The Rise of Common Ownership

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Abstract

Using institutional level holdings for all publicly held companies in the U.S., we document the rise of common-ownership in U.S. stocks over the last 32 years and study the potential determinants of this fundamental shift in stock ownership. Estimating various measures of common ownership based on the characteristics of the overlapping shareholder base of two companies, we find that these measures increase between 1,250% and 2,300% between 1980 and 2012. We find that common ownership is higher among pairs of firms that are listed in the same indices or that share similar investment styles (e.g., pay dividends) and risk characteristics (e.g., size, value, and momentum). This evidence points toward factors that could affect common-ownership, and therefore have implications for the governance and corporate policies of U.S. firms.

Keywords: Corporate governance, institutional ownership, common ownership

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There is a growing sense among academics and practitioners that common ownership—where two firms are at least partially owned by the same investor—is on the rise among publicly-held U.S. firms. For example, if one looks at the ownership of an average firm included in the S&P 500 index, one will often see many of the same institutions (e.g., Vanguard, Blackrock, State Street, and Fidelity) as that firm's largest investors.[4] This observation has led some to argue that common ownership by institutions may contribute to anticompetitive behaviors by firms (e.g., Azar, Schmalz, and Tecu, 2016; Azar, Raina, and Schmalz, 2016) and that significant legal and regulatory changes are needed to limit institutions' ability to hold significant stakes in some industries (e.g., Posner, Morton, and Weyl, 2016; Elhauge, 2016).[5]

Despite the recent attention such common ownership has received, there is little systematic analysis of its determinants let alone how one should even quantify the extent and rise of common ownership. For example, while there is a sense that the increasing popularity of low-cost, index investing is contributing to the rise of common ownership (e.g., see Harford et al. (2011) for some preliminary evidence of this for firms in the S&P 500), there is little discussion of how much index investing contributes to common ownership, what other contributors might be, or how these contributors have changed over time. In this paper, we attempt to fill this void by studying the overlapping ownership structure of every pair of publicly-traded U.S. firms every year between 1980

[4] Relatedly, Azar (2016) finds that the probability that two firms selected at random from the S&P 1500 index have a shareholder in common with at least 5% ownership in both firms has increased from 20% to 90% over the period 1999 to 2014 and that the overlap is mostly generated by a small number of funds (e.g., Blackrock). Azar (2012) uses the same measure of common ownership and shows similar results for all publicly listed US firms.

[5] A condensed version of the argument made in Posner, Morton, and Weyl (2016) was published as an op-ed article on *The New York Times* on December 7, 2016. See Posner, E., F.S. Morton, and G. Weyl. (2016) "A Monopoly Donald Trump Can Pop," *The New York Times*, December 7th, which is available at http://nyti.ms/2gRQKhH.

and 2012. The resulting dataset is composed of overlapping ownership structures across 385,032,108 pair-year observations.

We conduct analysis on several dimensions. First, we discuss different potential measures of common ownership and their various tradeoffs. Second, we document time series patterns of common ownership measures, thus allowing us to quantify the extent of its increase over the last 32 years and to begin assessing how closely its rise has coincided with the rise of institutional ownership and passive investment strategies. Third, we discuss the potential determinants of common ownership, and then quantify their association with observed differences in common ownership over time, across firm-pairs, and within firm-pairs over time.

Measuring common ownership is non-trivial. For example, if an investor owns 1% of firm A and 20% of firm B, how should one quantify the *extent* of common ownership for that investor for that pair of firms? Should one weight the ownership stakes of the two firms, and if so, how? Moreover, if one wishes to measure the extent of common ownership across all owners for a particular pair of firms, how should one aggregate the common ownership stake of each common investor? We outline five different measures which capture different aspects of these issues and identify different features of common ownership. Several of these measures are based on prior literature (Anton and Polk (2004) and Harford, Jenter, Li (2011)), and several are new. We discuss these measures in detail and the different assumptions they make regarding the relationship of ownership stakes in two firms.

In general, we find similar time trends regardless which of the five measures of common ownership is used in our subsequent analysis. For example, we find that

common ownership has increased between 1980 and 2012 by 1,250% to 2,300%, depending on the measure used. In 1980 the average pair of firms had 1.7 institutional owners in common; by 2012 this figure was 33.6. These increases are far larger than the average level of institutional ownership, which has increased from 12.6% to 46.0% (equal weighted), or 263% between 1980 and 2012.

What might contribute to this rise in common ownership? We outline several hypotheses, including the potential importance of index and style investing and the use of common ownership by investors to encourage anti-competitive behaviors that enhance the value of their investments. To shed light on each of the potential determinants of common ownership we identify, we then analyze their association with observed changes in common ownership. Specifically, we estimate panel regressions with pair and year fixed effects to analyze how within-pair changes in common ownership are associated with changes in the characteristics of firm-pairs over time.

The first potential determinant we analyze is index investing. Passive index funds and Exchange Traded Funds (ETFs) tend to track major indices, therefore, if two firms belong to the same index, common ownership could be higher. We find that this is indeed the case. Depending on the measure used, we find that common ownership increases by 27% to 582% relative to the average level of common ownership between two firms if both firms are members of the S&P 500. Consistent with the growing popularity of index investing, this effect also increases over time, and is roughly twice as large in 2012 compared to 1980. Because our estimations control for pair fixed effects and institutional ownership across the pair, this estimate is not due to specific features of pairs which do not change over time or changes in institutional ownership across

time. We find similar results across different major indices used in our study, including the Russell 1000 and 2000 indexes and the S&P 400 and 600 indexes.

We next evaluate the potential importance of style characteristics between two stocks. There are differing theoretical predictions of how style characteristics relate to common ownership. For example if two stocks are similar in style, they might attract more common owners that hold stocks of a particular style (e.g., "value") as an investing strategy. Alternatively, if investors focus on diversification across stock characteristics, one might expect stocks of different styles (e.g., a "value" stock and a "growth" stock) to have more common owners. We find that similarities between styles (not differences) are positively associated with common ownership. Specifically, we find that the more similar firms become over time in terms of their size, market-to-book ratio (i.e., value), dividend policy, and industry, the greater the common ownership. In most cases, we also find that similar past stock returns (i.e., "momentum"), another potentially important component of style, is positively associated with common ownership.

Recent empirical work has suggested that anti-competitive behavior by firms could be linked with common ownership (e.g., Azar, Schmalz, and Tecu, 2016; Azar, Raina, and Schmalz, 2016). Presumably, common owners can enhance the value of their investments by softening the competition between industry rivals in their portfolios. Therefore, one might expect that situations in which anti-competitive behavior is easier to facilitate (e.g., industries with a high herfindahl index) to attract more common owners. However, we find no statistically robust relationship between common ownership across firms in the same industry and the industry's herfindahl index. Specifically, when an industry's HHI goes up, and the potential for anti-competitive

behavior increases, we find that common ownership is no greater across firms within that industry relative to common ownership with other firms not in that industry.

While some of our findings are intuitive, others are less so. For example, we also find common ownership increases among a pair of firms as the average size of the firms in that pair increases. This positive correlation holds even after controlling for whether the two stocks are in the same index or share similar style characteristics and has increased by a factor of 10 over the last 30 years.[6] Additionally, we find that in recent years, through 2012, the quantity of common ownership across most measures has leveled off, despite increased inflows into passive index funds.[7]

Finally, we use Bushee's (2001) categorization of institutional investors to distinguish between passive and active common ownership. We find that being included in the S&P 500 or the Russell 2000 matters more for passive common ownership than for active common ownership. The difference is much smaller for other indices. We also find that differences between firms in industry, market to book ratio, and momentum matter more for active common ownership than for passive common ownership. Perhaps surprisingly, differences in size and dividend payout policy matter less for active common ownership than for passive common ownership.

Our paper makes several key contributions. First, it is the first to document time series and cross-sectional patterns of common ownership across the entire universe of publicly traded firms in the United States. Second, we are the first to compare and

[6] Our paper is not the first to document a potential association between size and common ownership. Using an indicator for whether two firms have a shareholder in common with at least 5% ownership in both firms, Azar (2012) finds a non-monotonic relationship between the likelihood of having a common owner and firm size.

[7] We do not report post-2012 figures or use any post-2012 data in our current analysis, because we have identified data problems in the widely-used 13f filings reported by Thomson Reuters (via WRDS) after 2012 that may be contributing to this decline. E.g., Blackrock's holdings are missing between 2013 and 2015. We are currently working with WRDS and Thomson Reuters to resolve these data problems.

contrast different measures of common ownership across the universe of publicly traded firms. Third, this is the first paper to provide a framework for the potential determinants of common ownership and to quantify their association with observed variation in common ownership across firms and over time.

The findings we report provide important context for recent work which evaluates the role common ownership may have on firm competitiveness (e.g., Azar, Schmalz, and Tecu, 2016; Azar, Raina, and Schmalz, 2016), governance (Azar (2012), Jung (2013), Kang et al. (2013), Kempf et al. (2016)), corporate outcomes (Matvos and Ostrovsky (2008), Gompers and Xuan (2009), Harford et al. (2011), Masulis and Nahata (2011), Cici et al. (2015), He and Huang (2016)), executive pay (Antón et al. (2016), Kwon (2016)), stock price movements (Jotikasthira et al. (2012), Anton and Polk (2014), Bartram et al. (2015), Hau and Lai (2016)), credit risks (Massa and Žaldokas (2016) and weekly return predictability (Gao et al. (2016)). If one seeks to understand the implications of common ownership, it is likely important to understand its determinants.[8]

This paper proceeds in the following order. Section 1 provides an overview of hypotheses regarding the determinants of common ownership. Section 2 outlines common ownership measures and how we construct the data. Section 3 outlines the empirical methodology; Section 4 reports the results; and Section 5 concludes.

[8] For example, we find that common ownership is very highly correlated with firm size, suggesting it might be an important factor to control for when analyzing the implications of common ownership. Consistent with this possibility, Antón et al. (2016) argue that common ownership of industry rivals results in executive pay that weakens incentives for CEOs to compete aggressively against their industry rivals, while Kwon (2016) argues that once one accounts for firm size, relative performances evaluation is increasing with common ownership.

1. The determinants of common ownership

There is a large theoretical literature on the potential implications of common ownership. For example, common owners might pressure managers to internalize externalities between their portfolio companies (Easterbrook and Fischel (1982), Hansen and Lott (1996), Rubin (2006)), which can lead to anti-competitive behaviors (e.g., Bersnahan and Salop (1986), Salop and O'Brien (2000), Farrell and Shapiro (1990), Gilo et al. (2006), López and Vives (2016)). Other papers study the implications for monitoring incentives (Edmans et al. (2016), managerial incentives (Inderst et al. (2007), Fulghieri and Sevilir (2009)), and asset prices (Peng and Xiong (2002), Barberis and Shleifer (2003) Basak and Pavlova (2012), Vayanos and Woolley (2013)).

