The Rise of Common Ownership*

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Abstract

Common ownership—where two firms are at least partially owned by the same investor—is on the rise among publicly-held U.S. firms. In this paper, we discuss the challenges in quantifying the impact of common ownership on firms' strategic choices and analyze the potential determinants of its rise. To do so, we derive measures that capture the extent to which common ownership will shift managers' actions and estimate them for every pair of stocks between 1980 and 2012. Our findings suggest that naïve measures of overlapping ownership have increased far more than managers' motive to internalize how their choices affect other firms' valuations. We also find that the growth of indexing is unlikely to shift managerial motives. While indexing is associated with more overlapping ownership, it is also associated with a firm's common owners spreading their assets over more stocks, which reduces common owners' likelihood of being informed and managers' incentives to internalize this particular source of 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 and that this could have important implications for acquisitions, executive pay, governance, among numerous other outcomes (e.g., see Antón et al., 2016; Harford et al., 2011; He and Huang, 2017; He et al., 2018; Kempf et al., 2016). Evidence that common ownership is on the rise includes the growing popularity of index funds and the increasing presence of certain institutions (e.g., Blackrock, Fidelity, and Vanguard) as firms' largest investors.[1] Such common ownership might affect firms' strategic choices since common owners have an incentive to internalize how each firm's actions will affect the value of other firms in the portfolio (Easterbrook and Fischel, 1982; Hansen and Lott, 1996; Rubin, 2006). This observation has led some to argue that common ownership by institutions may contribute to anticompetitive behaviors by firms (e.g., Azar et al., 2016, forthcoming) and that legal and regulatory actions are needed to limit institutions' ability to hold significant stakes in some industries (e.g., Posner et al, 2016).[2]

Despite the recent attention such common ownership has received, there is little systematic analysis of its determinants or how one should quantify the extent to which it might affect firms' strategic choices. For example, while there is a sense that the increasing popularity of index investing is contributing to the rise of common ownership [e.g., see Harford et al. (2011) for some preliminary evidence of this], there is little discussion of how much index investing contributes to common ownership, what other contributors might be, or whether index-induced overlapping ownership structures increase firms' motives to internalize how their actions might affect the value of other firms held by such passive investors. In this paper, we attempt to fill this void by constructing measures to quantify the extent to which companies have overlapping owners and the extent to which such common owners might shift firms' strategic choices. We then calculate these measures for every pair of publicly-traded U.S. firms every year between 1980 and 2012 and document how they have changed over time. We also analyze how index membership is associated with

[1] 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.

[2] 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. Similarly, Elhauge (2016) argues that existing antitrust law can and should be used to undo horizontal shareholdings.

ownership overlap among stocks and firms' incentive to alter their strategic choices.

Measuring common ownership and its potential impact on managerial incentives 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 overlapping ownership for that investor? Moreover, if one wishes to measure the extent of overlap across all owners for a particular pair of firms, how should one aggregate the common ownership stake of each investor? Finally, how does one quantify the extent to which such overlapping ownership structures affect managers' incentive to internalize the externalities of their choices, especially when the sign, magnitude, and nature of such externalities are unobservable to an econometrician?

To quantify common ownership and its impact on managerial incentives, we proceed in two steps. First, we construct measures that capture the extent to which two stocks' ownership structures overlap. We refer to these as pair-level measures of "overlap" because there is no sense in which they necessarily capture the effect such common investors may have on managerial motives. To address this weakness, we proceed to our second step, which is to construct a model-driven measure that quantifies the impact of common owners on managerial motives. In other words, for a given pair of stocks, we quantify the impact ownership overlap will have on a manager's incentive to internalize how their actions might affect the value of the other firm. The measure is bi-directional (i.e., we separately calculate the incentive of firm A's manager to internalize externalities on firm B and the incentive of firm B's manager to internalize externalities on firm A) and quite general in that it does not depend on the nature, sign, or magnitude of the externality. It is best seen as a measure of how common ownership affects the incentives of a firm *per unit* of any externality that firm's actions might have on another firm held by its investors.

Our model shows that the impact of common ownership on managerial incentives will be the product of three inputs: the extent to which managers care about each investor's preferences, the importance each investor places on the externality, and the likelihood each investor is informed about whether a manager's actions have improved the value of their overall portfolio. If managers are more concerned about investors that own a larger proportion of their firm and if investors are more concerned about externalities affecting firms they hold larger positions in, our measure intuitively predicts that managerial motives to internalize externalities will be increasing in the ownership stakes held by common investors. However, if investors are less informed about firms that represent a smaller proportion of their overall portfolio, our model

suggests that common ownership that is driven by investors holding numerous stocks (e.g., index funds) does not necessarily increase managers' motive to internalize externalities. This last feature of our model-driven measure differs from other proposed measures of common ownership, which implicitly assume that all investors are fully informed about the externalities the firms impose on each other [e.g., see the MHHI measure that developed by Bresnahan and Salop (1986) and O'Brien and Salop (2000) and implemented by Azar, Schmalz, and Tecu (2016)]. Our model-driven measure also differs from existing measures of common ownership in that it is invariant to the specific nature of externalities and allows for the possibility that multiple firms in the investor's portfolio could be affected by one firm's actions.

We then take our measures of ownership overlap and its impact on incentives to the data to understand how they have each changed over the last 30 years for the average pair of stocks. The resulting dataset is composed of overlapping ownership structures across 385,032,108 pair-year observations from 1980 to 2012, and because the impact of common ownership on incentives within a pair might not be symmetric (i.e., the motive of firm A's manager to internalize the impact of her actions on firm B might be different than the motive of firm B's manager to internalize the impact of her actions on firm A), our dataset for measures of managerial incentives across pairs has twice as many observations.

We find that managers' incentive to internalize how their choices affect other firms' valuations has not increased as much as naïve measures of overlapping ownership might suggest. In particular, we find that naïve measures of ownership overlap increased between 1980 and 2012 by 1,600% to 2,300%, depending on the measure used. These increases are larger than the overall rise in institutional ownership, which has increased from 12.6% of an average firm's outstanding shares in 1980 to 46.0% in 2012, corresponding to a 263% increase over this time period. Our base measure for the impact of this common ownership on managerial incentives, however, has only increased by 328% from 1980 to 2012 and closely tracks the rise of institutional ownership. Modifying the underlying assumptions of our incentives-based measure (e.g., changing the weights managers place on different investors' preferences or changing the structure and importance of the underlying externality) yields similar findings.

We next analyze what factors might contribute to this differential rise in overlapping ownership and managerial motives to internalize the impact of one firm's actions on another. We outline several hypotheses, including the potential importance of index 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, we analyze their association with observed changes in our measures of ownership overlap and managerial motives. Specifically, we estimate panel regressions with pair and year fixed effects to analyze how within-pair changes in the characteristics of firm-pairs over time are associated with changes in our measures of ownership overlap and managerial incentives.

The first potential determinant we analyze, index investing, has a complex association with ownership overlap and managerial motives. In particular, we find that ownership overlap significantly increases when firms are in the same index (e.g., the S&P 500, 400 and 600 indexes, or the Russell 1000 and 2000 indexes), but that managerial incentives to internalize externalities actually decreases in many circumstances. For example, we find that ownership overlap increases by 36% to 83% relative to the average level of overlap between two firms if both firms are members of the Russell 2000 index, but that managers' incentive to internalize externalities *decreases* by 59%. Because our estimations control for pair (or pair-directional) fixed effects, these estimates are not due to specific time-invariant features of pairs and are instead driven by within-pair changes in index assignment. We find similar results when analyzing inclusion in either the S&P 400 or 600 indexes. Inclusion S&P 500 or Russell 1000 indexes, however, is associated with more incentives for managers to internalize the impact of their actions on other firms.

The mixed findings with respect to indexes and managerial motives highlight a key tradeoff of our model-driven measure of managerial incentives arising from common ownership. Two stocks' inclusion in the same index, combined with the growing popularity of low-cost index funds, naturally leads to an increase in overlapping ownership, which can enhance managerial motives to internalize externalities. However, index investing also reduces the importance of each stock for any investors' overall portfolio, thus decreasing the likelihood that investors are informed enough to evaluate whether managers are taking actions to improve the overall value of their increasingly diverse portfolios. Together, our model and empirical findings suggest that attempts to associate index investing with increased managerial motives to internalize how their actions affect other firms' valuations may be misplaced.

The second potential determinant we analyze is industry concentration. Common owners have an incentive to enhance the value of their investments by softening the competition between industry rivals in

their portfolios (e.g., see Hansen and Lott, 1996; Rubin, 2006).[3] Given that, one might expect investors driven by such motives to hold common positions among companies where anti-competitive behaviors are easier to facilitate (e.g., among two firms operating in the same concentrated industry). However, we find no evidence that common ownership across firms in the same industry increases when as an industry becomes more concentrated, as measured using the herfindahl index (HHI). Specifically, when an industry's HHI goes up, we find that neither overlapping ownership nor managerial motives are greater across firms within that industry relative to common ownership with other firms not in that industry.

Finally, we separately analyze the potential importance of passive and active institutions in contributing to the rise in overlapping ownership and managers' incentives to internalize externalities. Using Bushee's (2001) categorization of institutional investors to distinguish between passive- and active-driven common ownership, we find that passive institutions account for about 75% of the rise in the naïve measures of ownership overlap since 1980, but that passive and active institutions have contributed equally to the smaller rise in managerial incentives to internalize how their actions affect other firms. The determinants of passive and active common ownership also appear to differ; for example, being included in the same index matters more for passive overlapping ownership than for active overlapping ownership. However, there continues to be no clear association between both stocks being in an index and managers' motives to internalize the impact of their actions on other firms for either type of common owner.

Overall, our model and empirical findings highlight and illustrate the difficulties of quantifying common ownership and its impacts on managerial motives. Quantifying these incentives are important both for policy implications and for researchers attempting to study the impact of common ownership on firms' strategic choices. By deriving a measure of common ownership that captures three components by which common ownership is likely to impact managerial motives, we are able to provide a general and flexible way to measure common ownership that can be used in future studies of common ownership.[4] Our findings also illustrate that while the growth of indexing and passive investment strategies may contribute to

[3] The debate about whether common ownership results in anti-competitive behaviors is ongoing. Some empirical work suggests that common ownership is linked to anti-competitive behavior by firms (e.g., Azar, Schmalz, and Tecu, forthcoming; Azar, Raina, and Schmalz, 2016), while other papers argue the evidence is inconclusive (e.g., Dennis, Gerardi, and Schenone, 2017; Gramlich and Grundl, 2017; O'Brien and Waehrer, 2017).

[4] Given the difficulty in constructing these measures empirically (as discussed in Section 2), our goal is to eventually post easily accessible versions of our proposed model-driven measure online so that other researchers can more readily study the potential determinants and effects of common ownership.

ownership overlaps, their impact on managerial motives is far less certain.

We also contribute to the growing literature on common ownership by providing a framework to analyze 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 potential impact common ownership may have on the economy and firms' strategic choices.[5] If one seeks to understand the implications of common ownership, it is ultimately important to understand its determinants; otherwise, it will be difficult to know what potential omitted variable or simultaneity biases might confound an analysis of common ownership.[6] To our knowledge, we are also 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

1. Measuring common ownership

Common ownership reflects scenarios where two firms are at least partially owned by the same investor, and in this section, we approach the issue of how to measure the extent of common ownership from two different perspectives. First, we propose measures that capture the "overlap" of ownership between any two pairs of stocks. These measures will be useful in documenting how prevalent common ownership is across firm pairs and how it has changed over time. In many regards, however, these measures of ownership overlap are naïve measures of common ownership in that there is no reason to believe they capture common owners' incentives to internalize externalities or the impact of these incentives on managerial motives. To address this weakness, we then propose a simple model to capture some key features that are likely important for how common ownership affects managerial motives. Using this model, we propose a novel measure of common ownership that captures the impact of common investors on managerial motives to internalize externalities. This second set of measures will be useful to understanding

[5] E.g., recent work evaluates the role common ownership may have on firm competitiveness (Azar, Schmalz, and Tecu, 2016; Azar, Raina, and Schmalz, 2016), governance (Azar, 2012; He et al., 2018; 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).

