Do index funds' family ties benefit the firms they own?

Job market paper

José Albuquerque de Sousa[1]

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Abstract

I investigate the role of ties between non-index and index funds within the same mutual fund family in shaping the monitoring of firms held by both funds. Theoretically, I show that non-index funds have more incentives to monitor and purchase additional shares of a firm when they have family ties with an index fund that holds the same firm. This can be explained by the family's opportunity to leverage its profits through the index fund's stake in the firm. Empirically, using exogenous variation in family ties, I show that non-index funds purchase more shares of a firm when an index fund in the family also holds that firm. Furthermore, firms held by funds with family ties are more profitable and have higher valuations. The effect of family ties on valuation is larger for "dedicated" fund-firm relations and for firms in highly innovative industries, for which the potential gains from monitoring are the highest ex-ante.

[1] Rotterdam School of Management, Erasmus University. E-mail address: albuquerquedesousa@rsm.nl. I am grateful to Dion Bongaerts, Henrik Cronqvist, David Denis, Diane Denis, Mathijs van Dijk, Sai Hong Kan, Jerome Taillard, Francisco Urzúa Infante, Wolf Wagner, and participants of the Erasmus University PhD seminar 2016 and the Erasmus Finance Day 2017 for helpful comments.

1. Introduction

Over the past few years, there has been a rapid increase in the amount of assets managed by index funds. Many have argued that this has unintended consequences for the firms in which these funds invest. Unlike non-index funds, which aim at generating returns above a benchmark, index funds have the sole objective of replicating a benchmark's returns. Therefore, they lack the incentive to monitor the firms in which they invest (Wurgler, 2011). Monitoring is costly, and the potential increase in firm value would benefit all investors alike, thereby deteriorating the relative performance of the funds incurring the monitoring cost. This is the commonly known free-rider problem (Berle and Means, 1932; Shleifer and Vishny, 1986), which negatively affects firm value.

At the same time, large mutual fund families that have predominantly offered index funds in the past, such as Vanguard, now also offer actively managed funds. Conversely, families traditionally known for their active style of investment, such as Fidelity, have recently also started to offer index funds. Hence, most index funds do not act independently. They belong to a larger mutual fund family, and it may be too simplistic to consider index funds' incentives to monitor in isolation. In this paper, I analyze the impact of index funds' family ties on the value of the firms they own.

Institutional investors are generally able to affect corporate decisions in three ways: through voice (voting), engagement with the firm ("jawboning"), and exit (selling their stake in the firm, the "Wall Street walk"). In this paper, monitoring refers to the first two types of activities. Maug (1998) develops a theoretical model that shows that a blockholder's incentive to monitor a firm depends on four factors: the liquidity of the market, the ownership stake of the blockholder, the potential increase in firm value, and the costs of monitoring. When deciding about whether to monitor a firm, an investor weights the benefits and costs of monitoring. In Maug's (1998) model, the blockholder has an incentive to monitor because monitoring allows her to increase firm value. Given that her action is private, she can profit when trading with uninformed investors (households) hit by liquidity shocks during the game.

I adapt Maug's (1998) model to analyze the effect of mutual fund family ties on monitoring incentives by introducing three types of investors: a non-index fund, an index fund, and households. I compare two situations in which 1) the non-index fund and the index fund coordinate their actions – this situation represents the existence of family ties; and 2) the non-index fund and the index fund act separately – this situation represents the absence of family ties.

There are two important differences between the two situations: first, when the funds act separately, the profits that the non-index fund can reap from monitoring are proportional to its stake in the firm. When both funds coordinate their actions, however, they maximize joint profits. The family profits both through the ownership stake of the non-index fund, as well as the ownership stake of the index fund. Second, the

non-index fund can use the voting power of the index fund to pressure management to take a value increasing action. This translates into reduced monitoring costs, and thus increases the incentives to monitor.

I find that mutual fund family ties positively impact non-index funds' incentives to monitor due to the increased capital gains that the family can earn through the index fund, even when disregarding the reduced costs of monitoring. The increased incentives to monitor lead, in turn, to higher firm value. Crucially, in this model, an increased probability of monitoring is associated with additional share purchases. As in Maug (1998), the blockholder chooses during the game between "monitoring and buying" additional shares, and "not monitoring and selling" shares. The other two strategies ("monitoring and selling" and "not monitoring and buying") are suboptimal. This observation makes the theory empirically testable: if it holds, an exogenous change in mutual fund family ties should lead to additional share purchases by non-index funds.

Empirically, I test the impact of mutual fund family ties between non-index and index funds on the probability of purchasing additional shares and on firm value by exploiting an exogenous source of variation in mutual fund family ties: the addition of firms to S&P indices. When the addition occurs, index funds automatically start holding the firm, irrespectively of whether non-index funds within the same mutual fund family held that firm before it was added to the index. Therefore, the addition to the index serves as an exogenous "activation" of family ties.

My sample consists of all firms added to the S&P 400, 500, and 600 during the 1995-2011 period, and all the non-index funds that hold them three years prior to their addition to one of the indices. I perform a difference-in-differences analysis in which the treatment consists of the "activation" of family ties. If there is an index fund in the same family that starts holding the firm after its addition to the index, the fund-firm relation is assigned to the treatment group. Conversely, if no index fund in the same family starts holding the firm after its addition to the index, the fund-firm relation is assigned to the control group. Consistent with the theoretical prediction, I find that the change in the ownership stake of the treatment group is higher than the change in the ownership stake of the control group after the firm's addition to the index. The result is robust to the inclusion of firm fixed effects, mutual fund fixed effects and controlling for several firm and fund time-varying characteristics.

In order to test the hypothesis that family ties lead to higher firm value, I use two proxies commonly used in the literature: profitability (measured by the firm's Return on Assets) and valuation (measured by the firm's Tobin's Q). I aggregate the ownership stake of non-index funds by firm. I find that firms are more profitable and have higher valuations when the ownership stake of non-index funds that have family ties with index funds is higher. A 1% increase in the ownership stake of the index funds that hold the same

firm as the non-index funds of the same family leads to a 5 percentage point increase in the firm's Return on Assets (ROA) and a 0.2 percent increase in the firm's Tobin's Q.

To further explore which non-index funds contribute the most to the increased firm monitoring, profitability and valuation, I consider differences in the investment style and investment horizon of those funds. Bushee (1998) developed a methodology to classify institutional investors which is often used in the academic literature (e.g. Aghion, van Reenen, and Zingales, 2013; He and Tian, 2013). Institutional investors are classified in three groups: "dedicated" (large blockholders, with highly concentrated portfolios and low turnover), "transient" (investors with lower stakes in a single firm, more diversified portfolios, and high turnover, related to the firm's earnings) and "quasi-indexed" (investors with diversified portfolios and low turnover).

Although there is general consensus about the role of "dedicated" investors in spurring firm value, there is a heated debate as to whether transient investors can achieve the same results. Some authors argue that "transient" investors can effectively govern through the threat of exit (Stein, 1988, 1989; Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2010; Dasgupta and Piacentino, 2015; Bebchuk, Brav and Jiang, 2015 find similar results for hedge fund activists). Other authors find no evidence that "transient" investors are able to influence firm's investment and innovation, or even argue that transient investors' short termism negative impacts firm innovation (Cella, 2009; Asker, Farre-Mensa, and A. Ljungqvist, 2014). Chemmanur and Tian (2013) find that anti-takeover provisions spur corporate innovation.

Using a modified version of Bushee's (1998) methodology that allows me to classify a specific mutual fund-firm relation as "dedicated", "transient" or "quasi-indexed", I investigate whether the ties of different types of non-index mutual funds lead to a different impact on non-index fund ownership, firm profitability and valuation. I find that the effects described above (higher probability of buying additional shares, and higher firm profitability and valuation) are larger when the non-index fund has a "dedicated" relation with the firm. This is consistent with the notion that the higher stake of the blockholder in the firm, the easier it is to realize the benefits of monitoring. My results show that mutual fund family ties between "transient" non-index funds and index funds also have a positive impact, although more modest, on firm profitability and valuation.

The effect of mutual fund family ties on firm value should be larger when firms stand to benefit the most from monitoring. A large body of literature analyses the impact of institutional investor ownership on firm innovation. According to this literature, innovative activities are difficult to finance in a freely competitive marketplace, because of two main reasons (Hall and Lerner, 2010): First, asymmetric information between the entrepreneur and the investor (Akerlof, 1970). According to this argument, it is particularly difficult to finance high R&D projects because of the difficulty in distinguishing "good" from

"bad" projects (Leland and Pyle, 1977). Moreover, firms are reluctant to reveal their innovative ideas to the market because of the cost of revealing information to their competitors (Bhattacharya and Ritter, 1983; Anton and Yao, 2002). Second, because of moral hazard between the entrepreneur and the investor (Jensen and Meckling, 1976). This argument highlights the fact that pressure for quarterly results may induce short-term focus on managers (Porter, 1992). According to Holmström's (1999) career concern model, managers dislike the risk that innovation involves. The risk of being fired may dissuade risk-averse managers from innovating (Narayanan, 1985; Miller and Rock, 1985; Stein, 1989; Shleifer and Vishny, 1990; von Thadden, 1995; Kaplan and Minton, 2006). Alternatively, "lazy" managers might prefer a "quite life", and not exert enough effort to innovate (Hart, 1983; Bertrand and Mullainathan, 2003). Finally, entrenched managers may simply shirk (Aggarwal and Samwick, 2006).

I use Kogan, Papanikolaou, Seru, and Stoffman's (2012) empirical findings on the innovation levels of several industries to classify firms' industries as "less innovative", "innovative", and "highly innovative". I then redo my previous analysis split by industry innovation intensity. I find that the effects are higher in more innovative industries, which are more likely to benefit from better monitoring ex-ante.

This paper contributes to several strands of literature. First, it relates to recent work that investigates the role of passive ownership on corporate governance. Appel, Gormley, and Keim (2016) find evidence that passive investor ownership leads to better corporate governance, at least for low-cost governance activities, such as removing poison pills and staggered boards. Schmidt and Fahlenbrach (2017), on the other hand, find that passive ownership negatively affects corporate governance when it comes to high-cost governance activities such as monitoring of mergers and acquisitions and the choice of board members. However, both these papers consider the effect of passive ownership in isolation.

To the best of my knowledge, this paper is the first to consider the effect of index funds' family ties on firm value. Other papers consider the effect of interactions between different institutional investors (not within the same family) in affecting corporate governance. For example, Appel, Gormley, and Keim (2016b) argue that the growth in assets managed by passive investors has reduced the coordination costs necessary to push through hedge fund activist demands. Crane, Koch and Michenaud (2016) argue that institutional investors with similar holdings coordinate their actions to improve firm corporate governance. The mechanism highlighted in this paper is similar to the ones mentioned above, but it is more direct, since it involves funds within the same family.

Second, this paper relates to the literature on mutual fund families. This literature generally focuses on transactions between funds within a fund family (Gaspar, Massa and Matos, 2006; Goncalves-Pinto and Schmidt, 2013; Aggarwal and Zhao, 2016; Goncalves-Pinto and Sotes-Paladino, 2016) and is largely

oriented towards the effect of family ties on fund performance. This paper provides a different perspective on the importance of mutual fund family ties.

Third, and more generally, this paper relates to the large body of literature that investigates the impact of institutional investor ownership on firm level outcomes. A particular subset of this literature analyses the effect of institutional ownership on innovation. A short summary of this body of literature has been provided above. More research remains necessary to fully understanding the real impact of each type of institutional investors on firm innovation, which is particularly important given the fact that competitive success increasingly depends on intangible assets such as human capital and R&D capabilities (Zingales, 2000) and that innovation can positively affect economic growth (King and Levine, 1993).

This paper provides evidence that analyzing the effect of index ownership on firm value in isolation may lead to too simplistic conclusions. I document heterogeneity in the impact of index fund ownership on firm value related to the family in which index funds operate. Future research should consider the possibility that other contextual factors affect the relation between index ownership and firm value. Given the large increase in assets managed by index funds, this is a timely and relevant research area.

2. Theoretical framework

The setting and notation below follow Maug (1998). I assume an economy that has only one firm. The payoff of the firm's assets is $\tilde{v}$. In their current use, the assets are worth L. However, the firm can be restructured so that the expected payoff of its assets increases to H, where $L < H$. The incumbent manager of the firm is assumed not to be willing to restructure the firm.

I add to Maug (1998) by introducing two different types of blockholders, F and f. The two blockholders model, respectively, a non-index and an index mutual fund. Below, I define the characteristics of these two types of blockholders and present comparative statics of two situations: in the first situation, the two blockholders act together and share payoffs at the end of the game. In the second situation, the two blockholders act separately and each collects its own payoff at the end of the game. This models the two blockholders either belonging to the same mutual fund family or acting independently.