However, there is relatively little direct discussion regarding the determinants of common ownership. In this section, we attempt to develop hypotheses and discuss the factors that might contribute to either higher or lower common ownership for any given pair of firms. While some of these hypotheses are not new to our paper or are inherently untestable, we include them all here for completeness.[9]

1.1 Indexing and ETFs

If two companies belong to the same index then they are more likely to be owned by institutions that offer passive mutual funds or ETFs that follow the index, and therefore, have a larger common ownership. For a similar reason, passive investor ownership in each of the two companies should predict higher common ownership.

[9] In some cases, the hypotheses are testable (e.g., an association between common ownership and idiosyncratic risks) but not yet tested in the current draft. We plan to conduct these tests in a future revision of the paper.

Hypothesis (Cross section): The common ownership between two companies is higher when the two companies are in the same index.

Hypothesis (Cross section): The common ownership between two companies increases with the average passive ownership between the companies and decreases with the difference between the passive ownership in each company

Hypothesis (Time series): The average pairwise common ownership increases with the aggregate assets under management by passive investors.

1.2 Style/Strategy effect

If the two companies share characteristics that are valued or preferred by the same group of investors, they are likely to have more common ownership. These common characteristics can be viewed as a style of investment or an asset class. The categorization can be either behavioral (e.g., Barberis and Shleifer (2003)) or rational (e.g., Peng and Xiong (2002)). For example, if the two companies tend to pay dividends, investors with preferences for this payout policy (e.g., for tax reasons) are likely to hold both companies in their portfolios. Alternatively, if two companies both emphasize corporate social responsibility, they are both likely to be owned by investors who get utility from investing in companies that are socially responsible. Other style classes are small-cap, growth, or momentum stocks. More generally, if companies are exposed to the same risk factor, investors who seek exposure to this factor (but would like to diversify the idiosyncratic risk) will have both companies in their portfolio.

Hypothesis: Companies with similar exposure to risk factors or companies with similar characteristics, are likely to have more common ownership.

1.3 Diversification

If the idiosyncratic risks of two companies are negatively (positively) correlated, then investors will try to diversify away the exposure to this risk by holding (not holding) both companies in their portfolio. Similarly, if the two companies are exposed to the same risk factors (e.g., Fama/French factors, geographical area, specific industry, etc.) then investors are less likely to hold both companies in their portfolio in order to hedge their exposure to a certain risk factor (e.g., rather than hold two value stocks, an investor might hold one value stock and one growth stock).

Hypothesis: The common ownership between two companies decreases with the correlation between their idiosyncratic risks.

Hypothesis: Companies with similar exposure to risk factors (e.g., betas) or style characteristics are likely to have less common ownership.

1.4 Externalities

If two companies impose pecuniary externalities on one another, i.e., one company's actions affect another's value, an investor may seek an ownership stake in both companies so as to affect the policy of the portfolio companies (directly or indirectly) in order to account for these externalities (e.g., Easterbrook and Fischel (1982), Hansen and Lott (1996), and Rubin (2006)). That is, investors can benefit from buying large stakes in both companies and using their control rights to coordinate their actions such that the negative externalities are restrained and the positive externalities are exploited.

There are different kinds of externalities:

A. Synergies: If a merger between the two companies would create positive operational synergies (e.g., by facilitating the efficient reallocation of physical or human capital), an investor may seek an ownership stake in both firms so as to use their control rights in both companies to push for such a combination and thereby increase the market value of their portfolio. Alternatively, common owners can encourage the companies to form an alliance or a joint venture, if these synergies can be realized without changing the ownership structure, which often involves large transaction costs (e.g., advisory fees and litigation).

Hypothesis: Companies with more potential operational synergies (e.g., firms with complementary technologies, business strategies, or organizational structure) will have higher common ownership.

B. Competition and collusion: A common owner of two competitors (in the product market) has incentives to foster coordination (create collusion) or relax the competition between the companies in order to set prices, quantities and strategies (e.g., split the market such that it allows each company to exert local monopolistic power or form strategic alliances to share resources). As a result, the total profit of the two companies is likely to be higher. Taking advantage of anticompetitive behavior is likely to be a significant motive within industries with high concentration.

Hypothesis: Industries with high concentration (measured by high industry HHI) have a higher level of within industry common ownership.

C. Vertical relationship: When one firm is the supplier of the other, various frictions can impede efficient production (e.g., the concern of leakage of private information

can result with an inefficient supply chain, or hold-up problems can result with investment that is designed to improve the bargaining position of the supplier rather than tailoring it to needs of the buyer). These frictions can be mitigated by the common owner, who can reassure the management of the two companies that such opportunistic behavior will not take place.

Hypothesis: Companies with a vertical relationship (customer and supplier) have higher common ownership.

1.5 Governance

The ability to exploit these externalities through common ownership depends on the extent to which the corporate governance mechanisms in place give power to shareholders to influence managers and boards. For example, if managers are entrenched (the company has a staggered board or a dual class structure) then this effect of common ownership is likely weaker. Such governance structures might mitigate the incentive for an investor to create a common ownership position.

Hypothesis: Companies with governance mechanisms in place that limit the power of shareholders will have lower common ownership.

2. Measuring common ownership

Common ownership reflects scenarios where two firms are at least partially owned by the same investor. While this definition is intuitive, attempting to measure common ownership for a given pair of firms is less straightforward. For example, if an investor owns 1% of firm A and 20% of firm B, how should one quantify the *extent* of common ownership for that investor for that pair of firms? Should one weight the ownership

stakes of the two firms, and if so, how? Moreover, if one wishes to measure the extent of common ownership across all owners for a particular pair of firms, how should one aggregate the common ownership stake of each common investor?

In this section, we discuss five possible measures for common ownership at the investor level and two possible ways to aggregate common ownership across investors for a given pair of firms. To facilitate this discussion, we will employ the following notation: α_i^j is the percentage ownership stake of investor *i* in company *j*, MV^j is the total market capitalization of firm *j*; $I^{A,B}$ the set of institutional investors who own a strictly positive stake in firm A and in firm B, for all $i \in I^{A,B}$ we let $m_i^{A,B}$ be the investor-level measure of common ownership. The five measures of $m_i^{A,B}$ we consider are:

1. $AVG_i^{A,B} = \frac{\alpha_i^A + \alpha_i^B}{2}$. This first measure is simply the arithmetic average ownership stake of investor *i* in both companies. An implicit assumption of this measure is that α_i^A and α_i^B are perfect substitutes for the common interest of investor *i* in the two firms. While intuitive, the measure has number of potential downsides. First, it isn't clear it represents an economically meaningful measure of common ownership in cases where the ownership stake of the investor is asymmetric. For example, an investor that owns 1% of firm A but 29% of firm B, would have a common ownership measure of 15% according to this measure. Moreover, the measure treats changes in the ownership stake of the investor in either firm symmetrically; an increase in ownership of 1 percentage point in either firm would increase common ownership by ½ percentage point. Second, the measure does not account for the differences in the market capitalization of the two firms, which could be important if the common interest of the investor varies with the absolute sizes of their ownership stakes.

Throughout the text and our tables, we will refer to “cross avg” when referring to results related to this measure.

2. $MIN_i^{A,B} = min\{\alpha_i^A, \alpha_i^B\}$. This second measure instead uses the minimum ownership stake of investor *i* in both companies. While this measure is likely to understate the common interest of the investor in the two companies, an advantage is that it may more accurately capture the common interest of an investor in cases where the investor has an asymmetric ownership stake in the two firms. Using the earlier example where the investor owns 1% in Firm A and 29% in Firm B, this measure would be equal to just 1%, and it would be unaffected by additional increases in the investor’s ownership stake in Firm B. I.e., increasing the ownership stake from 29% to 30% in Firm B would not affect the extent of common ownership. A potential downside of this measure, however, is that it also does not account for any potential differences in the market capitalization of the two firms. Throughout the text and our tables, we will refer to “cross min” when referring to results related to this measure.

3. $WAVG_i^{A,B} = \alpha_i^A \frac{MV^A}{MV^A+MV^B} + \alpha_i^B \frac{MV^B}{MV^A+MV^B}$. This third measure, which was used by Anton and Polk (2014), attempts to account for the potential importance for the absolute sizes of the investor’s ownership stakes using the weighted average ownership stake of investor *i* in both companies, where the weights are their relative market capitalization. The potential downsides of this measure, however, are similar to that of the unweighted average in that it isn’t clear it represents an economically meaningful measure of common ownership in cases where the ownership stake of the investor is asymmetric. Throughout the text and our tables, we will refer to “cross wavg” when referring to results related to this measure.

4. $GAVG_i^{A,B} = \sqrt{\alpha_i^A \times \alpha_i^B}$. The fourth measure is the geometric average ownership stake of investor *i* in both companies. Unlike $AVG_i^{A,B}$ and $WAVG_i^{A,B}$, in this measure α_i^A and α_i^B are complements for the common interest of investor *i* in the two firms. Similar to $AVG_i^{A,B}$ and $WAVG_i^{A,B}$, however, the measure treats an increase in the larger of the two ownership stakes as an increase in common ownership. Throughout the text and our tables, we will refer to "cross gavg" when referring to results related to this measure.

5. $HJL_i^{A,B} = \frac{\alpha_i^A \times \alpha_i^B}{\alpha_i^A + \alpha_i^B}$. This final measure is a variant of Harford et al. (2011). Intuitively, $\frac{\alpha_i^A}{\alpha_i^A + \alpha_i^B}$ and $\frac{\alpha_i^B}{\alpha_i^A + \alpha_i^B}$ are the relative weights that investor i puts on firm A and B, respectively. Note that under perfect common ownership, where the investor owns the same fraction of company A and of company B, this measure would be 25%. Also note that the measure $HJL_i^{A,B}$ is a symmetric construct of the two weights, thus allowing us to avoid having to construct two separate measures of common ownership for each pair of firms as in Harford et al. (2011). Moreover, note that $\sum_{i \in I^{A,B}} HJL_i^{A,B}$ can be interpreted as the weighted average of the relative weights that common owners put on each firm. Throughout the text and our tables, we will refer to "cross hjl" when referring to results related to this measure.

For each investor-level measure of common ownership $m_i^{A,B}$, we then propose two possible ways to aggregate the measure to the pair level.