[6] 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.

when ownership overlaps are likely to be important for firms' strategic choices. Finally, we compare our proposed measure against other measures used in the literature.

1.1 Measures of common ownership from the perspective of "overlap"

While there are numerous ways one might measure ownership overlap across two stocks, we focus on just three measures of ownership overlap at the investor level and one possible way to aggregate this common ownership across investors for a given pair of stocks. To facilitate this discussion, we employ the following notation: $\alpha_{i,n}$ is the percentage ownership stake of investor *i* in company *n,* $I^{A,B}$ is the set of institutional investors who own a strictly positive stake in firm *A* and in firm *B*, and $\bar{v}_A$ and $\bar{v}_B$ are the market values of firms A and B, respectively. We then construct three variables:

$$Overlap\_AVG^{A,B} = \sum_{i \in I^{A,B}} \frac{\alpha_{i,A} + \alpha_{i,B}}{2},$$

$$Overlap\_MIN^{A,B} = \sum_{i \in I^{A,B}} min\{\alpha_{i,A}, \alpha_{i,B}\},$$

$$Overlap\_AP^{A,B} = \sum_{i \in I^{A,B}} \alpha_{i,A} \frac{\bar{v}_A}{\bar{v}_A + \bar{v}_B} + \alpha_{i,B} \frac{\bar{v}_B}{\bar{v}_A + \bar{v}_B}.$$

This first measure simply calculates the arithmetic average ownership stake of each common investor *i* in stocks *A* and *B* and then takes the unweighted sum across all common investors, while the second measure instead calculates the minimum ownership stake of investor *i* in both companies before summing across investors. For example, consider the case where there are two institutional investors: one that owns 1% of firm *A* and 20% of firm *B*, and a second that owns 5% of both *A* and *B*. In this scenario, $Overlap\_AVG^{A,B}$ would equal 15.5% and $Overlap\_MIN^{A,B}$ would only equal 6% given the asymmetric holdings of the first investor. The presence of additional institutions that do not own both firms *A* and *B* would not affect either measure since both measures are only aggregated over common investors.

The third measure of ownership overlap was proposed in Anton and Polk (2014) in their study of stock price movements, and unlike the first two, it uses market capitalization to weigh the relative importance of investors' ownership in each of the two firms before aggregating across investors.

While intuitive as measures of ownership overlap, all three measures have number of downsides as measures of common ownership. In particular, it isn't clear any of these measures represent an economically meaningful measure of common ownership's impact on managerial incentives. Additionally,

Overlap_AP is invariant to the decomposition of ownership between the two firms, which leads to some unappealing properties. For example, if an investor sells all but one share in firm *B* and uses the proceeds to buy shares in firm *A*, the value of *Overlap_AP* would not change although common ownership, for all intents and purposes, has effectively dropped to zero. To address these concerns, we now turn to describing our model-driven measure of common ownership.[7]

1.2 Measures of common ownership from the perspective of "managerial incentives"

In this section, we develop a simple model to capture the effects of common ownership on managerial incentives. The main premise of the model is that firms impose externalities on one another, and managers of these firms would internalize these externalities only if their shareholders would *and* if these shareholders are likely to be informed about whether the manager has done so. Since externalities cannot be identified from the data, the measure we develop for common ownership measures the effect of the overlap in the shareholder base on managerial incentives per unit of externality.

Preliminaries: Consider an economy with $N \geq 2$ public firms, indexed by *n*, where each firm has its own manager. The manager of firm *n* chooses a policy $x_n \in \{0,1\}$, and the value of firm *n* is given by $V_n(\boldsymbol{X}) = \bar{v}_n + \Delta_n(\boldsymbol{X})$ where $\bar{v}_n > 0$ and $\boldsymbol{X} = (x_1, \dots, x_N)$. Parameter $\bar{v}_n$ can be considered the market value of firm *n* absent the effect of policy choices, while $\Delta_n(\boldsymbol{X})$ captures the effect of policy choices on firm value. To start, we assume $\Delta_n(\boldsymbol{X}) = \sum_{m=1}^{N} \Delta_{n,m}(x_m)$. If $\Delta_{n,m}(x_m) > 0$ ($\Delta_{n,m}(x_m) < 0$) then firm *m* imposes a positive (negative) externality on firm *n* by adopting policy x_m. We do not make any restrictions on $\Delta_{n,m}(x_m)$, and the externalities can be asymmetric between two firms, $\Delta_{n,m}(\cdot) \neq \Delta_{m,n}(\cdot)$. To ensure that we only measure the direct effect of common ownership on the incentives of managers, we assume that there are no complementarities or substitution effects across firms with respect to the externality, which implies that there are no strategic interactions between managers of different firms (i.e., the optimal decision of manager *n* is independent of the actions taken by other managers).[8]

[7] In unreported results, we also analyzed alternative measures of overlap, including the use of a geometric rather than an arithmetic average. None of our subsequent findings for how ownership overlap has changed over time and what factors are associated with more or less ownership overlap are qualitatively different using these alternative measures.

[8] While it might also be interesting to measure the indirect effect of common ownership, this would introduce additional complications. An indirect effect of common ownership on firm *n* means that common ownership changes the incentives of manager of firm $m \neq n$, and because of the strategic interaction between firm *n* and firm *m*, a change in the incentives of manager *m* also changes the incentives of manager *n*. Through this channel, which we shut down, common ownership can have an indirect effect on the incentives of manager of firm *n*. But clearly, this effect depends

Ownership structure: We normalize the number of shares of each firm to one, and there are $I \geq 1$ large investors in the economy, where the ownership of investor i in firm n is given by $\alpha_{i,n} \in [0,1]$. Short sales are not allowed (because $\alpha_{i,n}$ is non-negative), we allow for the possibility that $\sum_{i=1}^{I} \alpha_{i,n} < 1$, since shares that are not owned by any of the large investors can be owned by retail/noise investors. The value of investor i's portfolio is given by $W_i(\boldsymbol{X}) = Y_i + \sum_{n=1}^{N} \alpha_{i,n} V_n(\boldsymbol{X})$, where the term $Y_i \geq 0$ captures non-traded assets, T-bills, or any other asset which has no externalities with any of the other N firms. The weight of firm n in the portfolio of investor i before policies are chosen can then be defined as $\beta_{i,n} = \frac{\alpha_{i,n}\bar{v}_n}{Y_i + \sum_{m=1}^{N} \alpha_{i,m}\bar{v}_m}$.

Voting and shareholder voice: We assume one share one vote, where each investor casts her votes either for or against the manager of each of her portfolio companies. This can be interpreted literally as a vote during director elections or on a given proposal, or it can simply be an expression of discontent or support of the incumbent manager. When it comes to voting, there are two types of investors: informed and uninformed. An investor is informed with probability $g(\beta_{i,n}) \in [0,1]$ and uninformed with probability $1 - g(\beta_{i,n})$, where we assume $g(\cdot)$ is an increasing function. This assumption captures the limited attention of investors and that investors are more likely pay attention and be informed about a firm (and its manager's actions) when it comprises a larger proportion of an investor's overall portfolio. And, uninformed investor votes for management with probability $\gamma_i \in [0,1]$, which is an investor specific parameter, while an informed investor votes with management with probability $\rho w_{i,n}(\boldsymbol{X})$, where $w_{i,n}(\boldsymbol{X})$ is defined as the improvement in the value of an investor i's portfolio from manager n's policy choice relative to the worst possible policy that manager could have chosen and parameter $\rho > 0$ ensures $\rho w_{i,n}(\boldsymbol{X}) \in [0,1]$.[9] Intuitively, an informed investor is more likely to support the manager if the action taken by the manager increases her portfolio value.

Given this setup, the probability $p_{i,n}(\boldsymbol{X})$ that investor i votes her $\alpha_{i,n}$ shares in support of manager n is given by

on the strategic environment (e.g., are actions by different managers taken simultaneously or sequentially) and on the solution concept that is adopted (the notion of equilibrium). The indirect effect also requires shareholders to be aware of the nature of the strategic environment. Given these complications, we focus on the direct effect.

[9] Specifically, $w_{i,n}(\boldsymbol{X}) = W_i(x_n, \boldsymbol{X}_{-n}) - min_x\, W_i(x_n, \boldsymbol{X}_{-n})$, where $\boldsymbol{X}_{-n}$ is the policy choices of all managers, except for the manager of firm n.

$$p_{i,n}(\boldsymbol{X}) = (1 - g(\beta_{i,n}))\gamma_i + g(\beta_{i,n})\rho w_{i,n}(\boldsymbol{X}),$$

and assuming retail investors in firm *n* vote for management with probability $\gamma_{retail,n} \in [0,1]$ and that all votes are conditionally independent across investors, the total expected number of votes in support of management of firm *n* is

$$P_n(\boldsymbol{X}) = \gamma_{retail,n}\left(1 - \sum_{i=1}^{I} \alpha_{i,n}\right) + \sum_{i=1}^{I} \alpha_{i,n}\, p_{i,n}(\boldsymbol{X}).$$

Managerial objective and decisions: The manager of firm *n* maximizes

$$U_n(\boldsymbol{X}) = B_n(x_n) + \lambda_n P_n(x_n, \boldsymbol{X}_{-n}).$$

Intuitively, when the manager chooses a policy for his firm he trades off the expected support from the shareholders of his firm with the private benefits (if $B_n(x_n) > 0$) or costs (if $B_n(x_n) < 0$) from choosing policy x_n. Parameter $\lambda_n \geq 0$ is the weight the manager puts on getting shareholder support, which reflects the strength of the corporate governance in firm *n*.

Model solution: The manager of firm *n* chooses $x_n = 1$ if and only if $U_n(1, \boldsymbol{X}_{-n}) \geq U_n(0, \boldsymbol{X}_{-n})$. In the Appendix we show that this inequality holds whenever

$$\sum_{i=1}^{I} \alpha_{i,n}\, g(\beta_{i,n}) \left[\sum_{m=1}^{N} \alpha_{i,m}[\Delta_{m,n}(1) - \Delta_{m,n}(0)]\right] + \frac{B_n(1) - B_n(0)}{\rho\lambda_n} \geq 0$$

Letting $\Pi_n(\boldsymbol{\alpha_1}, \ldots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \ldots, \boldsymbol{\beta_N}) = \sum_{i=1}^{I} \alpha_{i,n}\, g(\beta_{i,n})\left[\sum_{m=1}^{N} \alpha_{i,m}\left[\Delta_{m,n}(1) - \Delta_{m,n}(0)\right]\right]$, where $\boldsymbol{\alpha_n} = \{\alpha_{i,n}\}_{\boldsymbol{i=1}}^{\boldsymbol{I}}$ and $\boldsymbol{\beta_n} = \{\beta_{i,n}\}_{\boldsymbol{i=1}}^{\boldsymbol{I}}$, it can be seen that the incentives of manager *n* to choose policy $x_n = 1$ depends on the normalized change in the manager's private benefits $\frac{B_n(1) - B_n(0)}{\rho\lambda_n}$ and on $\Pi_n(\boldsymbol{\alpha_1}, \ldots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \ldots, \boldsymbol{\beta_N})$, the (normalized) expected increase in the shareholder support from taking policy $x_n = 1$, which depends on the overlap of shareholder base of firm *n* with all other firms.