The number of shares in the firm is normalized to 1. Blockholders F and f hold respectively α_F and α_f, $\alpha_F + \alpha_f = \alpha$, of the firm's shares, and a continuum of households holds an equal amount of shareholdings, totalizing $1 - \alpha$. All investors are risk neutral and also invest in a risk-free asset. Blockholder F distinguishes itself from households and blockholder f in that it can monitor the firm for a cost c_M, thereby raising the expected payoff of the firm to H. In this model, monitoring represents all different activities aimed at increasing firm value, and can consist of direct confrontations with management (public, e.g. a proxy fight, or private, e.g. "jawboning"), researching how to vote in an annual meeting, and/ or replacing management.

Monitoring is, however, costly. Costs of monitoring include, but are not limited to, fundamental analysis of the firm, research aimed at reaching voting decisions, and approaching other investors to achieve support in a proxy fight. There is abundant empirical evidence to support the argument that institutional investors can alleviate information asymmetry and agency problems through monitoring and engagement with managers (Gillan and Starks, 2003; Ferreira and Matos 2008; Hartzel and Starks, 2008; Aggarwal, Erel, Ferreira, and Matos, 2011; Manso, 2011; Aggarwal, Saffi, and Sturgess, 2015; Bena, Ferreira, Matos, and Pires, 2015; Boone and White, 2015; Harford, Kecskes, and Mansi, 2015; Gianetti and Yu, 2016). Aghion, Van Reenen, and Zingales (2013), and Wang and Zhao (2015) find that active institutional ownership has a positive effect on innovation by mitigating career concerns.

In order to be effective in its monitoring, F needs to control a sufficient amount of shares μ. This amount of shares does not need to be 0.5. It can either be larger, e.g. if the decision requires a larger amount of votes, or lower, because F may be able to influence the voting of other shareholders. A possible channel through which mutual fund family ties can affect the monitoring activities of non-index funds is the decreased cost of reaching voting decisions. Funds within the same family can coordinate their voting decisions at a lower cost. Reaching voting decisions may be too costly for an index fund acting alone. However, if the index fund belongs to a family in which one or more non-index funds hold the same firm, the non-index funds can share their private information about the firm and more easily reap the benefits of intervention.

Empirical evidence shows that mutual fund families use several strategies to economize on voting decisions (Choi, Fisch, and Kahan, 2013): 1) outsource fund's voting decisions to an external advisor (e.g. Institutional Shareholder Services); this strategy is more common in smaller mutual fund families; 2) vote in favor of management – this strategy is more common than following external advisor, and 3) the most common for large fund families: centralize decisions (funds within the family vote in lockstep, but families vote substantially differently from each other).

Since coordination is costly, it is not obvious that it will always take place. A possible reason for no coordination is competition between fund managers within the family (Kempf and Ruenzi, 2007). Recent evidence on the voting activity of passive funds and mutual fund families shows mixed results. Choi, S., J. Fisch, and M. Kahan (2013) find that funds within a family are likely to vote in lockstep, in order to economize on their voting decisions. Ertimur, Ferri, and Oesch (2013), Larcker, McCall, and Ormazabal (2015), and Malenko and Shen (2016), on the other hand, find that passive funds are more likely to follow the investment advice of proxy advisors such as Institutional Shareholder Services (ISS). Iliev and Lowry (2015) find that active funds are less likely vote in a "one size fits all" manner. However, among "contentious issues" (issues for which ISS recommendations are against management recommendations),

funds within the same family disagree in 6-7% of cases. Morgan, Poulsen, Wolf, and Yang (2011) find that mutual funds within family don't vote in lockstep when proposals are initiated by shareholders

Given that coordination of voting activities within a mutual fund family may be subject to discussion, I conservatively consider the costs of monitoring to be equal in the two situations presented in the model. Since the probability that the non-index funds monitor is inversely related to such costs, considering differences in monitoring costs would obviously strengthen the conclusions presented in this paper.

2.1. Timing of events

The model consists of a game with five periods. The timing of events is given in Figure 1. At $t = 1$, the shares of the firm are sold for a price P_0. At $t = 2$, blockholder *F* decides whether or not to monitor the firm and whether to trade. At $t = 3$, with a probability 1/2, ϕ households, $0 < \phi < 1$, suffer a liquidity shock that forces them to sell their assets. The ex-ante probability that a household will suffer a liquidity shock is therefore $\phi/2$. Unlike households, blockholders are not subject to liquidity shocks. As in Kyle (1985), market participants submit their orders to a market maker who observes total net order flow *y*. Unlike blockholder *F*, blockholder *f* does not trade with households, it just holds the firm passively. The market maker sets the price of the security at $t = 4$, according to its expected value, conditional on the order flow: $P_1 = E(\tilde{v}|y)$. At the end of the game ($t = 5$), the firm's profits are realized and all parties are paid.

2.2. Expected payoffs from monitoring and buying additional shares

I solve the model backwards, initially taking blockholder *F*'s initial stake as exogeounsly given. In the next section, I endogenize this stake. The initial stake of all players at $t = 1$ is taken as a given, as explained above. With probability 1/2, ϕ households suffer a liquidity shock at $t = 3$, and sell a total of $\phi(1 - \alpha)$ shares. The more shares the blockholders hold, the lower the sales of households when a liquidity shock hits. This impacts blockholder *F*'s monitoring and trading decision at $t = 2$.

Blockholder *F*'s strategy with respect to monitoring and trading is modelled as in Maug (1998): with probability *q*, blockholder *F* buys a quantity $x_B > 0$ shares in the firm and monitors ("buying and monitoring"; with probability $1 - q$, blockholder *F* buys a quantity $x_S < 0$ (sells) shares in the firm and does not monitor ("selling and not monitoring"). As shown in Maug (1998) and below equation (2.9), these two strategies dominate the strategies of "buying and not monitoring", and "selling and monitoring".

At $t = 3$, blockholder *F* and the households submit their trading orders anonymously, and the market maker sets prices according to the total order flow received. Note that although an extra participant is present, blockholder *f*, order flows and the pricing process remain unchanged, since blockholder *f* does not trade. To be able to profit from trading, blockholder *F* must be able to camouflage its order flow. This implies that:

$$x_B - x_S = \phi(1-\alpha) \tag{2.1}$$

This quantity makes it impossible for the market maker to distinguish between the cases in which blockholder *F* buys and households sell, and the case in which blockholder *F* sells and the households are not subject to a liquidity shock. As in Maug (1998), I assume, for simplicity, that blockholder *F* chooses symmetric trading quantities $x_B = -x_S = \phi(1-\alpha)/2$. This assumption does not affect the results because blockholder *F*'s trading intensity is co-determined by the randomizing probability *q*. Define this trading quantity as $u \equiv \phi(1-\alpha)/2$. Under these circumstances, the three possible realizations of the order flows and prices are as presented in Table 1: 1) $P_1 = H$, when total order flow equals *u* (blockholder *F* buys and households do not sell); 2) $P_1 = qH + (1-q)L$, when total order flow is $-u$ and blockholder *F* is able to camouflage its trade*; and* 3) $P_1 = L$, when total order flow equals -3*u* (both blockholder *F* and households sell). Hence, the expected prices per share when *F* buys and sells are, respectively:

$$E(P|B) = \frac{H}{2} + \frac{qH + (1-q)L}{2} \tag{2.2}$$

$$E(P|S) = \frac{L}{2} + \frac{qH + (1-q)L}{2} \tag{2.3}$$

The expected payoffs from buying and selling will differ in the cases in which blockholder *F* and *f* act together and share profits, and the case in which both blockholders act separately. The expected payoffs from buying in the two cases are, respectively:

$$u[H - E(P|B)] + \alpha_F H - c_M + \alpha_f H = \frac{\phi(1-\alpha)}{2}\ \frac{1-q}{2}(H-L) + \alpha_F H - c_M + \alpha_f H \tag{2.4}$$

$$u[H - E(P|B)] + \alpha_F H - c_M = \frac{\phi(1-\alpha)}{2}\ \frac{1-q}{2}(H-L) + \alpha_F H - c_M \tag{2.5}$$

The first term in both expressions represents the gains from blockholder *F*'s trading. The second term represents the return to her initial portfolio holdings, and the third term represents her monitoring costs. The fourth term in expression (2.4) represents the return on the initial portfolio holdings of blockholder *f*. This term is not present in equation (2.5), when the two blockholders do not act together. Therefore, the expected payoff from buying is higher when blockholders *F* and *f* act together, for any $\alpha_f > 0$.

Similarly, the expected payoff from selling and not monitoring in both cases can be expressed by:

$$-u[L - E(P|S)] + \alpha_F L + \alpha_f L = \frac{\phi(1-\alpha)}{2}\ \frac{q}{2}(H-L) + \alpha_F L + \alpha_f L \tag{2.6}$$

$$-u[L - E(P|S)] + \alpha_F L = \frac{\phi(1-\alpha)}{2} \frac{q}{2} (H - L) + \alpha_F L \tag{2.7}$$

For the same reason as above, the expected payoff from selling is higher in the case in which both blockholders act together. The market maker sets prices so as to make blockholder *F* be indifferent between buying and selling. Therefore, the randomizing probability q makes (2.4) and (2.6) equal when blockholders *F* and *f* act together, (2.5) and (2.7) equal when the two blockholders act separately. In the two cases, the randomizing probability q assumes, respectively, the values:

$$q_1 = \frac{1}{2} - \frac{2(c_M - \alpha (H - L))}{\phi(1-\alpha)(H-L)} \tag{2.8}$$

$$q_2 = \frac{1}{2} - \frac{2(c_M - \alpha_F (H - L))}{\phi(1-\alpha)(H-L)} \tag{2.9}$$

If q were higher, it would always be profitable to "sell and not monitor". If q were lower, it would always be profitable to "buy and monitor". Randomizing probability q must lie in the unit interval. If expressions (2.8) and (2.9) exceed 1, then *F* buys and monitors with certainty ($q = 1$). If expressions (2.8) and (2.9) are negative, then *F* sells and does not monitor ($q = 0$). In any equilibrium, the price lies between the two payoffs *H* and *L*. Therefore, any other strategy is dominated by the two strategies above: "buy and not monitor" yields a profit of $E(P|B) - H \leq 0$ per share, and "sell and monitor" yields a profit of $L - E(P|B) \leq 0$ per share, whereas "sell and not monitor" and "buy and monitor" always yield strictly positive profits per share.

The randomizing probability q can be seen as an indicator of welfare: an increase in q yields a welfare increase of $\Delta q(H - L - c_M) > 0$. The difference in welfare between the two cases in which the two blockholders act together or separately is given by:

$$\Delta q(H - L - c_M) = (q_1 - q_2)(H - L - c_M) = \frac{2\alpha_f}{\phi(1-\alpha)} (H - L - c_M) \tag{2.10}$$

Note that expression (2.10) is strictly positive. When blockholder *F*'s stake is taken exogenously, welfare is higher when blockholders *F* and *f* act together than when blockholders act separately. The welfare gain is proportional to blockholder *f*'s stake in the firm.

2.3. Endogenizing blockholder F's initial stake

In the previous analysis, all initial holdings were assumed to be exogenously given. In this section, I take the initial stake of blockholder *f* and the households as exogenous and endogenize blockholder F's holdings. I proceed as Maug (1998) by setting the initial price to reflect the valuation of households. In case they receive a liquidity shock, with probability $\phi/2$, households expect to receive P_1, set by the market maker.