1. $CROSS\_SUM_m^{A,B} = \sum_{i \in I^{A,B}} m_i^{A,B}$ is simply the sum of all investor-level measures of common ownership. It implicitly assumes that investors can coordinate their

collective decision making. Since the institutional investors who form the common ownership have something in common (a non-trivial ownership in both firms), it is reasonable to expect some level of coordination, especially when it comes to polices that are likely to affect both firms A and B. In any case, $CROSS\_SUM_m^{A,B}$ represents an upper bound on the importance of common ownership, as measure by $m_i^{A,B}$. This is the version of the measure we use in our main regression specifications

2. $CROSS\_MAX_m^{A,B} = max_{i \in I^{A,B}}\{m_i^{A,B}\}$ measures the common ownership of the investor with the largest common ownership among all common owners. This measure implicitly assumes that investors cannot coordinate their collective decision making, and only the size of the largest common owner matters. In this respect, $CROSS\_MAX_m^{A,B}$ represents the lower bound on the importance of common ownership, as measure by $m_i^{A,B}$. An alternative aggregator would be to sum over the ownership stakes of the X largest investors. Such a measure would reflect a hybrid of $CROSS\_SUM_m^{A,B}$ and $CROSS\_MAX_m^{A,B}$.[10]

2.1 Data construction

We start our data construction by creating a sample of firm-pair-year observations that includes the universe of potential U.S. public firm pairings between 1980 and 2012. For each year, we include all publicly traded firms from the Compustat-CRSP universe of firms that have non missing values for key variables such as stock price, assets, market to book, etc. We then construct a sample of firm pairs each year based on these public firms as of December 31 of that year. For *n* firms in a given year our pair

[10] In the current draft, we have not yet estimated results using the CROSS_MAX aggregator, but future versions of the paper will to do so.

construction yields $n*(n-1)/2$ distinct pairs. Thus each stock is paired with each other stock only once. We end up with a total of 385,032,108 pair-year observations.

We construct measures of common ownership for each pair from the Institutional 13F Holdings that have been tabulated and aggregated by Thomson Reuters. We access this data via Wharton Research Data Services. Some firms may have multiple classes of publicly traded stock; in these instances, we aggregate ownership by the value of the share classes (e.g. an institution needs to only be an owner of one of the class of shares in a stock to have an ownership stake, and this overall ownership stake is proportionately reduced based on the proportion of ownership the share class has across all publicly traded classes of the firm). The result of the merge with 13F data is that for each pair we have a list of all outstanding institutions which own both stocks, both the count, and share ownership of each. With these data we than compute the ownership measures as outlined above. We should note that it is non-trivial to compute these ownership pairs in terms of computing power, and typically would not be feasible to compute on a personal computer. Our final data set is 307 Gigabytes. We utilized the High Performance Computing Cluster (HPCC) at Wharton to calculate the ownership variables for each pair.

2.2 Summary statistics

We report summary statistics for common ownership measures and common ownership determinants in Table 1. Our full sample includes all publicly traded firms with non-missing ownership and determinant variables between 1980 and 2012, the resulting sample is composed of 385,032,108 pair-year observations. The median number of common owners during this time period is 3. Meaning that for the median

pair of firms in the sample across the full sample time period, the number of institutional owners that they have in common is 3. However, the sample is skewed, there are many pairs without common owners, and the mean number of common owners across the sample is higher, with 11.97 common owners for every pair of firms.

The average common ownership across the entire sample period varies from 2.2% to 7.5%, depending on how common ownership is measured. As can be seen in Table 2, according to all five measures, there is a considerable cross section and time series variation in common ownership, which we later exploit in our analysis. When looking at the summary statistics of determinants it is apparent that two firms being in the same index is a somewhat rare event in the sample. For example, just 0.7% of pair observations have both firms in the S&P 500. In any given year, there are approximately 500*499/2 = 124,750 pairs of S&P 500 firms, while the average number of firm pairs across the 32 years is approximately 13,000,000 per year. There are fewer observations for Russell indices as we only have the composition of these indices from 1998 to 2012. Therefore, some of our specifications focus only on the time period in which we have Russell data.[11]

Style determinants are based on size (natural log of assets), market to book ratio of equity, and momentum (i.e., past stock returns, based on portfolios where 10 = highest decile momentum (buy) portfolio and 1 = lowest decile momentum (sell) portfolio). Industry is based on 3-digit SIC code; on average 2% of the firm pairings are of firms from the same 3-digit SIC industry. The dividend indicator is a 1 if both firms pay some dividends and a 0 if one or both do not. All differences are based on the absolute value of the difference between the two firms in a pair.

[11] We plan to expand our data on Russell Index inclusion to earlier years in our next revision of the draft.

3. Empirical Methodology

To analyze the potential determinants of common ownership, we begin by estimating the following pair-level panel regression,

$$y_{it} = \beta X_{it} + \alpha_i + \delta_t + \varepsilon_{it},$$

where y_{it} is our aggregate measure of common ownership for pair *i* in year *t*, and X_{it} is our time-varying explanatory variables of interest. For example, X_{it} might be an indicator equal to 1 if both firms in pair *i* are listed in the S&P 500 index in year *t* and 0 otherwise. Alternatively, X_{it} might equal the absolute difference in Ln(assets) for the two firms in pair *i* in year *t*. We also include pair-level fixed effects, α_i , to control for time-invariant differences in common ownership across pairs and to ensure we only make use of within-pair variation for this initial analysis. In other words, we are interested in how a change X_{it} for a given pair of firms *i* is associated with the observed change in common ownership for that pair, y_{it}. We also include year fixed effects, δ_t, to absorb the secular trend in common ownership, which we will analyze separately. To account for potential covariance across pairs over time, we cluster the standard errors at the pair level.

Because we lack an exogenous source of variation in the potential determinants of common ownership, the findings of this panel estimation must be interpreted with caution. To be clear, we do not seek to identify the causal effect of any given explanatory variable *X* on common ownership, *y*. Rather we simply seek to establish and quantify basic correlations between potential determinants of common ownership and the various measures of common ownership discussed in Section 2. For example, we seek to answer questions like: "If a pair of firms goes from *both firms* being included

in the S&P 500 index to *not,* what is the average change in observed common ownership and how economically large is the observed change?" With that caveat in mind, we now proceed to our empirical analysis.

4. Results

In this section we report the main result of our empirical analysis.

4.1 Trends of common ownership

We start by considering the time series properties of common ownership. In doing so, we seek to quantify how much common ownership has increased over the last 32 years, how the trend in common ownership compares to the upward trends for overall institutional ownership and passive indexing documented in extant research, and how the increase in common ownership has varied across firms and different types of institutional investors (e.g., passive versus active institutions).

Consistent with anecdotal evidence, we find that common ownership has increased significantly from 1980 to 2012. This can be seen in Figure 1, which plots common ownership across our five measures over time. For each measure, we aggregate common ownership at the pair level using the $CROSS\_SUM_m^{A,B}$ version of each measure, which sums common ownership measure across all common investors in that particular pair of firms. Depending on the measure, the average amount of common ownership increased by around 1,250%-2,300% between 1980 and 2012.

We see a similar time trend when we instead proxy for the extent of common ownership using the proportion of firm pairings with no common institutional investor. This is seen in Figure 2, which plots the proportion of firm pairings in each year that

have no overlap of the shareholder base, as reported by the 13F filings. Consistent with Figure 1, the fraction of pairs without a link is sharply declining over time, with a modest increase starting 2009. In 1980, more than 75% of all firm pairings had no common owner, and this fraction decreases to about 2% of firm pairings in 2008 before gradually increasing to around 8% of firm pairings in 2012.

Interestingly, the time trend for common ownership does not perfectly align with that of the aggregate level of institutional ownership or passive investing, which are two commonly assumed determinants of common ownership. This is seen in Figure 3, which plots the average of our 5 measures of common ownership from 1980 to 2012, as well as the equal-weighted average percentage of a firm's equity held by institutional investors during that same time period. The figure confirms the well-known rise of institutional ownership in the last 30 years. However, the extent of common ownership begins to level off in 2009, which is a few years after the leveling of institutional ownership. The leveling off of common ownership in 2009 and later years also does not coincide well with the percent of stocks held by passively managed mutual funds, which has exhibited consistent growth since 1998 (e.g., see Appel et al. (2016)).

The increase in common ownership also appears driven by an increase in the number of common owners per pair of firms rather than an increase in the average common interest of each common investor. As seen in Figure 4, the average number of common owners has increased from 1.7 common owners in 1980 to around 33.6 common owners per pair in 2012. Dividing the average common ownership per pair (across the 5 measures) by the average number of common owners per pair, gives a rough estimate for the average common owner's stake size which is around 0.25%-

0.50% and fairly stable over the years.[12] While this measure does not capture the variation of block sizes at the pair level (not all blocks have the same size), it suggests that the average ownership stake of common owners has remained relatively constant.

There is substantial heterogeneity in the extent of common ownership across pairs, and this dispersion seems to closely track the average level of common ownership over time. This is seen in Figure 5, which plots the standard deviation for each of our 5 measures of common ownership from 1980 to 2012. There is a considerable variation of common ownership within years, and this variation is increasing with the average common ownership (the standard deviation follows a similar time-series pattern to the average common ownership). This suggests that when common ownership increases, it does not increase uniformly across all pairs of firms in the economy, but rather, it increases proportionally more in a subset of firms.

Figure 6 plots common ownership of active and passive institutional owners (based on Bushee (2001) classifications). As can be seen much of the rise in common ownership is linked with passive institutional owners. One important item to note, is that Bushee (2001) categorizes one BlackRock entity as active, and therefore there is a jump in active common ownership when BlackRock and BGI merge. Overall, the figure indicates that common ownership has risen among both active and passive managers, and that a greater proportion of the rise is linked with passive managers.

[12] An accurate measure of the average common owner's stake size should divide the total common ownership at the pair level across all common owners by the number of common owners, and then take the average across pairs. We will be performing this calculation in the next iteration of this paper.

4.2 Regression analysis

We begin our regression analysis by focusing on the potential importance of index inclusion. To do this, we start by constructing a number of pair-level dummy variables that indicate whether the two firms in a particular pairing are both included in a certain market index or not. We construct six such indicators, one for each of the following indexes: S&P 500, S&P 400, S&P 600, Russell 1000, Russell 2000, and Nasdaq, and estimate the panel regression from Section 3 for each our five aggregated measures of common ownership. Because of a lack of data on Russell 1000 and 2000 index inclusions prior to 1998 and the absence of S&P 400 and 600 indexes prior to the mid-1990s, we restrict our sample to post 1997 data, and because institutional ownership is likely to contribute to common ownership and be higher for firms included in a popular index, we also control for the average percent of shares held by institutions for the pair of firms. Our findings regarding index inclusion are reported in Table 3.