Definition of common ownership: We define the effect of common ownership between firms *A* and firm *B* on firm *A* as $CO(A,B) = \Pi_A(\boldsymbol{\alpha_1}, \ldots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \ldots, \boldsymbol{\beta_N}) - \Pi_A(\boldsymbol{\alpha_1}, \ldots, \boldsymbol{\alpha_B} = \boldsymbol{0}, \ldots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \ldots, \boldsymbol{\beta_B} = \boldsymbol{0}, \ldots, \boldsymbol{\beta_N})$. That is, $CO(A,B)$ is the change in the incentives of manager of firm *A* to take policy $x_n = 1$ over policy $x_n = 0$ under the existing ownership structure relative to a counterfactual in which no investor of firm *A* owns shares in firm *B* ($\boldsymbol{\alpha_B} = \boldsymbol{0}$) and the portfolio weights of all firms other than firm *B* do not

change in the investors' portfolios.[10] In this respect, $CO(A,B)$ captures how the overlap in the shareholder base between firm *A* and firm *B* affects the incentives of the manager to adopt policy $x_n = 1$. Note that

$$CO(A,B) = \left[\Delta_{B,A}(1) - \Delta_{B,A}(0)\right] \sum_{i=1}^{I} \alpha_{i,A} g\left(\beta_{i,A}\right) \alpha_{i,B}$$

Several remarks are in order. First, generally $CO(A,B) \neq CO(B,A)$ because the externalities between firms can be asymmetric but also because the weight of firm *A* in investors' portfolios can be different from the weights of firm *B*. Second, $CO(A,B)$ does not assume $x_n = 1$ is optimal, it only measures the effect of the overlap in the shareholder base between firms *A* and *B* on the incentives of the manager of firm *A* to adopt this policy. Third, investor *i* contributes more to $CO(A,B)$ in absolute terms when he holds more shares in firm *A* (because the manager cares more about the investor's opinion if the investor holds more shares), more shares in firm *B* (because the investor cares more about the externalities firm *A* imposes on firm *B* when it holds more shares of firm *B*), and when firm *A* receives a larger weight in his portfolio (because the investor pays more attention to firm *A* and is more likely to be an informed voter). Fourth, if the both polices of firm *A* exert the same externality on firm *B* then $CO(A,B) = 0$. Indeed, in this case, common owners of firms *A* and *B* have no reason to factor in the effect on firm *B* when deciding on the policy of firm *A*. And finally, the sign of $CO(A,B)$ is determined by the sign of $\Delta_{B,A}(1) - \Delta_{B,A}(0)$.

Since we cannot identify the sign of the externalities in the data, the measure we will construct will be invariant to the sign of the externality and only account for the absolute change in incentives that stems from changes in the ownership structure. Specifically, we drop the term $\Delta_{B,A}(1) - \Delta_{B,A}(0)$ from $CO(A,B)$, and use as our measure for common ownership

$$GGL_{\%}(A,B) = \sum_{i=1}^{I} \alpha_{i,A} g\left(\beta_{i,A}\right) \alpha_{i,B}$$

when the externalities are additive, and $GGL_{\$}(A,B) = \bar{v}_B GGL_{\%}(A,B)$ when the externalities are multiplicative (i.e., proportional to firm value). The measures $GGL_{\%}(A,B)$ and $GGL_{\$}(A,B)$ can therefore be interpreted as the effect of common ownership on managerial incentives *per unit of externality*.

[10] I.e., each investor *i* reinvests all the proceeds from "selling" the shares of firm *B* in his portfolio such that the weight that each of the other *N*-1 firms obtains in the rebalanced portfolio does not change (this rebalancing necessarily requires increasing the weight of Y_i).

The resulting measure is quite flexible. In the empirical section, we assume that $g(\cdot)$ is the identity function, but different functional forms of $g(\cdot)$ can be used to create different assumptions on how attention is allocated across portfolio companies. For example, if g is convex (concave), then firms representing a larger share of an investor's portfolio get proportionally more (less) attention from the investor relative to their portfolio weight, and a constant g function implies that portfolio weights do not matter for investor attention. Our model can also be easily augmented to allow managers to ascribe importance weights to the votes of different investors. For example, if managers only care about the votes of investors that hold at least 5% of the firm, then our model would indicate that one should only aggregate over those investors when constructing either $GGL_{\%}$ or $GGL_{\$}$. The generalized GGL measure is derived in the Appendix.

1.3 Comparing GGL measure to existing measures in the literature

To better understand the advantages and disadvantages of our proposed GGL measures of common ownership, it is useful to compare it to measures used in previous studies of common ownership.

Harford et al. (2011) propose a measure to account for the incentives of common investors during the merger of two firms. Harford et al. (2011) note that shareholders of a bidding firm are more likely to internalize the effect of paying a lower takeover premium on the target firm if they also own shares of the target. To capture this externality of common ownership, they estimate each investor's relative ownership stake in the target (B) to that of the acquirer (A) and aggregate these relative weights, $\frac{\alpha_{i,B}}{\alpha_{i,A}+\alpha_{i,B}}$, across investors in the bidding firm. Specifically, on such aggregation would be:

$$HJL(A,B) = \sum_{i \in I^{A,B}} \frac{\alpha_{i,B}}{\alpha_{i,A}+\alpha_{i,B}}.$$

While the HJL measure is similar to the GGL measures in that it is a bi-directional, pair-level measure of common ownership and its potential impact on managerial incentives, there are several key differences between GGL and HJL. First, the HJL measure only accounts for an investor's relative holdings in the bidding and the target firms. Therefore, it ignores the possibility that other firms in the investor's portfolio could be affected by the merger, or instances in which both the bidding firm and the target firms constitute a very small part of investor's portfolio (and therefore, are likely to receive less attention). While these assumptions might be appropriate in the context of M&A, they may not apply more generally. Second, the $GGL_i^{A,B}$ measure increases when the relative ownership of firm A increases, while this does not occur for

$HJL_i^{A,B}$. This is because GGL assumes that managers care about shareholder support, and hence, pay more attention to action consequences for investors that constitute a larger part of the firm's ownership. Third, Harford et al. (2011) aggregated the relative weights across investors in many different ways. By contrast, the GGL measure uses a model as the guidelines for the aggregation of the relative weights and does so by weighing the importance of each investor based on its ownership in the bidding firm and ownership in the target firm. In our empirical section, we also construct HJL as a comparison for GGL.

Another measure is the "modified Herfindahl-Hirschman Index" (MHHI) that was developed by Bresnahan and Salop (1986) and O'Brien and Salop (2000) and implemented by Azar, Schmalz, and Tecu, (2016) and Azar, Raina, and Schmalz, (2016). The MHHI is a measure of product market concentration, like an HHI, but also accounts for the effect of overlap in the shareholder base on market concentration.

There are three important differences between the MHHI and the GGL measure. First, the MMHI is tailored to capture a very specific type of externality arising from common ownership – those that arise in oligopolistic product market. As such, it makes stronger assumptions on the nature of externalities (e.g., the type of competition) and uses more information than the GGL measure (e.g., market shares). Since the GGL measure is invariant to the specific nature of externalities, it has a wider scope and can account for externalities that stem from vertical relationships, innovation, M&A transactions, financial transactions, human capital, etc. Second, the MHHI is measured at the industry level, while the GGL measure is a bi-directional pair level measure. As such, the GGL measure is not sensitive to the scope of an industry or product market, which are not always well defined.[11] Third, the MHHI assumes that investors are always fully informed about the externalities firms impose on each other, and therefore, that managers fully internalize those externalities. By contrast, the GGL measure explicitly accounts for the possibility that a well-diversified investor may not be well-informed about a given manager's actions when that manager's firm only represents a small proportion of the investor's portfolio.

[11] In the Appendix, we show that the pair level measure can be generalized to a directional group level measure which captures how common ownership affects the incentives of firm A manager to internalize the externalities his firm imposes on a group of firms (e.g., industry). We show that if $\Delta_{m,A}(1) - \Delta_{m,A}(0)$ is the same across all firms in the reference set Γ, then we can write the group level measure as $GGL_{\%}(A, \Gamma) = \sum_{m \in \Gamma} GGL_{\%}(A, \mathrm{m})$. Note that this assumption does not require the externality that firm A imposes on any other firm in the set Γ to be the same, it only requires the differential impact to be the same, which is a weaker assumption.

To conclude, the innovation behind the GGL measure is as follows: (i) it is a model-driven measure of the effect of common ownership on the incentives of managers to internalize externalities between two given companies; (ii) the measure is invariant to the specific nature of externalities between the firms; (iii) the measure is directional and it allows for the effect of common ownership from firm *A* to *B* to be different from its effect from firm *B* to *A*; (iv) the measure explicitly accounts for the limited attention that investors can pay to their portfolio companies. This last feature is key, since managers have incentives to internalize externalities only if their shareholders require them to do so. In other words, overlap in the shareholder base is a necessary but insufficient condition for common ownership to effect economic incentives.

2. The determinants of ownership overlap and the incentives arising from common ownership

While there is a large theoretical literature on the potential implications of common ownership, there is relatively little direct discussion regarding the determinants of common ownership. In this section, we discuss the factors that might contribute to either higher or lower common ownership for any given pair of firms. We break this discussion into two pieces: the determinants of "ownership overlap," and the determinants of the "managerial incentives arising from overlapping ownership". The potential determinants of ownership overlap are relatively straightforward, but the potential impact of these determinants on managers' incentives are more complex.

2.1 Ownership overlap

The determinants of ownership overlap across any two stocks can be broadly categorized into those driven by the presence of externalities and those that are not. Externality-driven explanations involve investors obtaining ownership stakes in both companies so as to induce managers to account for these externalities (e.g., Easterbrook and Fischel, 1982; Hansen and Lott, 1996; Rubin, 2006). Non-externality explanations instead involve investors creating portfolios that contain multiple companies for reasons unrelated to any desire for managers to internalize the externalities of their policy choices.

The types of externalities that might facilitate ownership overlap include those related to synergies and collusion. The incentive to create overlapping ownership structures will be greater among companies with more potential operational synergies (e.g., firms with complementary technologies, business strategies, or customer-supplier). Therefore, we might expect to find more ownership overlap among companies with greater synergies. Likewise, a common owner has an incentive to foster coordination between competing

companies in order to set prices, quantities and strategies in a way that maximizes their joint profitability. Therefore, we might expect to find more ownership overlap among firms competing in the same industry, particularly in highly-concentrated industries, where the ability to maintain collusive behaviors will be easier. The ability to exploit these externalities through common ownership, however, will depend on the extent to which the corporate governance mechanisms in place give power to shareholders to influence managers and boards. Therefore, we might also expect less ownership overlap among companies with governance mechanisms in place that limit the power of shareholders.

Non-externality explanations involve investors creating large portfolios for reasons related to indexing, style investing, or diversification. If two companies belong to the same index then they are more likely to be jointly owned by institutions that offer passive mutual funds or ETFs that follow the index, and therefore, have more ownership overlap. Likewise, if the two companies share characteristics that are valued or preferred by groups of investors, they are likely to have ownership overlap. 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. More generally, if companies are exposed to the same risk factor (small-large, value-growth, or momentum), investors who seek exposure to this factor (but would like to diversify the idiosyncratic risk) will have both companies in their portfolio. Investors desire to diversify, however, could lower ownership overlap among companies with similar characteristics. For example, if the two companies are exposed to the same risk factors (e.g., Fama/French factors, geographical area, specific industry, etc.) then investors might be 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).

2.2 Managerial Incentives Arising from Ownership Overlap

The determinants of managers' incentive to internalize the externalities of their choices because of common ownership are more complex. While externality-based explanations for the creation of ownership overlap also apply to the creation of ownership structures that induce managers to internalize externalities, the same is not true for the non-externality-based explanations of ownership overlap. For example, while indexing or style investing might create more ownership overlap, they might reduce managers' incentives to internalize externalities if such investors are less likely to be informed about whether an individual

manager's actions imposed externalities on another stock in the investor's portfolio. This might occur if index and style investors tend to hold more stocks in their portfolios, thus reducing the importance of any given stock to the overall portfolio's value and reducing the likelihood that the investor finds it worthwhile to be informed about each manager's actions and their implications.

Such a tension is captured by our GGL measures, while it is not captured by the various *Overlap* measures described earlier. We would expect indexing to be positively associated with measures of *Overlap*, but there is no clear prediction on how two stocks being in the same index or of similar style characteristics will affect manager's incentives with respect to common ownership, as captured by GGL. However, if investors obtain ownership stakes in multiple companies to induce managers to account for externalities, then we would expect to find both *Overlap* and GGL to be higher among pairs of firms where externalities are likely to be greater. We now turn to the data to analyze these possibilities.

