stephen Blake Marriott	2,006,844 (7)(16)		-2,002,797							4,047
JWM Family Enterprises, Inc.	2,002,797 (7)									2,002,797
JWM Family Enterprises, L.P.	2,002,797 (7)		-2,002,797							--

Footnotes from the proxy statement (continue on the next two pages):

(1)   Based on the number of shares outstanding (27,134,986) on March 3, 2017, plus the number of shares acquirable by the specified persons within 60 days of March 3, 2017,

as described below.

(2)   Includes shares subject to Non-Employee Director Share Awards currently exercisable or exercisable within 60 days after March 3, 2017, as follows: Mr. Andrews, 7,687 shares; Mr. Gellein, 14,976 shares; Mr. Hutchison, 14,976 shares; Mr. Martinez, 12,837 shares; Mr. McCarten, 14,976 shares; Ms. Morgan, 7,687 shares; and Mr. Shaw, 24,225 shares. With respect to Mr. Hutchison, also includes shares subject to 3,139 stock units ("Non-Employee Director Stock Units") issued to Mr. Hutchison in lieu of annual cash retainers, which are currently exercisable or exercisable within 60 days after March 3, 2017.

(3)   Includes shares subject to SARs currently exercisable or exercisable within 60 days after March 3, 2017, as follows: Mr. Cunningham, **25,655 shares**; Mr. Geller, **34,968 shares**; Mr. Hutchison, **3,244 shares**; Ms. Kane-Hanan, **20,445 shares**; Mr. Miller, **19,827 shares**; and Mr. Weisz, **114,757 shares**. For purposes of determining the number of shares subject to SARs that are beneficially owned by each such person, we have calculated the number of shares that such person could obtain by exercising all vested SARs on March 3, 2017, based on the closing price of our common stock on that date ($93.05).

(4)   Includes 1,966 shares held by a limited liability corporation in which Mr. McCarten owns a 2 percent interest and acts as Manager.

(5)   Includes 36,001 shares held by two grantor-retained annuity trusts.

(6)   Includes an aggregate of 365,302 shares subject to SARs, Non-Employee Director Share Awards and Non-Employee Director Stock Units currently exercisable or exercisable within 60 days after March 3, 2017. For purposes of determining the number of shares subject to SARs that are beneficially owned, we have calculated the number of shares that such persons could obtain by exercising all vested SARs on March 3, 2017, based on the closing price of our common stock on that date ($93.05).

(7)   Includes the following **2,002,797 shares** that J.W. Marriott, Jr., his children John W. Marriott III, Deborah M. Harrison and David S. Marriott, his grandson Stephen Blake Marriott, Juliana B. Marriott, the Juliana B. Marriott Marital Trust, JWM Family Enterprises, Inc. and JWM Family Enterprises, L.P. each report as beneficially owned: (a) 919,999 shares owned by Thomas Point Ventures, L.P.; (b) 290,402 shares owned by Terrapin Limited Holdings, LLC; (c) 744,896 shares owned by JWM Family Enterprises, L.P.; and (d) 47,500 shares owned by Anchorage Partners, L.P. JWM Family Enterprises, Inc., a corporation in which J.W. Marriott, Jr., each of his children, and Stephen Blake Marriott are directors, is the sole general partner of JWM Family Enterprises, L.P., a limited partnership, which in turn is the sole general partner of Thomas Point Ventures, L.P. and Anchorage Partners, L.P., which also are limited partnerships, and the sole member of Terrapin Limited Holdings, LLC, a limited liability company. The address for the corporation, the three limited partnerships and the limited liability company is 9737 Washingtonian Boulevard, Suite 404, Gaithersburg, Maryland 20878. Each of J.W. Marriott, Jr., Deborah Marriott Harrison, John W. Marriott III, David S. Marriott, Stephen Blake Marriott, Juliana B. Marriott and The Juliana B. Marriott Marital Trust disclaims beneficial ownership of the foregoing shares in excess of such holder's pecuniary interest.

(8)   Includes the following **334,228 shares** that both J.W. Marriott, Jr. and his brother Richard E. Marriott report as beneficially owned: (a) 67,306 shares owned by The J. Willard & Alice S. Marriott Foundation, a charitable foundation, for which J.W. Marriott, Jr. and Richard E. Marriott serve as trustees; and (b) 266,922 shares held by seven trusts for the benefit of their children and grandchildren, for which J.W. Marriott, Jr. and Richard E. Marriott serve as co-trustees. Each of J.W. Marriott, Jr. and Richard E. Marriott disclaims beneficial ownership of the foregoing shares in excess of his pecuniary interest.

(9)   Includes the following 373,143 shares that J.W. Marriott, Jr. reports as beneficially owned, in addition to the shares referred to in footnotes (7) and (8): (a) 79,443 shares held in a revocable trust, for which J.W. Marriott, Jr. serves as the sole trustee; (b) 28,576 shares held in a revocable trust, for which the spouse of J.W. Marriott, Jr. serves as the sole trustee; (c) **25,000 shares** owned by six trusts for the benefit of the grandchildren and great-grandchildren of J.W. Marriott, Jr., for which the spouse of J.W. Marriott, Jr. serves as a co-trustee; (d) 171,019 shares held by three trusts for the benefit of J.W. Marriott, Jr.'s children, for which his spouse serves as a co-trustee; (e) **4,955 shares** held by three trusts for the benefit of John W. Marriott III's children, for which the spouse of J.W. Marriott, Jr. serves as a co-trustee; (f) 3,500 shares owned by the J. Willard Marriott, Jr. Foundation, for which J.W. Marriott, Jr. and his spouse serve as trustees; and (g) **60,650 shares** subject to SARs currently exercisable or exercisable within 60 days after March 3, 2017. J.W. Marriott, Jr.'s address is Marriott International, 10400 Fernwood Road, Bethesda, Maryland 20817. J.W. Marriott, Jr. disclaims beneficial ownership of the foregoing shares in excess of his pecuniary interest.

(10)   Includes the following **104,845.2 shares** that John W. Marriott III reports as beneficially owned, in addition to the shares referred to in footnote (7): (a) 62,147.2 shares held directly; (b) 17,698 shares held by three trusts for the benefit of John W. Marriott III's children, for which John W. Marriott III and Deborah M. Harrison serve as trustees; and (c) 25,000 shares owned by six trusts for the benefit of the grandchildren and great-grandchildren of J.W. Marriott, Jr., for which John W. Marriott III serves as a co-trustee. John W. Marriott III's address is JWM Family Enterprises, 9737 Washingtonian Boulevard, Suite 404, Gaithersburg, Maryland 20878. John W. Marriott III disclaims beneficial ownership of the foregoing shares in excess of his pecuniary interest.

(11) Includes the following 94,910 shares that David S. Marriott reports as beneficially owned in addition to the shares referred to in footnote (7): (a) 47,926 shares held directly; (b) 533 shares held by David S. Marriott's spouse; (c) 8,406 shares held by four trusts for the benefit of David S. Marriott's children, for which David S. Marriott and his spouse serve as co-trustees; (d) **25,000 shares** owned by six trusts for the benefit of the grandchildren and great-grandchildren of J.W. Marriott, Jr., for which David S. Marriott serves as a co-trustee; (e) 8,013 shares held by the Juliana B. Marriott Marital Trust, of which David S. Marriott is a trustee; (f) 4,132 shares owned by two trusts for the benefit of Juliana B. Marriott's children, for which Juliana B. Marriott and David Marriott serve as co-trustees; and (g) **900 shares** subject to SARs currently exercisable or exercisable within 60 days after March 3, 2017. David S. Marriott's address is Marriott International, 10400 Fernwood Road, Bethesda, Maryland 20817. David S. Marriott disclaims beneficial ownership of the foregoing shares in excess of his pecuniary interest.

(12) Includes the following 82,309.9 shares that Deborah M. Harrison reports as beneficially owned in addition to the shares referred to in footnote (7): (a) 15,041.2 shares held directly by Ms. Harrison; (b) 1,425.7 shares held directly by Ms. Harrison's spouse; (c) 16,978 shares held by three trusts for the benefit of Ms. Harrison's children, for which Ms. Harrison serves as trustee; (d) 502 shares held by two trusts for the benefit of Ms. Harrison's grandchildren, for which Ms. Harrison's spouse and another individual serve as trustees; (e) 2,688 shares held by a limited liability company for which Ms. Harrison's spouse serves as manager; (f) **25,000 shares** owned by six trusts for the benefit of the grandchildren and great-grandchildren of J.W. Marriott, Jr., for which Ms. Harrison serves as a co-trustee; (g) **17,698 shares** held by three trusts for the benefit of John W. Marriott III's children, for which John W. Marriott III and Ms. Harrison serve as trustees; and (h) **2,977 shares** subject to SARs held by Ms. Harrison's spouse currently exercisable or exercisable within 60 days after March 3, 2017. Ms. Harrison's address is Marriott International, 10400 Fernwood Road, Bethesda, Maryland 20817. Ms. Harrison disclaims beneficial ownership of the foregoing shares in excess of her pecuniary interest.

(13) Includes the following 20,819 shares that Juliana B. Marriott reports as beneficially owned in addition to the shares referred to in footnote (7): (a) 4,370 shares held directly; (b) 8,013 shares held by the Juliana B. Marriott Marital Trust, of which Ms. Marriott is a trustee; (c) 4,304 shares owned by two trusts for the benefit of Ms. Marriott's children, for which Juliana B. Marriott serves as trustee; and (d) 4,132 shares owned by two trusts for the benefit of Ms. Marriott's children, for which Juliana B. Marriott and David Marriott serve as co-trustees. Juliana B. Marriott's address is Marriott International, 10400 Fernwood Road, Bethesda, Maryland 20817. Juliana B. Marriott disclaims beneficial ownership of the foregoing shares in excess of her pecuniary interest.

(14) Includes the following 1,682,701 shares that Richard E. Marriott reports as beneficially owned, in addition to the shares referred to in footnote (8): (a) 1,500,394 shares held by two grantor-retained annuity trusts; (b) 107,113 shares held by a revocable trust for which Richard E. Marriott serves as the sole trustee, (c) 28,326 shares held by a revocable trust for which Richard E. Marriott's spouse serves as the sole trustee; (d) 45,168 shares owned by a trust for the benefit of one of Richard E. Marriott's children, for which his spouse serves as a co-trustee; and (e) 1,700 shares held by a trust established for the benefit of J.W. Marriott Jr., for which Richard E. Marriott serves as sole trustee. Richard E. Marriott's address is Host Hotels & Resorts, Inc., 10400 Fernwood Road, Bethesda, Maryland 20817. Richard E. Marriott disclaims beneficial ownership of the foregoing shares in excess of his pecuniary interest.