Index inclusion is strongly and positively associated with each of our common ownership measures. For all five measures, common ownership is about 0.6 to 5 percentage points higher for a pair of firms that goes from not being in the same index (i.e., S&P 400, S&P 500, S&P 600, Russell 1000, Russell 2000, or Nasdaq) to being in the same index. The estimates are all statistically significant at a level of at least 1% (with some *t*-stats exceeding 400) and economically large. For example, moving from both stocks not being in the S&P 500 to both firms being included in the S&P 500 is associated with about a three-fourths standard deviation increase in common ownership for the pair of stocks. The index with the largest association for all five measures of common ownership is the S&P 500, while the index with smallest association depends

on how we measure common ownership: it is the Russell 1000 for *cross min* and *cross hjl* and S&P 400 for *cross avg* and *cross wavg*.

The positive association between index inclusion and common ownership is consistent with our hypothesis in Section 1.1 that the growth of index investing may be contributing to the rise in common ownership. However, as noted earlier, these estimates must be interpreted with caution. For example, we cannot rule out the possibility of reverse causality, where an overlapping shareholder base between two companies increases the likelihood that the two are included in the same index. This might occur if common ownership affects the performances of the two firms (e.g., by any of the channels we discussed in Section 1.4), which might in turn affect the likelihood that one or both firms enter or exit a specific index. Nor can we rule out the possibility of omitted variables that affect both the common ownership of the two companies and their inclusion in a specific index.

Higher average institutional ownership for the pair and a smaller absolute difference in the level of common ownership are also both positively associated with common ownership. In other words, as the level of institutional ownership becomes higher *or* more similar for a pair of firms, the extent of common ownership for the pair also increases, on average. Since we are controlling for index inclusion, this effect does not stem from the companies being part of the same index, and the findings are consistent with the conventional wisdom that common ownership may partly stem from the growth of institutional investors. That said, this interpretation should be cautioned since our measures of common ownership are constructed from the 13F filings, which only

consist of institutional investors. Wealthy individuals who may hold blocks of shares in multiple firms are unlikely to show up in our data.

We next analyze whether similarities in the "investment style" or risk characteristics of a pair of stocks is associated with common ownership as suggested in Section 1.2. The evidence in Table 3 is broadly consistent with the style hypothesis we laid out in Section 1.2. In particular, in all five specifications, the coefficients on diff_at, diff_mkt_to_book, diff_momentum are negative, and the coefficients on both_div and ind_dum3 are positive. In all cases, the coefficients are statistically significant at a level of at least 1%. That is, controlling for the average over the two companies, an increase in the absolute difference between the two companies in their size, market to book ratio, or momentum factor, reduces the common ownership between the two.[13] Similarly, if the two companies are in the same industries or are both paying dividends, then they have larger common ownership.

The coefficients in Table 3 allow us to compare the relative magnitudes of indices and style. Both firms being in S&P 500 results in a 200% increase in common ownership relative to the average common ownership, in the case of the cross min measure. We can evaluate this compared to some of the "style" variables. A one standard deviation reduction in difference in size variable results in a 20% increase in common ownership. When comparing "style" vs. index inclusion variables it is important to note that index inclusion is a rare event, going from not being in an index to being in an index is an 11.76 standard deviation change in the case of the S&P 500. While the exact magnitudes vary across each of the potential determinants, in general, the

[13] Since we control for the average level across the two companies, an increase in the difference between the two companies of x units should be interpreted as if one company experienced an increase by x/2 units and the other company experienced a decrease of x/2 units.

magnitudes of "style" variables and the magnitudes of index variables are both economically important for common ownership.

Notice that the association between commonality in characteristics and common ownership arises although we are controlling for index inclusion and the amount of institutional ownership in both companies. While it is possible that the effect is arising due to inclusion into indexes which we do not control for (i.e., indexes or ETFs that replicate a certain strategy or include only companies with a certain characteristic), the interpretation is still consistent with the style effect.

Also notice that our empirical strategy so far does not allow us to distinguish between two hypotheses: the style hypothesis according to which companies with similar characteristics have large common ownership (Section 1.2) and the idea that common ownership can result with the two companies adopting similar corporate polices or strategies, and therefore overtime become more similar to each other.[14] While we cannot distinguish between the two directions of causality, both of these alternatives are interesting and intriguing.[15]

In addition to differences in key determinants of common ownership, we also control for the level effects of the determinants. It is interesting to note that in all specifications, the coefficient on average size of the two companies (after controlling for the difference in size) has a positive and statistically significant effect on common ownership. That is,

[14] The general idea is that investors learn from their experience as owners in one company about the best practices and consequently lobby for a change of the corporate policy in their other portfolio companies. Therefore, under this hypothesis, after controlling for the (relevant) characteristics of the portfolio companies (e.g., their size), corporate polices could become more similar as common ownership increases.

[15] As was mentioned before, we cannot rule out the possibility of an omitted variable, although given our pair fixed effect specification, we can rule out some time invariant omitted variables.

common ownership is more prevalent in larger firms. This is true even though we control for index inclusion. In other words, even for companies that are in the same index, the larger they are, the more common ownership they have. The reason may be that some passive investors which try to replicate the index put larger weights on the largest companies that construct the index in order to minimize their tracking costs. The effect of size is economically quite large. An increase in one standard deviation of the average size of the pair increases the common ownership by 3.3 percentage points when it is measured by cross avg (the largest effect, and 44% of the average value of cross avg) and by 0.9 percentage points when it is measured by cross_hjl (the smallest effect, and 40% of the average value of cross hjl).

We also assess how common ownership may be linked with industry structure and characteristics, given the potential for anti-competitive behavior by firms that have common owners and the hypothesis we outline in section 1.4.B. To do this we regress common ownership on the average HHI index of the industries of the two companies in the pair, and on an interaction variable between the average HHI index and whether or not the two companies are in the same industry. Under this specification, a positive coefficient on the interaction variable suggests that common ownership of two companies that are in the same industry is larger when the industry is more concentrated, as measured by the HHI index. Interestingly, in our main specification, the coefficient on the interaction variable is not statistically different from zero, no matter how we measure common ownership. That is, for a pair of firms in the same industry, an increase in the concentration of the industry is not significantly associated with an increase of common ownership.

This result is interesting for the following reason: The negative externalities that industry rivals impose on each other are likely to be stronger when the industry is more concentrated. Seemingly, common owners of industry rivals can benefit from incentivizing them not to compete hard against each other (or from coordinating their strategies), thereby increasing the combined value of the two companies and their portfolio (see our hypothesis in Section 1.4). Therefore, this benefit is likely to be larger when the industry is more concentrated. The fact that we do not find any association between the interaction variable and common ownership suggests that the benefit from a coordination or collusion among industry rivals is not an important motive for common ownership.

It is important to note that with pair fixed effects, the industry dummy mainly loads on instances in which firms switch industry, which may be a consequence of an acquisition, asset sale, or reclassification of the industry. To conclude, we do not find strong evidence in support of our hypothesis in Section 1.4.B.

In Table 4 we estimate the effect of common ownership determinants over different 5 year subsamples. We report results for the cross min measure (we obtain directionally similar results with other measures). As can be seen the coefficients on indices, particularly the S&P 500 grow over time. Style variables such as difference and size and difference in market to book fluctuate in size and magnitude, however there is no discernable overall time trend.

4.3 The determinates of active and passive common ownership

Table 5 and 6 report the regression analysis when the dependent variable is our measure of common ownership based only on passive institutional investors (Table 5)

and the measure based only on active institutional investors (Table 6). It is important to note that common ownership measures based on passive investors tend to have higher averages during the sample period. For example, the cross min measure has an average of 2.5% based on passive ownership, while it is 1.1% based on active ownership. In general the average of passive common ownership measures is roughly twice the active common ownership measure. Therefore we want to interpret the economic magnitudes when compared relative to the mean level of the dependent variable. Interpretations are based on dummy variables for indexes and standard deviations continuous variables. Several interesting results show up.

First, the inclusion to the S&P 500 and Russell 2000 indices matters more for the passive common ownership than for the active common ownership. This is consistent with these indices tracking more money than others. For example, in specification 1 of table 5, the cross min measure increases by 5.8%, or 232% compared to the average of the passive cross min measure (2.5%). Alternatively, in specification 1 of Table 6, the cross min measure increases by 0.6%, or 54% compared to the average of the passive cross min measure. This can also explain why the R-squared in our regressions of passive common ownership is larger than for active ownership (90% and 75%, respectively); passive investment is largely driven by indexing, so we are able to explain more of the passive common ownership. An additional interesting aspect of the results in Table 6 is that the S&P 500 dummy is not positive in all specifications, suggesting some evidence that the common ownership measures we use capture different aspects of active common ownership.

Second, as one might expect, differences between firms in industry, market to book ratio, and momentum seem to matter significantly more for active common ownership than for passive common ownership. Interestingly, the coefficients on these variables tend to be at least twice as large in absolute terms, despite the lower average size of active common ownership. However, contrary to what one might expect, differences between firms in size and dividend payout policy matter (weakly) less for active common ownership than for passive common ownership. Consistent with the pooled analysis, in both specifications, differences between firms are negatively associated with common ownership.

Finally, for a pair of firms in the same industry, an increase in the concentration of the industry is negatively associated with an increase of passive common ownership. In all cases the significance is marginal. By contrast, the coefficient on this interaction variable is positive for active common ownership (Table 6), although not in all specifications. However, the economic magnitude suggests a minimal economic effect on common ownership, a one standard deviation increase in industry HHI when both firms are in the same industry is linked with an 0.0096% increase in common ownership, or 0.87% increase relative to the average level of common ownership, for the cross min measure, for example. As a point of reference, we can compare this to the effect of firms simply being in the same industry, where the effect is 5.7% relative to the average.

5. Concluding remarks

Between 1980 and 2012 there has been a dramatic rise in common ownership across publicly listed firms in the United States. The average pair of firms in 1980 had 1.7 institutional owners in common; by 2012 this figure was 33.6. Across a variety of measures which quantify the amount of common ownership across firms, not just the number of common owners we find increases of between 1,250% and 2,300%. This increase far outpaces the overall increase in institutional ownership during this time period for the average firm of 263%. We find evidence consistent with several key determinants of common ownership linked with index inclusion and investment styles, even after controlling for institutional ownership and a variety of fixed effects. We find minimal evidence that situations in which firms are more likely to engage in anticompetitive behavior attracts common ownership. Overall our findings provide important context for empirical and theoretical work that has suggested common ownership is important for competitiveness, corporate governance, firm outcomes, and stock price movements.