3. Data construction and summary statistics

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.[12] 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 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 when calculating our pair-level measures of ownership overlap, *Overlap_AVG*, *Overlap_MIN* and *Overlap_AP*, and twice as many observations when calculating our bi-directional, pair-level measure, $GGL_{\%}$.

We construct measures of common ownership for each pair from the Institutional 13F Holdings that have been tabulated and aggregated by Thomson Reuters, which we access via Wharton Research Data Services. Some firms may have multiple classes of publicly traded stock; in these instances, we aggregate

[12] We do not 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. 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.

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 institutions which own both stocks and their ownership stakes in each stock. With these data, we than compute the ownership measures as outlined above in Section 1. In terms of computing power and storage, it is non-trivial to compute these ownership pairs and typically would not be feasible on a personal computer. Utilizing the High Performance Computing Cluster (HPCC) at Wharton, we calculate these variables, and our final pair-level data set is 226 Gigabytes (GB), and our final bi-directional pair-level dataset is 452 GB.

We report summary statistics for common ownership measures and common ownership determinants in Table 1. 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 at 11.97.

The average ownership overlap across the entire sample period, as measured by *Overlap_AVG*, *Overlap_MIN* and *Overlap_AP*, varies from 3.3% to 7.5%. As can be seen in Table 2, according to these three 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 potential 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. Because of this data limitation, our later specifications focus only on the time period in which we have Russell data.

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.

4. Empirical Methodology

To analyze the potential determinants of ownership overlap, 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 ownership overlap 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 ownership overlap across pairs and to ensure we only make use of within-pair variation for this 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 ownership overlap 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.

To analyze the potential determinants of managerial incentives arising from ownership overlap, we estimate a similar bi-directional pair-level panel regression,

$$y_{ijt} = \beta X_{ijt} + \alpha_{ij} + \delta_t + \varepsilon_{ijt},$$

where y_{ijt} is our aggregate measure of manager *i's* incentive to internalize the impact of her choices on firm j in year t, and X_{ijt} is our time-varying explanatory variables of interest. We include bi-directional, pair-level fixed effects, α_{ij}, to control for time-invariant differences in manager *i*'s incentives with respect to firm j and to ensure we only make use of within bi-directional pair variation for this analysis. To account for potential covariance across pairs over time, we cluster the standard errors at the bi-directional pair level.

Because we lack an exogenous source of variation in the potential determinants of common ownership, the findings of the above panel estimations must be interpreted with caution. To be clear, we do not seek to identify the causal effect of any given explanatory variable X on ownership overlap or managerial incentives, 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 1. 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 ownership overlap (as measured by *Overlap_AVG*, *Overlap_MIN*, and *Overlap_AP*) and managerial incentives arising from this ownership overlap (as measured by $GGL_{\%}$) and how economically large are the observed changes?" With that caveat in mind, we now proceed to our empirical analysis.

5. Results

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

5.1 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, but the extent of the increase varies considerably depending on whether one uses naïve measures of overlap or our model-driven measure that accounts for the impact of this overlap on managerial incentives. This can be seen in Figure 1, which plots the average percent increase for each of the different common ownership measures over time. All three naïve measures of overlap have increased dramatically over the last 30 years, ranging between increases of 1,600% to 2,300%. There is a similar magnitude increase in the average number of common owners per pair. However, $GGL_{\%,}$ which take into account managerial incentives, increases far less during this time period; it increases by about 330%.

We also plot overlapping ownership based on the extensive margin, that is 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. The fraction of pairs without a link declines sharply over time, with a modest increase starting in 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.

The increase in our incentives-based measure of common ownership, $GGL_{\%}$, is similar to the well-known increase in overall institutional ownership. This is seen in Figure 3, which plots the $GGL_{\%}$ measure 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. Interestingly, the naïve measures of overlap have increased considerable more than that of institutional ownership (see Figure 1).

The upward trend in ownership overlap appears to be largely driven by the holdings of passive institutions. This is shown in Panel A of Figure 4, which plots the average of our three overlap ownership measures separately for active and passive institutional owners (based on Bushee (2001) classifications). As can be seen, much of the rise in overlap ownership is linked with passive institutional owners.[14]

Interestingly, an important dichotomy emerges when we instead plot our measure of common ownership that accounts for managerial incentives separately for active and passive institutions. This is shown in Panel B of Figure 4, where we plot $GGL_{\%}$ over time separately for passive and active institutions. Unlike the ownership overlap measures, active and passive $GGL_{\%}$ both trend in a similar fashion over the last 30 years, providing nearly equal contributions to the overall increase in common ownership. This dichotomy presents an important distinction in how taking into account incentives, such as in the $GGL_{\%}$ measure, may alter how much different types of asset managers are contributing to common ownership.

5.2 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

[14] 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.

pair of firms. Our findings regarding index inclusion are reported in Table 3.

Index inclusion is strongly and positively associated with each of our measures of ownership overlap. For all three measures of ownership overlap, inclusion of both stocks in the same index (S&P 400, S&P 500, S&P 600, Russell 1000, Russell 2000, or Nasdaq) is associated with increases in ownership overlap. The estimates are all statistically significant at a level of at least 1% (with some *t*-stats exceeding 400) and economically large (Table 3, Columns 1-3). For example, moving from both stocks not being in the S&P 500 to both stocks being included in the S&P 500 is associated with a 55% to 200% increase in the ownership overlap, which corresponds to a 37% to 119% standard deviation increase in common ownership for the pair of stocks. The magnitudes are similar for inclusion of both stocks in other indexes. We also see a similar magnitude increase in the number of common investors (Column 4). For example, inclusion of both stocks in the S&P 500 is associated with about 70 additional common investors, which corresponds to a nearly 700% increase relative to the sample average of 11.97 common investors.

However, once we take into account managerial incentives, as with the $GGL_{\%}$ measure, the association between index inclusion and common ownership is unclear. Inclusion in some indices (e.g., S&P 500, Russell 1000, and Nasdaq) is associated with increases in common ownership while inclusion in other indexes (e.g. Russell 2000, S&P 400, and S&P 600) is associated with decreases in common ownership (Table 3, Column 5). For example, inclusion of both stocks in the Russell 2000 is associated with a 59% decline in common ownership, as measured by $GGL_{\%}$, while inclusion in the Russell 1000 is associated with a 247.6% increase in common ownership. Relative to the sample standard deviation for $GGL_{\%}$, however, these magnitudes only correspond to -1% and 4% of a standard deviation, respectively.

The unclear relationship between being in the same index and managerial incentives highlights the potential importance of accounting for investor attention. A key difference between $GGL_{\%}$ and the naïve measures of ownership is that it accounts for the likelihood that investors are less likely to be informed when a stock represents only a small fraction of their overall portfolio. The negative association between some index inclusions and $GGL_{\%}$ suggests that being in some indexes is associated with a firm's common owners spreading their assets over more stocks, which can reduce the common owners' likelihood of being informed and reduce managers' incentives to internalize this common ownership.

However, as noted earlier, these correlations should not be interpreted as causal. We cannot rule out

the possibility of omitted variables that affect both common ownership of the two companies and their inclusion in a specific index. Nor can we 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 overlapping/common ownership affects the performances of the two firms, which might in turn affect the likelihood that one or both firms enter or exit a specific index.

Higher average institutional ownership for the pair and a smaller absolute difference in the level of institutional ownership are also both positively associated with overlapping and common ownership. In other words, as the level of institutional ownership becomes higher *or* more similar for a pair of firms, the extent of overlapping and common ownership for the pair also increases, on average. Since we are controlling for index inclusion, this correlation does not stem from the companies being part of the same index, and the findings are consistent with the possibility that the growth of overlapping and common ownership over the last 30 years may partly stem from the growth of institutional investors. That said, this interpretation should be cautioned since our measures of overlapping and 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 will not 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 overlapping ownership as suggested in Section 2.1 and find that stocks of similar investment style tend to have greater common ownership. Larger differences in size, market-to-book, or past stock momentum are associated with less ownership overlap (Table 3, Columns 1-4). 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, is associated with less common ownership between the two stocks.[15] Similarly, if the two companies are in the same industries or are both paying dividends, then they have more overlapping ownership.[16] All coefficients are statistically significant at a level of at least 1%. However, the result is a bit different for common ownership measures which take

[15] 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.

[16] 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.

into account managerial incentives, such as $GGL_{\%}$. For example, while some style measures are similar to overlapping ownership measure coefficients, others (e.g. size) are not statistically significant.

Notice that the association between commonality in characteristics and overlapping 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 observed correlations are 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.

Given the potential for anti-competitive behavior by firms that have common owners, we also assess how overlapping and common ownership may be linked with industry structure and characteristics. To do this we regress both overlapping and 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 would suggest 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, we find little evidence that common ownership increases among pairs of companies operating in the same industry as their industry becomes more concentrated. In our main specification, the coefficient on the interaction between being in the same industry and industry HHI is not statistically different from zero, no matter how we measure common ownership (Table 3, Columns 1-5). This result is interesting since the negative externalities that industry rivals impose on each other are likely to be stronger when the industry is more concentrated and common owners of industry rivals would benefit from incentivizing them not to compete hard against each other. The lack of an 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.

The associations we document are not specific to any particular time period. This is shown in Table 4. In Panel A, we reproduce our estimations using the naïve measures of overlap as the dependent variable over different 5-year subsamples. Since we obtain directionally similar results with each overlap measure, we only report results for the Overlap_Min measure for brevity. Coefficients for the investment style variables, such as difference and size and difference in market to book, fluctuate in size and magnitude, but

exhibit no discernable overall time trend. However, the coefficients on indices, particularly the S&P 500, tend to grow over time. This last finding is consistent with the growing popularity of index funds in recent years. In Table 4 Panel B we estimate the effect of common ownership ($GGL_{\%}$), over different subsamples, and again find that index inclusion has different effects depending on the index.

5.3 The determinants of active and passive common ownership

Table 5 and 6 report the regression analysis when the dependent variable is our measures of overlapping and 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 overlapping measures based on passive investors tend to have higher averages during the sample period. For example, the *Overlap_Min* measure has an average of 2.5% when constructed using only passive institutional holdings, while it is 1.1% based on active institutional holdings. In general, the average of passive overlapping ownership measures is roughly twice the active overlapping ownership measure. Therefore, we want to interpret the economic magnitudes when compared relative to the mean level of the dependent variable. Alternatively, our active and passive measures of common ownership ($GGL_{\%}$), have roughly equal means during the sample period, so the coefficients across both are roughly comparable.

Inclusion in the S&P 500 and Russell 2000 indices matters more for the passive overlapping ownership than for the active overlapping ownership. This is consistent with these indices tracking more money than others. For example, in Column 1 of Table 5, the *Overlap_MIN* measure increases by 5.8%, or 232% compared to the average of the passive *Overlap_MIN* measure (2.5%). Alternatively, in Column 1 of Table 6, the *Overlap_MIN* measure increases by 0.6%, or 54% compared to the average of the active *Overlap_MIN* measure. This also explains why the R-squared in our regressions of passive overlapping ownership is larger than for active ownership (90% and 75%, respectively).

Alternatively, for the $GGL_{\%}$ measure, we find largely similar magnitudes and patterns with respect to index inclusion when $GGL_{\%}$ is calculated separately for passive and active institutional ownership. As seen in Tables 5 and 6, index inclusion has similar correlations with managerial incentives for both active and passive investors, though as noted earlier, the observed coefficient is different depending on the index. Since the average $GGL_{\%}$ measure is the same for active and passive $GGL_{\%}$ measures, the coefficients in Table 5 and Table 6 generally appear to have the same economic magnitude as well.

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 overlapping and common ownership. In all cases the significance is marginal. By contrast, the coefficient on this interaction variable is positive for active overlapping ownership (Table 6), although not in all specifications and not for our measure of common ownership that accounts for managerial incentives. The economic magnitude suggests a minimal association between ownership overlap and industry concentration; for example, for the *Overlap_MIN* measure, a one standard deviation increase in industry HHI when both firms are in the same industry is linked with an 0.0096% increase in overlap, or 0.87% increase relative to the average level of overlap.