The households loose money if they have to sell their shares at $P_1 = qH + (1-q)L$ while they are intrinsically worth H. This happens with probability $q\phi/2$. Therefore, at $t = 0$, shares are sold at an adverse selection discount, equivalent to F's trading gains per share. P_0 is given by:

$$P_0 = qH + (1-q)L - \frac{q\phi}{2}\ (qH - (qH + (1-q)L)) = qH + (1-q)L - G \tag{2.11}$$

The expected trading profits of blockholder F can be calculated by multiplying the profits from buying at $t = 4$ by q, and the profits from selling by $1 - q$:

$$(1-\alpha)\left[\frac{\phi}{2}q(1-q)(H-L)\right] \equiv (1-\alpha)G \tag{2.12}$$

where G represents the expected trading profits per share by households. The expected trading profits are the same irrespectively of whether the two blockholders act together or separately. Expected net trading profits are therefore:

$$(1-\alpha)\ G\ -\ qc_M \tag{2.13}$$

Total benefits from the initial purchase are calculated as the initial stake multiplied by the price difference. These benefits include the payoff from the initial purchase of blockholder f when the two blockholders act together. When the two blockholders act separately, total benefits of the initial purchase refer solely to the benefits of blockholder F. Benefits from the initial purchase in the two cases are then given, respectively, by:

$$\alpha(qH + (1-q)L - P_0) = \alpha G \tag{2.14}$$

$$\alpha(qH + (1-q)L - P_0) = \alpha_F G \tag{2.15}$$

Adding both sources of profits (trading and initial purchase) yields a total profit of, respectively:

$$(1-\alpha)G - qc_M + \alpha G = G - qc_M \tag{2.16}$$

$$(1-\alpha)G - qc_M + \alpha_F G = G(1-\alpha_F) - qc_M \tag{2.17}$$

Maximizing total profits with respect to blockholder F's initial stake, α_F, results in an endogeneized initial stake, for each of the two cases, of respectively:

$$\hat{\alpha}_{F1} = \frac{c_M}{2(H-L) - c_M} - \alpha_f \tag{2.18}$$

$$\hat{\alpha}_{F2} = \frac{c_M\,(1-\alpha_f)}{2(H-L)(1-\alpha_f) - c_M} \tag{2.19}$$

Using the endogenous initial stakes of blockholder F in the two cases to calculate the equilibrium probability q as in (2.8) and (2.9) yields:

$$\hat{q}_1 = \frac{1}{2} - \frac{c_M}{\phi(H-L)} \tag{2.20}$$

$$\hat{q}_2 = \frac{1}{2} - \frac{c_M}{\phi(H-L)(1-\alpha_f)} \tag{2.21}$$

This result shows that the presence of blockholder f effectively diminishes the probability of buying and monitoring of blockholder F when the two do not act together. This leads to hypothesis 1 of this paper:

HYPOTHESIS 1: *Mutual fund family ties between index and non-index funds lead to higher probability of "buying and monitoring" by non-index funds.*

2.4. Welfare consequences

Expressions (2.20) and (2.21) can be used to calculate de welfare consequences of the two blockholders acting together in contrast to their acting separately, as in (2.10):

$$\Delta q(H-L-c_M) = (q_1 - q_2)(H-L-c_M) = \frac{c_M \alpha_f}{\phi(H-L)(1-\alpha_f)}(H-L-c_M) \tag{2.22}$$

Expression (2.22) leads to hypothesis 2 of this paper:

HYPOTHESIS 2: *Mutual fund family ties between index and non-index funds lead to higher firm value. This increase in firm value is positively related to the ownership stake of the index funds.*

3. Sample selection, data sources and summary statistics

3.1. Sample of additions

My sample consists of firms added to the S&P Composite 500 (introduced March 31st, 1964), S&P Midcap 400 (June 1st, 1991), and S&P Small cap 600 (October 1st, 1994) indices in the 1995-2011 period[2]. These indices are mutually exclusive in terms of firms included, and together they constitute the S&P Composite 1500 Index (January 1st, 1967). To identify the firms added to each of these indices, I use the COMPUSTAT Index Constituents Database, available from Wharton Research Data Services (WRDS).

[2] My sample starts in 1995 because the youngest of the three indices - the S&P Small cap 600 - was introduced in 1994. The sample ends in 2011 for two reasons: 1) my analysis window runs up to three year after firms were added to an index; 2) although data on mutual fund ownership is available until 2015, investment companies often do not report their holdings immediately. Therefore, data reported on the 2015 holdings might be incomplete.

3.2. Firm characteristics, liquidity, investment, profitability and valuation

Data on firm characteristics, investment, and variables necessary to compute firm profitability (Return on assets) and valuation (Tobin'Q) are gathered from COMPUSTAT, using the firms' GVKEY identifier. Table A1 in the Appendix reports definitions of all the variables used in the analysis. I collect data on all variables starting 4 years before the year of addition to the S&P index (necessary to calculate growth variables on the third year before addition to the index), and extended to 3 years after the year of addition, so that I can investigate the long-term effects of the addition.

I construct a measure of the innovation intensity of a firm's industry by using the summary statistics for patent values across industries reported in Kogan, Papanikolaou, Seru, and Stoffman (2012) (reproduced in Table A2 of the Appendix). I divide the 30 FF industries according to their level of innovation, and construct 3 categories of industry innovation intensity (i.i.i.): highly innovative industries (i.i.i. = 3), innovative industries (i.i.i. = 2) and less innovative industries (i.i.i. = 1).

From CRSP, I collect data on stock returns, bid ask, and trading volume, using the firm's PERMNO. These variables are used to calculate the measures of liquidity, as described in Table A1 in the Appendix. Data on the number of analysts covering a firm is collected from I/B/E/S.

3.3. Mutual fund characteristics and holdings

Following section 30(d) of the Investment Company Act of 1940, mutual funds are required to report their holdings using the N30D, N-30B-2, N-CSR, N-CSRS, and N-Q filings. The Thomson Reuters S12 Mutual Fund Holdings Database, available from WRDS, uses the abovementioned filings as the primary source for mutual fund holdings data. I gather data on mutual fund ownership for the additions in my sample from this database,[3] and merge these funds with the CRSP Mutual Fund data using MFLINKS available on WRDS. From both datasets, I collect data on assets under management and holdings. I identify mutual fund families using CRSP's Mutual Fund database manager names and codes.

3.4. S&P index funds

To identify S&P index funds (mutual funds that replicate the S&P indices), I follow a methodology similar to Busse and Tong (2012), Iliev and Lowry (2015), and Appel, Gormley and Kim (2016). I first merge Thomson Reuters S12 data with CRSP Mutual Fund data using MFLINKS available on WRDS. Since I am only interested in mutual funds that fully replicate the S&P indices, I flag funds that contain a string that

[3] The COMPUSTAT Index Constituents Database reports additions by the header CUSIP. I use the Center for Research in Security Prices (CRSP)/ COMPUSTAT Merged (CCM) Database available on WRDS to gather the historical CUSIP numbers of the firms added. I download ownership data for all those historical CUSIP numbers from the Thomson Reuters S12 Database.

identifies them as S&P index funds[4] or if the CRSP Mutual Fund database identifies them as S&P index funds. I exclude mutual funds when their name suggests that the fund owns only a specific subset of S&P stocks, or a different S&P index[5]. Furthermore, I verify whether the funds holds 400, 500 or 600 (+/-10%) stocks.

3.5. Summary statistics

As Table 2 shows, there were 2,466 additions to the three indices in this period. Panel A of Figure 2 shows the number of additions per year and per index. Several of these additions correspond to the same firms, which have been added to an index, removed, and re-added later to the same or to another index. The number of unique firms in the sample is 2,070. Table 3 shows the number of additions according their sequence since the inception of the first index (S&P Composite 500). The table also reports whether the addition is a "downgrade" (move to a lower index in terms of market capitalization), an "upgrade" (move to a higher index in terms of market capitalization) or a re-addition to the same index, if the addition is not the first. Moreover, I report the number of additions excluding cases in which another addition (deletion) has taken place 3 years after (before) the current addition. The number of unique firms that have a first addition to an index and no deletion 3 years after this first event is 1,034. In the analysis, I consider all firms, and verify the robustness of my results by including only the 1,034 first additions around which there are no other events. Additions follow a cyclical pattern. If innovation is also cyclical and the two cycles are correlated, my results could be affected. Therefore, I use year fixed effects in my analysis.

Table 4 shows summary statistics of the firms added to the S&P indices, on the addition level (as discussed, several firms are added more than once), for the -/+3 year period around the year of addition. The sample consists of 2,466 additions. Some general trends can be identified: on average, firms' assets more than double. Investment (measure by capital expenditures and R&D expenses scaled by assets) decreases by roughly one percentage point, whereas profitability and valuation both decrease significantly. Figure A1 illustrates these findings. These statistics are comparable when variables are summarized at the fund-firm relation level (Table 5).

Figure A2 shows summary statistics of firm ownership according to the categories of "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its

[4] I use the strings *Index, INDEX, Idx, Indx, Ind_, IND*, *S & P, S and P, S&P, SandP, _SP_, 400, 500, and 600* (where _ indicates a space) to identify mutual fund as a passive mutual funds that follow an S&P index. I use the strings in Appel, Gormley, and Keim (2015) to identify other passive funds.

[5] I drop mutual funds containing the words *100, 1500, REIT*, *SML, GROWTH, VALUE, QUALITY, ENHANCED, PLUS, STRATEGY, OPPORTUNITIES, STARS, DYNAMIC, SELECT, TRACKER, GLOBAL, EUROPE, NORTH AMERICA, SECTOR*, and funds that mention a specific sector.

addition to the index, but not prior to it). Prior to the addition of the firm to the index, virtually no funds identified as "S&P funds" owned the firm. The percentage ownership of non-index funds decreases after the firm is added to the index.

Figure A3 depicts ownership by type of fund: "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it), in the 1995-2011 period, when the represented year is the year of addition. The percentage ownership of mutual funds has constantly been increasing over time – it constituted ca. 15% in 1995, and more than 30 % in 2011).

Figure A4 in the Appendix shows the number of additions in each of the three categories for each of the three S&P indices. As expected, the S&P 600 (small cap) includes firms from more innovative industries. I use these categories to study the impact of family ties on valuation in industries with different innovation intensities.

4. Methodology

4.1. Identification strategy

The objective of this analysis is to identify the effect of mutual fund family ties on changes in the ownership stake of non-index funds and the effect of mutual fund family ties on firm profitability and valuation. Ideally, I would test hypotheses 1 and 2 by randomly assigning family ties to a group of fund-firm pairs (treatment condition), and compare changes in outcomes in this group before and after the assignment of family ties (treatment) to changes in outcomes before and after the treatment in a group of index fund-firm pairs to which no family ties were assigned (control condition).

However, it is impossible to run such an experiment, since it is not feasible to randomly assign family ties to fund-firm pairs. To address this issue, I consider a setting in which a shock leads to a random assignment of fund-firm pairs to the treatment and control conditions: the addition of a firm to an index. Before the firm is added to an index, the index fund does not hold the firm. Therefore, the ties between non-index and index funds within mutual fund family are inexistent. These ties are "activated" once the firm is added to the index, and the index fund starts holding the firm. This is the treatment condition. If no index fund within the mutual fund family holds the firm after its addition to the index, the family tie is not "activated". This is the control condition.

This identification strategy is valid if it is impossible to ex-ante predict when the family tie is going to be "activated" (i.e. it is impossible to ex-ante predict whether an index fund in the non-index funds' family will hold the firm after it is added to the index). This ensures that the effect on the dependent variable

is not caused by unobserved variables. Note that the fact that index addition might be predictable is not an issue, since both the treatment and control conditions only include firms that were added to an index, and all index funds start holding these firms after the shock.

A possible issue with this identification strategy might be that larger firms normally have a broader set of investors, and therefore are more likely to be included in the treatment group (the probability that a non-index fund has family ties with an index fund that holds the firm is higher for larger firms). If this is the case, the effect on the dependent variable can no longer be attributed to family ties, but could be due to other firm characteristics. To mitigate this concern, I exploit the fact that each firm may be attributed to both the treatment and the control condition (depending on whether or not the non-index fund in question has ties with an index fund) by using firm addition fixed effects. Given the fact that larger firms have a higher number of observations (since more non-index funds follow them), I also cluster the standard errors at the firm addition level. To alleviate the concern that time varying firm characteristics may drive my results, I also control for a set of time-varying firm characteristics.

Another possible issue is that if there are no index funds in the mutual fund family (i.e. the family only contains non-index funds), it is possible to predict with certainty that the non-index fund-firm pair will be assigned to the control condition. Conversely, if there are index funds following all three indices (S&P 400, 500, and 600) in the mutual fund family, it is possible to predict with certainty that the non-index fund-firm pair will be assigned to the control condition. Therefore, for each firm, all non-index funds within each mutual fund family will either be assigned to the treatment or the control condition. As a consequence, it is no longer possible to conclude that changes in the dependent variable are caused by family ties. This change could be due to other mutual fund family characteristics.

However, mutual fund families do not always have index funds following each of the three different S&P indices. Because of this, each mutual fund family may be attributed to either the treatment or control condition, depending on which index the firm has been added to. I exploit this feature of my sample by using mutual fund family fixed effects, thereby ruling out the possibility that time-invariant family characteristics may drive my results.

4.2. Impact of mutual fund family ties on the ownership stake of non-index funds

Let i denote a firm, f a non-index fund, and t a fiscal year. I estimate the impact of mutual fund family ties on the ownership stake of non-index funds by running the difference-in-differences:

$$O_{ift} = \alpha + \beta_1 P_{it} T_{if} + \beta_2 P_{it} + \beta_3 \gamma T_{if} + \iota_i + \theta_t + \delta I'_{it} + \lambda F'_{it} + \varepsilon_{ift} \quad (4.1)$$

where O_{ift} is the ownership stake of non-index fund f on firm i at time t, P_{it} is a dummy variable that takes the value 0 before and 1 after firm i is added to an index, T_{if} is a dummy variable that takes the value

1 if an index fund in *f*'s family owns firm *i* after the firm was added to the index, and ε_{ift} is the error term. In the basic specification, I include firm (ι_i) and time (θ_t) fixed effects, as well as time varying firm (I'_{it}) and fund (F'_{it}) characteristics, and cluster all standard errors at the addition level. In a robustness test, I use mutual fund family fixed effects and cluster the standard errors at the mutual fund family-firm level. Moreover, I use an alternative treatment measure: the ownership stake of the index funds that have family ties with non-index fund *f*. Note that, since the coefficients in this regression are calculated using data at the fund-firm relation level, each firm and each fund may be assigned to both the treatment and control group. These should alleviate concerns that treatment and control are not exogenously assigned and that the two groups of firms and/ or funds are not identical on all other characteristics except the existence of family ties.