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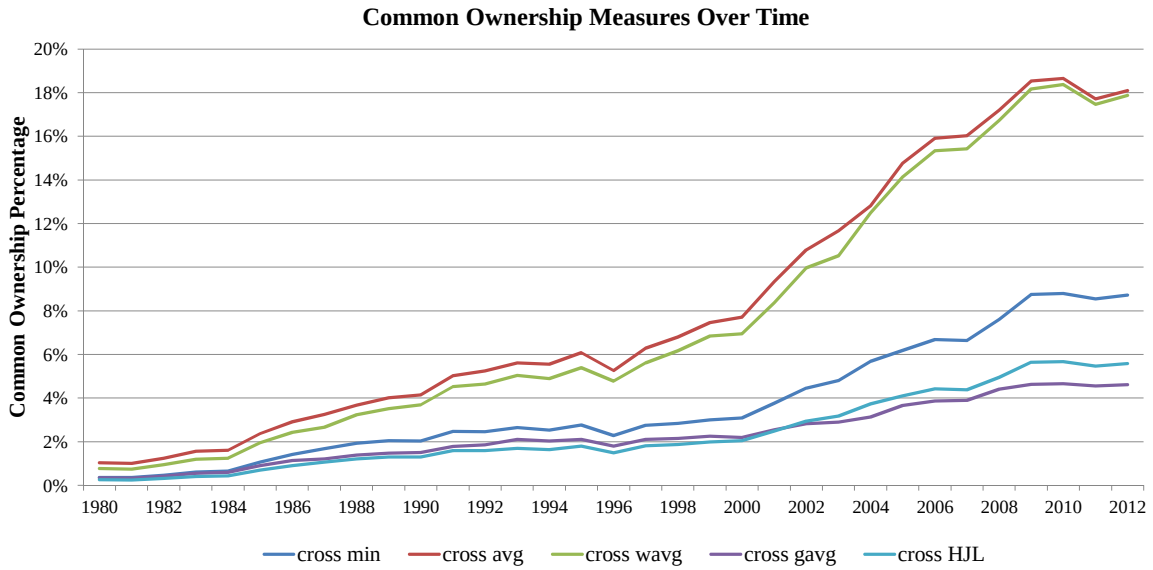

Figure 1: Common Ownership Measures Over Time

This figure plots the average of the five key common ownership measures, for each measure, from 1980 to 2012. Details on each measure can be found in Section 2.

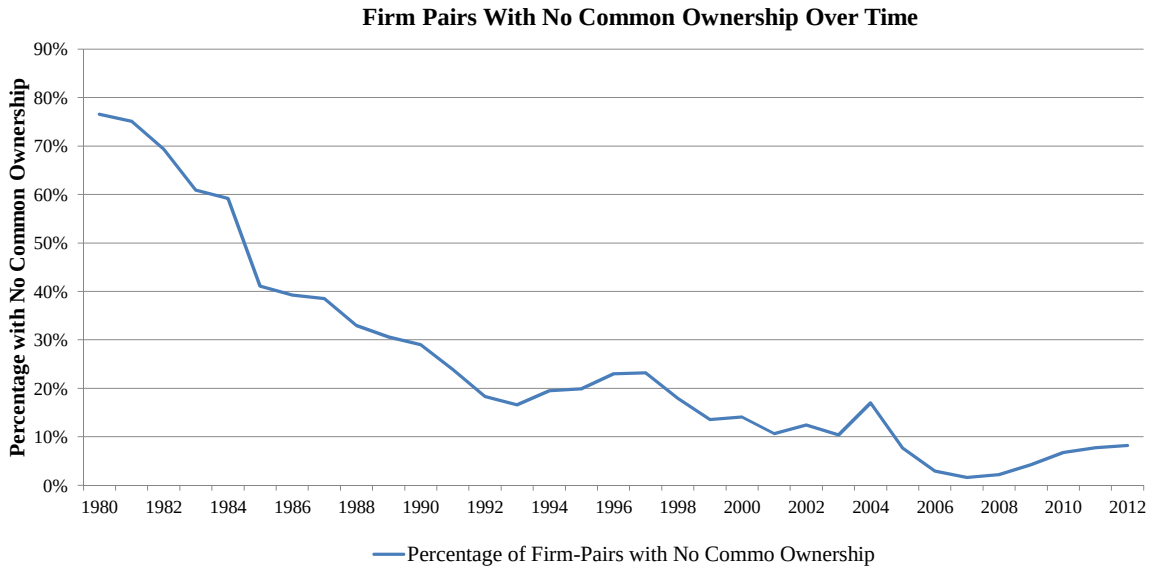

Figure 2: Proportion of Links with Zero Common Ownership

This figure plots the proportion of common ownership firm pairs in a given year for which there were no institutions that held positions in both firms based on Thomson 13f data.

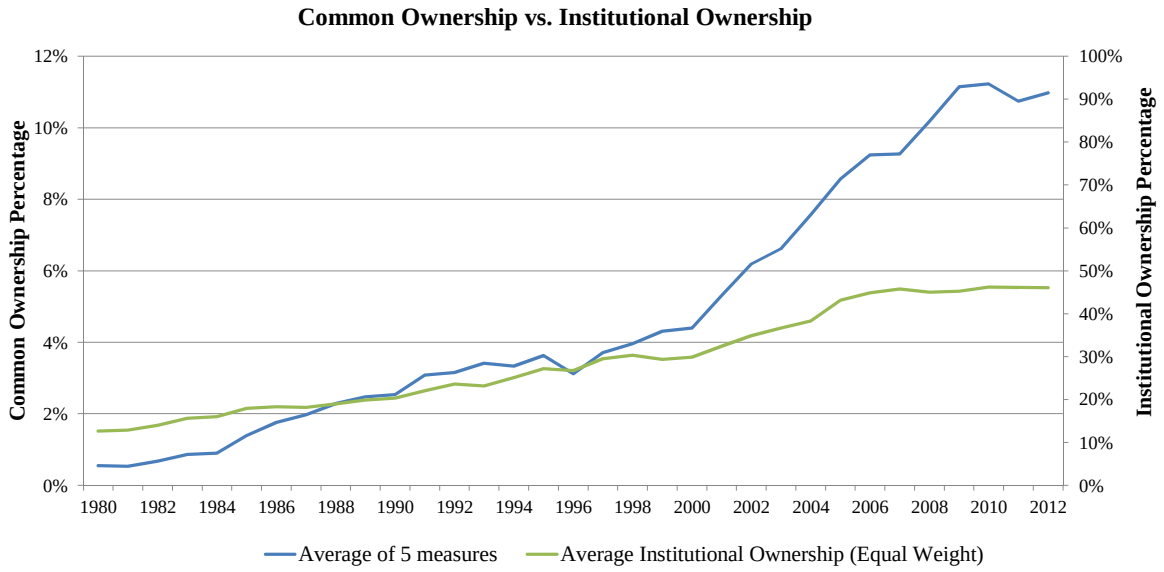

Figure 3: Common Ownership vs Institutional Ownership

This figure plots the average of common ownership measures relative to the average institutional ownership, equal weighted, in a given year. Details on each measure can be found in Section 2.

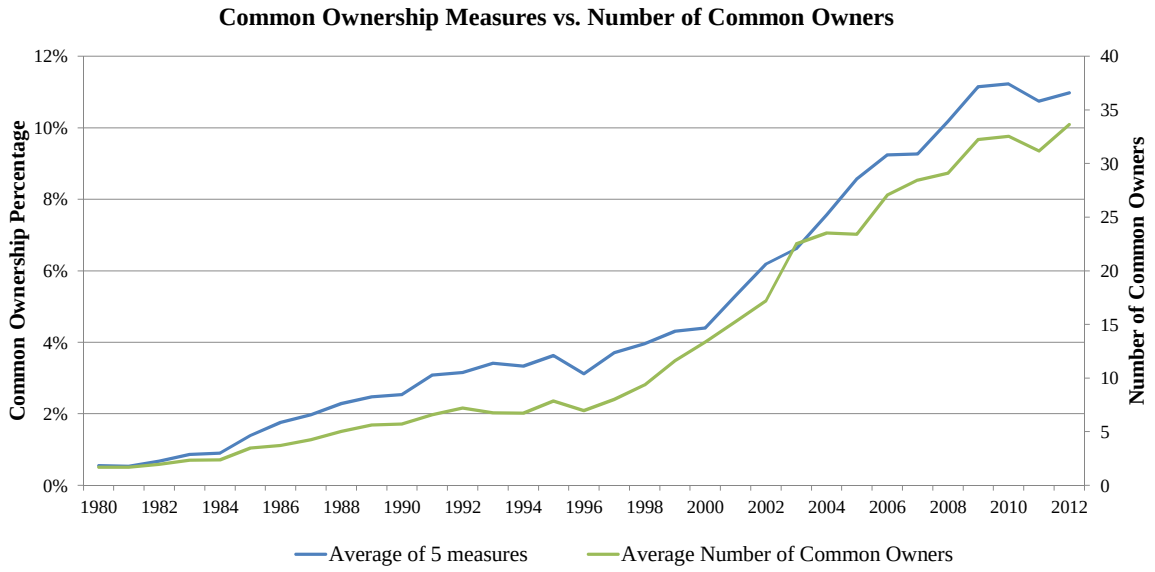

Figure 4: Common Ownership Measures vs Number of Common Owners

This figure plots the average of common ownership measures relative to the average number of common owners a firm pair has in a given year. Details on each measure can be found in Section 2.