6. Concluding remarks

Between 1980 and 2012 there has been a dramatic rise in both ownership overlap and managerial incentives to internalize the externalities of their actions 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. We find evidence consistent with several key determinants of overlapping ownership linked with index inclusion and investment styles, even after controlling for institutional ownership and a variety of fixed effects. However, once managerial incentives are accounted for, index inclusion and the associated increase in passive ownership, has no clear association with common ownership. We also find that the increase in managerial incentives to internalize externalities is driven in roughly equal proportion by active and passive investors. Lastly, we find little 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.

7. Reference list

1. Antón, Miguel and Christopher Polk (2014): "Connected Stocks." Journal of Finance 69, 1099--1127.
2. Antón, Miguel, Ederer Florian, Gine Mireia, Schmalz, Martin C. (2016), Common Ownership, Competition, and Top Management Incentives, working paper.
3. Azar, José, 2011, A new look at oligopoly: Implicit collusion through portfolio diversification, working paper.
4. Azar, José, 2016, Portfolio Diversification, Market Power, and the Theory of the Firm, working paper.
5. Azar José, Raina Sahil, Schmalz, Martin C. (2016a), Ultimate Ownership and Bank Competition, working paper.
6. Azar José, Schmalz, Martin C., Tecu Isabel,. (forthcoming), Anti-Competitive Effects of Common Ownership, *Journal of Finance*.
7. Barberis, N., A. Shleifer, and R. Vishny. 1998. A model of investor sentiment. *Journal of Financial Economics* 49:307–43.
8. Basak, S., and A. Pavlova. Forthcoming 2012. Asset prices and institutional investors. *American Economic Review*. VOL. 103, NO. 5, AUGUST 2013 (pp. 1728-58)
9. Bartram, Söhnke M., John Griffin, Tae-Hoon Lim, and David T. (2015) How important are foreign ownership linkages for international stock returns? Review of Financial Studies 28, 3036–3072
10. Bresnahan, T. F., and S. C. Salop (1986): Quantifying the competitive effects of production joint ventures," International Journal of Industrial Organization, 4(2), 155-175.
11. Cici Gjergji, Gibson Scott, Rosenfel Claire, (2015), Cross-Company Effects of Common Ownership: Dealings Between Borrowers and Lenders With a Common Blockholder, working paper.
12. Dennis, P., K. Gerardi, and C. Schenone (2017). "Common Ownership Does Not Have Anti-Competitive Effects in the Airline Industry," University of Virginia.
13. Easterbrook, F.H., Fischel, D.R., 1982. Corporate control transactions. Yale Law Journal 91, 698–

737.

14. Elhauge, E. (2016) “Horizontal Shareholding,” *Harvard Law Review*, 129, 1267-1317.
15. Farrell, Joseph, and Carl Shapiro, 1990, Asset ownership and market structure in oligopoly, RAND Journal of Economics 21, 275–292.
16. Fulghieri, Paolo and Merih Sevilir (2009): "Size and Focus of a Venture Capitalist's Portfolio." Review of Financial Studies 22, 4643-4680
17. Gao, George P., Moulton, Pamela C., Ng, David T. (2016), Institutional Ownership and Return Predictability Across Economically Unrelated Stocks. Working paper.
18. Gilo, D., Y. Moshe, and Y. Spiegel (2006): \Partial cross ownership and tacit collusion," The RAND Journal of Economics, 37(1), 81-99.
19. Gompers, P. A., Xuan, Y., 2008. Bridge building in venture capital-backed acquisitions. Working Paper, Harvard Business School, Boston, MA.
20. Gramlich, J., and S. Grundl (2017). “Testing for Competitive Effects of Common Ownership,” Finance and Economics Discussion Series 2017-029, Federal Reserve Board, Washington DC.
21. Hansen, R.G., Lott Jr., J.R., 1996. Externalities and corporate objectives in a world with diversified shareholder/consumers. Journal of Financial and Quantitative Analysis 31, 43–68.
22. Harford, Jarrad, Dirk Jenter, and Kai Li, 2011, Institutional cross-holdings and their effects on acquisition decisions, Journal of Financial Economics 99, 27-39.
23. Hau, Harald and Sandy Lai (2013): "Real Effects of Stock Underpricing." Journal of Financial Economics 2013, 392--408.
24. He Jie, Huang Jiekun 2017, “Product Market Competition in a World of Cross Ownership: Evidence from Institutional Blockholdings,” Review of Financial Studies 30, 2674-2718.
25. Inderst, Roman, Holger M. Mueller and Felix Münnich (2007): .Financing a Portfolio of Projects.” Review of Financial Studies 20, 1289.1325.
26. Jotikasthira, Chotibhak, Christian Lundblad, and Tarun Ramadorai (2012): "Asset Fire Sales and Purchases and the International Transmission of Funding Shocks." Journal of Finance 67, 2015--2050.
27. Jung, M. J., 2013. Investor overlap and diffusion of disclosure practices. Review of Accounting

Studies 18, 167-206.

28. Kang J.K., Luo J., Na H.S., 2013, Are Institutional Investors with Multiple Blockholdings Effective Monitors? Working paper.
29. Kempf Elisabeth, Manconi Alberto and Spalt Oliver, (2016), "Distracted Shareholders and Corporate Actions", Review of Financial Studies, forthcoming
30. Kwon Heung Jin, (2016) Executive Compensation under Common Ownership, working paper
31. López, A. L., and X. Vives (2016): "Cross-Ownership, R&D Spillovers and Antitrust Policy," *Working Paper*.
32. Massa Massimo, Žaldokas Alminas , Information Transfers among Coowned Firms, Journal of Financial Intermediation, forthcoming
33. Masulis, Ronald W., and Rajarishi Nahata, 2011, Venture capital conflicts of interest: Evidence from Acquisitions of Venture-Backed Firms. The Journal of Financial and Quantitative Analysis, Vol. 46, No. 2 (APRIL 2011), pp.395-430
34. Matvos, G., Ostrovsky, M., 2008. Cross-ownership, returns, and voting in mergers. Journal of Financial Economics 89, 391–403.
35. O'Brien, D. P., and S. C. Salop (2000): Competitive effects of partial ownership: Financial interest and corporate control," Antitrust Law Journal, pp. 559-614.
36. O'Brien, D. P., and K. Waehrer (2017): "The Competitive Effects of Common Ownership: We Know Less Than We Think," Antitrust Law Journal 81(3), pp. 729-776.
37. Peng Lin, Xiong Wei, (2006), Investor attention, overconfidence and category learning, Journal of Financial Economics, 80, 2006, 563-602.
38. Posner, E.A., F.S. Morton, and E.G. Weyl. (2016) "A Proposal to Limit Anti-Competitive Power of Institutional Investors," working paper.
39. Rubin, A., 2006. Diversification and corporate decisions. Corporate Ownership and Control 3, 209–212.
40. Vayanos, Dimitri, and Paul Woolley, 2013, An institutional theory of momentum and reversal, Review of Financial Studies 26, 1087–1145.

Appendix A

In this Appendix we offer two generalizations to the GGL measure. Under the first generalization we allow the manager to weigh the votes of investors differently. Specifically, let

$$P_n(\boldsymbol{X}) = \gamma_{retail,n}\left(1 - \sum_{i=1}^{I} \alpha_{i,n}\right) + \sum_{i=1}^{I} \eta(\alpha_{i,n})\, p_{i,n}(\boldsymbol{X})$$

The key difference from the expression in main text is in the second term: $\eta(\alpha_{i,n})$ replaces $\alpha_{i,n}$, where $\eta(\cdot) > 0$ and $\eta'(\cdot) > 0$. Intuitively, the function η measures the importance that managers ascribe to a block of votes. If managers just care about whether a proposal is passed or voted down, then η would be the identity function as in the main text. However, generally, managers might overweight the importance of large blocks and underweight the importance of small blocks.[17]

Using this formulation, $U_n(1, \boldsymbol{X}_{-n}) \geq U_n(0, \boldsymbol{X}_{-n})$ holds if and only if

$$P_n(1, \boldsymbol{X}_{-n}) - P_n(0, \boldsymbol{X}_{-n}) + \frac{B_n(1) - B_n(0)}{\lambda_n} \geq 0 \Leftrightarrow$$

$$\sum_{i=1}^{I} \eta(\alpha_{i,n}) \left[p_{i,n}(1, \boldsymbol{X}_{-n}) - p_{i,n}(0, \boldsymbol{X}_{-n})\right] + \frac{B_n(1) - B_n(0)}{\lambda_n} \geq 0 \Leftrightarrow$$

$$\sum_{i=1}^{I} \eta(\alpha_{i,n})\, g(\beta_{i,n}) \left[w_{i,n}(1, \boldsymbol{X}_{-n}) - w_{i,n}(0, \boldsymbol{X}_{-n})\right] + \frac{B_n(1) - B_n(0)}{\rho\lambda_n} \geq 0 \Leftrightarrow$$

$$\sum_{i=1}^{I} \eta(\alpha_{i,n})\, g(\beta_{i,n}) [W_i(1, \boldsymbol{X}_{-n}) - W_i(0, \boldsymbol{X}_{-n})] + \frac{B_n(1) - B_n(0)}{\rho\lambda_n} \geq 0 \Leftrightarrow$$

$$\sum_{i=1}^{I} \eta(\alpha_{i,n})\, g(\beta_{i,n}) \left[\sum_{m=1}^{N} \alpha_{i,m} [\Delta_m(1, \boldsymbol{X}_{-n}) - \Delta_m(0, \boldsymbol{X}_{-n})]\right] + \frac{B_n(1) - B_n(0)}{\rho\lambda_n} \geq 0 \Leftrightarrow$$

$$\sum_{i=1}^{I} \eta(\alpha_{i,n})\, g(\beta_{i,n}) \left[\sum_{m=1}^{N} \alpha_{i,m} [\Delta_{m,n}(1) - \Delta_{m,n}(0)]\right] + \frac{B_n(1) - B_n(0)}{\rho\lambda_n} \geq 0$$

[17] The function η can also be applied to the noise/retail votes, but it will not change any of the results.

Applying the same logic as in the main text, results in the following generalized GGL measure:

$$GGL_{\%}(A,B) = \sum_{i=1}^{I} \eta(\alpha_{i,A})\, g(\beta_{i,A})\alpha_{i,B}$$

For example, if

$$\eta(\alpha_{i,A}) = \begin{cases} \alpha_{i,A} & if\ \alpha_{i,A} > z \\ 0 & else, \end{cases}$$

then the manager of firm A is affected by the votes of his investors only if the investor's ownership in firm A is larger than z. In this case, the generalized GGL measure will only aggregate across common owners of firm A and B who owns at least z percentage of the equity of firm A.