(15) Includes **8,013 shares** held directly that the Juliana B. Marriott Marital Trust reports as beneficially owned in addition to the shares referred to in footnote (7). The address of The Juliana B. Marriott Marital Trust is c/o Jacqueline M. Perry, JWM Family Enterprises, 9737 Washingtonian Boulevard, Suite 404, Gaithersburg, Maryland 20878.

(16) Includes the following 4,046.7 shares that Stephen Blake Marriott reports as beneficially owned in addition to the shares referred to in footnote (7): (a) 3,887.7 shares held directly; and (b) 159 shares owned by a trust for the benefit of Stephen Blake Marriott's nephew, for which Stephen Blake Marriott is a co-trustee. Stephen Blake Marriott's address is Marriott International, 10400 Fernwood Road, Bethesda, Maryland 20817. Stephen Blake Marriott disclaims beneficial ownership of the foregoing shares in excess of his pecuniary interest.

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Table 1: Descriptive statistics, 1982–2017
This table reports descriptive statistics (average and 10th, 50th, and 90th percentiles) for insider, affiliate, and institutional ownership of publicly traded U.S. firms from 1982–2017. Insider and affiliate ownership comes from Factset and institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level using CRSP PERMCO and share data, keeping only firms with common stock outstanding.

Period	Equal-weighted				Value-weighted				N
	Avg	p10	p50	p90	Avg	p10	p50	p90	
Panel A: Insider ownership (fraction of shares)									
2006–2008	0.11	0.00	0.04	0.31	0.04	0.00	0.00	0.14	3,642
2009–2011	0.11	0.00	0.04	0.31	0.04	0.00	0.00	0.12	3,445
2012–2014	0.10	0.00	0.04	0.28	0.04	0.00	0.00	0.14	3,305
2015–2017	0.09	0.00	0.03	0.27	0.03	0.00	0.00	0.11	3,309
Panel B: Affiliate ownership (fraction of shares)									
2006–2008	0.05	0.00	0.00	0.17	0.03	0.00	0.00	0.04	3,642
2009–2011	0.05	0.00	0.00	0.15	0.02	0.00	0.00	0.02	3,445
2012–2014	0.05	0.00	0.00	0.16	0.02	0.00	0.00	0.01	3,305
2015–2017	0.05	0.00	0.00	0.15	0.02	0.00	0.00	0.00	3,309
Panel C: Institutional ownership (fraction of shares)									
1982–1984	0.14	0.00	0.06	0.41	0.37	0.12	0.39	0.58	5,385
1985–1987	0.18	0.00	0.11	0.47	0.42	0.17	0.44	0.62	5,959
1988–1990	0.20	0.00	0.13	0.52	0.45	0.22	0.47	0.65	5,926
1991–1993	0.24	0.00	0.18	0.59	0.48	0.25	0.50	0.69	5,864
1994–1996	0.28	0.01	0.21	0.64	0.51	0.28	0.52	0.73	6,867
1997–1999	0.30	0.01	0.23	0.69	0.53	0.32	0.53	0.76	7,123
2000–2002	0.34	0.01	0.28	0.75	0.57	0.36	0.57	0.79	5,919
2003–2005	0.45	0.04	0.44	0.88	0.64	0.43	0.63	0.85	4,844
2006–2008	0.54	0.07	0.56	0.97	0.69	0.49	0.69	0.90	4,586
2009–2011	0.54	0.07	0.59	0.94	0.70	0.47	0.71	0.91	3,986
2012–2014	0.59	0.10	0.66	0.96	0.72	0.51	0.73	0.93	3,686
2015–2017	0.61	0.12	0.70	0.98	0.74	0.56	0.75	0.94	3,662
Panel D: Number of institutional shareholders									
1982–1984	21	0	4	59	190	16	152	433	5,385
1985–1987	27	0	7	73	234	25	207	458	5,959
1988–1990	33	0	10	88	284	44	266	532	5,926
1991–1993	41	1	14	109	323	55	293	639	5,864
1994–1996	44	1	16	112	340	52	296	688	6,867
1997–1999	54	2	19	138	477	80	447	893	7,123
2000–2002	74	3	30	188	616	130	605	1,144	5,919
2003–2005	102	6	57	244	639	148	573	1,247	4,844
2006–2008	119	9	71	271	703	163	629	1,375	4,586
2009–2011	132	9	79	306	771	175	699	1,475	3,986
2012–2014	166	13	101	392	908	203	846	1,701	3,686
2015–2017	194	17	116	460	1,106	242	1,029	2,044	3,662

Table 2: Ownership of U.S. firms, 2015–2017

This table summarizes the ownership structure of U.S. firms from 2015–2017, including the fraction of shares owned by insiders, affiliates, and institutional investors, the fraction of shares owned (IO) by institutions with the largest stakes (by rank or block size), and the number of institutions needed to reach either 25% or 50% of firm ownership. 'Avg' is the cross-sectional mean and p10, p50, and p90 are cross-sectional percentiles. Insider ownership comes from Factset and institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding.

	Equal-weighted				Value-weighted			
	Avg	p10	p50	p90	Avg	p10	p50	p90
Insider ownership	0.092	0.004	0.034	0.269	0.034	0.000	0.004	0.112
Affiliate ownership	0.047	0.000	0.000	0.153	0.018	0.000	0.000	0.001
Institutional ownership	0.614	0.117	0.695	0.981	0.737	0.555	0.745	0.937
IO of top inst shareholder	0.104	0.036	0.092	0.160	0.085	0.058	0.073	0.123
IO of top 3 inst shareholders	0.222	0.075	0.220	0.337	0.204	0.156	0.191	0.272
IO of top 5 inst shareholders	0.293	0.092	0.302	0.448	0.276	0.203	0.261	0.371
IO of top 10 inst shareholders	0.393	0.108	0.417	0.606	0.371	0.261	0.356	0.508
IO of top 25 inst shareholders	0.506	0.116	0.554	0.793	0.498	0.351	0.481	0.681
IO of top 50 inst shareholders	0.567	0.117	0.627	0.899	0.586	0.415	0.568	0.798
# inst to reach IO of 25%[a]	4.7	2.0	4.0	7.0	6.6	3.0	5.0	9.3
# inst to reach IO of 50%[b]	15.4	6.0	11.4	27.4	48.6	10.0	27.2	89.9
IO of >1% blocks	0.460	0.084	0.491	0.763	0.422	0.249	0.397	0.637
IO of >3% blocks	0.319	0.038	0.324	0.564	0.284	0.165	0.262	0.444
IO of >5% blocks	0.232	0.000	0.224	0.449	0.201	0.102	0.187	0.335
IO of >7% blocks	0.165	0.000	0.144	0.366	0.094	0.000	0.074	0.245
IO of >9% blocks	0.105	0.000	0.071	0.278	0.048	0.000	0.000	0.158
# of >1% inst blockholders	13.2	3.0	13.9	22.7	13.6	8.0	13.0	20.1
# of >3% inst blockholders	4.9	1.0	5.0	8.4	4.9	3.0	5.0	7.1
# of >5% inst blockholders	2.7	0.0	3.0	5.0	2.8	1.4	3.0	4.0
# of >7% inst blockholders	1.5	0.0	1.4	3.0	1.0	0.0	1.0	2.3
# of >9% inst blockholders	0.8	0.0	0.8	2.0	0.4	0.0	0.0	1.0

[a]Given IO>25% (81.3% of firms, representing 98.8% of overall market value, have IO greater than 25%)
[b]Given IO>50% (65.7% of firms, representing 93.5% of overall market value, have IO greater than 50%)

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Panel A

Shares owned

Panel B

Total shares owned, ranks 1 to X

Panel C

Number of inst blockholders

Panel D

Shares owned by inst blockholders
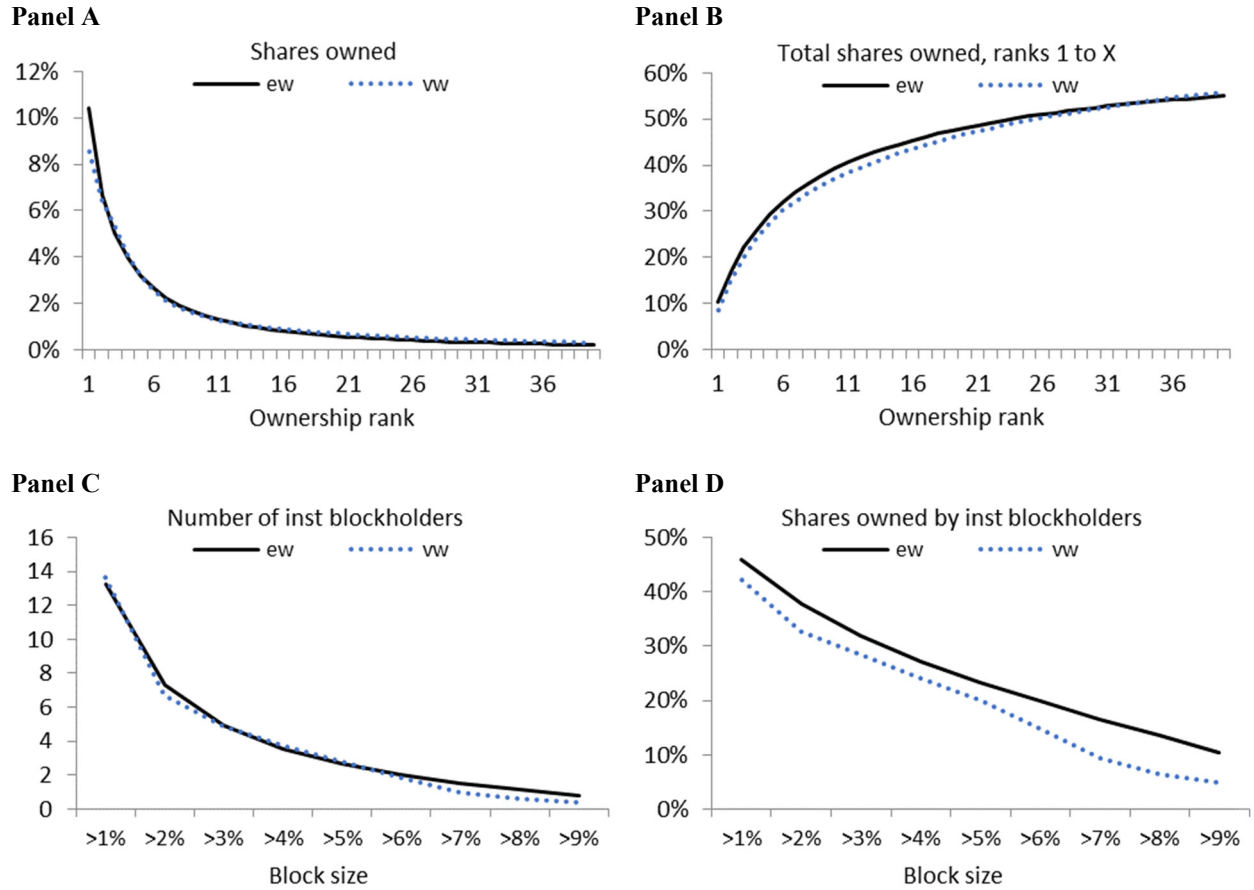
Fig. 1: Institutional ownership, 2015–2017. The figure shows ownership by the top institutional shareholders of each firm, taking an equal- or value-weighted average across firms ('ew' or 'vw'). Panel A shows the ownership share of institutions ranked by ownership stake (ranks 1 to 40) and Panel B shows the total shares owned by the top X shareholders (firms with fewer than 40 institutional shareholders are included in both panels, setting missing stakes to zero). Panel C shows the number of institutions with stakes greater than x%, for x = 1 to 9, and Panel D shows the total ownership of those institutions (setting ownership to zero if the firm has no blockholders of that size). Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding.