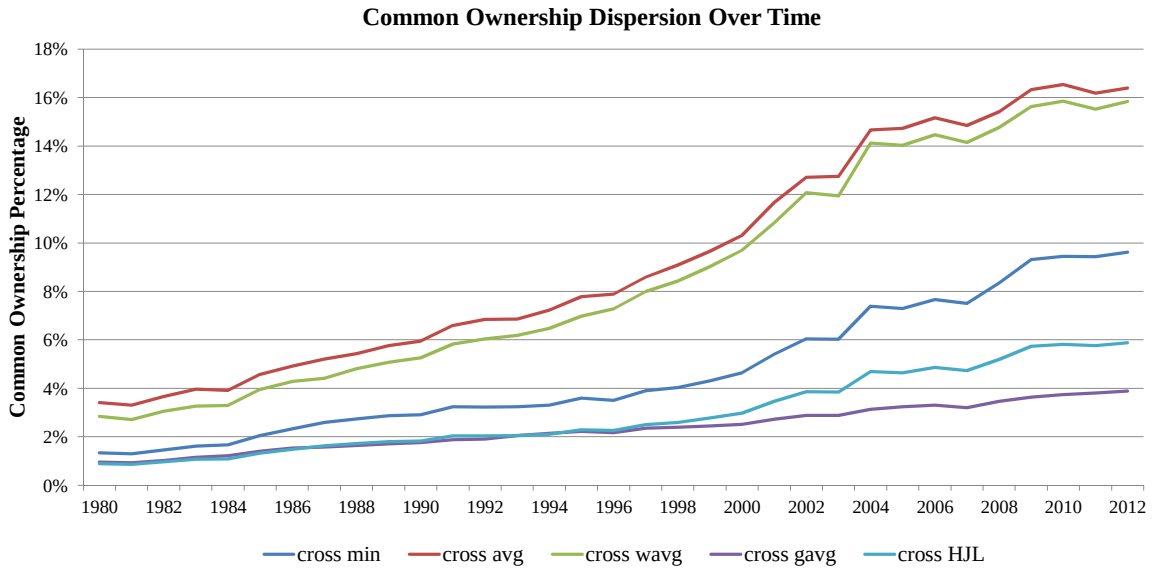

Figure 5: Standard Deviation of Common Ownership Measures Over Time

This figure plots the standard deviation of the five key common ownership measures, for each measure, from 1980 to 2012. Details on each measure can be found in Section 2.

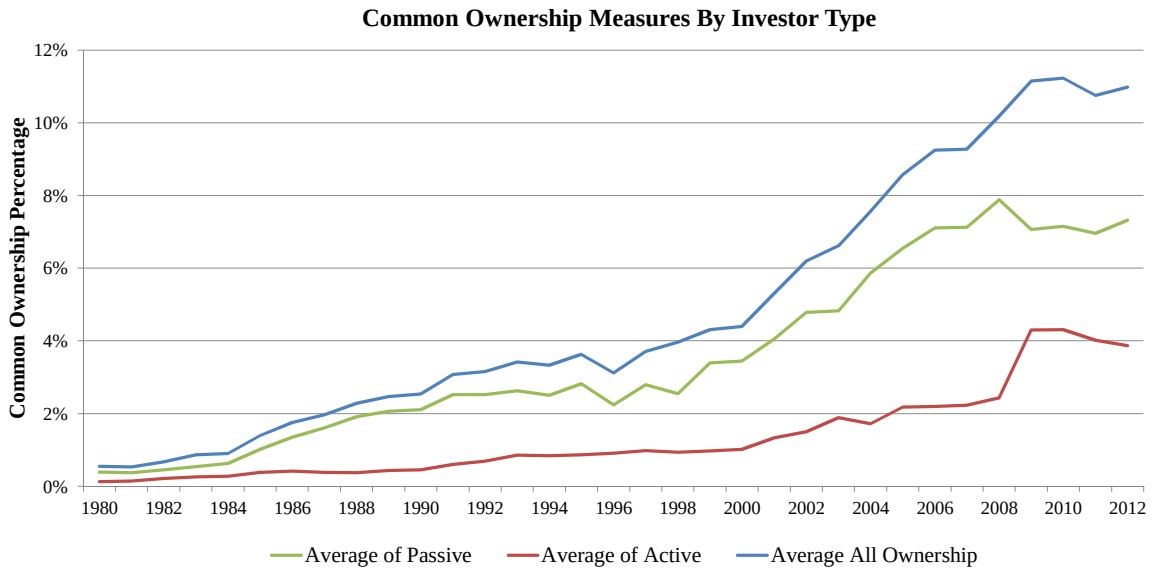

Figure 6: Common Ownership Measures Passive vs. Active

This figure plots the average of the five key common ownership measures based on active ownership and passive ownership from 1980 to 2012. Details on each measure can be found in Section 2. Active Ownership is based on Bushee (2001) categorizations of transient and dedicated holders of stocks, while Passive Ownership is based on Quasi-Indexers.

Table 1. Summary Statistics

This table reports summary statistics for common ownership variables and variables that are key potential determinants (explanatory variables) of common ownership variables. The common ownership variables are defined in Section 2 of the paper. The explanatory variables are composed of index indicator variables (coded 1 if both firms are in an index and 0 otherwise), "style" variables, which are composed of the average level of the variable (size for example) across the pair of firms and the absolute value of the difference in variable across the pair of firms. Size is defined as the logarithm of firm assets, market to book is the market value of equity divided by the book value of equity. Momentum is a number between 1 and 10 based on the momentum portfolio that the stock belongs to based on the performance over the prior 6 months. If a stock is in the top momentum (buy) portfolio it is coded as a 10, and if it is in the bottom (sell) portfolio it is coded as a 1, it could be any of the portfolios in between as well. The pair observation takes the average or absolute difference of these values. Average Industry HHI is the average HHI of the industries, based on a 3 digit SIC code industry classification, of each of the firms in a pair. The industry dummy is 1 if both firms in a pair belong to the same industry and is 0 otherwise.

Full Sample Summary Statistics

Common Ownership Variables	*N*	Mean	Std Dev	P1	P10	P25	P50	P75	P90	P99
Count of Common Owners	385,032,108	11.973	25.286	0.000	0.000	1.000	3.000	11.000	34.000	114.000
Cross Min	385,032,108	0.033	0.055	0.000	0.000	0.000	0.011	0.041	0.097	0.261
Cross Avg	385,032,108	0.075	0.111	0.000	0.000	0.000	0.029	0.099	0.229	0.496
Cross WAvg	385,032,108	0.070	0.106	0.000	0.000	0.000	0.025	0.089	0.217	0.473
Cross GAvg	385,032,108	0.022	0.027	0.000	0.000	0.000	0.013	0.033	0.060	0.113
Cross HJL	385,032,108	0.022	0.035	0.000	0.000	0.000	0.007	0.027	0.064	0.164

Determinant Variables	*N*	Mean	Std Dev	P1	P10	P25	P50	P75	P90	P99
Both S&P 500 Dummy	385,032,108	0.007	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Both Russell 2000 Dummy	169,745,514	0.107	0.309	0.000	0.000	0.000	0.000	0.000	1.000	1.000
Both Russell 1000 Dummy	169,745,514	0.027	0.162	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Both S&P 400 Dummy	385,032,108	0.003	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Both S&P 600 Dummy	385,032,108	0.006	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Both Nasdaq Index Dummy	385,032,108	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Average Institutional Ownership	385,032,108	0.316	0.213	0.001	0.052	0.143	0.291	0.455	0.620	0.860
Difference Institutional Ownership	385,032,108	0.281	0.223	0.000	0.028	0.092	0.232	0.430	0.614	0.864
Size	385,032,108	5.104	1.749	1.431	2.909	3.867	5.023	6.259	7.409	9.444
Difference in Size	385,032,108	2.473	1.875	0.039	0.387	0.982	2.083	3.566	5.118	7.997
Both Pay Dividends Dummy	385,032,108	0.144	0.351	0.000	0.000	0.000	0.000	0.000	1.000	1.000
Average Market to Book	385,032,108	1.924	1.285	0.745	0.960	1.138	1.490	2.184	3.407	7.062
Difference Market to Book	385,032,108	1.429	2.088	0.009	0.093	0.253	0.652	1.630	3.632	10.972
Average Momentum Portfolio (1 to 10)	385,032,108	5.379	2.101	1.000	2.500	4.000	5.500	7.000	8.500	10.000
Difference in Momentum Portfolio	385,032,108	3.399	2.453	0.000	0.000	1.000	3.000	5.000	7.000	9.000
Both in Same Industry Dummy	315,221,268	0.020	0.141	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Average HHI of Industries	315,221,268	0.031	0.048	0.001	0.004	0.008	0.016	0.035	0.070	0.231

Table 2. Common Ownership Measures Over Time

This table reports summary statistics for each common ownership variable in our sample for different years. The variables are defined in Section 2 of the paper.

Panel A: Common Ownership Measures 1980

Common Ownership Variables	*N*	Mean	Std Dev	P1	P10	P25	P50	P75	P90	P99
Count of Common Owners	6,503,421	1.732	8.455	0.000	0.000	0.000	0.000	0.000	3.000	36.000
Cross Min	6,503,421	0.004	0.014	0.000	0.000	0.000	0.000	0.000	0.009	0.069
Cross Avg	6,503,421	0.011	0.035	0.000	0.000	0.000	0.000	0.000	0.030	0.186
Cross WAvg	6,503,421	0.008	0.029	0.000	0.000	0.000	0.000	0.000	0.019	0.152
Cross GAvg	6,503,421	0.004	0.010	0.000	0.000	0.000	0.000	0.000	0.013	0.046
Cross HJL	6,503,421	0.003	0.009	0.000	0.000	0.000	0.000	0.000	0.007	0.046

Panel B: Common Ownership Measures 1990

Common Ownership Variables	*N*	Mean	Std Dev	P1	P10	P25	P50	P75	P90	P99
Count of Common Owners	11,113,255	5.477	13.468	0.000	0.000	0.000	2.000	6.000	12.000	59.000
Cross Min	11,113,255	0.020	0.029	0.000	0.000	0.000	0.006	0.030	0.056	0.128
Cross Avg	11,113,255	0.040	0.058	0.000	0.000	0.000	0.016	0.058	0.109	0.278
Cross WAvg	11,113,255	0.036	0.052	0.000	0.000	0.000	0.017	0.052	0.095	0.246
Cross GAvg	11,113,255	0.015	0.017	0.000	0.000	0.000	0.009	0.023	0.038	0.073
Cross HJL	11,113,255	0.013	0.018	0.000	0.000	0.000	0.004	0.019	0.036	0.080

Panel C: Common Ownership Measures 2000

Common Ownership Variables	*N*	Mean	Std Dev	P1	P10	P25	P50	P75	P90	P99
Count of Common Owners	15,688,401	13.089	24.960	0.000	0.000	1.000	5.000	13.000	36.000	113.000
Cross Min	15,688,401	0.030	0.046	0.000	0.000	0.001	0.010	0.040	0.088	0.211
Cross Avg	15,688,401	0.076	0.102	0.000	0.000	0.003	0.037	0.104	0.217	0.457
Cross WAvg	15,688,401	0.068	0.097	0.000	0.000	0.002	0.028	0.092	0.199	0.437
Cross GAvg	15,688,401	0.021	0.025	0.000	0.000	0.001	0.013	0.034	0.056	0.104
Cross HJL	15,688,401	0.020	0.030	0.000	0.000	0.000	0.007	0.027	0.057	0.136