Under the second generalization, we consider the effect of common ownership on the incentives of the manager of firm A to internalize externalities on a group of firms (e.g., industry), rather than a single firm. Let Γ denote the set of firms with respect to which we seek to measure the effect of common ownership. Following the same logic as in the main text, we measure this effect by the difference in the manager's incentives to take action $x_n = 1$ under the existing ownership structure relative to a counterfactual in which investors in firm A have no ownership in any of the M firms (assuming the weights of all other firms in their portfolios remain unchanged). Recall

$$\Pi_n(\boldsymbol{\alpha_1}, \dots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \dots, \boldsymbol{\beta_N}) = \sum_{i=1}^{I} \eta(\alpha_{i,n})\, g(\beta_{i,n}) \left[\sum_{m=1}^{N} \alpha_{i,m} \left[\Delta_{m,n}(1) - \Delta_{m,n}(0) \right] \right],$$

Then the generalized group-level measure is

$$CO(A,\Gamma) = \sum_{m \in \Gamma} [\Pi_A(\boldsymbol{\alpha_1}, \dots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \dots, \boldsymbol{\beta_N}) - \Pi_A(\boldsymbol{\alpha_1}, \dots, \boldsymbol{\alpha_m} = \mathbf{0}, \dots, \boldsymbol{\alpha_N}; \boldsymbol{\beta_1}, \dots, \boldsymbol{\beta_m} = \mathbf{0}, \dots, \boldsymbol{\beta_N})].$$

Therefore,

$$CO(A,\Gamma) = \sum_{i=1}^{I} \eta(\alpha_{i,A})\, g(\beta_{i,A}) \left[\sum_{m \in \Gamma} \alpha_{i,m} \left[\Delta_{m,A}(1) - \Delta_{m,A}(0) \right] \right],$$

which can be rewritten as

$$CO(A,\Gamma) = \sum_{m \in \Gamma} \left[\left[\Delta_{m,A}(1) - \Delta_{m,A}(0) \right] \sum_{i=1}^{I} \eta(\alpha_{i,n})\, g(\beta_{i,A})\alpha_{i,m} \right],$$

If $\Delta_{m,A}(1) - \Delta_{m,A}(0)$ is the same across all firms in the set Γ, then we can normalize $CO(A, \Gamma)$ by the term $\Delta_{m,A}(1) - \Delta_{m,A}(0)$ and get the following group-level unit-free measure

$$GGL_{\%}(A, \Gamma) = \sum_{m \in \Gamma} GGL_{\%}(A, \mathrm{m}).$$

Similarly, if $\Delta_{m,A}(1) - \Delta_{m,A}(0)$ is the same across all firms in the set Γ, but the externality of firm A on firm m is a multiple of firm m market value, then

$$GGL_{\$}(A, \Gamma) = \sum_{m \in \Gamma} GGL_{\$}(A, \mathrm{m}).$$

Notice that assuming that $\Delta_{m,A}(1) - \Delta_{m,A}(0)$ is the same across all firms in the set Γ does not require the externalities that firm A imposes on each of these firms to be the same. It only requires the *difference* between the externalities that are imposed by firm A when $x_A = 1$ and the externalities when $x_A = 0$ to be the same. This is a much weaker assumption. For example, under this assumption, the product market strategy employed by firm A can have different effect on each of its competitors. However, a change in that strategy should have the same differential effect on each competitor. Without this assumption, group-level measure cannot be unit free.

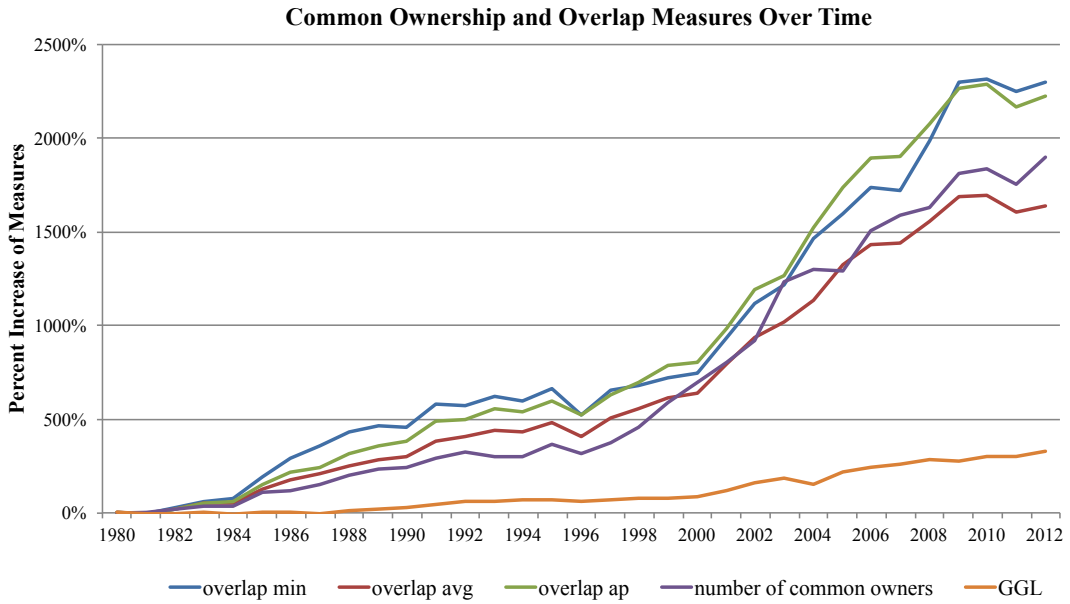

Figure 1: Common Ownership and Overlap Measures Over Time

This figure plots the average of the overlap measures and common ownership GGL measure in a given year, from 1980 to 2012. Details on each measure can be found in Section 1.

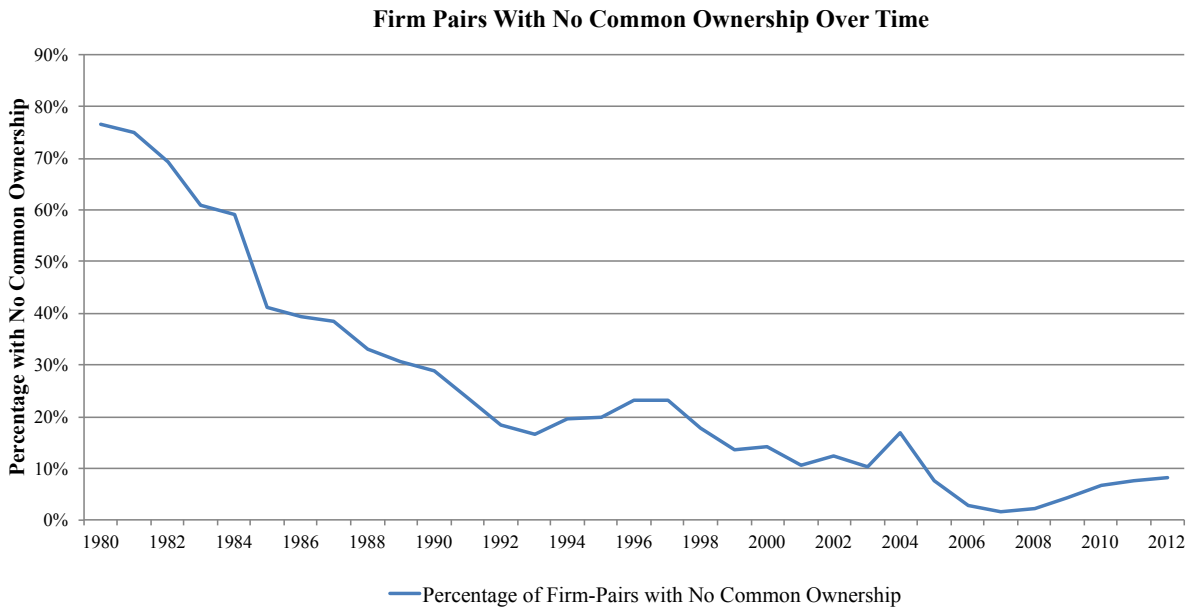

Figure 2: Proportion of Links with Zero Common Ownership

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.

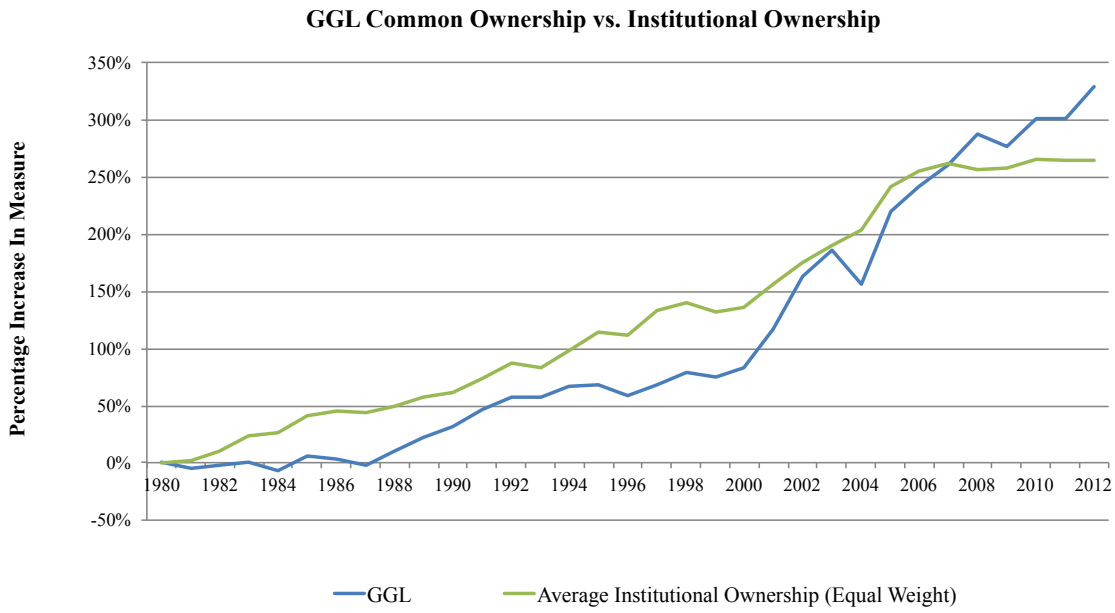

Figure 3: GGL Common Ownership vs Institutional Ownership

This figure plots the average of the GGL common ownership relative to the average institutional ownership, equal weighted, in a given year. Details on each measure can be found in Section 1.

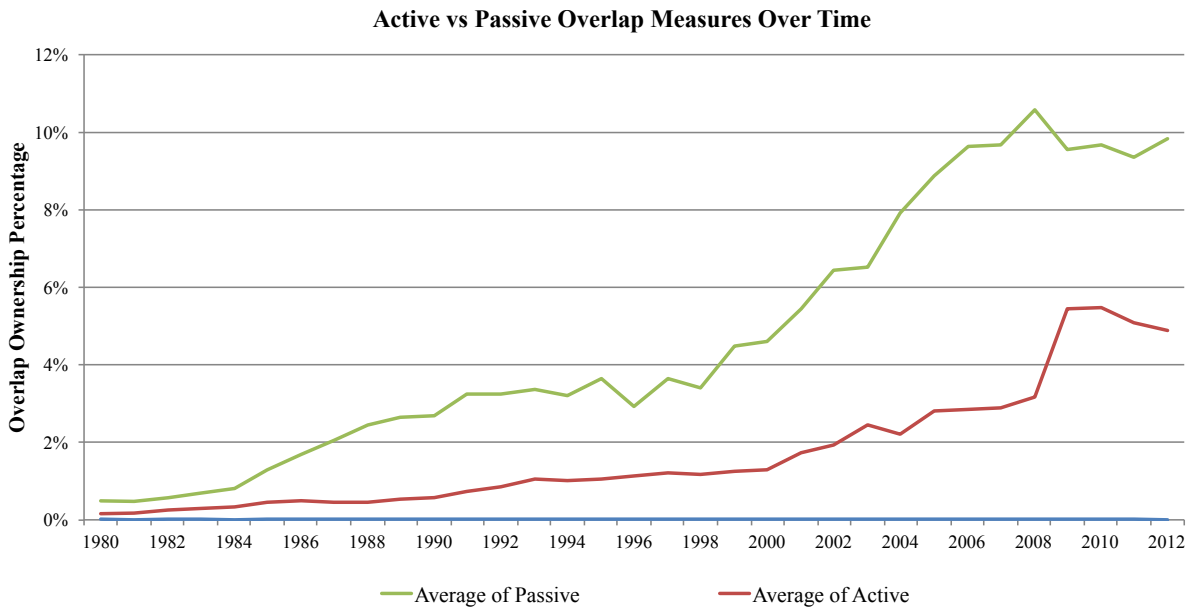

Figure 4 Panel A: Overlap Ownership Measures Passive vs. Active

This figure plots the average of the three key overlap ownership measures based on active ownership and passive ownership from 1980 to 2012. Details on each measure can be found in Section 1. Active Ownership is based on Bushee (2001) categorizations of transient and dedicated holders of stocks, while Passive Ownership is based on Quasi-Indexers.