4.3. Impact of mutual fund family ties on firm value

To analyze the impact of mutual fund family ties on firm level outcomes, I construct two new measures of treatment at the firm level: the aggregate number and the aggregate ownership of index funds that start holding the firm's shares after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index.

Let *i* denote a firm, and *t* a time period. Each firm is owned by several funds. Therefore, firm-level outcomes are determined by several funds simultaneously. Assuming that each fund contributes a certain portion to the aggregate firm level outcome, Y_{it}, and that the effect of each fund on the corresponding portion of the aggregate firm level outcome is constant, the treatment effect is given by the difference-in-differences:

$$Y_{it} = \alpha + \beta_1 P_{it} T_i + \beta_2 P_{it} + \beta_3 \gamma T_i + \iota_i + \theta_t + \delta I'_{it} + \varepsilon_{ift} \quad (4.2)$$

where Y_{it} is firm *i*'s profitability (measured by its ROA) or valuation (measured by log Tobin's Q) at time *t*, P_{it} is a dummy variable that takes the value 0 before and 1 after firm *i* is added to an index, T_{if} is a dummy variable that takes the value 1 if an index fund in *f*'s family owns firm i after the firm was added to the index, and ε_{ift} is the error term. I include firm (ι_i) and time (θ_t) fixed effects, as well as time varying firm (I'_{it}) characteristics. All standard errors are clustered at the addition level.

4.4. Type of relation with the firm before addition to the index

In my analysis, all funds that are not identified as "S&P funds" are classified as non-index funds. However, some of the non-index funds may not really be "active" funds, in the sense that they may not engage in monitoring at all. To be able to compare the effect of different investment styles, horizons and ownership stakes on the effect of mutual fund family ties on firm level outcomes, I use the data on mutual fund ownership (collected from the Thomson S12 database) to classify each type of mutual fund-firm relation in

my sample, in the three years prior to the firm addition to an index, as "dedicated", "transient", or "quasi-indexed".

To achieve this, I follow Bushee's (1998) methodology (the same methodology is used, for example, in Aghion et al., 2013; He and Tian, 2013; Crane et al, 2016. The classification has similarities to other types of classification, such as in Attig, Cleary, El Ghoul, and Guedhami, 2012; Cella, Ellul, and Gianetti, 2013; Fich, Harford and Tran, 2015). Bushee's methodology uses Thomson 13f data (holdings on an institutional level) to classify institutional investors as "dedicated" (large blockholders, with highly concentrated portfolios and low turnover), "transient" (investors with lower stakes in a single firm, more diversified portfolios, and high turnover, which is sensitive to the firm's earnings) and "quasi-indexed" (investors with diversified portfolios and low turnover).

A potential limitation of Bushee's (1998) methodology is that a mutual fund family (eg. Fidelity) is classified as either "dedicated", "transient" or "quasi-indexed", independently of the heterogeneity of the funds in the family, and the heterogeneity of its funds' holdings. Therefore, I modify the methodology to account for this heterogeneity and allow for different types of relation at the mutual fund-firm level. I classify each of the 1,608,768 fund-firm relations in my sample by allowing each fund to have a different type of relation with the each of the firms in its portfolio.

I first collect data on the same variables as Bushee (1998). Definitions of variables used in the factor analysis can be found in Table A3 of the Appendix. However, I collect these data on a fund level (using the Thomson S12 database), instead of an institutional level (using the Thomson 13f database, as in Bushee (1998)). I calculate the values of all variables in the 3 year period before each firm in my sample is added to the S&P index, and then perform a factor analysis with an oblique rotation to reduce the 9 variables to three factors: BLOCK (which reflects whether the fund is a blockholder of the firm), PTURN (which reflects the fund's trading activity) and MOMEN (which reflects the sensitivity of the fund's trading to the firm's current earnings).

Using the factor scores that result from the factor analysis, I then perform a k-means cluster analysis to classify the fund-firm relations as "dedicated", "transient", and "quasi-indexed". I redo the analysis considering "dedicated" and "transient" funds spearately, so that I am able to distinguish the effect of mutual fund family ties for different types of investors.

5. Results

Table 7 presents summary statistics of the sample panel, at the mutual fund-firm relation level. The first column presents summary statistics for the whole sample. Columns 2 to 5 present summary statistics of the

periods before and after the firm is added to an index, split by treatment and control group (whether or not the non-index fund has family ties with an index fund that holds the firm after its addition to the index). Column 5 presents the result of the independent samples t-test on the mean difference between treatment and control group before the firm is added to the index. As can be seen, the different groups of family-firm relations vary considerably. This could be either because the assignment to treatment and control is not fully random, or a result of a higher number of observations for larger firms, with a more dispersed ownership. Hence, it is important to include fixed effects and cluster the standard errors in the difference-in-differences analysis, as described in section 4.2.

Column 6 presents the result of the independent samples t-test on the mean difference in changes between the treatment and control group. Description of all the variables and their sources can be found in Table A1 of the Appendix. The results show that most variables change differently for both groups. To mitigate the concern that this may affect the results of my analysis, I include time-varying firm and fund controls. Table 8 presents correlations between all variables collected. Based on these correlations and the number of observations for which data is available, I construct the set of control variables to be included in the regressions.

Finally, I visually inspect whether the "parallel trends assumption" holds. Figure 3 shows the development of profitability and valuation for treatment and control (measured by terciles of family ties measured by index ownership). In the 3 years before the addition to the index, the same increasing trend can be observed for both groups.

5.1. Ownership stake

Table 9 presents the results of the difference-in-differences (4.1) conducted to evaluate the impact of family ties with index funds on changes in the ownership stake of non-index funds. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family that starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. All standard errors are clustered at the addition level.

For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The specification in the second column includes more time-varying controls than the first one, but has less observations. The results show that the existence of family ties is associated with a 0.01 percentage point higher non-index ownership stake. Given that the average non-index ownership stake before the stock is added to the index is around 0.065%, this result is not only statistically, but also economically significant. When treatment is measured by the ownership stake of index funds, a 1% increase in index fund ownership is associated with a 1.52 percentage point higher non-index ownership. Table A4

in the Appendix shows that the results remain unaffected when using mutual fund family fixed effects and clustering the standard errors at the mutual fund family-addition level.

Importantly, both the control and the treatment group reduce their ownership stake after a firm is added to an index. However, consistent with hypothesis 1, the probability that a fund buys additional shares is higher when the non-index fund has family ties with an index fund that holds the same firm. Although not providing direct evidence that non-index funds monitor more when they have family ties with index funds that hold the same firm, these results are consistent with the theoretical prediction that such non-index funds have a higher probability of "buying and monitoring".

5.2. The impact of index fund family ties on firm profitability and valuation

Tables 10 and 11 present the results of the difference-in-differences (4.2) conducted to evaluate the impact of family ties with index funds on firm profitability and valuation. Profitability is measured by return on assets, valuation is measured by Tobin's Q. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index.

For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. Consistent with hypothesis 2, family ties are associated with higher firm value. A 1% increase in the number of index funds that have a tie with the non-index funds that hold the firm before its addition to the index is associated with a 3-5 percentage point increase in ROA (average ROA of the sample is 14.5%) and a 4-5 % increase in Tobin's Q. Although the profitability and valuation of both the treatment and control group decrease after the firm is added to an index, the existence of mutual fund family ties mitigates this decrease.

5.3. Type of relation with the firm before addition to the index

There is a total of 1,608,768 mutual fund-firm relations in my sample. 971,353 of these relations were not present before the firm was added to the index. Another 55,297 are "index" relations. For the remaining 582,118 relations, I perform a factor and cluster analysis to classify the type of relation between the mutual fund and the firm. Panel A of Table 6 shows summary statistics of the variables used for the factor analysis, and the resulting rotated factor loadings. In line with Bushee's (1998) findings, the variables equity (EQ), concentration (CONC), percentage holding (PH), and large percentage holding (LPH) load heavily on the blockholding factor (BLOCK). The variables turnover (TURN) and instability (INSTAB) load heavily on

the turnover factor (PTURN). The variables on current earnings trading sensitivity (CETS 1, 2, and 3) load heavily on the momentum factor (MOMEN).

Panel B of Table 6 shows the results of the cluster analysis. As in Bushee (1998), the three clusters are characterized by 1) a high factor score on the blockholding factor (BLOCK) – "dedicated" fund-firm relations; 2) high factor scores on the turnover and momentum factors (PTURN and MOMEN) – "transient" fund-firm relations; and 3) average factor scores on all three measures – "quasi-indexed" fund-firm relations. A total of 17,491 relations are classified as "dedicated", 466,519 as "transient", 69,377 as "quasi-indexed", and 28,731 remain unclassified (due to the absence of data on the input variables necessary to conduct the factor and cluster analysis).

For each treatment measure, the third and fourth columns of Table 9 present results for, respectively, "dedicated" and "transient" fund-firm relations. Consistent with the conjecture that investors with higher ownership stakes are better able to monitor, the effect of mutual fund family ties on non-index fund ownership is 8-12 times higher for "dedicated" than for "transient" fund-firm relations. However, family ties are also associated with an increase in the ownership stake of "transient" funds.

For each treatment measure, the third and fourth columns of Tables 10 and 11 present results for, respectively, "dedicated" and "transient" funds. The effect of family ties seems particularly strong for "dedicated" fund-firm relations. The effect of family ties on valuation is around 10 times higher than the effect of family ties for "transient" relations. The theory developed in this paper focuses on the monitoring channel. Given these results, future research could reveal whether family ties also benefit firms through the channel of exit.

5.4. The impact of index fund family ties on valuation by industry innovation intensity

Table 12 presents the results of the difference-in-differences (4.2) conducted to evaluate the impact of family ties with index funds on firm valuation, split by industry innovation intensity. Firms in highly innovative industries benefit the most from mutual fund family ties: the effect is more than three times larger for these firms than for firms in the least innovative industries. Family ties are more important when non-index funds have a "dedicated" relation with the firm. These results suggest that mutual fund family ties are particularly important for the type of firms that can benefit the most from monitoring ex-ante.

6. Conclusion

The rapid increase in assets managed by passive mutual funds raises questions about the consequences this development may have for the firms in which they invest. This paper highlights the importance of not considering the impact of index funds in isolation. Mutual fund family ties seem to

mitigate the negative effect of decreased monitoring as a result of an increase in passive ownership. I find that family ties with index funds have a positive impact on the monitoring activity of non-index funds. Non-index funds have a higher probability of adopting a "buying and monitoring" strategy when there is an index fund in the same family that holds the firms in which they invest.

This increased probability of monitoring has important welfare consequences: firms held by these funds have higher profitability and higher valuations. This effect is larger when the non-index funds have larger ownership stakes in the firm and trade less frequently ("dedicated" relation). This result contributes to the ongoing literature about the effects of different types of investors on monitoring and firm value. Ties of both "dedicated" and "transient" investors lead to higher firm value, but the effect is considerably larger for "dedicated" fund-firm relations. However, the effect of "transient" investors' ties is also significant. Future research could reveal whether this type of ties affects firm value through the "exit" channel.

Firms in more innovative industries benefit the most from non-index fund family ties. This result is consistent with the hypothesis that firms in more innovative industries stand to benefit the most from increased monitoring. Here too, future research could determine the channels through which this effect occurs.

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Table 1. Theoretical framework: order flows and market prices

This table presents the possible order flows and prices set by the market maker once households are hit by a liquidity shock, as in Maug (1998). Variable definitions can be found in section 2.

Value	Probability	Order flow	Transactions	Price
H	$q/2$	u	F buys u HH sell 0	H
H	$q/2$	$-u$	F buys u HH sell $2u$	$qH + (1 - q)L$
L	$(1 - q)/2$	$-u$	F sells u HH sell 0	$qH + (1 - q)L$
L	$(1 - q)/2$	$-3u$	F sells u HH sell $2u$	L

Table 2. Sample of additions

This table presents the number of firms added to the three S&P indices in the 1995-2011 period. Each row represents a different year. Each column reports the number of firms added to a different index. The first three columns show the total number of additions for each of the three indices across all years. The three columns in the middle show the number of additions that are not followed (preceded) by another addition (deletion) within a period of three years. The last three columns present the number of additions that are not preceded by any other addition since the inception of the corresponding index. The last row of the table shows the total number of unique firms in each of the three categories described above.