A: Ownership of institutions with 1, 5, 10, and 25 largest stakes
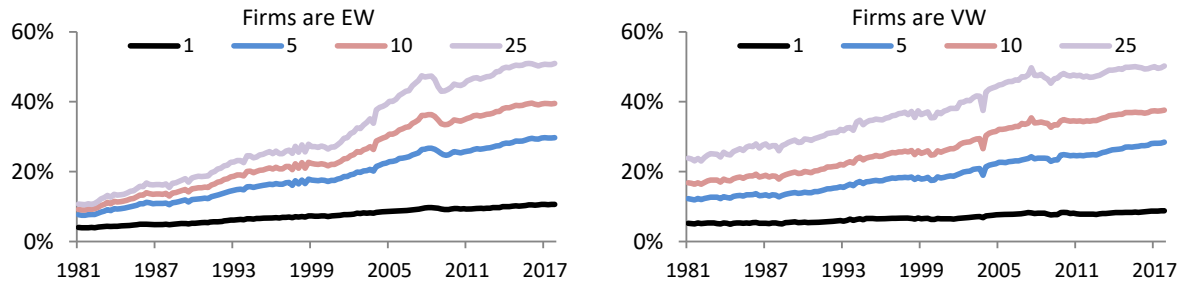
B: # of institutions needed to reach 25% or 50% ownership
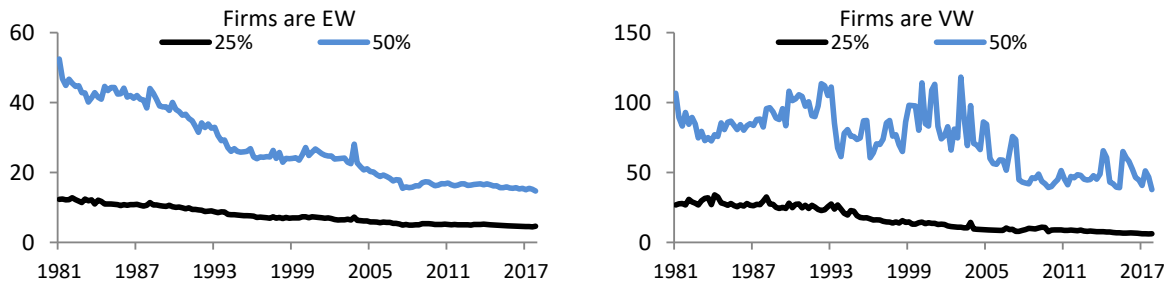
C: # of institutions with greater than 1%, 3%, 5%, or 7% blocks
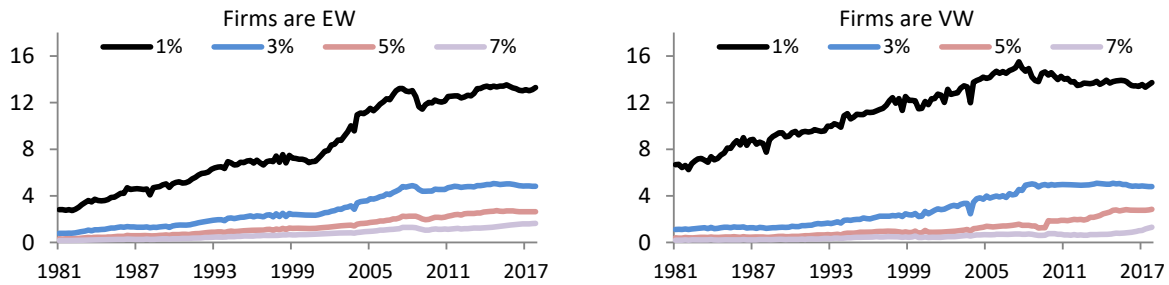
D: Ownership of institutions with greater than 1%, 3%, 5%, or 7% blocks
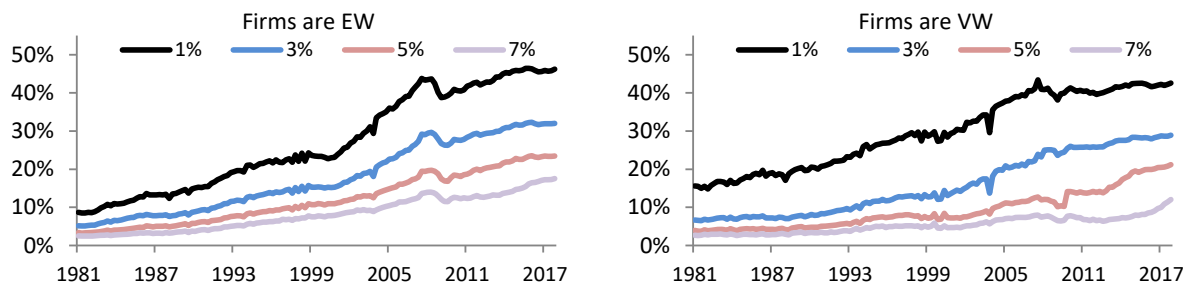
Fig. 2: Institutional ownership, 1981–2017. The figure shows ownership by the top institutional shareholders of each firm, taking an equal- or value-weighted average across firms. Panel A shows total ownership of the top 1, 5, 10 and 25 institutional shareholders. Panel B shows how many institutions are needed to reach 25% or 50% ownership. Panel C shows the number of institutions with ownership greater than 1%, 3%, 5% or 7%. Panel D shows total ownership of the groups in Panel C. Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding.

Table 3: Ownership structure of firms in size, age, turnover, and volatility quintiles, 2015–2017
This table reports the ownership structure of U.S. firms sorted by size, age, turnover, and volatility. Size portfolios are based on NYSE market-cap quintiles. Turnover, age, and volatility portfolios are formed by first sorting firms into NYSE size quintiles and then, within each size quintile, into five portfolios with an equal number of firms by age, turnover, or volatility. The table shows the average for each group. Insider ownership comes from Factset and institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding. Bold indicates a statistic that is more than two standard errors from the (equal-weighted) average of all firms.

Panel A: Size portfolios	Small	2	3	4	Large
Insider ownership	**0.130**	**0.073**	**0.064**	**0.045**	**0.030**
Affiliate ownership	**0.067**	**0.039**	**0.026**	**0.024**	**0.019**
Institutional ownership	**0.416**	**0.789**	**0.844**	**0.836**	**0.775**
IO of top inst shareholder	**0.096**	**0.126**	**0.121**	0.104	**0.089**
IO of top 3 inst shareholders	**0.192**	**0.270**	**0.266**	**0.241**	**0.210**
IO of top 10 inst shareholders	**0.319**	**0.497**	**0.491**	**0.452**	0.390
IO of top 25 inst shareholders	**0.384**	**0.660**	**0.670**	**0.615**	**0.524**
# of inst to reach IO of 25%[a]	**5.1**	**4.2**	**4.0**	4.6	**5.4**
# of inst to reach IO of 50%[b]	**13.1**	**11.9**	**12.8**	15.8	**29.5**
Fraction of firms with IO>25%	**0.642**	**0.978**	**0.985**	**0.981**	**0.982**
Fraction of firms with IO>50%	**0.388**	**0.883**	**0.937**	**0.943**	**0.950**
# of >1% inst blockholders	**9.0**	**17.5**	**19.2**	**17.7**	**14.5**
# of >3% inst blockholders	**3.8**	**6.4**	**6.4**	**5.9**	**5.2**
# of >5% inst blockholders	**2.0**	**3.5**	**3.5**	**3.3**	**3.0**
# of >7% inst blockholders	**1.2**	**2.1**	**2.2**	**1.9**	**1.2**
IO of >1% inst blockholders	**0.341**	**0.614**	**0.632**	**0.563**	0.450
IO of >3% inst blockholders	**0.249**	**0.426**	**0.413**	**0.369**	**0.303**
IO of >5% inst blockholders	**0.180**	**0.314**	**0.305**	**0.267**	**0.215**
IO of >7% inst blockholders	**0.132**	**0.232**	**0.225**	**0.184**	**0.108**

| Panel B: Age portfolios	Young	2	3	4	Old
Insider ownership	0.092	0.087	0.090	0.091	0.101
Affiliate ownership	**0.083**	0.052	**0.033**	**0.034**	**0.036**
Institutional ownership	0.596	0.630	0.620	0.625	0.600
IO of top inst shareholder	**0.127**	0.105	**0.095**	**0.098**	**0.096**
IO of top 3 inst shareholders	**0.244**	0.221	**0.210**	0.218	**0.215**
IO of top 10 inst shareholders	**0.408**	0.396	0.382	0.395	0.383
IO of top 25 inst shareholders	0.510	0.517	0.500	0.512	0.493
# of inst to reach IO of 25%[a]	4.5	4.6	5.0	4.8	4.6
# of inst to reach IO of 50%[b]	**12.7**	**13.9**	16.0	15.3	**19.4**
Fraction of firms with IO>25%	0.801	0.808	0.806	0.827	0.825
Fraction of firms with IO>50%	**0.627**	0.664	0.658	0.673	0.662
# of >1% inst blockholders	**12.4**	**13.8**	13.6	13.6	12.8
# of >3% inst blockholders	**4.7**	5.0	5.0	**5.1**	4.8
# of >5% inst blockholders	**2.5**	2.7	2.7	2.8	2.7
# of >7% inst blockholders	1.5	1.5	1.5	1.6	1.6
IO of >1% inst blockholders	0.465	0.474	0.453	0.465	**0.441**
IO of >3% inst blockholders	**0.335**	0.325	**0.308**	0.321	**0.306**
IO of >5% inst blockholders	**0.251**	0.235	**0.219**	0.229	0.224
IO of >7% inst blockholders	**0.189**	0.166	**0.149**	0.161	0.158

Table 3 continues on next page

Table 3, cont.