Panel D: Common Ownership Measures 2010

Common Ownership Variables	*N*	Mean	Std Dev	P1	P10	P25	P50	P75	P90	P99
Count of Common Owners	8,110,378	31.635	42.113	0.000	1.000	6.000	17.000	44.000	75.000	199.000
Cross Min	8,110,378	0.085	0.094	0.000	0.000	0.009	0.046	0.142	0.234	0.349
Cross Avg	8,110,378	0.181	0.164	0.000	0.002	0.039	0.135	0.296	0.436	0.591
Cross WAvg	8,110,378	0.179	0.158	0.000	0.002	0.037	0.143	0.292	0.414	0.574
Cross GAvg	8,110,378	0.045	0.037	0.000	0.001	0.012	0.039	0.074	0.097	0.141
Cross HJL	8,110,378	0.055	0.058	0.000	0.000	0.007	0.033	0.091	0.146	0.212

Table 3: Common Ownership and Pair Characteristics

This table reports regression estimates of the relationship between common ownership (dependent variable) and key potential common ownership determinants (explanatory variables). The unit of observation is at the pair-year level, meaning that each common ownership variable and each explanatory variable is based on the characteristics of two firms in a specific pair in a given year. Specifications (1) to (6) evaluate the relationship between key determinants of common ownership on different measures of common ownership, each measure is described in detail in Section 2 of the paper. The explanatory variables are composed of index indicator variables (coded 1 if both firms are in an index and 0 otherwise), "style" variables, which are composed of the average level of the variable (size for example) across the pair of firms and the absolute value of the difference in variable across the pair of firms. Size is defined as the logarithm of firm assets, market to book is the market value of equity divided by the book value of equity. Momentum is a number between 1 and 10 based on the momentum portfolio that the stock belongs to based on the performance over the prior 6 months. If a stock is in the top momentum (buy) portfolio it is coded as a 10, and if it is in the bottom (sell) portfolio it is coded as a 1, it could be any of the portfolios in between as well. The pair observation takes the average or absolute difference of these values. Average Industry HHI is the average HHI of the industries, based on a 3 digit SIC code industry classification, of each of the firms in a pair. The industry dummy is 1 if both firms in a pair belong to the same industry and is 0 otherwise. These regressions are based on data from 1992 through 2012. All specifications include pair fixed effects. Standard errors are clustered by pair, and statistics are reported in brackets below the coefficient estimates. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	Cross Min	Cross Avg	Cross WAvg	Cross GAvg	Cross HJL	Cross Count
	(1)	(2)	(3)	(4)	(5)	(6)
Both S&P 500 Dummy$_{it}$	0.06569***	0.04098***	0.04282***	0.00590***	0.03246***	69.62424***
	[397.29]	[181.25]	[176.92]	[108.09]	[337.25]	[434.63]
Both Russell 2000 Dummy$_{it}$	0.02731***	0.02713***	0.03379***	0.00607***	0.01586***	6.37109***
	[1089.37]	[754.27]	[869.45]	[559.76]	[1079.03]	[1003.34]
Both Russell 1000 Dummy$_{it}$	0.01888***	0.03131***	0.03754***	0.00136***	0.01193***	25.10083***
	[284.47]	[327.00]	[364.28]	[54.93]	[303.33]	[643.66]
Both S&P 400 Dummy$_{it}$	0.03286***	0.02638***	0.03006***	0.00426***	0.01690***	12.10525***
	[234.95]	[143.12]	[153.04]	[84.47]	[207.85]	[227.28]
Both S&P 600 Dummy$_{it}$	0.04994***	0.04447***	0.04865***	0.00775***	0.02627***	10.58786***
	[486.38]	[346.31]	[364.18]	[203.40]	[456.73]	[497.08]
Both Nasdaq Index Dummy$_{it}$	0.02613***	0.03143***	0.03447***	0.00376***	0.01611***	30.74678***
	[51.63]	[44.95]	[46.59]	[18.63]	[54.13]	[71.68]
Average Institutional Ownership$_{it}$	0.15741***	0.37754***	0.32046***	0.08380***	0.10260***	38.13737***
	[2237.96]	[3091.01]	[2589.39]	[2343.63]	[2388.59]	[1388.97]
Difference Institutional Ownership$_{it}$	-0.06654***	-0.13137***	-0.09287***	-0.02919***	-0.04197***	-18.81737***
	[-1780.70]	[-2091.53]	[-1389.57]	[-1610.29]	[-1851.28]	[-1281.63]
Size$_{it}$	0.00886***	0.01942***	0.01702***	0.00111***	0.00574***	8.15653***
	[481.92]	[668.15]	[553.05]	[127.58]	[521.40]	[989.78]
Difference in Size$_{it}$	-0.00346***	-0.00431***	-0.00598***	-0.00131***	-0.00209***	-1.37944***
	[-374.02]	[-296.68]	[-381.10]	[-295.03]	[-377.60]	[-369.42]
Both Pay Dividends Dummy$_{it}$	0.00552***	0.00906***	0.00864***	0.00127***	0.00343***	3.37971***
	[197.77]	[212.14]	[190.31]	[94.00]	[206.39]	[277.56]
Average Market to Book$_{it}$	0.00231***	0.00566***	0.00590***	-0.00002***	0.00165***	2.10459***
	[244.89]	[363.95]	[346.88]	[-5.05]	[287.98]	[531.24]
Difference Market to Book$_{it}$	-0.00090***	-0.00181***	-0.00244***	-0.00009***	-0.00061***	-0.52409***
	[-181.72]	[-219.33]	[-269.61]	[-33.79]	[-203.36]	[-255.39]
Average Momentum$_{it}$	-0.00005***	-0.00024***	-0.00021***	-0.00008***	-0.00003***	-0.05442***
	[-30.54]	[-98.20]	[-79.27]	[-102.21]	[-36.23]	[-108.17]
Difference Momentum$_{it}$	-0.00009***	-0.00010***	-0.00005***	-0.00000***	-0.00005***	-0.02321***
	[-72.02]	[-49.43]	[-21.96]	[-3.53]	[-71.73]	[-58.97]
Average of Industry HHI$_{it}$	-0.00164***	-0.00644***	-0.00875***	-0.00230***	-0.00114***	-3.98793***
	[-7.92]	[-20.56]	[-26.19]	[-22.95]	[-9.31]	[-52.46]
Both in Same Industry Dummy$_{it}$	0.00152***	0.00240***	0.00253***	0.00053***	0.00090***	0.49722***
	[15.28]	[15.30]	[14.46]	[10.57]	[15.15]	[14.65]
Average of Industry HHI$_{it}$ * Both in Same Industry Dummy$_{it}$	-0.00144	0.00319	0.00178	-0.00027	-0.00096	-0.13683
	[-0.79]	[1.14]	[0.58]	[-0.30]	[-0.89]	[-0.17]
Pair FE$_i$	Yes	Yes	Yes	Yes	Yes	Yes
Time FE$_t$	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.898	0.925	0.905	0.845	0.907	0.939
N	167,771,574	167,771,574	167,771,574	167,771,574	167,771,574	167,771,574

Table 4: Common Ownership and Determinants Over Time

This table reports regression estimates of the relationship between common ownership (dependent variablea) and key potential common ownership determinants (explanatory variables) over time. The unit of observation is at the pair-year level, meaning that each common ownership variable and each explanatory variable is based on the characteristics of two firms in a specific pair in a given year. Specifications (1) to (7) evaluate the relationship between key determinants of common ownership over different sub periods for one of our common ownership variables (cross_min). Explanatory variables are defined in the main text and in the Table description of Table 2. We exclude industry explanatory variables because this information is not populated well in the 1980s. Additionally, some index data was unavailable in earlier time periods. All specifications include pair fixed effects. Standard errors are clustered by pair, and statistics are reported in brackets below the coefficient estimates. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	Dependent Variable = Cross Min						
	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2012
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Both S&P 500 Dummy$_{it}$	0.01975***	0.03826***	0.04112***	0.05489***	0.05676***	0.05856***	0.04508***
	[122.81]	[230.87]	[136.54]	[201.56]	[157.74]	[172.06]	[69.78]
Both Russell 2000 Dummy$_{it}$					0.02261***	0.03640***	0.03738***
					[735.73]	[792.56]	[530.35]
Both Russell 1000 Dummy$_{it}$					0.00729***	0.00702***	0.00054***
					[85.62]	[47.34]	[2.58]
Both S&P 400 Dummy$_{it}$			0.01145***	0.01941***	0.02992***	0.02173***	0.01270***
			[75.89]	[94.14]	[117.12]	[85.32]	[26.42]
Both S&P 600 Dummy$_{it}$			0.00417***	0.02105***	0.03924***	0.04750***	0.03678***
			[37.40]	[182.66]	[239.59]	[235.99]	[118.18]
Both Nasdaq Index Dummy$_{it}$				0.01832***	0.02455***	0.01789***	0.01803***
				[20.26]	[28.36]	[16.07]	[12.49]
Average Institutional Ownership$_{it}$	0.07330***	0.10274***	0.08827***	0.09946***	0.13187***	0.15932***	0.16177***
	[571.45]	[860.50]	[832.94]	[1245.26]	[1483.35]	[1102.55]	[558.62]
Difference Institutional Ownership$_{it}$	-0.03108***	-0.04245***	-0.03606***	-0.03789***	-0.05279***	-0.05232***	-0.06187***
	[-496.41]	[-701.17]	[-682.54]	[-951.03]	[-1100.38]	[-710.57]	[-407.38]
Size$_{it}$	0.00044***	0.00262***	0.00309***	0.00398***	0.00695***	0.00693***	0.00659***
	[35.10]	[200.95]	[214.31]	[286.16]	[315.81]	[186.85]	[93.44]
Abs(Size)$_{it}$	-0.00049***	-0.00157***	-0.00161***	-0.00206***	-0.00223***	-0.00377***	-0.00247***
	[-83.17]	[-238.09]	[-220.37]	[-299.11]	[-200.66]	[-201.33]	[-72.93]
Both Pay Dividends Dummy$_{it}$	0.00036***	0.00085***	0.00122***	0.00021***	0.00271***	0.00430***	0.00130***
	[28.76]	[40.05]	[51.91]	[7.09]	[67.02]	[92.68]	[24.19]
Average Market to Book$_{it}$	0.00066***	0.00065***	0.00093***	0.00187***	0.00205***	0.00305***	0.00545***
	[89.62]	[78.61]	[106.45]	[227.34]	[160.36]	[149.22]	[127.77]
Difference Market to Book$_{it}$	-0.00023***	-0.00015***	-0.00035***	-0.00072***	-0.00082***	-0.00061***	-0.00106***
	[-59.88]	[-34.10]	[-77.59]	[-172.84]	[-122.58]	[-56.54]	[-49.07]
Average Momentum$_{it}$	0.00007***	-0.00017***	-0.00001***	-0.00026***	-0.00037***	-0.00013***	-0.00054***
	[66.48]	[-128.31]	[-3.75]	[-171.00]	[-169.21]	[-44.59]	[-132.16]
Difference Momentum$_{it}$	-0.00002***	0.00003***	-0.00003***	0.00002***	-0.00002***	-0.00003***	0.00006***
	[-27.45]	[25.97]	[-29.45]	[13.33]	[-11.99]	[-11.11]	[17.05]
Pair FE$_i$	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE$_t$	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.875	0.906	0.907	0.893	0.926	0.942	0.976
N	40,595,028	54,288,710	64,055,144	91,707,698	62,952,520	46,891,039	24,541,969