	Total sample			**No other addition (deletion) 3 years later (earlier)**			**First addition, no other addition (deletion) 3 years later (earlier)**		
Year of addition	**S&P 600 smallcap**	**S&P 400 midcap**	**S&P 500 comp**	**S&P 600 smallcap**	**S&P 400 midcap**	**S&P 500 comp**	**S&P 600 smallcap**	**S&P 400 midcap**	**S&P 500 comp**
1995	43	36	26	32	16	22	24	15	9
1996	60	36	20	37	18	14	32	13	7
1997	87	52	29	51	20	23	41	18	10
1998	86	56	37	45	24	24	40	9	4
1999	104	77	43	49	45	25	44	29	4
2000	140	88	53	94	50	28	79	32	10
2001	77	51	30	54	34	21	49	21	11
2002	49	30	24	36	22	19	33	13	9
2003	46	34	9	30	23	7	21	7	3
2004	58	37	20	42	28	13	34	9	3
2005	54	29	16	33	12	13	32	9	4
2006	59	32	32	33	20	21	28	10	14
2007	88	60	38	55	46	27	51	24	14
2008	83	52	35	59	33	25	47	13	9
2009	60	40	29	40	26	23	36	8	9
2010	51	34	16	38	25	14	32	7	3
2011	59	42	19	47	28	13	34	12	5
Subtotal	**1,204**	**786**	**476**	**775**	**470**	**332**	**657**	**249**	**128**
Total		**2,466**			**1,577**			**1,034**	
Unique firms		*2,070*			*1,396*			*1,034*	

Table 3. Sample of additions - sequence

The tables below present the number of additions since the inception of the S&P indices according to the sequence of the addition, for the whole sample period (1995-2011). Panel A presents statistics for the whole sample, Panel B presents statistics for additions that are not followed (preceded) by another addition (deletion) within a period of three years. The first row presents the number of first additions since the inception of the S&P indices to each of the three indices. The following rows present the number of additions that have been preceded by one or several other additions. A second addition can be the result of a re-addition (when the firm has been deleted from the index, and later re-added to the same index), a "downgrade" (when the firm has been deleted from an index for larger firms and added to an index for smaller firms), or an "upgrade" (when a firm has been deleted from an index for smaller firms and added to an index for larger firms). Each column of the table presents the number of additions classified according to those three categories.

Panel A. Full sample

Seq.	S&P 600 small cap		S&P 400 mid cap			S&P 500 large cap		All indices		
# 1	1,038		426			185		1,649		
	Re-addition	**Down-grade**	**Up-grade**	**Re-addition**	**Down-grade**	**Up-grade**	**Re-addition**	**Up-grade**	**Re-addition**	**Down-grade**
# 2	24	121	256	7	58	204	16	460	47	179
# 3	1	17	14	6	13	64	3	78	10	30
# 4	0	3	4	0	1	2	1	6	1	4
# 5	0	0	1	0	0	1	0	2	0	0
Subtotal (#2 - #5)	25	141	275	13	72	271	20	546	58	213
total	1,370		1,146			767		**2,466**		

Panel B. No other addition (deletion) 3 years later (earlier)

Seq.	S&P 600 small cap		S&P 400 mid cap			S&P 500 large cap		All indices		
# 1	657		249			128		**1,034**		
	Re-addition	**Down-grade**	**Up-grade**	**Re-addition**	**Down-grade**	**Up-grade**	**Re-addition**	**Up-grade**	**Re-addition**	**Down-grade**
# 2	16	89	151	2	43	149	10	300	28	132
# 3	1	10	9	3	9	39	3	48	7	19
# 4	0	2	2	0	1	1	1	3	1	3
# 5	0	0	1	0	0	1	0	2	0	0
Subtotal (#2 - #5)	17	101	163	5	53	190	14	353	36	154
total	893		691			536		**1,577**		

Table 4. S&P additions: summary statistics

This table presents summary statistics of all firms included in the analysis, in the 7-year window around the year of addition. The column on the right presents summary statistics for the full sample of firms. Panels A, B, C, D, and E summarize firm characteristics, liquidity, investment, firm profitability and valuation, and ownership characteristics, respectively. A description of all the variables and their sources can be found in Table A1 of the Appendix. All variables are winsorized at the top and bottom 1% (except industry innovation intensity, firm age, analyst coverage).

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel A. Firm characteristics									
Assets *(millions)*	*Mean*	2,294.4	2,573.1	3,027.4	3,751.4	4,152.0	4,612.5	5,074.9	3,632.1
	St. dev.	5,667.6	6,251.8	7,054.2	8,061.6	8,435.4	9,166.6	9,670.2	7,924.3
	# add.	2,092	2,265	2,337	2,406	2,291	2,181	2,075	15,647
Leverage	*Mean*	0.525	0.509	0.499	0.507	0.515	0.523	0.527	0.514
	St. dev.	0.246	0.240	0.237	0.237	0.239	0.239	0.237	0.240
	# add.	2,086	2,258	2,331	2,395	2,285	2,172	2,063	15,598
Industry innovation intensity	*Mean*	1.468	1.507	1.529	1.536	1.511	1.485	1.462	1.500
	St. dev.	0.681	0.694	0.701	0.701	0.692	0.684	0.678	0.691
	# add.	2,460	2,460	2,460	2,460	2,460	2,460	2,460	17,220
Firm age	*Mean*	11.27	11.28	11.87	12.11	13.15	14.16	15.25	12.70
	St. dev.	10.73	10.81	10.86	10.97	11.06	11.09	11.17	11.04
	# add.	2,092	2,265	2,337	2,411	2,292	2,185	2,075	15,657
Firm risk	*Mean*	0.124	0.124	0.125	0.128	0.133	0.137	0.136	0.130
	St. dev.	0.060	0.058	0.057	0.057	0.058	0.060	0.059	0.059
	# add.	1,404	1,522	1,634	1,738	1,811	1,883	1,924	11,916
‚Payout ratio *(%)*	*Mean*	40.25	44.36	46.85	45.88	48.88	49.38	55.56	47.34
	St. dev.	103.61	111.57	104.96	105.44	121.60	117.41	117.36	112.00
	# add.	1,778	1,954	2,005	2,074	2,017	1,934	1,871	13,633
Panel B. Liquidity									
Average spread *(%)*	*Mean*	8.32	8.50	8.63	9.03	8.99	8.66	8.07	8.61
	St. dev.	4.44	4.14	4.02	4.42	4.63	4.51	4.17	4.35
	# add.	2,101	2,269	2,340	2,460	2,430	2,314	2,195	16,109
Total volume *(%)*	*Mean*	1.75	1.93	2.22	2.61	2.61	2.55	2.54	2.32
	St. dev.	1.79	1.77	1.90	2.10	2.06	2.03	1.97	1.98
	# add.	2,091	2,260	2,333	2,404	2,289	2,178	2,072	15,627
Analyst coverage	*Mean*	7.11	7.60	8.56	9.34	9.80	10.22	10.41	9.06
	St. dev.	5.38	5.53	5.83	6.10	6.45	6.85	7.15	6.34
	# add.	1,334	1,520	1,599	1,679	1,635	1,596	1,542	10,905
Panel C. Investment									
CAPEX/ Assets	*Mean*	0.061	0.060	0.059	0.059	0.055	0.050	0.046	0.056
	St. dev.	0.066	0.064	0.063	0.064	0.060	0.057	0.053	0.062
	# add.	1,941	2,128	2,201	2,279	2,178	2,086	2,001	14,822
R&D/ Assets	*Mean*	0.067	0.058	0.053	0.050	0.051	0.052	0.050	0.054
	St. dev.	0.083	0.073	0.065	0.061	0.063	0.066	0.065	0.068
	# add.	1,086	1,191	1,234	1,271	1,228	1,178	1,117	8,311
Panel D. Profitability and valuation									
ROA	*Mean*	0.137	0.145	0.157	0.152	0.137	0.126	0.123	0.140
	St. dev.	0.104	0.100	0.097	0.102	0.104	0.102	0.102	0.102
	# add.	2,000	2,173	2,240	2,307	2,195	2,085	1,984	14,992
Tobin's Q	*Mean*	2.350	2.518	2.637	2.407	2.141	1.993	1.904	2.286
	St. dev.	1.803	1.897	2.020	1.845	1.637	1.473	1.282	1.750
	# add.	1,843	2,013	2,058	2,121	2,027	1,936	1,844	13,842

Table 4. (continued)

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel A. Institutional ownership									
# institutional investors	*Mean*	99.07	111.66	132.13	166.95	172.63	180.12	188.03	150.07
	St. dev.	74.27	76.28	81.18	95.01	100.73	106.25	112.61	98.64
	# add.	2,111	2,269	2,382	2,405	2,307	2,183	2,090	15,747
Ownership institutional investors *(%)*	*Mean*	51.56	56.20	60.96	66.25	66.45	67.13	67.34	62.33
	St. dev.	24.24	23.08	23.30	20.37	20.47	20.24	20.65	22.54
	# add.	2,111	2,269	2,382	2,405	2,307	2,183	2,090	15,747
Top 5 ownership *(%)*	*Mean*	20.56	21.26	21.55	22.52	23.08	23.28	23.34	22.22
	St. dev.	6.73	6.16	6.55	5.47	5.49	5.51	5.75	6.05
	# add.	2,111	2,269	2,382	2,405	2,307	2,183	2,090	15,747
Panel B. Mutual fund ownership									
# mutual funds *(total)*	*Mean*	102.80	120.65	154.98	214.31	226.81	240.96	252.39	187.50
	St. dev.	114.46	118.41	138.09	182.20	194.66	206.58	216.84	180.23
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866
Ownership mutual funds *(%)*	*Mean*	15.44	17.26	19.31	21.95	22.32	23.18	23.80	20.48
	St. dev.	10.19	10.35	10.70	10.46	10.82	11.02	11.05	11.04
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866
# S&P index funds	*Mean*	2.74	2.73	3.07	11.98	13.40	13.97	14.57	8.89
	St. dev.	8.76	8.68	8.75	16.93	18.79	19.27	19.86	16.12
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866
Ownership S&P index funds *(%)*	*Mean*	0.16	0.17	0.20	0.81	0.95	1.07	1.17	0.65
	St. dev.	0.42	0.44	0.47	0.69	0.74	0.78	0.81	0.76
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866

Table 5. Mutual fund-firm relations: summary statistics

This table presents summary statistics of all fund-firm relations included in the analysis, in the 7-year window around the year of addition. The column on the right presents summary statistics for the full sample of firms. Panels A, B, and C summarize firm characteristics, fund characteristics, and percentage ownership, respectively. A description of all the variables and their sources can be found in Table A1 of the Appendix.

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel A. Firm characteristics									
Assets *(millions)*	*Mean*	4,302.75	4,315.97	4,902.18	6,619.19	7,417.80	8,857.93	9631.64	7,131.67
	St. dev.	8,495.60	8,773.46	9,745.72	11,549.57	12,134.29	13,985.68	14,370.64	12,243.71
	# relations	214,861	276,894	362,683	520,451	534,654	544,585	547,889	3,002,017
ROA	*Mean*	0.145	0.149	0.157	0.155	0.146	0.136	0.136	0.145
	St. dev.	0.095	0.097	0.094	0.103	0.103	0.101	0.100	0.100
	# relations	202,378	262,977	344,305	494,379	506,285	515,395	520,031	2,845,750
Tobin's Q	*Mean*	2.400	2.432	2.647	2.533	2.384	2.249	2.163	2.37
	St. dev.	1.657	1.854	2.122	1.959	1.865	1.752	1.557	1.84
	# relations	191,179	249,026	322,234	463,943	478,202	480,699	479,993	2,665,276
Panel B. Fund characteristics									
Assets *(millions)*	*Mean*	1,632.39	1,787.80	1,783.14	1,896.88	1,996.80	2,275.87	2,571.89	2,042.27
	St. dev.	12,388.09	13,883.79	15,310.21	17,209.98	18,790.06	21,578.64	24,060.03	18,742.03
	# relations	210,819	269,095	349,064	471,313	456,910	445,423	435,389	2,638,013
# holdings	*Mean*	599.38	600.86	566.14	548.03	563.77	563.40	563.43	756.73
	St. dev.	817.53	817.94	792.18	732.65	738.14	736.32	734.25	567.16
	# relations	217,050	277,836	375,191	525,263	538,369	546,852	550,647	3,031,208
Panel C. Ownership									
Ownership (%)	*Mean*	0.150	0.143	0.124	0.101	0.097	0.094	0.091	0.107
	St. dev.	0.347	0.335	0.307	0.274	0.271	0.268	0.265	0.287
	# relations	217,126	277,917	375,324	525,537	538,570	547,019	550,957	3,032,450

Table 6. Results of factor and cluster analysis for classification of the fund-firm relation

The tables below present the results of the factor (Panel A) and cluster analysis (Panel B) conducted to classify the fund-firm relations in the sample, based on ownership data in the 4 years prior to addition. Panel A shows summary statistics of the variables included in the factor analysis, and the rotated factor loadings for the three pre-defined factors: BLOCK, PTURN, and MOMEN (blockholding, portfolio turnover, and momentum). Variable descriptions and their sources can be found in Tables A1 and A3 of the Appendix. Panel B shows the results of the k-means cluster analysis conducted to classify the type of fund-firm relation (dedicated, transient or quasi-indexed). Unclassified fund-firm relations are fund-firm relations for which it was not possible to calculate the abovementioned factors, due to missing data on the variables used to calculate the factors. The number of fund-firm relations included in each cluster, the mean factor scores, and its standard deviation are presented. Figure A5 in the Appendix shows scatter plots of the cluster analysis.