Panel C: Turnover portfolios	Low	2	3	4	High
Insider ownership	**0.142**	0.095	**0.083**	**0.072**	**0.065**
Affiliate ownership	**0.085**	0.044	**0.033**	**0.028**	**0.032**
Institutional ownership	**0.462**	**0.605**	**0.675**	**0.713**	**0.679**
IO of top inst shareholder	**0.094**	0.103	**0.107**	**0.109**	0.104
IO of top 3 inst shareholders	**0.191**	0.221	**0.233**	**0.239**	0.228
IO of top 10 inst shareholders	**0.317**	0.390	**0.423**	**0.440**	**0.418**
IO of top 25 inst shareholders	**0.390**	**0.499**	**0.551**	**0.580**	**0.552**
# of inst to reach IO of 25%[a]	**6.1**	**5.0**	**4.3**	**4.2**	**4.2**
# of inst to reach IO of 50%[b]	**23.3**	16.6	**14.4**	**13.4**	**13.6**
Fraction of firms with IO>25%	**0.691**	**0.846**	**0.882**	**0.887**	0.825
Fraction of firms with IO>50%	**0.453**	**0.643**	**0.750**	**0.790**	**0.731**
# of >1% inst blockholders	**9.6**	**13.0**	**14.6**	**15.6**	**15.0**
# of >3% inst blockholders	**3.7**	**4.8**	**5.4**	**5.8**	**5.5**
# of >5% inst blockholders	**2.0**	**2.6**	**2.9**	**3.1**	**3.0**
# of >7% inst blockholders	**1.1**	1.5	**1.7**	**1.8**	**1.7**
IO of >1% inst blockholders	**0.340**	**0.449**	**0.503**	**0.534**	**0.510**
IO of >3% inst blockholders	**0.239**	**0.309**	**0.347**	**0.368**	**0.352**
IO of >5% inst blockholders	**0.174**	**0.223**	**0.251**	**0.267**	**0.255**
IO of >7% inst blockholders	**0.121**	0.158	**0.178**	**0.188**	**0.180**

Panel D: Volatility portfolios	Low	2	3	4	High
Insider ownership	0.086	**0.101**	0.092	0.087	0.092
Affiliate ownership	**0.034**	**0.035**	0.038	0.052	**0.065**
Institutional ownership	**0.603**	**0.680**	**0.672**	0.631	**0.542**
IO of top inst shareholder	**0.092**	0.105	**0.108**	**0.110**	0.103
IO of top 3 inst shareholders	**0.209**	**0.232**	**0.233**	**0.229**	**0.210**
IO of top 10 inst shareholders	**0.381**	**0.425**	**0.420**	0.402	**0.359**
IO of top 25 inst shareholders	**0.495**	**0.555**	**0.548**	0.518	**0.453**
# of inst to reach IO of 25%[a]	**5.6**	4.6	**4.4**	**4.4**	**4.3**
# of inst to reach IO of 50%[b]	**20.1**	15.6	**14.4**	**13.9**	**13.9**
Fraction of firms with IO>25%	**0.876**	**0.891**	**0.859**	0.809	**0.689**
Fraction of firms with IO>50%	0.647	**0.754**	**0.730**	0.665	**0.562**
# of >1% inst blockholders	13.3	**14.8**	**14.7**	13.6	**11.2**
# of >3% inst blockholders	4.9	**5.5**	**5.4**	5.0	**4.3**
# of >5% inst blockholders	**2.6**	**3.0**	**2.9**	2.7	**2.4**
# of >7% inst blockholders	**1.4**	**1.7**	**1.7**	1.6	**1.4**
IO of >1% inst blockholders	**0.439**	**0.506**	**0.503**	0.474	**0.410**
IO of >3% inst blockholders	**0.297**	**0.348**	**0.345**	0.330	**0.294**
IO of >5% inst blockholders	**0.207**	**0.250**	**0.249**	0.242	**0.221**
IO of >7% inst blockholders	**0.139**	**0.174**	**0.176**	0.175	0.162

[a]Conditional on IO > 25%
[b]Conditional on IO > 50%

Table 4: Ownership regressed on firm size, age, turnover, and volatility, 2015–2017
This table reports slopes, t-statistics, and R²s from panel regressions of various ownership measures on size, age, turnover, and volatility. The ownership measures are described in the first column. Size (in logs), age (in logs), turnover, and volatility are de-meaned and scaled to have a standard deviation of one in the full sample. Standard errors are clustered by firm. Panel A uses all firms and Panel B uses only larger firms (bigger than the NYSE median). Insider ownership comes from Factset and institutional ownership comes from Refinitiv and WRDS. Bold indicates a slope that is more than 2 standard errors from zero.

|	Slope				t-statistic				
	Size	Age	Turn	Volat	Size	Age	Turn	Volat	R^2
Panel A: All firms									
Insider ownership	**-0.039**	0.004	**-0.022**	0.007	-13.89	1.34	-8.84	1.99	0.125
Affiliate ownership	0.004	**-0.015**	**-0.029**	**0.032**	1.50	-6.03	-10.98	9.14	0.072
Institutional ownership	**0.161**	**-0.026**	**0.082**	**-0.085**	31.83	-6.51	17.78	-18.16	0.517
IO of top inst shareholder	**0.011**	**-0.015**	-0.001	0.000	8.28	-10.05	-0.61	0.15	0.039
IO of top 3 inst shareholders	**0.027**	**-0.020**	**0.009**	**-0.013**	12.81	-9.51	4.77	-5.39	0.100
IO of top 10 inst shareholders	**0.055**	**-0.029**	**0.036**	**-0.046**	15.38	-9.60	11.47	-13.02	0.225
IO of top 25 inst shareholders	**0.086**	**-0.035**	**0.062**	**-0.074**	18.66	-9.53	15.32	-17.19	0.331
# of inst to reach IO of 25%[a]	0.081	0.057	**-0.568**	0.095	0.51	0.74	-5.25	0.74	0.009
# of inst to reach IO of 50%[a]	**7.281**	**2.315**	**-2.741**	**2.785**	6.01	4.78	-4.25	3.26	0.069
Fraction of firms with IO>25%	**0.160**	**-0.034**	**0.049**	**-0.098**	22.69	-6.33	9.21	-13.60	0.343
Fraction of firms with IO>50%	**0.250**	**-0.019**	**0.093**	**-0.080**	34.88	-3.10	15.81	-11.26	0.432
# of >1% inst blockholders	**2.501**	**-0.660**	**2.489**	**-2.895**	19.88	-6.87	20.72	-25.65	0.424
# of >3% inst blockholders	**0.698**	**-0.276**	**0.764**	**-0.947**	13.80	-6.51	16.32	-19.50	0.252
# of >5% inst blockholders	**0.481**	**-0.084**	**0.390**	**-0.411**	15.25	-3.06	13.83	-13.58	0.198
# of >7% inst blockholders	**0.157**	**-0.058**	**0.241**	**-0.258**	6.40	-2.77	11.51	-11.25	0.080
IO of >1% inst blockholders	**0.075**	**-0.037**	**0.068**	**-0.077**	15.86	-9.80	15.75	-17.58	0.295
IO of >3% inst blockholders	**0.048**	**-0.030**	**0.039**	**-0.043**	13.26	-9.23	11.89	-11.93	0.175
IO of >5% inst blockholders	**0.039**	**-0.023**	**0.025**	**-0.023**	12.85	-7.77	9.15	-7.30	0.116
IO of >7% inst blockholders	**0.020**	**-0.021**	**0.016**	**-0.014**	7.10	-7.77	6.60	-4.79	0.047
Panel B: Large firms									
Insider ownership	**-0.024**	**-0.008**	**-0.020**	**0.030**	-3.65	-2.33	-2.73	2.13	0.037
Affiliate ownership	-0.004	-0.007	**-0.029**	**0.033**	-0.71	-1.65	-3.69	2.82	0.026
Institutional ownership	**-0.059**	**-0.022**	**0.077**	**-0.074**	-6.14	-3.49	5.76	-3.88	0.127
IO of top inst shareholder	**-0.016**	**-0.012**	**-0.012**	**0.029**	-6.15	-4.31	-3.25	3.71	0.107
IO of top 3 inst shareholders	**-0.035**	**-0.010**	-0.009	**0.034**	-10.10	-2.94	-1.76	3.50	0.122
IO of top 10 inst shareholders	**-0.069**	**-0.017**	0.009	**0.030**	-12.68	-3.93	1.24	2.25	0.185
IO of top 25 inst shareholders	**-0.105**	**-0.025**	**0.031**	-0.001	-15.22	-4.88	3.30	-0.08	0.241
# of inst to reach IO of 25%[a]	**1.428**	-0.033	**-0.923**	0.722	2.92	-0.24	-3.11	1.69	0.029
# of inst to reach IO of 50%[a]	**18.544**	**3.524**	-1.542	-0.197	5.51	3.38	-1.32	-0.11	0.099
Fraction of firms with IO>25%	-0.001	0.006	**0.036**	**-0.053**	-0.21	1.16	3.27	-2.48	0.036
Fraction of firms with IO>50%	0.012	0.012	**0.089**	**-0.108**	0.81	1.48	5.24	-4.04	0.050
# of >1% inst blockholders	**-3.931**	**-0.850**	**2.308**	**-3.279**	-14.91	-4.93	7.05	-7.55	0.232
# of >3% inst blockholders	**-0.764**	**-0.271**	**0.654**	**-0.397**	-7.72	-3.93	5.46	-2.12	0.105
# of >5% inst blockholders	**-0.424**	0.051	**0.245**	0.077	-6.14	1.04	3.18	0.57	0.052
# of >7% inst blockholders	**-0.943**	**0.071**	0.078	0.127	-19.51	2.04	1.48	1.32	0.171
IO of >1% inst blockholders	**-0.132**	**-0.032**	**0.040**	-0.014	-17.19	-5.73	3.83	-0.87	0.279
IO of >3% inst blockholders	**-0.070**	**-0.022**	0.014	**0.033**	-11.01	-4.32	1.69	2.34	0.159
IO of >5% inst blockholders	**-0.060**	-0.010	-0.002	**0.051**	-10.12	-1.97	-0.31	3.78	0.119
IO of >7% inst blockholders	**-0.090**	-0.009	-0.012	**0.054**	-17.04	-1.89	-1.93	4.43	0.183

[a]Conditional on total IO greater than 25% or 50%.