Table 5: Common Ownership and Passive Ownership

This table reports regression estimates of the relationship between common ownership based only on the ownership of passive institutions (quasi indexers based on Bushee (2001)) and key potential common ownership determinants (explanatory variables) over time. The unit of observation is at the pair-year level, meaning that each common ownership variable and each explanatory variable is based on the characteristics of two firms in a specific pair in a given year. In this instance, common ownership variables are constructed based only on institutions that are classified as quasi-indexers, our proxy for passive, based on categorizations from Brian Bushee's website. Explanatory variables are defined in the main text and in the table description of Table 2. This regressions are based on data from 1998 through 2012. All specifications include pair fixed effects. Standard errors are clustered by pair, and statistics are reported in brackets below the coefficient estimates. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	Cross Min	Cross Avg	Cross WAvg	Cross GAvg	Cross HJL
	(1)	(2)	(3)	(4)	(5)
Both S&P 500 Dummy$_{it}$	0.05783***	0.04236***	0.03777***	0.01093***	0.02882***
	[472.47]	[245.29]	[210.51]	[264.62]	[404.76]
Both Russell 2000 Dummy$_{it}$	0.02419***	0.02530***	0.02932***	0.00612***	0.01411***
	[1301.95]	[909.77]	[988.52]	[705.87]	[1292.28]
Both Russell 1000 Dummy$_{it}$	0.01004***	0.01581***	0.02072***	0.00022***	0.00636***
	[210.34]	[220.67]	[271.26]	[12.01]	[225.01]
Both S&P 400 Dummy$_{it}$	0.02490***	0.01850***	0.01849***	0.00247***	0.01252***
	[247.59]	[124.73]	[120.18]	[63.68]	[210.33]
Both S&P 600 Dummy$_{it}$	0.04070***	0.03962***	0.04191***	0.00676***	0.02199***
	[543.32]	[385.10]	[399.05]	[218.99]	[513.01]
Both Nasdaq Index Dummy$_{it}$	0.01330***	0.01733***	0.01785***	0.00144***	0.00810***
	[37.77]	[32.80]	[32.81]	[9.97]	[39.46]
Average Institutional Ownership$_{it}$	0.10114***	0.23901***	0.20425***	0.05584***	0.06562***
	[2005.24]	[2592.79]	[2274.11]	[1987.94]	[2134.45]
Difference Institutional Ownership$_{it}$	-0.04314***	-0.08142***	-0.05705***	-0.01984***	-0.02695***
	[-1598.75]	[-1704.34]	[-1147.82]	[-1403.16]	[-1647.90]
Size$_{it}$	0.00615***	0.01328***	0.01156***	0.00052***	0.00397***
	[463.43]	[606.94]	[498.07]	[74.48]	[497.91]
Difference in Size$_{it}$	-0.00251***	-0.00290***	-0.00373***	-0.00109***	-0.00151***
	[-374.66]	[-261.50]	[-311.16]	[-306.18]	[-373.13]
Both Pay Dividends Dummy$_{it}$	0.00454***	0.00793***	0.00731***	0.00142***	0.00286***
	[217.50]	[232.07]	[207.21]	[129.87]	[228.49]
Average Market to Book$_{it}$	0.00035***	0.00101***	0.00137***	-0.00065***	0.00032***
	[51.29]	[88.13]	[111.33]	[-176.64]	[77.90]
Difference Market to Book$_{it}$	-0.00021***	-0.00027***	-0.00096***	0.00010***	-0.00015***
	[-59.79]	[-43.76]	[-145.53]	[52.50]	[-68.94]
Average Momentum$_{it}$	-0.00015***	-0.00045***	-0.00044***	-0.00008***	-0.00011***
	[-138.91]	[-235.27]	[-209.48]	[-121.48]	[-159.91]
Difference Momentum$_{it}$	-0.00001***	-0.00001***	0.00004***	0.00002***	-0.00000***
	[-12.55]	[-7.04]	[24.96]	[38.72]	[-9.12]
Average of Industry HHI$_{it}$	-0.00028*	-0.00214***	-0.00586***	-0.00002	-0.00028***
	[-1.82]	[-8.77]	[-22.62]	[-0.22]	[-3.07]
Both in Same Industry Dummy$_{it}$	0.00075***	0.00105***	0.00110***	0.00019***	0.00042***
	[10.37]	[8.75]	[8.16]	[4.71]	[9.71]
Average of Industry HHI$_{it}$ * Both in Same Industry Dummy$_{it}$	-0.00295**	-0.00104	0.00087	-0.00235***	-0.00174**
	[-2.21]	[-0.49]	[0.37]	[-3.14]	[-2.21]
Pair FE$_i$	Yes	Yes	Yes	Yes	Yes
Time FE$_t$	Yes	Yes	Yes	Yes	Yes
R^2	0.896	0.909	0.890	0.840	0.903
N	167,771,574	167,771,574	167,771,574	167,771,574	167,771,574

Table 6: Common Ownership and Active Ownership

This table reports regression estimates of the relationship between common ownership based only on the ownership of active institutions (transient and dedicated owners based on Bushee (2001)) and key potential common ownership determinants (explanatory variables) over time. The unit of observation is at the pair-year level, meaning that each common ownership variable and each explanatory variable is based on the characteristics of two firms in a specific pair in a given year. In this instance, common ownership variables are constructed based only on institutions that are classified as transient or dedicated owners (non-quasi indexers), our proxy for active, based on categorizations from Brian Bushee's website. Explanatory variables are defined in the main text and in the table description of Table 2. This regressions are based on data from 1998 through 2012. All specifications include pair fixed effects. Standard errors are clustered by pair, and statistics are reported in brackets below the coefficient estimates. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.

	Cross Min	Cross Avg	Cross WAvg	Cross GAvg	Cross HJL
	(1)	(2)	(3)	(4)	(5)
Both S&P 500 Dummy$_{it}$	0.00605***	-0.00385***	0.00251***	-0.00364***	0.00258***
	[69.02]	[-26.67]	[16.68]	[-54.95]	[48.51]
Both Russell 2000 Dummy$_{it}$	0.00355***	0.00243***	0.00497***	0.00275***	0.00201***
	[284.89]	[122.61]	[241.02]	[250.87]	[270.28]
Both Russell 1000 Dummy$_{it}$	0.00784***	0.01410***	0.01541***	0.00236***	0.00495***
	[209.20]	[230.13]	[244.78]	[81.03]	[218.03]
Both S&P 400 Dummy$_{it}$	0.00733***	0.00713***	0.01078***	0.00395***	0.00403***
	[92.85]	[62.74]	[90.10]	[65.52]	[86.60]
Both S&P 600 Dummy$_{it}$	0.00903***	0.00496***	0.00681***	0.00498***	0.00421***
	[166.99]	[68.41]	[92.22]	[114.11]	[137.09]
Both Nasdaq Index Dummy$_{it}$	0.01264***	0.01403***	0.01645***	0.00416***	0.00789***
	[35.79]	[26.29]	[31.07]	[16.91]	[36.68]
Average Institutional Ownership$_{it}$	0.05473***	0.13499***	0.11312***	0.05428***	0.03602***
	[1650.68]	[2069.13]	[1866.60]	[1685.57]	[1752.41]
Difference Institutional Ownership$_{it}$	-0.02230***	-0.04787***	-0.03401***	-0.01926***	-0.01434***
	[-1276.10]	[-1459.99]	[-1067.24]	[-1148.75]	[-1333.50]
Size$_{it}$	0.00224***	0.00532***	0.00475***	0.00116***	0.00148***
	[252.10]	[346.30]	[306.67]	[142.37]	[274.44]
Difference in Size$_{it}$	-0.00085***	-0.00129***	-0.00216***	-0.00063***	-0.00053***
	[-191.67]	[-167.74]	[-276.13]	[-152.73]	[-196.44]
Both Pay Dividends Dummy$_{it}$	0.00088***	0.00099***	0.00116***	0.00038***	0.00052***
	[61.60]	[39.59]	[47.49]	[28.43]	[59.81]
Average Market to Book$_{it}$	0.00201***	0.00478***	0.00461***	0.00122***	0.00136***
	[348.01]	[457.98]	[434.62]	[253.59]	[379.91]
Difference Market to Book$_{it}$	-0.00068***	-0.00154***	-0.00145***	-0.00036***	-0.00046***
	[-226.52]	[-286.48]	[-263.51]	[-138.74]	[-247.59]
Average Momentum$_{it}$	0.00012***	0.00022***	0.00025***	0.00002***	0.00008***
	[138.21]	[145.97]	[156.69]	[26.62]	[155.00]
Difference Momentum$_{it}$	-0.00007***	-0.00008***	-0.00008***	-0.00003***	-0.00004***
	[-97.65]	[-66.14]	[-61.73]	[-42.58]	[-100.60]
Average of Industry HHI$_{it}$	-0.00059***	-0.00258***	-0.00140***	-0.00164***	-0.00037***
	[-5.97]	[-15.47]	[-8.44]	[-17.76]	[-6.29]
Both in Same Industry Dummy$_{it}$	0.00063***	0.00108***	0.00124***	0.00045***	0.00039***
	[12.27]	[12.58]	[13.98]	[9.72]	[12.65]
Average of Industry HHI$_{it}$ * Both in Same Industry Dummy$_{it}$	0.00204**	0.00550***	0.00194	0.00247***	0.00112**
	[2.28]	[3.57]	[1.29]	[3.00]	[2.05]
Pair FE$_i$	Yes	Yes	Yes	Yes	Yes
Time FE$_t$	Yes	Yes	Yes	Yes	Yes
R^2	0.732	0.799	0.767	0.717	0.754
N	167,771,574	167,771,574	167,771,574	167,771,574	167,771,574