Panel A. Summary statistics of variables and rotated factor loadings

	Summary statistics *N=1,746,354*			**Rotated factor loadings** *N = 553,387*			
Variable	**# fund-firm relations**	**Mean**	**St.dev.**	**BLOCK**	**PTURN**	**MOMEN**	***Unique variance***
EQ	567,156	1,279,672	3,527,224	0.755	-0.059	0.017	*0.391*
CONC	564,531	0.003	0.005	0.252	-0.236	-0.008	*0.833*
PH	566,821	0.0007	0.002	0.869	0.019	-0.004	*0.259*
LPH	566,821	0.150	0.357	0.763	0.022	-0.004	*0.432*
TURN	567,027	0.455	0.180	0.092	0.354	-0.079	*0.883*
INSTAB	566,821	-1.473	0.711	-0.127	0.401	0.057	*0.781*
CETS1	555,959	0.0001	0.001	0.005	-0.021	0.974	*0.049*
CETS2	555,969	0.0003	0.002	0.011	0.033	0.979	*0.044*
CETS3	558,088	0.231	0.745	-0.078	-0.074	0.534	*0.703*

Panel B. Factor scores by cluster

Cluster (type of fund-firm relation)		**# fund-firm relations**		**Factor scores**		
				BLOCK	**PTURN**	**MOMEN**
Active	Dedicated	17,491	*Mean*	3.907	-1.609	-0.015
			St. dev.	0.965	0.833	0.930
	Transient	466,519	*Mean*	-0.325	0.127	0.005
			St. dev.	0.141	0.474	1.002
Passive	Quasi-indexed	69,377	*Mean*	1.200	-0.448	-0.028
			St. dev.	0.510	0.663	0.870
	Unclassified	*28,731*				

Table 7. Sample panel summary statistics for treatment and control

This table presents summary statistics of the sample panel, at the mutual fund-firm relation level. The first column presents summary statistics for the whole sample. Columns 2 to 5 present summary statistics of the periods before and after the firm is added to an index, split by treatment and control group (whether or not the non-index fund has family ties with an index fund that holds the firm after its addition to the index). Column 5 presents the result of the independent samples *t*-test on the mean difference between treatment and control group before the firm is added to the index. Column 6 presents the result of the independent samples *t*-test on the mean difference in changes between the treatment and control group. Description of all the variables and their sources can be found in Table A1 of the Appendix.

		Full sample *(N=2,136,264)*	**Treatment** *(N=310,389)* *(non-index fund has family ties with index fund that holds firm)*		**Control** *(N=1,825,875)* *(non-index fund has no family ties with index fund that holds firm)*		***t*-test** *independent samples mean diff*		
			Pre	***Post***	***Pre***	***Post***		***T-C Pre***	***ΔT-ΔC***
Panel A. Firm characteristics									
Assets *(millions)*	*Mean*	4,723.25	5,858.53	9,626.27	3,306.11	5,145.09	*Diff*	2,552.42***	0.061***
	St. dev.	9,016.99	9,974.69	13,001.13	7,233.60	9,282.05	*t-stat*	120	-52.78
	# obs.	1,999,038	150,500	150,120	882,751	815,667			
Leverage	*Mean*	0.514	0.527	0.526	0.507	0.517	*Diff*	0.019***	-0.010***
	St. dev.	0.230	0.227	0.222	0.232	0.229	*t-stat*	30.78	-36.66
	# obs.	1,992,224	149,668	149,247	879,944	813,365			
Industry innovation intensity	*Mean*	1.535	1.511	1.521	1.562	1.514	*Diff*	0.051***	0.059***
	St. dev.	0.702	0.696	0.697	0.712	0.693	*t-stat*	26.25	85.73
	# obs.	2,136,264	155,548	154,841	913,112	912,763			
Firm age	*Mean*	14.53	14.26	17.52	12.68	16.03	*Diff*	-1.58***	-0.177***
	St. dev.	11.71	11.95	12.22	11.37	11.60	*t-stat*	-49.48	-28.89
	# obs.	1,999,465	150,500	150,143	882,751	816,071			
Firm risk	*Mean*	0.126	0.118	0.117	0.125	0.130	*Diff*	-0.007***	-0.005***
	St. dev.	0.056	0.057	0.013	0.057	0.056	*t-stat*	-37.00	-49.47
	# obs.	1,663,179	121,776	140,170	646,618	754,615			
Payout ratio *(%)*	*Mean*	52.42	48.72	66.83	47.91	55.14	*Diff*	0.81***	9.69***
	St. dev.	1.17	1.06	1.30	1.10	1.23	*t-stat*	-2.49	41.97
	# obs.	1,800,625	132,363	137,896	782,571	782,571			
Panel B. Liquidity									
Average spread *(%)*	*Mean*	8.14	7.72	7.51	8.38	8.07	*Diff*	-0.66***	0.16***
	St. dev.	4.07	3.64	3.92	3.95	4.26	*t-stat*	-61.01	19.76
	# obs.	2,045,281	150,684	153,468	883,413	857,716			
Total volume *(%)*	*Mean*	2.71	2.60	3.25	2.44	2.92	*Diff*	0.16***	0.16***
	St. dev.	2.07	2.07	2.19	2.01	2.07	*t-stat*	28.33	51.66
	# obs.	1,997,697	150,469	150,039	882,202	814,987			
Analyst coverage	*Mean*	10.86	12.34	15.34	9.12	11.48	*Diff*	3.22***	0.73***
	St. dev.	7.07	7.16	8.10	6.09	7.21	*t-stat*	150	69.37
	# obs.	1,475,888	104,617	116,372	615,070	639,829			
Panel C. Investment									
CAPEX/ Assets	*Mean*	0.053	0.058	0.049	0.056	0.049	*Diff*	0.002***	-0.00004
	St. dev.	0.060	0.064	0.057	0.062	0.056	*t-stat*	11.00	-0.51
	# obs.	1,936,456	145,271	146,910	848,832	795,443			
R&D/ Assets	*Mean*	0.052	0.050	0.047	0.056	0.050	*Diff*	-0.006***	0.001***
	St. dev.	0.066	0.067	0.061	0.070	0.062	*t-stat*	-23.15	7.76
	# obs.	1,095,357	80,306	80,961	481,625	452,465			
Panel D. Profitability and valuation									
ROA	*Mean*	0.142	0.154	0.142	0.150	0.131	*Diff*	0.004***	0.009***
	St. dev.	0.099	0.095	0.099	0.098	0.100	*t-stat*	13.12	54.99
	# obs.	1,904,091	141,458	140,950	844,440	777,243			
Tobin's Q	*Mean*	2.253	2.576	2.145	2.481	1.968	*Diff*	0.095***	0.031***
	St. dev.	1.711	2.018	1.576	1.901	1.379	*t-stat*	16.70	10.40
	# obs.	1,792,186	132,949	133,335	791,637	734,265			

Table 7. (continued)

		Full sample (N=2,136,264)	Treatment (N=310,389) (non-index fund has family ties with index fund that holds firm)		Control (N=1,825,875) (non-index fund has no family ties with index fund that holds firm)			*t*-test independent samples mean diff	
			Pre	*Post*	*Pre*	*Post*		*T-C Pre*	*ΔT-ΔC*
Panel E. Mutual fund characteristics									
Assets	*Mean*	1,908.23	2,473.83	3,522.27	1,403.53	2,176.01	*Diff*	1,070.30***	38,591***
	St. dev.	8,860.82	10,231.80	11,844.70	6,735.45	10,266.95	*t-stat*	50.28	25.70
	# obs.	1,665,049	139,726	105,536	814,980	604,807			
# holdings	*Mean*	569.30	675.12	694.01	543.09	555.62	*Diff*	132.03***	15.03***
	St. dev.	816.71	861.48	884.19	796.85	813.10	*t-stat*	57.45	29.14
	# obs.	1,921,574	144,294	141,681	841,948	793,651			
Panel F. Institutional investor ownership									
# institutional investors	*Mean*	190.17	211.72	304.94	151.04	207.52	*Diff*	60.68***	38.05***
	St. dev.	110.23	97.11	118.61	88.56	111.83	*t-stat*	240	250
	# obs.	2,004,881	151,436	149,920	885,758	817,767			
Ownership institutional investors *(%)*	*Mean*	69.03	69.21	74.14	65.48	71.89	*Diff*	3.72***	-1.00***
	St. dev.	20.72	21.28	16.16	22.39	18.75	*t-stat*	60.16	-28.31
	# obs.	2,005,236	151,436	149,931	885,758	818,111			
Top 5 ownership *(%)*	*Mean*	23.19	22.39	23.60	22.47	24.05	*Diff*	-0.08***	-0.29***
	St. dev.	5.40	5.59	4.55	5.68	5.04	*t-stat*	-5.04	-29.27
	# obs.	2,004,881	151,436	149,920	885,758	817,767			
Panel G. Mutual fund ownership by type of relation									
Total	*Mean*	0.058	0.065	0.048	0.076	0.038	*Diff*	-0.011***	0.020***
	St. dev.	0.162	0.162	0.150	0.181	0.137	*t-stat*	-21.51	76.01
	# obs.	1,998,134	150,478	150,039	882,444	815,173			
Dedicated	*Mean*	0.387	0.495	0.298	0.528	0.225	*Diff*	-0.034***	0.074***
	St. dev.	0.363	0.313	0.349	0.335	0.332	*t-stat*	-8.03	17.11
	# obs.	88,590	7,527	7,355	38,813	34,895			
Transient	*Mean*	0.017	0.016	0.018	0.019	0.015	*Diff*	-0.002***	0.006***
	St. dev.	0.054	0.038	0.065	0.043	0.065	*t-stat*	-18.99	47.40
	# obs.	1,554,697	121,314	119,162	687,483	626,738			
Quasi-indexed	*Mean*	0.166	0.197	0.136	0.222	0.104	*Diff*	-0.025***	0.058***
	St. dev.	0.245	0.218	0.243	0.256	0.221	*t-stat*	-13.16	53.81
	# obs.	318,988	20,374	19,833	147,051	131,730			
Unclassified	*Mean*	0.052	0.065	0.041	0.095	0.035	*Diff*	-0.030***	0.057***
	St. dev.	0.156	0.155	0.135	0.202	0.132	*t-stat*	5.05	16.02
	# obs.	35,859	1,263	3,689	9,097	21,810			

Table 8. Correlations sample panel

This table presents correlations between all variables collected. Description of all the variables and their sources can be found in Table A1 of the Appendix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Firm assets	1.00																		
(2) Leverage	0.29	1.00																	
(3) Ind. Innov. Int.	-0.01	-0.05	1.00																
(4) Age	0.16	0.17	0.05	1.00															
(5) Risk	-0.21	-0.19	0.05	-0.31	1.00														
(6) Payout ratio	0.13	0.03	-0.07	-0.01	-0.13	1.00													
(7) Av. Spread	-0.16	-0.10	0.00	-0.17	0.57	-0.09	1.00												
(8) Total volume	0.00	-0.05	-0.03	-0.17	0.40	0.05	0.42	1.00											
(9) Analyst coverage	0.32	-0.09	-0.07	-0.15	0.06	0.07	0.03	0.37	1.00										
(10) CAPEX/assets	-0.15	-0.11	-0.22	-0.09	-0.02	0.00	0.08	0.06	0.12	1.00									
(11) R&D/assets	-0.19	-0.23	0.28	-0.17	0.35	-0.04	0.27	0.23	0.08	-0.05	1.00								
(12) ROA	-0.11	-0.13	-0.15	-0.02	-0.27	0.11	-0.19	-0.07	0.12	0.34	-0.19	1.00							
(13) Tobin's Q	-0.19	-0.30	0.12	-0.21	0.21	-0.05	0.17	0.06	0.19	0.14	0.39	0.35	1.00						
(14) M. fund assets	0.00	0.00	0.00	0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00					
(15) # holdings	-0.11	-0.02	-0.01	0.02	0.00	-0.01	-0.01	-0.06	-0.17	-0.02	-0.04	-0.02	-0.07	0.13	1.00				
(16) # Inst. Investors	0.58	0.06	0.03	0.11	-0.23	0.13	-0.18	0.18	0.62	-0.07	-0.06	0.19	0.19	0.00	-0.17	1.00			
(17) Inst. Own. Firm	0.07	0.08	0.04	-0.04	-0.20	0.03	-0.22	0.27	0.20	-0.07	-0.08	0.08	-0.04	0.00	-0.05	0.36	1.00		
(18) Top 5 owners	-0.06	0.10	0.07	-0.04	-0.10	0.02	-0.07	0.13	-0.07	-0.02	0.04	-0.09	-0.12	0.01	0.03	-0.07	0.57	1.00	
(19) M. fund ownership	-0.08	-0.03	0.00	-0.01	0.00	-0.02	0.00	-0.05	-0.08	0.01	0.00	0.01	0.00	0.17	0.05	-0.12	-0.02	0.02	1.00

Table 9. Impact of family ties with index funds on non-index ownership

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on changes in the ownership stake of non-index funds. The treatment group is composed by non-index fund-firm relations if an index fund in the family starts holding the firm after its addition to an index. The control group is composed by non-index fund-firm relations if no index fund in the family starts holding the firm after its addition to an index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table A1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