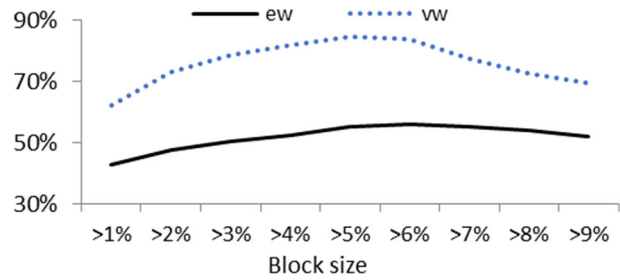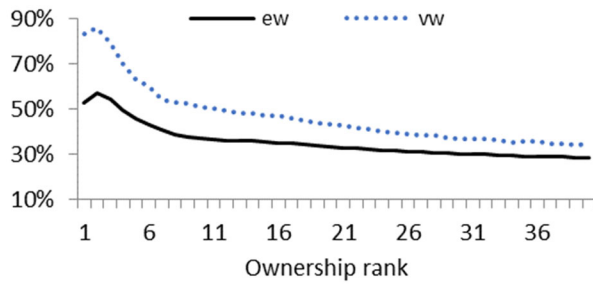**Table 5: Characteristics of the top shareholders, 2015–2017**
This table reports characteristics of the top institutional shareholders of each firm (institutions with the largest stakes or a minimum ownership level, as indicated). Characteristics are averaged across firms, using equal or value weights ('EW' or 'VW'). 'Portfolio weight' is the firm's weight in the institution's portfolio (the value of the stake divided by AUM, defined as the value of the institution's U.S. stock holdings). 'AUM rank' is the institution's rank in the cross-sectional distribution of AUM (institutions are sorted by AUM and 'rank' is measured as the fraction of aggregate AUM held by that institution and smaller institutions; the AUM-weighted average institution has a rank of just over 50%). 'Firms owned' is the number of firms in the institution's portfolio. 'Turnover' is the institution's quarterly portfolio turnover in the prior quarter. 'Portfolio R^2' is the R^2 when returns on the institution's portfolio are regressed on the value-weighted market index (estimated using weekly returns over the prior 6 months). Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level using CRSP PERMCO and share data, keeping only firms with common stock outstanding.

	EW	VW		EW	VW
Panel A: Portfolio weight of top inst shareholders					
Largest stake	3.5%	2.6%	Blockholders>7%	3.6%	3.1%
3rd largest stake	1.2%	1.3%	Blockholders>5%	2.7%	1.8%
5th largest stake	1.1%	1.6%	Blockholders>3%	2.0%	1.8%
10th largest stake	0.8%	1.8%	Blockholders>1%	1.3%	1.9%
25th largest stake	0.5%	1.9%			
Panel B: AUM rank of top inst shareholders					
Largest stake	52.7%	83.1%	Blockholders>7%	55.3%	77.2%
3rd largest stake	54.4%	79.4%	Blockholders>5%	55.1%	84.4%
5th largest stake	45.9%	63.6%	Blockholders>3%	50.5%	78.4%
10th largest stake	37.3%	50.9%	Blockholders>1%	42.9%	62.4%
25th largest stake	31.7%	39.8%			
Panel C: Firms owned by top inst shareholders					
Largest stake	624	1,691	Blockholders>7%	645	1,259
3rd largest stake	973	2,022	Blockholders>5%	718	2,089
5th largest stake	846	1,239	Blockholders>3%	706	1,803
10th largest stake	833	1,184	Blockholders>1%	717	1,358
25th largest stake	980	945			
Panel D: Turnover of top inst shareholders					
Largest stake	8.2%	3.9%	Blockholders>7%	7.6%	4.5%
3rd largest stake	8.8%	4.3%	Blockholders>5%	7.8%	3.7%
5th largest stake	10.3%	6.5%	Blockholders>3%	8.9%	4.4%
10th largest stake	12.0%	7.7%	Blockholders>1%	10.8%	6.6%
25th largest stake	13.6%	9.9%			
Panel E: Portfolio R^2 of top inst shareholders					
Largest stake	84.2%	96.3%	Blockholders>7%	84.7%	95.2%
3rd largest stake	89.6%	97.3%	Blockholders>5%	85.9%	97.1%
5th largest stake	90.0%	95.8%	Blockholders>3%	86.6%	96.7%
10th largest stake	90.8%	95.2%	Blockholders>1%	88.1%	95.8%
25th largest stake	93.1%	94.6%			

A: Portfolio weight of top inst shareholders
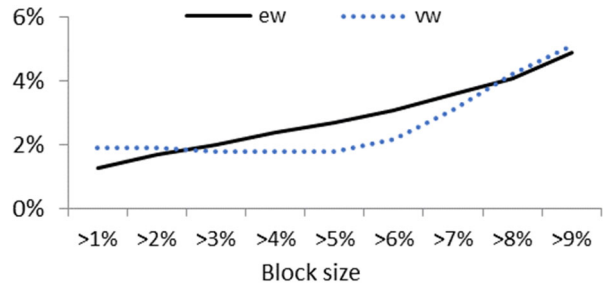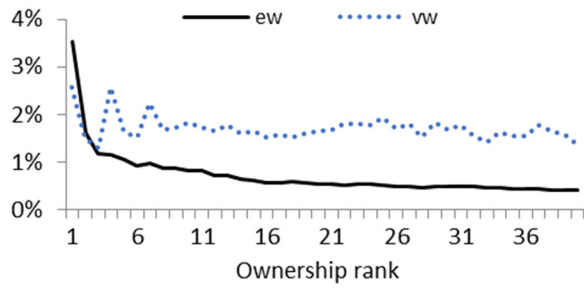
B: AUM rank of top inst shareholders

C: Firms owned by top inst shareholders
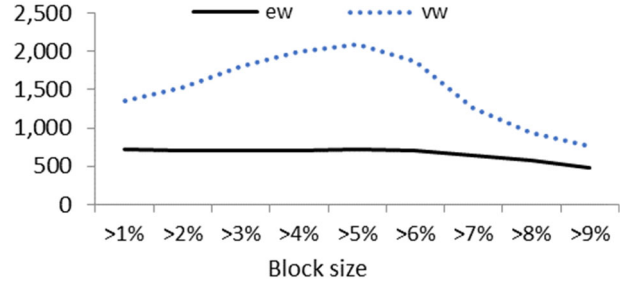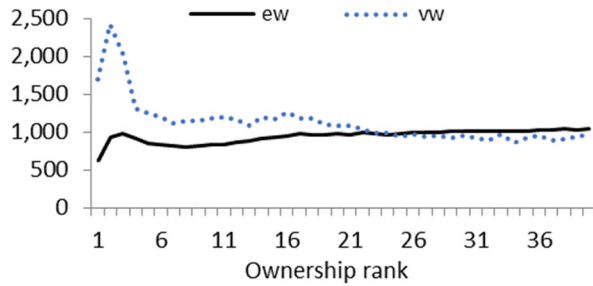
D: Turnover of top inst shareholders
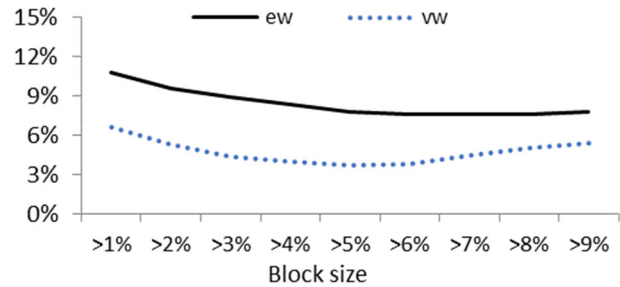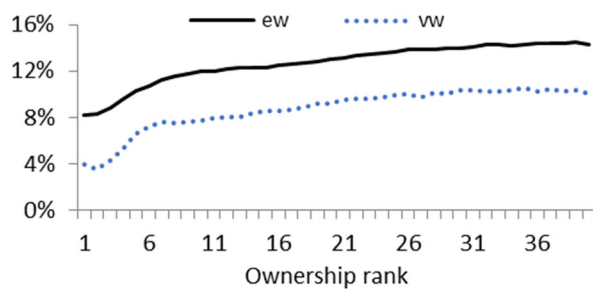
Fig. 3: Characterstics of the top institutional shareholders, 2015–2017. The figure shows characteristics of the top institutional shareholders of each firm, specifically, institutions with the largest stakes (left-hand column) or a minimum ownership level (right-hand column). Characteristics are measured at the firm level and then averaged across firms, using equal or value weights as indicated. The sample and characteristics are defined in Table 5.

A: Portfolio weights of top inst shareholders
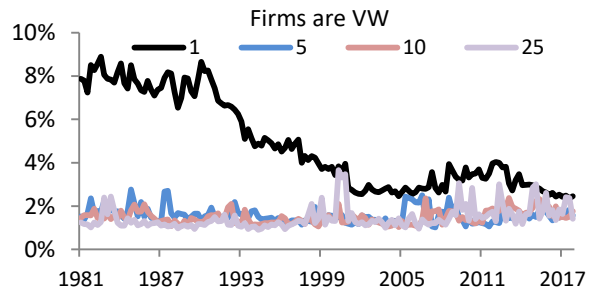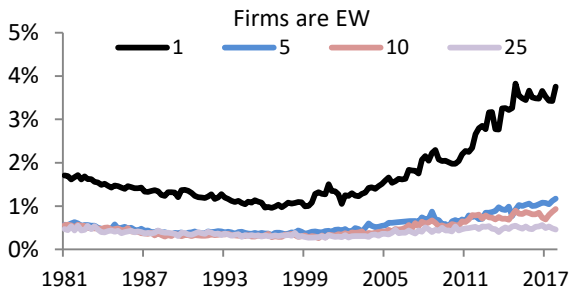
B: AUM rank of top inst shareholders
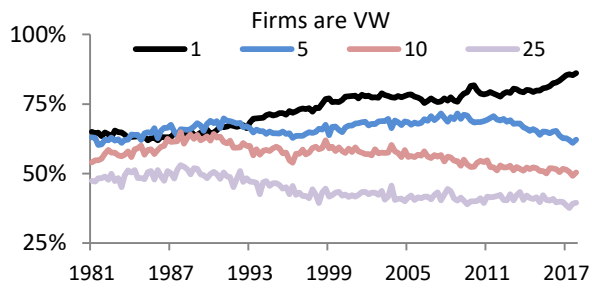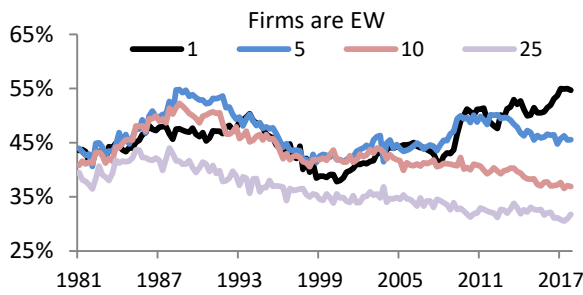
C: Firms owned by top institutional shareholders
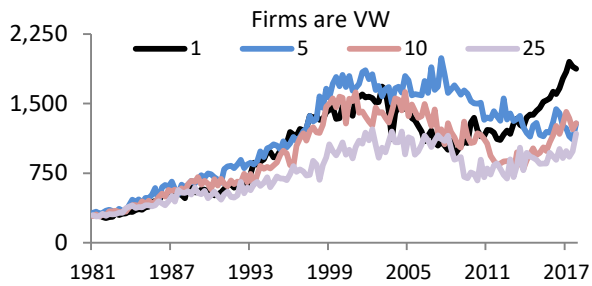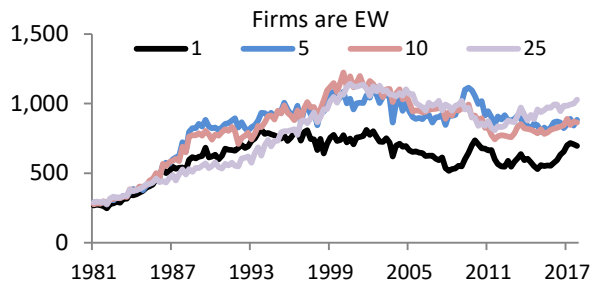
D: Turnover of top institutional shareholders
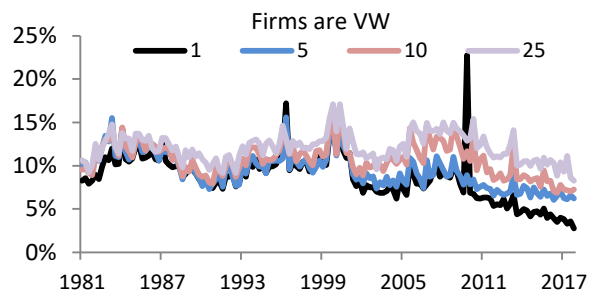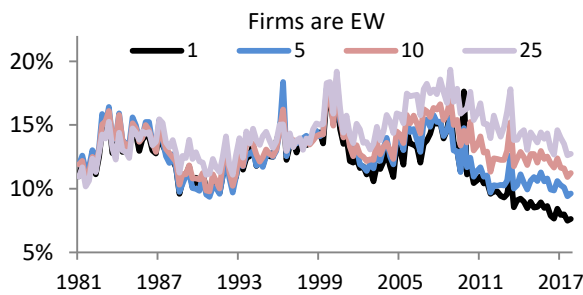
Fig. 4: Top institutional shareholders, 1981–2017. The figure shows the characteristics of the 1st, 5th, 10th, and 25th largest institutional shareholder of each firm, taking an equal- or value-weighted average across firms. The characteristics include the weight of the firm in the institution's portfolio (Panel A); the AUM rank of the institution relative to other institutions (Panel B); the number of firms held by the institution (Panel C); and the institution's portfolio turnover in the prior quarter (Panel D). Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level using CRSP PERMCO and share data, keeping only firms with common stock outstanding.