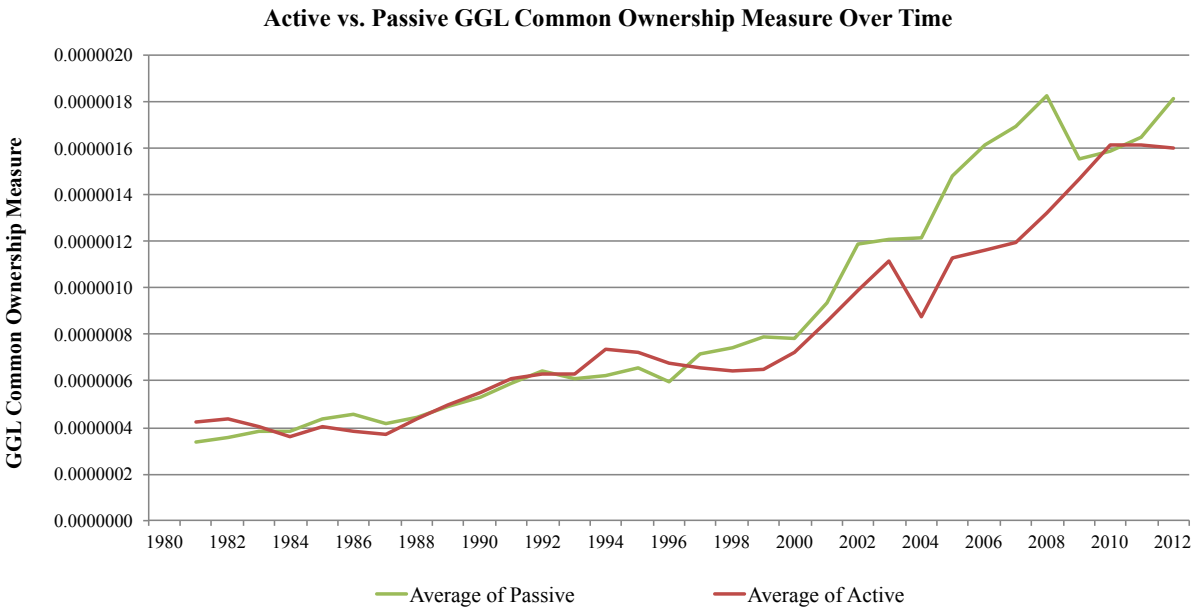

Figure 4 Panel B: Common Ownership Measures Passive vs. Active

This figure plots the average of the GGL common ownership measures based on active ownership and passive ownership from 1980 to 2012. Details on the measure can be found in Section 1. 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 overalapping and common ownership variables and variables that are key potential determinants (explanatory variables). The ownership variables are defined in Section 1 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
Overlap Min	385,032,108	0.033	0.055	0.000	0.000	0.000	0.011	0.041	0.097	0.261
Overlap Avg	385,032,108	0.075	0.111	0.000	0.000	0.000	0.029	0.099	0.229	0.496
Overlap AP	385,032,108	0.070	0.106	0.000	0.000	0.000	0.025	0.089	0.217	0.473
Cross GGL %	770,064,216	0.0000017	0.0000986	0.0000000	0.0000000	0.0000000	0.0000000	0.0000002	0.0000018	0.0000259
Sum of Betas Across Common Owners	770,064,216	0.012	0.130	0.000	0.000	0.000	0.000	0.002	0.013	0.200
Sum of Betas/Count of Common Owners	770,064,216	0.0003	0.0018	0.0000	0.0000	0.0000	0.0000	0.0002	0.0007	0.0049

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. Ownership Measures Over Time

This table reports summary statistics for each ownership variable in our sample for different years. The variables are defined in Section 1 of the paper.

Panel A: Ownership Measures 1980

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
Overlap Min	6,503,421	0.004	0.014	0.000	0.000	0.000	0.000	0.000	0.009	0.069
Overlap Avg	6,503,421	0.011	0.035	0.000	0.000	0.000	0.000	0.000	0.030	0.186
Overlap AP	6,503,421	0.008	0.029	0.000	0.000	0.000	0.000	0.000	0.019	0.152
Cross GGL %	13,006,842	0.0000008	0.0000761	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000001	0.0000106
Sum of Betas Across Common Owners	13,006,842	0.006	0.083	0.000	0.000	0.000	0.000	0.000	0.003	0.108
Sum of Betas/Count of Common Owners	13,006,842	0.0004	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	0.0077

Panel B: Ownership Measures 1990

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
Overlap Min	11,113,255	0.020	0.029	0.000	0.000	0.000	0.006	0.030	0.056	0.128
Overlap Avg	11,113,255	0.040	0.058	0.000	0.000	0.000	0.016	0.058	0.109	0.278
Overlap AP	11,113,255	0.036	0.052	0.000	0.000	0.000	0.017	0.052	0.095	0.246
Cross GGL %	22,226,510	0.0000011	0.0000787	0.0000000	0.0000000	0.0000000	0.0000000	0.0000001	0.0000009	0.0000156
Sum of Betas Across Common Owners	22,226,510	0.008	0.097	0.000	0.000	0.000	0.000	0.001	0.006	0.145
Sum of Betas/Count of Common Owners	22,226,510	0.0003	0.0015	0.0000	0.0000	0.0000	0.0000	0.0001	0.0006	0.0054

Panel C: Ownership Measures 2000

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
Overlap Min	15,688,401	0.030	0.046	0.000	0.000	0.001	0.010	0.040	0.088	0.211
Overlap Avg	15,688,401	0.076	0.102	0.000	0.000	0.003	0.037	0.104	0.217	0.457
Overlap AP	15,688,401	0.068	0.097	0.000	0.000	0.002	0.028	0.092	0.199	0.437
Cross GGL %	31,376,802	0.0000015	0.0001100	0.0000000	0.0000000	0.0000000	0.0000000	0.0000002	0.0000013	0.0000242
Sum of Betas Across Common Owners	31,376,802	0.011	0.151	0.000	0.000	0.000	0.000	0.001	0.010	0.183
Sum of Betas/Count of Common Owners	31,376,802	0.0002	0.0013	0.0000	0.0000	0.0000	0.0000	0.0001	0.0004	0.0043

Panel D: Ownership Measures 2010

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
Overlap Min	8,110,378	0.085	0.094	0.000	0.000	0.009	0.046	0.142	0.234	0.349
Overlap Avg	8,110,378	0.181	0.164	0.000	0.002	0.039	0.135	0.296	0.436	0.591
Overlap AP	8,110,378	0.179	0.158	0.000	0.002	0.037	0.143	0.292	0.414	0.574
Cross GGL %	16,220,756	0.0000033	0.0001955	0.0000000	0.0000000	0.0000000	0.0000001	0.0000012	0.0000054	0.0000431
Sum of Betas Across Common Owners	16,220,756	0.029	0.209	0.000	0.000	0.000	0.001	0.011	0.047	0.451
Sum of Betas/Count of Common Owners	16,220,756	0.0004	0.0012	0.0000	0.0000	0.0000	0.0001	0.0003	0.0009	0.0047

Table 3: Ownership and Pair Characteristics

This table reports regression estimates of the relationship between overlapping and common ownership (dependent variable) and key potential ownership determinants (explanatory variables). The unit of observation is at the pair-year level for overlapping variables and pair-year-direction for common ownership variables. Specifications (1) to (5) evaluate the relationship between key determinants of ownership on different measures of overlapping and common ownership, each measure is described in detail in Section 1 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.

	Overlap Min	Overlap Avg	Overlap AP	Cross Count	Cross GGL %
	(1)	(2)	(3)	(4)	(5)
Both S&P 500 Dummy$_{it}$	0.06569***	0.04098***	0.04282***	69.62424***	0.00000710***
	[397.29]	[181.25]	[176.92]	[434.63]	[15.96]
Both Russell 2000 Dummy$_{it}$	0.02731***	0.02713***	0.03379***	6.37109***	-0.00000100***
	[1089.37]	[754.27]	[869.45]	[1003.34]	[-20.26]
Both Russell 1000 Dummy$_{it}$	0.01888***	0.03131***	0.03754***	25.10083***	0.00000421***
	[284.47]	[327.00]	[364.28]	[643.66]	[5.83]
Both S&P 400 Dummy$_{it}$	0.03286***	0.02638***	0.03006***	12.10525***	-0.00000104***
	[234.95]	[143.12]	[153.04]	[227.28]	[-4.32]
Both S&P 600 Dummy$_{it}$	0.04994***	0.04447***	0.04865***	10.58786***	-0.00000061***
	[486.38]	[346.31]	[364.18]	[497.08]	[-10.09]
Both Nasdaq Index Dummy$_{it}$	0.02613***	0.03143***	0.03447***	30.74678***	0.00000877***
	[51.63]	[44.95]	[46.59]	[71.68]	[20.49]
Average Institutional Ownership$_{it}$	0.15741***	0.37754***	0.32046***	38.13737***	0.00001092***
	[2237.96]	[3091.01]	[2589.39]	[1388.97]	[61.29]
Difference Institutional Ownership$_{it}$	-0.06654***	-0.13137***	-0.09287***	-18.81737***	-0.00000495***
	[-1780.70]	[-2091.53]	[-1389.57]	[-1281.63]	[-51.39]
Size$_{it}$	0.00886***	0.01942***	0.01702***	8.15653***	
	[481.92]	[668.15]	[553.05]	[989.78]	
Size First Firm of Pair$_{it}$					0.00000012***
					[5.37]
Size Second Firm of Pair$_{it}$					0.00000020***
					[12.33]
Difference in Size$_{it}$	-0.00346***	-0.00431***	-0.00598***	-1.37944***	-0.00000001
	[-374.02]	[-296.68]	[-381.10]	[-369.42]	[-0.92]
Both Pay Dividends Dummy$_{it}$	0.00552***	0.00906***	0.00864***	3.37971***	0.00000020*
	[197.77]	[212.14]	[190.31]	[277.56]	[1.70]
Average Market to Book$_{it}$	0.00231***	0.00566***	0.00590***	2.10459***	0.00000046***
	[244.89]	[363.95]	[346.88]	[531.24]	[26.13]
Difference Market to Book$_{it}$	-0.00090***	-0.00181***	-0.00244***	-0.52409***	-0.00000018***
	[-181.72]	[-219.33]	[-269.61]	[-255.39]	[-19.18]
Average Momentum$_{it}$	-0.00005***	-0.00024***	-0.00021***	-0.05442***	0.00000004***
	[-30.54]	[-98.20]	[-79.27]	[-108.17]	[10.41]
Difference Momentum$_{it}$	-0.00009***	-0.00010***	-0.00005***	-0.02321***	-0.00000001***
	[-72.02]	[-49.43]	[-21.96]	[-58.97]	[-3.31]
Average of Industry HHI$_{it}$	-0.00164***	-0.00644***	-0.00875***	-3.98793***	0.00000106***
	[-7.92]	[-20.56]	[-26.19]	[-52.46]	[2.60]
Both in Same Industry Dummy$_{it}$	0.00152***	0.00240***	0.00253***	0.49722***	0.00000271***
	[15.28]	[15.30]	[14.46]	[14.65]	[16.79]
Average of Industry HHI$_{it}$* Both in Same Industry Dummy$_{it}$	-0.00144	0.00319	0.00178	-0.13683	-0.00000462
	[-0.79]	[1.14]	[0.58]	[-0.17]	[-1.51]
Pair FE$_t$	Yes	Yes	Yes	Yes	No
Pair Direction FE	NM	NM	NM	NM	Yes
Time FE$_t$	Yes	Yes	Yes	Yes	Yes
R^2	0.898	0.925	0.905	0.939	0.329
N	167,771,574	167,771,574	167,771,574	167,771,574	335,543,148

Table 4 Panel A: Overlapping 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 = Overlap 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 4 Panel B: Common Ownership and Determinants Over Time
This table reports a similar specifiction as Panel A, but with a common ownership measure as the dependent variable.