	% Ownership							
	Family ties dummy				**Family ties measured by log % ownership index funds**			
	All non-index funds		**Dedicated**	**Transient**	**All non-index funds**		**Dedicated**	**Transient**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.01*** (14.25)**	**0.01*** (12.93)**	**0.08*** (10.12)**	**0.01*** (13.83)**	**1.52*** (6.01)**	**1.54*** (6.03)**	**6.55*** (6.34)**	**0.52*** (5.05)**
Treatment	-0.014*** (-18.76)	-0.014*** (-17.87)	-0.013** (-2.57)	-0.003*** (-20.78)	0.252 (1.60)	0.280* (1.76)	3.450*** (4.77)	-0.076 (-1.34)
Post	-0.06*** (-53.62)	-0.06*** (-48.58)	-0.31*** (-36.99)	-0.01*** (-31.16)	-0.06*** (-47.76)	-0.06*** (-44.22)	-0.35*** (-32.46)	-0.02*** (-34.96)
Log fund assets	0.03*** (121.13)	0.03*** (119.57)	0.03*** (21.13)	0.01*** (100.84)	0.03*** (116.20)	0.03*** (114.35)	0.02*** (15.10)	0.01*** (96.57)
Log firm assets	-0.003*** (-2.85)	-0.004*** (-4.11)	0.026*** (3.73)	-0.002*** (-6.38)	-0.0012 (-1.21)	-0.003*** (-2.64)	0.033*** (4.72)	-0.001*** (-3.67)
Log firm age		-0.004*** (-3.00)	0.008 (0.96)	0.0003 (0.55)		-0.007*** (-5.12)	-0.007 (-0.72)	-0.001** (-2.19)
Log average spread		0.0016 (1.42)	-0.0100 (-1.30)	0.0012*** (2.66)		0.0032** (2.50)	-0.0056 (-0.61)	0.0019*** (4.04)
Log CAPEX/assets		-0.02* (-1.67)	0.07 (1.03)	-0.01** (-2.23)		-0.02* (-1.72)	0.08 (1.01)	-0.01 (-1.40)
Inst. Ownership		0.04*** (11.41)	-0.05** (-2.08)	0.03*** (18.34)		0.04*** (12.17)	-0.05* (-1.92)	0.03*** (18.97)
Top 5 Inst. Own.		-0.05*** (-4.96)	0.28*** (4.42)	-0.05*** (-13.88)		-0.07*** (-7.11)	0.24*** (3.12)	-0.06*** (-15.75)
Mutual fund own.	0.23*** (35.42)	0.20*** (30.05)	1.05*** (25.38)	0.06*** (25.99)	0.21*** (29.88)	0.18*** (24.81)	1.02*** (21.07)	0.05*** (22.71)
Index fund ownership		0.21*** (2.86)	0.76 (1.57)	0.02 (0.93)		0.36*** (4.25)	1.62*** (2.74)	0.10*** (3.87)
Constant	-0.22*** (-28.53)	-0.22*** (-25.01)	-0.20*** (-4.07)	-0.06*** (-18.81)	-0.17*** (-20.61)	-0.17*** (-17.76)	-0.15*** (-2.86)	-0.06*** (-16.51)
Observations	1,550,961	1,493,448	73,590	1,131,645	1,170,900	1,126,922	47,950	866,668
R-squared	0.17	0.17	0.31	0.08	0.16	0.16	0.33	0.08
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table 10. Impact of family ties with index funds on firm profitability

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on firm valuation. Profitability is measured by ROA. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table A1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

	Profitability (ROA)							
	Family ties measured by log # index funds				**Family ties measured by log % ownership index funds**			
	All non-index funds		**Dedicated**	**Transient**	**All non-index funds**		**Dedicated**	**Transient**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.003** **(2.18)**	**0.005*** **(2.81)**	**0.014*** **(2.85)**	**0.006*** **(3.06)**	**0.043*** **(1.69)**	**0.056**** **(2.06)**	**0.454*** **(2.99)**	**0.047** **(1.32)**
Post	-0.03*** (-6.94)	-0.03*** (-6.80)	-0.03*** (-6.26)	-0.03*** (-6.68)	-0.03*** (-7.77)	-0.03*** (-6.91)	-0.02*** (-6.69)	-0.02*** (-6.65)
Log firm assets	-0.01** (-2.21)	-0.01*** (-3.54)	-0.01*** (-3.49)	-0.01*** (-3.49)	-0.01** (-2.00)	-0.01*** (-3.22)	-0.01*** (-3.22)	-0.01*** (-3.15)
Log firm age		-0.004 (-1.47)	-0.004 (-1.25)	-0.004 (-1.41)		-0.005 (-1.60)	-0.005 (-1.42)	-0.005 (-1.63)
Log average spread		-0.02*** (-4.46)	-0.02*** (-4.56)	-0.01*** (-4.27)		-0.02*** (-4.45)	-0.02*** (-4.51)	-0.02*** (-4.28)
Log CAPEX/assets		0.22*** (5.41)	0.23*** (5.35)	0.23*** (5.52)		0.22*** (5.43)	0.23*** (5.42)	0.23*** (5.51)
Inst. Ownership		0.12*** (11.55)	0.12*** (11.05)	0.13*** (11.77)		0.12*** (11.33)	0.12*** (10.73)	0.12*** (11.49)
Top 5 Inst. Own.		-0.30*** (-10.67)	-0.30*** (-10.39)	-0.31*** (-10.67)		-0.30*** (-10.69)	-0.30*** (-10.31)	-0.31*** (-10.70)
Mutual fund own.	0.13*** (8.09)	0.06*** (3.11)	0.06*** (3.26)	0.06*** (3.12)	0.13*** (7.99)	0.06*** (3.11)	0.06*** (3.34)	0.06*** (3.04)
Index fund ownership		-0.16 (-0.66)	-0.25 (-0.94)	-0.18 (-0.73)		-0.09 (-0.36)	-0.13 (-0.52)	-0.004 (-0.02)
Constant	0.15*** (8.06)	0.22*** (10.64)	0.22*** (10.72)	0.21*** (10.45)	0.15*** (7.78)	0.22*** (10.32)	0.22*** (10.34)	0.21*** (10.24)
Observations	12,417	11,713	10,766	11,234	12,417	11,713	10,643	11,234
R-squared	0.73	0.73	0.72	0.72	0.73	0.73	0.72	0.72
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table 11. Impact of family ties with index funds on firm valuation

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on firm valuation. Valuation is measured by Tobin's Q. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table A1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

	Valuation (log Tobin's Q)							
	Family ties measured by log # index funds				**Family ties measured by log % ownership index funds**			
	All non-index funds		**Dedicated**	**Transient**	**All non-index funds**		**Dedicated**	**Transient**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.02*** (3.06)**	**0.03*** (4.92)**	**0.06*** (3.96)**	**0.03*** (5.05)**	**0.13 (1.56)**	**0.28*** (3.18)**	**1.78*** (4.05)**	**0.24** (2.12)**
Post	-0.14*** (-8.30)	-0.12*** (-7.79)	-0.13*** (-7.32)	-0.14*** (-7.72)	-0.11*** (-8.63)	-0.09*** (-6.78)	-0.08*** (-6.45)	-0.08*** (-6.38)
Log firm assets	-0.14*** (-11.72)	-0.15*** (-13.64)	-0.16*** (-13.74)	-0.15*** (-13.45)	-0.13*** (-11.44)	-0.15*** (-13.14)	-0.16*** (-13.67)	-0.15*** (-12.99)
Log firm age		-0.08*** (-5.58)	-0.08*** (-5.25)	-0.07*** (-5.25)		-0.08*** (-5.79)	-0.08*** (-5.30)	-0.08*** (-5.51)
Log average spread		0.04*** (3.61)	0.04*** (3.13)	0.04*** (3.62)		0.04*** (3.62)	0.04*** (3.13)	0.04*** (3.60)
Log CAPEX/assets		0.74*** (5.68)	0.75*** (5.52)	0.74*** (5.65)		0.74*** (5.65)	0.76*** (5.58)	0.74*** (5.59)
Inst. Ownership		0.68*** (15.54)	0.69*** (15.97)	0.69*** (15.95)		0.66*** (15.43)	0.67*** (15.53)	0.68*** (15.77)
Top 5 Inst. Own.		-1.92*** (-18.10)	-1.91*** (-17.73)	-1.94*** (-18.16)		-1.93*** (-18.15)	-1.92*** (-17.65)	-1.95*** (-18.20)
Mutual fund own.	0.84*** (14.02)	0.60*** (8.86)	0.60*** (8.69)	0.60*** (8.79)	0.84*** (13.92)	0.60*** (8.79)	0.60*** (8.64)	0.58*** (8.62)
Index fund ownership		-3.29*** (-3.86)	-2.99*** (-3.19)	-3.21*** (-3.75)		-2.54*** (-2.94)	-2.29** (-2.54)	-2.10** (-2.46)
Constant	1.69*** (22.75)	1.86*** (24.18)	1.89*** (23.94)	1.85*** (24.02)	1.68*** (22.56)	1.85*** (23.83)	1.89*** (23.56)	1.85*** (23.80)
Observations	11,471	11,331	10,435	10,885	11,471	11,331	10,324	10,885
R-squared	0.77	0.80	0.80	0.80	0.77	0.80	0.80	0.80
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table 12. Impact of family ties with index funds on firm valuation by industry innovation intensity

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on firm valuation by industry innovation intensity. Valuation is measured by Tobin's Q. Family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. The first three columns present the results for less innovative industries. The following three columns present the results for industries with average innovation intensity. The last three columns present the results for highly innovative industries. For each innovation intensity category, the first column presents results that include all aggregate non-index fund-firm relations. The second column presents results for "dedicated" funds only. The third column presents results for transient funds only. A description of all the variables can be found in Table A1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

	Valuation (log Tobin's Q)								
	Less innovative industry			**Innovative industry**			**Highly innovative industry**		
	All	**Dedicated**	**Transient**	**All**	**Dedicated**	**Transient**	**All**	**Dedicated**	**Transient**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment * post	**0.19***	**1.43*****	**0.19**	**0.19**	**1.39**	**0.10**	**0.62****	**2.82****	**0.66***
	(1.88)	**(2.80)**	**(1.40)**	**(1.12)**	**(1.48)**	**(0.43)**	**(2.28)**	**(2.03)**	**(1.72)**
Post	-0.07***	-0.07***	-0.07***	-0.12***	-0.12***	-0.12***	-0.05	-0.04	-0.05
	(-4.83)	(-4.88)	(-4.66)	(-4.47)	(-4.21)	(-4.22)	(-1.46)	(-1.12)	(-1.31)
Log firm assets	-0.12***	-0.13***	-0.11***	-0.19***	-0.19***	-0.19***	-0.16***	-0.16***	-0.16***
	(-7.22)	(-7.81)	(-7.09)	(-10.01)	(-9.91)	(-9.96)	(-5.71)	(-5.72)	(-5.48)
Log firm age	-0.06***	-0.06***	-0.06***	-0.12***	-0.14***	-0.12***	-0.03	-0.02	-0.03
	(-4.19)	(-3.86)	(-4.04)	(-3.85)	(-4.02)	(-3.65)	(-0.99)	(-0.55)	(-0.82)
Log average spread	0.02*	0.02	0.02*	0.04*	0.05*	0.04*	0.07**	0.07**	0.07*
	(1.67)	(1.11)	(1.78)	(1.77)	(1.91)	(1.74)	(2.05)	(2.00)	(1.96)
Log CAPEX/assets	0.84***	0.80***	0.82***	0.58**	0.70**	0.61**	0.22	0.23	0.22
	(5.74)	(5.32)	(5.63)	(2.08)	(2.41)	(2.13)	(0.53)	(0.51)	(0.53)
Inst. Ownership	0.46***	0.47***	0.46***	0.82***	0.86***	0.85***	0.86***	0.80***	0.87***
	(9.55)	(9.49)	(9.54)	(9.20)	(9.45)	(9.61)	(7.91)	(7.07)	(7.87)
Top 5 Inst. Own.	-1.51***	-1.51***	-1.53***	-2.11***	-2.12***	-2.12***	-2.46***	-2.49***	-2.50***
	(-12.02)	(-11.78)	(-12.21)	(-10.02)	(-9.73)	(-10.07)	(-8.30)	(-8.22)	(-8.35)
Mutual fund own.	0.45***	0.49***	0.46***	0.82***	0.76***	0.77***	0.38*	0.41**	0.36*
	(5.63)	(5.98)	(5.70)	(6.06)	(5.49)	(5.73)	(1.96)	(2.04)	(1.86)
Index fund ownership	-1.87*	-1.77*	-1.70*	-0.33	-0.10	0.47	-6.88**	-6.59**	-6.34**
	(-1.89)	(-1.72)	(-1.74)	(-0.20)	(-0.06)	(0.29)	(-2.51)	(-2.24)	(-2.32)
Constant	1.68***	1.75***	1.68***	1.92***	1.89***	1.93***	1.98***	1.99***	1.96***
	(16.55)	(17.10)	(16.48)	(12.46)	(11.77)	(12.49)	(11.07)	(10.95)	(11.02)
Observations	6,272	5,686	6,034	3,535	3,248	3,389	1,524	1,390	1,462
R-squared	0.81	0.81	0.81	0.78	0.78	0.78	0.80	0.80	0.80
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Figure 1. Theoretical framework: timing of events

The figure below depicts the sequence of events as described in section 2, which largely follows Maug (1998).