Table 6: Top shareholders of firms in size, age, turnover, and volatility quintiles, 2015–2017

This table reports characteristics of the top institutional shareholders of U.S. firms sorted by size, age, turnover, and volatility. Size portfolios are based on NYSE market-cap quintiles. Age, turnover, and volatility portfolios are formed by first sorting firms into NYSE size quintiles and then, within each size quintile, into five portfolios with an equal number of firms by age, turnover, or volatility. Characteristics, defined in Table 5, are averaged over firms in each group. Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding. Bold indicates a statistic that is more than two standard errors from the cross-sectional mean.

Panel A: Size portfolios		*Small*	*2*	*3*	*4*	*Large*
Portfolio weight	Largest stake	3.4%	**4.3%**	4.3%	3.6%	**1.8%**
	3rd largest stake	**1.0%**	**1.6%**	1.2%	1.4%	1.0%
	5th largest stake	**0.6%**	**1.4%**	**1.5%**	**1.6%**	**1.4%**
	10th largest stake	**0.4%**	0.9%	**1.2%**	**1.3%**	**1.8%**
	25th largest stake	**0.1%**	**0.4%**	**0.7%**	**0.8%**	**1.3%**
AUM rank	Largest stake	**34.5%**	**62.2%**	**69.1%**	**75.8%**	**82.8%**
	3rd largest stake	**41.5%**	**59.2%**	**66.5%**	**68.8%**	**80.4%**
	5th largest stake	**40.0%**	**46.5%**	**48.5%**	**53.2%**	**63.4%**
	10th largest stake	**33.6%**	**38.1%**	**39.1%**	**39.9%**	**48.5%**
	25th largest stake	**28.8%**	**30.7%**	32.2%	**35.1%**	**39.1%**
Firms owned	Largest stake	**331**	**869**	**1,115**	**1,334**	**1,732**
	3rd largest stake	**685**	**1,105**	**1,383**	**1,333**	**2,071**
	5th largest stake	**779**	846	858	890	**1,182**
	10th largest stake	**892**	749	749	716	973
	25th largest stake	**1,184**	865	829	852	899
Turnover	Largest stake	**11.0%**	**6.5%**	**5.6%**	**4.8%**	**4.1%**
	3rd largest stake	**11.5%**	**7.3%**	**6.2%**	**6.1%**	**4.0%**
	5th largest stake	**12.2%**	**9.5%**	**9.1%**	**8.3%**	**6.4%**
	10th largest stake	**13.3%**	11.9%	**11.1%**	**11.1%**	**8.3%**
	25th largest stake	**15.0%**	13.7%	13.3%	**12.2%**	**10.5%**
Panel B: Age portfolios		*Young*	*2*	*3*	*4*	*Old*
Portfolio weight	Largest stake	**7.4%**	3.5%	**2.0%**	**2.2%**	**2.5%**
	3rd largest stake	**2.2%**	1.2%	**0.9%**	**0.7%**	**0.8%**
	5th largest stake	**1.7%**	1.1%	**0.9%**	0.9%	**0.7%**
	10th largest stake	**1.3%**	**1.0%**	**0.7%**	**0.6%**	**0.5%**
	25th largest stake	**0.7%**	0.5%	0.5%	**0.4%**	0.4%
AUM rank	Largest stake	**42.3%**	**50.6%**	**55.0%**	**55.7%**	**60.3%**
	3rd largest stake	**47.2%**	53.5%	**57.2%**	**57.2%**	**57.2%**
	5th largest stake	**42.6%**	45.4%	**47.6%**	45.9%	**48.1%**
	10th largest stake	**35.7%**	**35.6%**	37.0%	**38.2%**	**40.0%**
	25th largest stake	31.8%	31.4%	31.9%	31.3%	31.8%
Firms owned	Largest stake	**274**	555	**723**	**812**	**1,057**
	3rd largest stake	**570**	898	**1,117**	**1,219**	**1,259**
	5th largest stake	**601**	801	**926**	914	**1,062**
	10th largest stake	**629**	739	857	**944**	**1,061**
	25th largest stake	**884**	942	969	**1,045**	**1,067**
Turnover	Largest stake	**10.5%**	**8.9%**	**7.7%**	**7.3%**	**6.5%**
	3rd largest stake	**11.5%**	**9.5%**	**8.0%**	**7.8%**	**7.3%**
	5th largest stake	**12.7%**	**10.8%**	**9.7%**	**9.5%**	**8.9%**
	10th largest stake	**14.5%**	**12.5%**	**11.6%**	**11.1%**	**10.3%**
	25th largest stake	**15.3%**	**14.4%**	**13.0%**	**13.1%**	**12.5%**

Table 6 continues

Table 6, cont.

Panel C: Turnover portfolios		Low	2	3	4	High
Portfolio weight	Largest stake	3.4%	3.4%	3.2%	3.4%	3.0%
	3rd largest stake	1.0%	**1.0%**	1.2%	1.3%	1.3%
	5th largest stake	**0.8%**	**0.9%**	1.0%	1.2%	**1.3%**
	10th largest stake	0.7%	**0.6%**	0.8%	0.9%	**1.0%**
	25th largest stake	0.5%	**0.4%**	0.5%	0.5%	**0.6%**
AUM rank	Largest stake	**48.4%**	52.8%	54.5%	**56.1%**	**58.1%**
	3rd largest stake	**52.0%**	55.4%	55.4%	56.6%	**57.7%**
	5th largest stake	45.3%	46.5%	46.4%	47.0%	47.5%
	10th largest stake	**38.8%**	37.4%	37.2%	37.2%	**36.6%**
	25th largest stake	**32.6%**	31.8%	31.8%	**30.9%**	31.6%
Firms owned	Largest stake	598	640	668	673	**748**
	3rd largest stake	1,018	1,073	962	971	1,050
	5th largest stake	921	886	837	**814**	901
	10th largest stake	**1,026**	853	**788**	768	818
	25th largest stake	**1,102**	**1,032**	994	**911**	**911**
Turnover	Largest stake	**7.4%**	7.6%	7.6%	7.9%	**8.8%**
	3rd largest stake	8.1%	**7.9%**	8.4%	8.6%	**9.5%**
	5th largest stake	**9.2%**	**9.2%**	9.6%	10.4%	11.6%
	10th largest stake	**10.1%**	**10.7%**	11.6%	12.6%	14.0%
	25th largest stake	**11.1%**	**12.3%**	13.5%	14.8%	15.4%

Panel D: Volatility portfolios		Low	2	3	4	High
Portfolio weight	Largest stake	**2.6%**	3.3%	3.2%	3.7%	3.8%
	3rd largest stake	**0.9%**	1.0%	1.1%	1.2%	**1.6%**
	5th largest stake	**0.9%**	**0.9%**	1.0%	1.0%	**1.4%**
	10th largest stake	**0.6%**	0.8%	0.8%	0.8%	**1.0%**
	25th largest stake	0.4%	0.5%	0.5%	0.6%	**0.6%**
AUM rank	Largest stake	**57.2%**	**56.5%**	54.4%	**52.0%**	**49.0%**
	3rd largest stake	55.2%	**57.8%**	55.6%	54.4%	**53.5%**
	5th largest stake	45.7%	**47.8%**	47.1%	46.3%	45.7%
	10th largest stake	37.7%	**38.6%**	37.2%	37.1%	36.6%
	25th largest stake	31.5%	31.9%	31.7%	31.8%	31.4%
Firms owned	Largest stake	**884**	**782**	655	**546**	496
	3rd largest stake	1,072	**1,170**	1,005	**894**	919
	5th largest stake	861	**923**	861	826	870
	10th largest stake	878	852	807	820	863
	25th largest stake	**1,031**	1,001	984	963	**920**
Turnover	Largest stake	**6.6%**	**7.0%**	**7.5%**	**8.4%**	**10.0%**
	3rd largest stake	**7.3%**	**7.2%**	8.3%	**9.1%**	**10.7%**
	5th largest stake	**8.9%**	**8.8%**	9.7%	10.7%	12.2%
	10th largest stake	**10.3%**	**10.5%**	11.6%	12.8%	14.1%
	25th largest stake	**11.6%**	**12.8%**	13.9%	14.4%	15.3%

Table 7: Top shareholders regressed on firm size, age, turnover, and volatility, 2015–2017

This table reports slopes, t-statistics, and R^2s when the characteristics of a firm's top institutional shareholders (1st, 3rd, 5th, 10th, and 25th largest stakes) are regressed on the firm's size, age, turnover, and volatility. The characteristics are listed in the first column and described in Table 5. Size (in logs), age (in logs), turnover, and volatility are de-meaned and scaled to have a standard deviation of one in the full sample. Standard errors are clustered by firm. Panel A uses all firms and Panel B uses only larger firms (bigger than the NYSE median). Insider ownership comes from Factset and institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding. Bold indicates a slope that is more than 2 standard errors from zero.