	Dependent Variable = Cross GGL %						
	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$_{it}$	0.00000344***	0.00000479***	0.00000761***	0.00000749***	0.00000504***	0.00000758***	0.00000929***
	[5.71]	[26.00]	[19.70]	[11.30]	[6.07]	[28.02]	[7.50]
Both Russell 2000 Dummy$_{it}$					-0.00000092***	-0.00000110***	-0.00000074**
					[-18.27]	[-8.57]	[-2.27]
Both Russell 1000 Dummy$_{it}$					0.00000379***	0.00000316***	0.00000350***
					[4.28]	[15.56]	[5.18]
Both S&P 400 Dummy$_{it}$			0.00000025**	-0.00000005	-0.00000110***	-0.00000092***	-0.00000089***
			[2.27]	[-0.48]	[-2.71]	[-9.43]	[-4.48]
Both S&P 600 Dummy$_{it}$			-0.00000031*	-0.00000102**	-0.00000054***	-0.00000058***	-0.00000124***
			[-1.68]	[-2.32]	[-5.55]	[-7.91]	[-2.96]
Both Nasdaq Index Dummy$_{it}$				0.00000964***	0.00000684***	0.00000655***	0.00000736***
				[28.91]	[12.56]	[3.13]	[6.62]
Average Institutional Ownership$_{it}$	0.00002311***	0.00001538***	0.00001639***	0.00001178***	0.00001094***	0.00000975***	0.00001446***
	[20.92]	[33.87]	[29.07]	[47.07]	[32.94]	[22.91]	[12.10]
Difference Institutional Ownership$_{it}$	-0.00000972***	-0.00000683***	-0.00000700***	-0.00000529***	-0.00000479***	-0.00000437***	-0.00000622***
	[-16.21]	[-28.16]	[-26.89]	[-47.04]	[-25.32]	[-20.80]	[-10.52]
Size First Firm of Pair$_{it}$	-0.00000022***	-0.00000009***	-0.00000008	0.00000000	-0.00000002	0.00000022***	0.00000023*
	[-6.84]	[-5.86]	[-1.64]	[0.04]	[-0.49]	[6.24]	[1.81]
Size Second Firm of Pair$_{it}$	-0.00000006***	0.00000000	-0.00000000	0.00000008***	0.00000016***	0.00000039***	0.00000050***
	[-2.95]	[0.41]	[-0.07]	[8.54]	[10.23]	[16.63]	[6.52]
Abs(Size)$_{it}$	-0.00000002	0.00000003**	-0.00000001	-0.00000001	0.00000003**	0.00000004	0.00000021**
	[-1.21]	[2.48]	[-0.51]	[-0.88]	[2.22]	[1.09]	[2.22]
Both Pay Dividends Dummy$_{it}$	-0.00000012*	0.00000020***	0.00000026***	0.00000060***	0.00000016	0.00000060***	0.00000011
	[-1.90]	[2.77]	[2.89]	[8.82]	[0.77]	[3.20]	[0.36]
Average Market to Book$_{it}$	0.00000009***	0.00000012***	0.00000029***	0.00000037***	0.00000041***	0.00000059***	0.00000177***
	[3.42]	[8.73]	[12.42]	[36.11]	[17.22]	[16.93]	[6.38]
Difference Market to Book$_{it}$	-0.00000007***	-0.00000005***	-0.00000013***	-0.00000016***	-0.00000015***	-0.00000021***	-0.00000065***
	[-6.35]	[-7.73]	[-9.89]	[-31.81]	[-12.86]	[-14.68]	[-5.92]
Average Momentum$_{it}$	0.00000001***	0.00000002***	0.00000002***	0.00000004***	0.00000002***	0.00000007***	0.00000006***
	[3.21]	[4.65]	[5.22]	[12.29]	[7.33]	[12.36]	[2.69]
Difference Momentum$_{it}$	-0.00000001***	-0.00000001***	-0.00000002***	-0.00000001***	-0.00000001*	-0.00000001	-0.00000002
	[-2.63]	[-2.99]	[-6.20]	[-6.52]	[-1.90]	[-1.59]	[-0.89]
Pair Direction FE$_i$	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE$_t$	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.541	0.622	0.503	0.454	0.435	0.653	0.633
N	81,190,056	108,577,420	128,110,288	183,415,396	125,905,040	93,782,078	49,083,938

Table 5: Ownership and Passive Institutions

This table reports regression estimates of the relationship between overlapping and common ownership based only on the ownership of passive institutions (quasi indexers based on Bushee (2001)) and key potential ownership determinants (explanatory variables) over time. In this instance, overlapping and 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 1. 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.

	Overlap Min	Overlap Avg	Overlap AP	Cross GGL %
	(1)	(2)	(3)	(4)
Both S&P 500 Dummy$_{it}$	0.05783***	0.04236***	0.03777***	0.00000571***
	[472.47]	[245.29]	[210.51]	[115.83]
Both Russell 2000 Dummy$_{it}$	0.02419***	0.02530***	0.02932***	-0.00000056***
	[1301.95]	[909.77]	[988.52]	[-39.00]
Both Russell 1000 Dummy$_{it}$	0.01004***	0.01581***	0.02072***	0.00000178***
	[210.34]	[220.67]	[271.26]	[53.50]
Both S&P 400 Dummy$_{it}$	0.02490***	0.01850***	0.01849***	-0.00000038***
	[247.59]	[124.73]	[120.18]	[-9.77]
Both S&P 600 Dummy$_{it}$	0.04070***	0.03962***	0.04191***	0.00000016***
	[543.32]	[385.10]	[399.05]	[9.65]
Both Nasdaq Index Dummy$_{it}$	0.01330***	0.01733***	0.01785***	0.00000407***
	[37.77]	[32.80]	[32.81]	[24.52]
Average Institutional Ownership$_{it}$	0.10114***	0.23901***	0.20425***	0.00000482***
	[2005.24]	[2592.79]	[2274.11]	[113.67]
Difference Institutional Ownership$_{it}$	-0.04314***	-0.08142***	-0.05705***	-0.00000234***
	[-1598.75]	[-1704.34]	[-1147.82]	[-188.77]
Size$_{it}$	0.00615***	0.01328***	0.01156***	
	[463.43]	[606.94]	[498.07]	
Size First Firm of Pair$_{it}$				0.00000014***
				[33.85]
Size Second Firm of Pair$_{it}$				0.00000014***
				[63.86]
Difference in Size$_{it}$	-0.00251***	-0.00290***	-0.00373***	-0.00000000*
	[-374.66]	[-261.50]	[-311.16]	[-1.86]
Both Pay Dividends Dummy$_{it}$	0.00454***	0.00793***	0.00731***	0.00000038***
	[217.50]	[232.07]	[207.21]	[33.93]
Average Market to Book$_{it}$	0.00035***	0.00101***	0.00137***	0.00000015***
	[51.29]	[88.13]	[111.33]	[20.29]
Difference Market to Book$_{it}$	-0.00021***	-0.00027***	-0.00096***	-0.00000007***
	[-59.79]	[-43.76]	[-145.53]	[-18.38]
Average Momentum$_{it}$	-0.00015***	-0.00045***	-0.00044***	0.00000002***
	[-138.91]	[-235.27]	[-209.48]	[21.27]
Difference Momentum$_{it}$	-0.00001***	-0.00001***	0.00004***	-0.00000001***
	[-12.55]	[-7.04]	[24.96]	[-9.51]
Average of Industry HHI$_{it}$	-0.00028*	-0.00214***	-0.00586***	0.00000049***
	[-1.82]	[-8.77]	[-22.62]	[8.89]
Both in Same Industry Dummy$_{it}$	0.00075***	0.00105***	0.00110***	0.00000099***
	[10.37]	[8.75]	[8.16]	[21.48]
Average of Industry HHI$_{it}$ * Both in Same Industry Dummy$_{it}$	-0.00295**	-0.00104	0.00087	-0.00000432***
	[-2.21]	[-0.49]	[0.37]	[-6.66]
Pair FE$_i$	Yes	Yes	Yes	No
Pair Direction FE	NM	NM	NM	Yes
Time FE$_t$	Yes	Yes	Yes	Yes
R^2	0.896	0.909	0.890	0.280
N	167,771,574	167,771,574	167,771,574	335543148

Table 6: Common Ownership and Active Institutions

This table reports regression estimates of the relationship between ownership based only on the ownership of active institutions (transient and dedicated owners based on Bushee (2001)) and key potential ownership determinants (explanatory variables) over time. In this instance, overlapping and 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 1. 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.

	Overlap Min	Overlap Avg	Overlap AP	Cross GGL %
	(1)	(2)	(3)	(4)
Both S&P 500 Dummy$_{it}$	0.00605***	-0.00385***	0.00251***	0.00000109***
	[69.02]	[-26.67]	[16.68]	[2.72]
Both Russell 2000 Dummy$_{it}$	0.00355***	0.00243***	0.00497***	-0.00000043***
	[284.89]	[122.61]	[241.02]	[-9.61]
Both Russell 1000 Dummy$_{it}$	0.00784***	0.01410***	0.01541***	0.00000238***
	[209.20]	[230.13]	[244.78]	[3.31]
Both S&P 400 Dummy$_{it}$	0.00733***	0.00713***	0.01078***	-0.00000060**
	[92.85]	[62.74]	[90.10]	[-2.55]
Both S&P 600 Dummy$_{it}$	0.00903***	0.00496***	0.00681***	-0.00000075***
	[166.99]	[68.41]	[92.22]	[-14.54]
Both Nasdaq Index Dummy$_{it}$	0.01264***	0.01403***	0.01645***	0.00000477***
	[35.79]	[26.29]	[31.07]	[12.56]
Average Institutional Ownership$_{it}$	0.05473***	0.13499***	0.11312***	0.00000577***
	[1650.68]	[2069.13]	[1866.60]	[35.45]
Difference Institutional Ownership$_{it}$	-0.02230***	-0.04787***	-0.03401***	-0.00000250***
	[-1276.10]	[-1459.99]	[-1067.24]	[-26.80]
Size$_{it}$	0.00224***	0.00532***	0.00475***	
	[252.10]	[346.30]	[306.67]	
Size First Firm of Pair$_{it}$				-0.00000001
				[-0.36]
Size Second Firm of Pair$_{it}$				0.00000007***
				[4.13]
Difference in Size$_{it}$	-0.00085***	-0.00129***	-0.00216***	0.00000000
	[-191.67]	[-167.74]	[-276.13]	[0.40]
Both Pay Dividends Dummy$_{it}$	0.00088***	0.00099***	0.00116***	-0.00000015
	[61.60]	[39.59]	[47.49]	[-1.28]
Average Market to Book$_{it}$	0.00201***	0.00478***	0.00461***	0.00000031***
	[348.01]	[457.98]	[434.62]	[20.28]
Difference Market to Book$_{it}$	-0.00068***	-0.00154***	-0.00145***	-0.00000011***
	[-226.52]	[-286.48]	[-263.51]	[-12.88]
Average Momentum$_{it}$	0.00012***	0.00022***	0.00025***	0.00000002***
	[138.21]	[145.97]	[156.69]	[5.54]
Difference Momentum$_{it}$	-0.00007***	-0.00008***	-0.00008***	-0.00000001**
	[-97.65]	[-66.14]	[-61.73]	[-1.96]
Average of Industry HHI$_{it}$	-0.00059***	-0.00258***	-0.00140***	0.00000060
	[-5.97]	[-15.47]	[-8.44]	[1.59]
Both in Same Industry Dummy$_{it}$	0.00063***	0.00108***	0.00124***	0.00000164***
	[12.27]	[12.58]	[13.98]	[10.72]
Average of Industry HHI$_{it}$ * Both in Same Industry Dummy$_{it}$	0.00204**	0.00550***	0.00194	-0.00000012
	[2.28]	[3.57]	[1.29]	[-0.04]
Pair FE$_i$	Yes	Yes	Yes	No
Pair Direction FE	NM	NM	NM	Yes
Time FE$_t$	Yes	Yes	Yes	Yes
R^2	0.732	0.799	0.767	0.330
N	167,771,574	167,771,574	167,771,574	335543148