		Slope				t-statistic				R^2
		Size	Age	Turn	Volat	Size	Age	Turn	Volat	
Panel A: All firms										
Port weight	Largest stake	**0.009**	**-0.023**	**-0.005**	0.003	5.14	-9.05	-3.76	1.77	0.024
	3rd largest stake	**0.004**	**-0.006**	-0.000	0.001	6.52	-7.64	-0.38	1.46	0.011
	5th largest stake	**0.005**	**-0.004**	**0.001**	0.000	9.67	-7.24	2.23	-0.46	0.014
	10th largest stake	**0.006**	**-0.003**	0.001	0.001	10.39	-7.65	1.22	1.32	0.024
	25th largest stake	**0.005**	**-0.001**	0.001	0.000	12.43	-3.13	1.88	1.24	0.028
AUM rank	Largest stake	**0.160**	**0.074**	**0.052**	**-0.018**	32.27	14.57	11.62	-3.23	0.288
	3rd largest stake	**0.134**	**0.045**	**0.020**	**0.009**	33.04	10.99	5.46	2.00	0.160
	5th largest stake	**0.084**	**0.021**	-0.004	**0.022**	22.71	6.30	-1.47	5.50	0.056
	10th largest stake	**0.050**	**0.021**	**-0.010**	**0.016**	18.55	8.20	-4.36	5.29	0.030
	25th largest stake	**0.043**	0.003	-0.003	**0.006**	21.21	1.55	-1.82	2.50	0.027
Firms owned	Largest stake	**0.363**	**0.553**	**0.259**	**-0.171**	11.46	16.00	9.01	-4.54	0.135
	3rd largest stake	**0.233**	**0.363**	**0.093**	0.000	10.66	15.99	4.83	-0.01	0.063
	5th largest stake	**0.058**	**0.243**	-0.005	**0.099**	2.88	13.39	-0.29	4.55	0.015
	10th largest stake	**-0.090**	**0.250**	**-0.054**	**0.119**	-4.80	15.73	-3.50	6.03	0.021
	25th largest stake	**-0.137**	**0.090**	**-0.099**	**0.081**	-9.20	7.46	-7.40	4.99	0.015
Turnover	Largest stake	**-0.022**	**-0.012**	-0.001	**0.010**	-18.79	-10.56	-0.55	6.57	0.139
	3rd largest stake	**-0.021**	**-0.013**	-0.000	**0.010**	-18.68	-11.70	-0.25	6.69	0.108
	5th largest stake	**-0.013**	**-0.011**	**0.004**	**0.008**	-12.37	-10.52	3.31	5.63	0.054
	10th largest stake	**-0.008**	**-0.015**	**0.007**	**0.007**	-7.40	-13.93	6.67	5.07	0.038
	25th largest stake	**-0.013**	**-0.010**	**0.009**	**0.006**	-10.70	-9.76	7.42	3.75	0.027
Panel B: Large firms										
Port weight	Largest stake	-0.001	**-0.026**	**-0.021**	**0.035**	-0.09	-4.98	-3.32	2.45	0.044
	3rd largest stake	0.002	**-0.006**	-0.001	0.007	1.26	-3.18	-0.43	1.68	0.011
	5th largest stake	**0.005**	**-0.005**	-0.000	**0.011**	2.67	-3.41	-0.02	2.42	0.011
	10th largest stake	**0.010**	**-0.005**	-0.000	**0.006**	4.34	-4.40	-0.04	2.64	0.012
	25th largest stake	**0.009**	**-0.002**	0.000	0.002	6.32	-2.87	0.41	1.45	0.011
AUM rank	Largest stake	**0.053**	**0.088**	**0.061**	**-0.128**	4.41	9.60	5.51	-6.07	0.127
	3rd largest stake	**0.113**	**0.018**	0.004	-0.030	11.73	2.42	0.38	-1.75	0.055
	5th largest stake	**0.139**	-0.001	0.007	0.014	15.68	-0.16	0.75	0.80	0.059
	10th largest stake	**0.088**	**0.022**	-0.007	0.012	13.57	5.14	-1.20	1.06	0.049
	25th largest stake	**0.059**	0.000	0.008	-0.011	12.68	0.15	1.74	-1.31	0.021
Firms owned	Largest stake	-0.010	**0.525**	**0.226**	**-0.622**	-0.12	8.26	3.17	-4.51	0.088
	3rd largest stake	**0.299**	**0.154**	0.004	**-0.228**	6.16	3.65	0.08	-2.51	0.034
	5th largest stake	**0.243**	**0.115**	0.021	-0.095	4.50	3.00	0.38	-0.88	0.013
	10th largest stake	**0.187**	**0.253**	-0.053	0.008	3.38	7.50	-1.27	0.12	0.024
	25th largest stake	0.022	**0.078**	-0.013	-0.083	0.55	3.14	-0.37	-1.20	0.003
Turnover	Largest stake	**-0.004**	**-0.012**	-0.002	**0.010**	-2.54	-8.93	-1.31	3.52	0.070
	3rd largest stake	**-0.014**	**-0.008**	**0.004**	0.002	-9.58	-5.87	2.11	0.63	0.043
	5th largest stake	**-0.019**	**-0.006**	**0.009**	-0.007	-9.90	-3.78	4.27	-1.88	0.033
	10th largest stake	**-0.017**	**-0.011**	**0.014**	0.002	-8.31	-6.61	5.62	0.52	0.049
	25th largest stake	**-0.014**	**-0.012**	**0.015**	0.001	-6.31	-6.71	5.82	0.28	0.032

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Table 8: Ownership by the Big 3, 2015–2017

This table summarizes the ownership of publicly traded U.S. firms by Vanguard, Blackrock, and State Street, specifically, the fraction of a firm's shares owned by each institution and each institution's ownership rank among a firm's institutional shareholders. 'Avg' is the cross-sectional mean and 'p10,' 'p50,' and 'p90' are cross-sectional percentiles. The data come from Refinitiv and WRDS. Ownership is aggregated to the firm level using CRSP PERMCO and share data, keeping only firms with common stock outstanding. 'N' is the number of firms per quarter; the top panel includes all firms in the sample (ownership is set to zero if the institution does not hold any shares), while the bottom panel includes only firms owned by the institution.

Period	Equal-weighted				Value-weighted				N
	Avg	p10	p50	p90	Avg	p10	p50	p90	
Panel A: Fraction of shares owned									
Vanguard	0.045	0.004	0.041	0.085	0.064	0.048	0.064	0.084	3,662
Blackrock	0.050	0.000	0.051	0.101	0.061	0.043	0.060	0.080	3,662
State Street	0.017	0.000	0.015	0.041	0.039	0.020	0.040	0.052	3,662
Panel B: Ownership rank									
Vanguard	4.1	1.0	3.0	8.0	2.1	1.0	2.0	3.0	3,406
Blackrock	4.7	1.0	3.0	11.0	2.5	1.0	2.0	4.0	3,479
State Street	11.1	4.0	10.0	19.0	5.3	3.0	4.0	9.0	2,805

Table 9: Ownership by the Big 3, by size quintile, 2015–2017
This table summarizes the ownership of publicly traded U.S. firms by Vanguard, Blackrock, and State Street for firms sorted into size portfolios (based on NYSE market-cap quintiles). Ownership is measured by the fraction of shares owned ('share') or the institution's ownership rank among a firm's institutional shareholders ('rank'). Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding.

Panel A: Vanguard	Small	2	3	4	Large
Share = 0	0.129	0.017	0.010	0.011	0.004
0.0% < share ≤ 2.5%	0.424	0.093	0.032	0.031	0.025
2.5% < share ≤ 5.0%	0.364	0.269	0.088	0.063	0.067
5.0% < share ≤ 7.5%	0.059	0.340	0.460	0.366	0.627
7.5% < share ≤ 10.0%	0.020	0.242	0.376	0.455	0.226
Share > 10%	0.004	0.040	0.035	0.073	0.051
Rank = 1	0.045	0.066	0.099	0.342	0.371
Rank = 2	0.098	0.227	0.393	0.337	0.371
Rank = 3	0.123	0.243	0.277	0.191	0.160
Rank = 4 or 5	0.248	0.263	0.167	0.094	0.076
Rank = 6 to 10	0.316	0.157	0.047	0.019	0.014
Rank > 10	0.041	0.026	0.006	0.007	0.004

Panel B: Blackrock	Small	2	3	4	Large
Share = 0	0.093	0.010	0.006	0.008	0.004
0.0% < share ≤ 2.5%	0.448	0.090	0.056	0.069	0.024
2.5% < share ≤ 5.0%	0.216	0.164	0.146	0.168	0.122
5.0% < share ≤ 7.5%	0.149	0.251	0.249	0.423	0.709
7.5% < share ≤ 10.0%	0.050	0.235	0.306	0.272	0.132
Share > 10%	0.044	0.251	0.238	0.059	0.010
Rank = 1	0.116	0.354	0.386	0.198	0.180
Rank = 2	0.117	0.220	0.207	0.289	0.359
Rank = 3	0.111	0.122	0.130	0.192	0.288
Rank = 4 or 5	0.167	0.159	0.155	0.190	0.150
Rank = 6 to 10	0.218	0.104	0.101	0.108	0.018
Rank > 10	0.178	0.031	0.015	0.016	0.000

Panel C: State Street	Small	2	3	4	Large
Share = 0	0.457	0.021	0.012	0.012	0.008
0.0% < share ≤ 2.5%	0.511	0.757	0.517	0.327	0.084
2.5% < share ≤ 5.0%	0.027	0.209	0.424	0.555	0.739
5.0% < share ≤ 7.5%	0.004	0.012	0.037	0.093	0.148
7.5% < share ≤ 10.0%	0.001	0.000	0.006	0.010	0.013
Share > 10%	0.000	0.000	0.004	0.003	0.009
Rank = 1	0.001	0.000	0.003	0.006	0.024
Rank = 2	0.002	0.003	0.006	0.005	0.016
Rank = 3	0.005	0.006	0.035	0.091	0.229
Rank = 4 or 5	0.028	0.055	0.146	0.279	0.491
Rank = 6 to 10	0.169	0.409	0.434	0.370	0.187
Rank > 10	0.338	0.505	0.364	0.238	0.044

Table 10: Ownership turnover of U.S. firms, 2015–2017

This table reports the level and turnover of institutional ownership of U.S. firms from 2015–2017. Ownership turnover is measured as the fraction of a firm's shares that changes institutional ownership over 1 or 4 quarters, as indicated. Rows labeled '>1% blocks' reports ownership turnover among institutions that hold at least 1% of the firm. 'Avg' is the cross-sectional mean and p10, p50, and p90 are cross-sectional percentiles. Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding.

	Equal-weighted				Value-weighted			
	Avg	p10	p50	p90	Avg	p10	p50	p90
Inst. ownership	0.614	0.117	0.695	0.981	0.737	0.555	0.745	0.937
Inst. ownership, >1% blocks	0.460	0.084	0.491	0.763	0.422	0.249	0.397	0.637
Own. turnover, 1 qtr	0.088	0.012	0.072	0.172	0.068	0.027	0.051	0.123
Own. turnover, 1 qtr, >1% blocks	0.049	0.003	0.033	0.104	0.027	0.005	0.016	0.059
Own. turnover, 4 qtr	0.209	0.043	0.193	0.384	0.156	0.068	0.127	0.283
Own. turnover, 4 qtr, >1% blocks	0.123	0.016	0.102	0.253	0.070	0.014	0.045	0.156

A: Level of institutional ownership
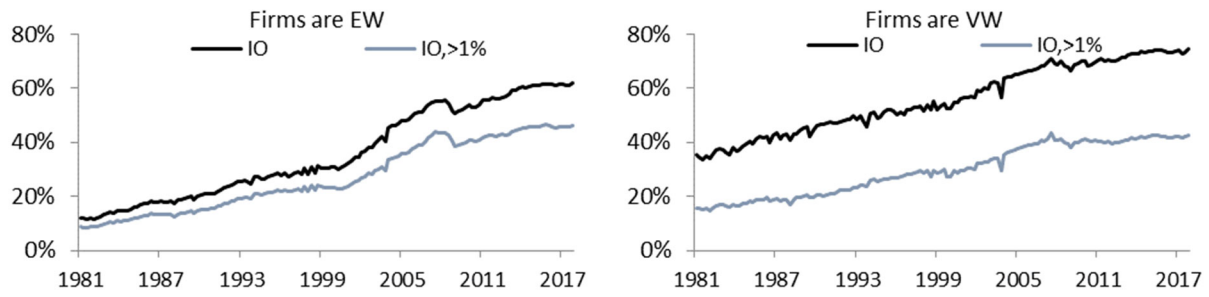
B: Ownership turnover
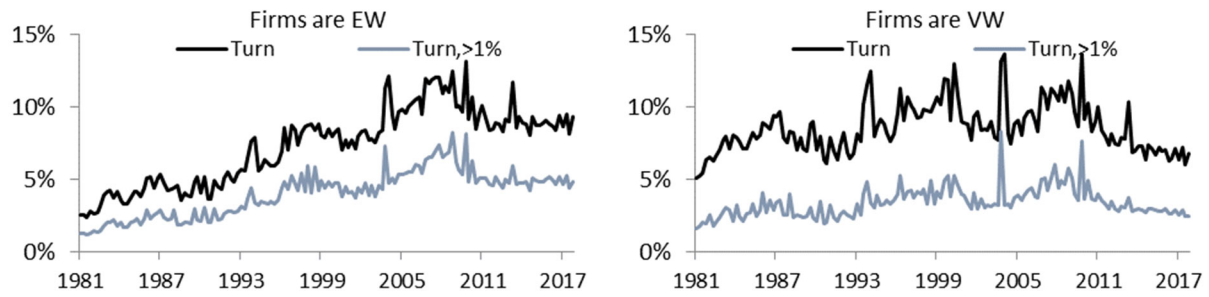
Fig. 5: Level and turnover of institutional ownership, 1981–2017. The figure shows the level and turnover of institutional ownership of U.S. firms, taking an equal- or value-weighted average across firms. Ownership turnover is measured as the fraction of a firm's shares that changes institutional ownership during the quarter. Lines labeled '>1%' show statistics for institutions that hold at least 1% of the firm. Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding.

Table 11: Ownership turnover for firms in size, age, turnover, and volatility quintiles, 2015–2017

This table reports the level and turnover of institutional ownership for size, age, turnover, and volatility portfolios. Size portfolios are based on NYSE market-cap quintiles. Age, turnover, and volatility portfolios are formed by first sorting firms into NYSE size quintiles and then, within each size quintile, into five portfolios with an equal number of firms by age, turnover, or volatility. The table shows the average for firms in each group. Insider ownership comes from Factset and institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding. Bold indicates a statistic that is more than two standard errors from the cross-sectional mean.

Panel A: Size portfolios	Small	2	3	4	Large
Institutional ownership, total	**0.416**	**0.789**	**0.844**	**0.836**	**0.775**
Institutional ownership, >1% blocks	**0.341**	**0.614**	**0.632**	**0.563**	0.450
Ownership turnover, 1 quarter	**0.069**	**0.117**	**0.114**	**0.111**	**0.078**
Ownership turnover, 1 quarter, >1% blocks	**0.041**	**0.066**	**0.062**	**0.055**	**0.031**
Ownership turnover, 4 quarter	**0.169**	**0.268**	**0.266**	**0.255**	**0.179**
Ownership turnover, 4 quarter, >1% blocks	**0.106**	**0.160**	**0.157**	**0.141**	**0.080**

Panel B: Age portfolios	Young	2	3	4	Old
Institutional ownership	0.596	0.630	0.620	0.625	0.600
Institutional ownership, >1% blocks	0.465	0.474	0.453	0.465	**0.441**
Ownership turnover, 1 quarter	**0.111**	0.096	0.085	**0.078**	**0.071**
Ownership turnover, 1 quarter, >1% blocks	**0.063**	**0.054**	**0.047**	**0.043**	**0.038**
Ownership turnover, 4 quarter	**0.276**	**0.227**	**0.200**	**0.191**	**0.170**
Ownership turnover, 4 quarter, >1% blocks	**0.157**	**0.138**	**0.117**	**0.113**	**0.099**

Panel C: Turnover portfolios	Low	2	3	4	High
Institutional ownership	**0.462**	**0.605**	**0.675**	**0.713**	**0.679**
Institutional ownership, >1% blocks	**0.340**	**0.449**	**0.503**	**0.534**	**0.510**
Ownership turnover, 1 quarter	**0.039**	**0.062**	0.083	**0.107**	**0.134**
Ownership turnover, 1 quarter, >1% blocks	**0.020**	**0.033**	**0.045**	**0.058**	**0.076**
Ownership turnover, 4 quarter	**0.102**	**0.161**	0.211	**0.260**	**0.303**
Ownership turnover, 4 quarter, >1% blocks	**0.054**	**0.091**	0.124	**0.154**	**0.184**

Panel D: Volatility portfolios	Low	2	3	4	High
Institutional ownership	**0.603**	**0.680**	**0.672**	0.631	**0.542**
Institutional ownership, >1% blocks	**0.439**	**0.506**	**0.503**	0.474	**0.410**
Ownership turnover, 1 quarter	**0.059**	**0.076**	**0.088**	**0.097**	**0.106**
Ownership turnover, 1 quarter, >1% blocks	**0.031**	**0.041**	0.048	**0.054**	**0.059**
Ownership turnover, 4 quarter	**0.152**	**0.192**	**0.218**	**0.234**	**0.242**
Ownership turnover, 4 quarter, >1% blocks	**0.085**	**0.113**	**0.128**	**0.138**	**0.144**

Table 12: Ownership turnover regressed on firm size, age, turnover, and volatility, 2015–2017

This table reports slopes, t-statistics, and R²s when ownership turnover is regressed on a firm's size, age, turnover, volatility, and, in some regressions, total institutional ownership. The ownership turnover measures, in the first column, are described in Table 8. Size (in logs), age (in logs), turnover, and volatility are de-meaned and scaled to have a standard deviation of one in the full sample. Standard errors are clustered by firm. Panel A uses all firms and Panel B uses only larger firms (bigger than the NYSE median). Institutional ownership comes from Refinitiv and WRDS. Ownership is aggregated to the firm level, keeping only firms on CRSP with common stock outstanding. Bold indicates a slope that is more than 2 standard errors from zero.

	Slope					t-statistic					R²
	Size	Age	Turn	Volat	IO	Size	Age	Turn	Volat	IO	
Panel A: All firms											
Own. turnover, 1 qtr	**0.015**	**-0.016**	**0.030**	**-0.007**		15.10	-19.90	24.11	-6.11		0.245
Own. turnover, 1 qtr, >1% blocks	**0.003**	**-0.011**	**0.018**	**-0.005**		5.01	-18.93	21.20	-6.38		0.152
Own. turnover, 1 qtr	**-0.005**	**-0.012**	**0.020**	**0.004**	**0.123**	-7.54	-20.29	20.73	4.42	52.35	0.383
Own. turnover, 1 qtr, >1% blocks	**-0.010**	**-0.008**	**0.011**	**0.002**	**0.084**	-22.16	-19.95	17.21	3.36	50.88	0.278
Own. turnover, 4 qtr	**0.030**	**-0.045**	**0.062**	**-0.020**		13.51	-23.08	22.30	-8.44		0.324
Own. turnover, 4 qtr, >1% blocks	**0.007**	**-0.026**	**0.042**	**-0.015**		4.28	-17.25	20.74	-8.44		0.207
Own. turnover, 4 qtr	**-0.019**	**-0.037**	**0.037**	**0.006**	**0.307**	-13.45	-25.59	18.33	3.49	59.11	0.565
Own. turnover, 4 qtr, >1% blocks	**-0.028**	**-0.020**	**0.024**	**0.004**	**0.220**	-25.97	-17.87	15.99	2.58	56.71	0.432
Panel B: Large firms											
Own. turnover, 1 qtr	**-0.022**	**-0.011**	**0.037**	-0.005		-12.70	-8.13	12.37	-1.32		0.336
Own. turnover, 1 qtr, >1% blocks	**-0.017**	**-0.008**	**0.019**	0.000		-17.16	-8.89	10.99	-0.01		0.264
Own. turnover, 1 qtr	**-0.017**	**-0.009**	**0.031**	0.001	**0.083**	-12.39	-7.85	12.14	0.35	16.87	0.387
Own. turnover, 1 qtr, >1% blocks	**-0.014**	**-0.007**	**0.015**	0.004	**0.052**	-17.19	-8.88	10.31	1.66	15.84	0.303
Own. turnover, 4 qtr	**-0.055**	**-0.038**	**0.073**	**-0.028**		-13.81	-11.18	11.52	-3.65		0.455
Own. turnover, 4 qtr, >1% blocks	**-0.048**	**-0.029**	**0.043**	**-0.019**		-17.68	-10.51	11.02	-3.41		0.372
Own. turnover, 4 qtr	**-0.042**	**-0.033**	**0.057**	-0.012	**0.218**	-13.53	-11.49	11.63	-1.82	20.54	0.556
Own. turnover, 4 qtr, >1% blocks	**-0.039**	**-0.026**	**0.032**	-0.008	**0.152**	-17.43	-10.67	10.66	-1.64	19.75	0.453