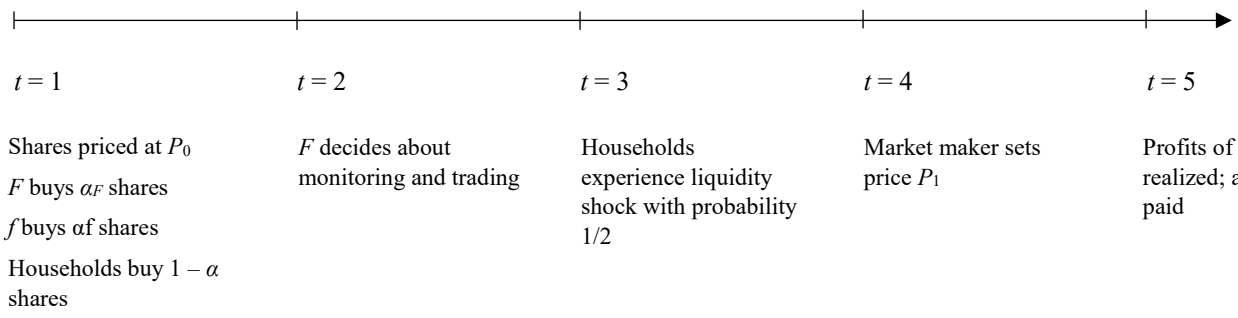
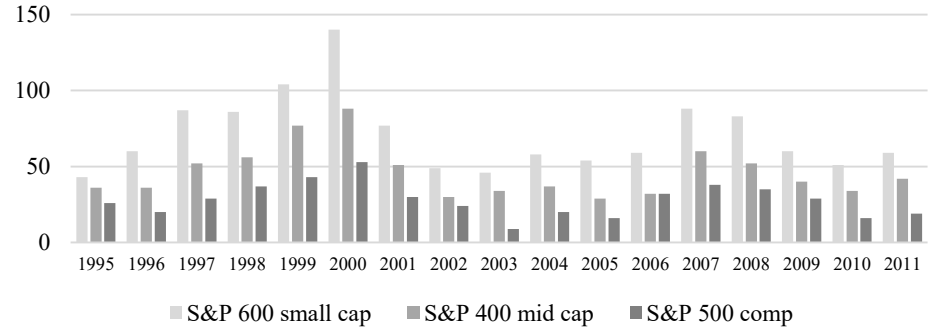


Figure 2. S&P additions 1995-2011

The figures below depict the number of firms added to the three S&P indices in the 1995-2011 period. Each year is depicted in the x-axis. The y-axis reports the number of firms added to a different index. Panel A shows the total number of additions for each of the three indices across all years. Panel B shows the number of additions that are not followed (preceded) by another addition (deletion) within a period of three years. Panel C presents the number of additions that are not preceded by any other addition since the inception of the corresponding index. The last row of the table shows the total number of unique firms in each of the three categories described above.

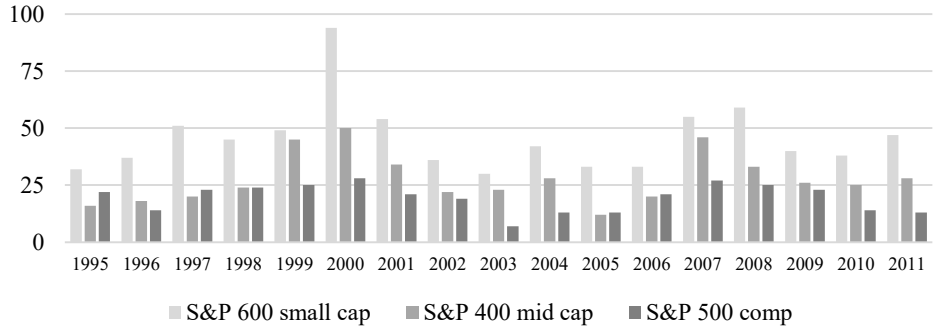
Panel A. Full sample

Total: 2,466 additions
2,070 unique firms



Panel B. No other addition (deletion) 3 years later (earlier)

Total: 1,577 additions
1,396 unique firms



Panel C. First addition, no other addition (deletion) 3 years later (earlier)

Total: 1,034 additions, unique firms

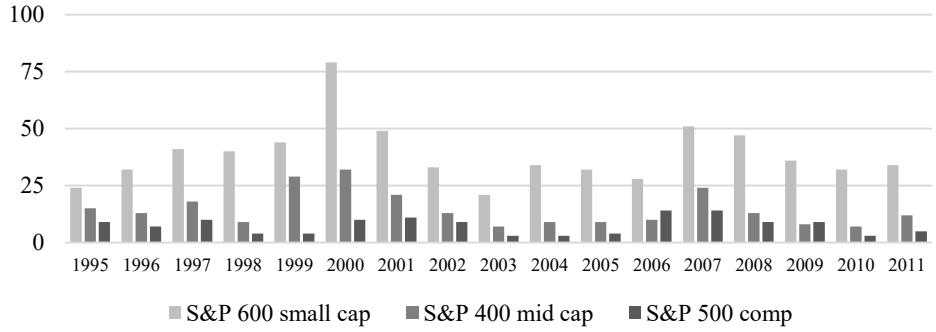
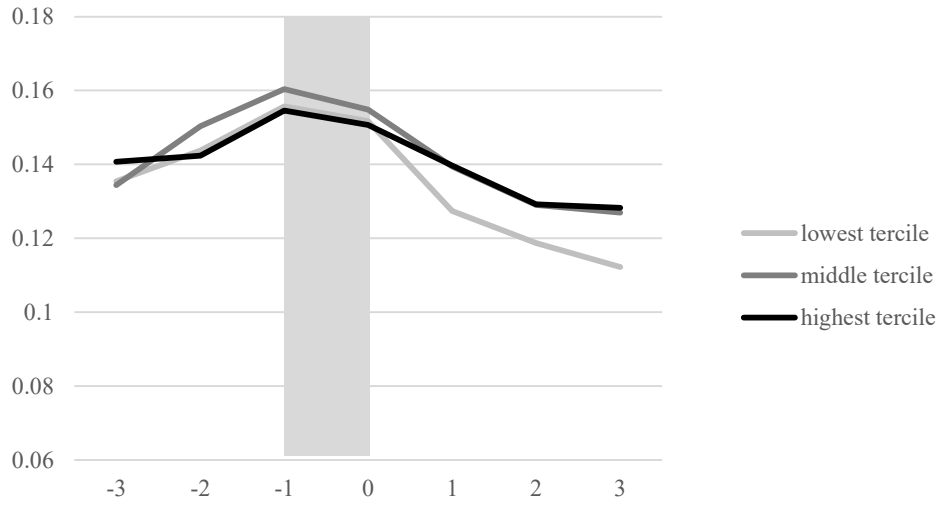


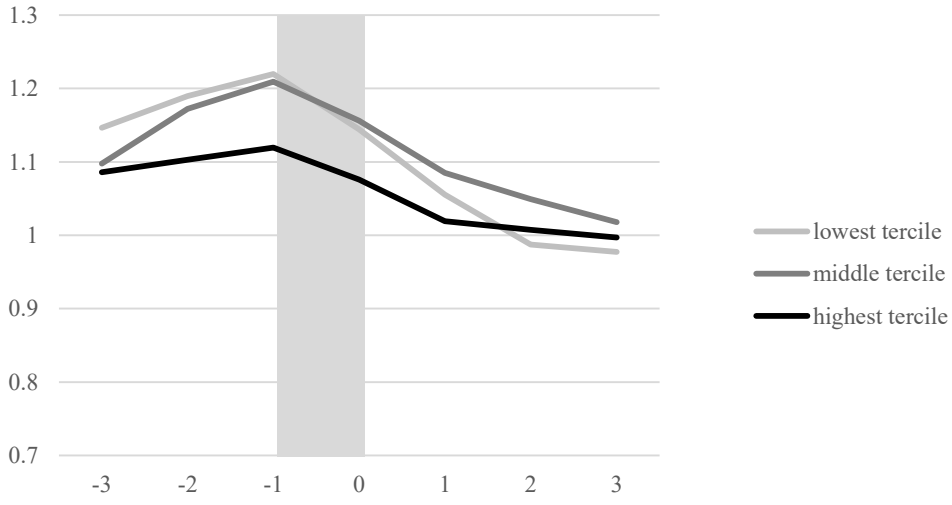
Figure 3. Profitability and valuation around year of addition

The figures below depict the development of the measures of profitability and valuation (return on assets, and log Tobin's Q), in the years around the addition to the index, for all index funds in the sample. The treatment variable, based on the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index, is split into terciles. The highest tercile corresponds to the firms for which the treatment measure is the highest. Definitions of the variables are presented in Appendix A1.

Panel A. Return on assets



Panel B. log Tobin's Q



APPENDIX

Table A1. Variable definitions and data sources

This table presents all variable definitions and data sources. Panel A includes several firm characteristics, Panels B, C, and D include firm liquidity, investment, profitability, and valuation measures, respectively, Panel E includes mutual fund characteristics, and Panel F includes mutual fund ownership.

Variable	Definition	Data source
Panel A. Firm characteristics		
Assets, total	Total value of assets reported on the Balance Sheet (AT)	Compustat
Firm age	Difference between current year and year of first report date on Compustat database (LINKDT)	Compustat
Firm risk	Standard deviation of past 5 year monthly returns (RET)	CRSP
Liabilities, total	Current liabilities plus long-term debt plus other noncurrent liabilities, including deferred taxes and investment tax credit (LT)	Compustat
Leverage	Total liabilities/ Total assets (LT/AT)	Compustat
Payout ratio	Dividends (DVC+DVP) plus purchase of shares (PRSTKC) scaled by net income (NI)	Compustat
Shares outstanding	Number of shares outstanding (CSHO)	Compustat
Panel B. Liquidity		
Average spread (%)	Yearly average of monthly spread (%). Montlhy spread (%) calculated as the absolute value of the difference between the low price and the mid price, scaled by the mid price: $\lvert BIDLO - [(BIDLO + ASKHI)/2]\rvert/[(BIDLO + ASKHI)/2]$	CRSP
Monthly ask high	Highest daily price of the month (ASKHI). Dropped if it takes a negative value in database.	CRSP
Monthly bid low	Lowest daily price of the month (BIDLO). Dropped if it takes a negative value in database	CRSP
Total volume (%)	Total number of shares sold in the year, calculated as the sum of the total number of monthly shares sold (VOL), scaled by the total number of shares outstanding (CSHO)	CRSP
Analyst coverage	Number of EPS estimates	I/B/E/S
End-of-year close price	Calendar year close price (PRCC_F)	Compustat
Panel C. Investment		
CAPEX/Assets	Cash outflow or the funds used for additions to the company's property, plant and equipment, excluding amounts arising from acquisitions, reported in the Statement of Cash Flows (CAPX), scaled by total assets (AT)	Compustat
R&D/Assets	All costs incurred during the year that relate to the development of new products or services (XRD), scaled by total assets (AT)	Compustat

Table A1. (continued)

Variable	Definition	Data source
Panel D. Profitability and Valuation		
Net income	Income after all expenses, including special items, income taxes, and minority interest, but before provisions for common and/or preferred dividends (NI)	Compustat
ROA	Return on assets, defined as operating income before depreciation (OIBDP) scaled by total assets (AT).	Compustat
Tobin's Q	Market value of assets/ book value of assets (AT), where market value of assets equals the sum of the book value of assets (AT) and the market value of equity (PRCC_F * CSHO), minus the sum of the book value of equity (AT - LT) and deferred taxes (TXDB)	Compustat
Panel E. Mutual fund characteristics		
Assets	Mutual fund's assets	Thomson S12
# holdings	Number of holdings	CRSP mutual fund database
Panel F. Mutual fund ownership		
Shares	Number of shares of firm held by mutual fund	Thomson S12

Table A2. Industry innovation intensity classification

This table presents the industries belonging to the different industry innovation intensity classifications. I construct this measure using the summary statistics for patent values across industries reported in Kogan, Papanikolaou, Seru, and Stoffman (2012). I divide the 30 FF industries according to their level of innovation: highly innovative industries (i.i.i. = 3), innovative industries (i.i.i. = 2) and less innovative industries (i.i.i. = 1).

Category	**Fama-French 30 industry portfolio**	θ^{cm}	θ^{sm}
Highly innovative	08 Healthcare, medical equipment, pharmaceutical products	9.09	9.13
	09 Chemicals	6.67	3.66
	14 Electrical equipment	8.09	4.58
	15 Automobiles and trucks	6.22	3.85
	16 Aircraft, ships, and railroad equipment	7.45	7.19
Innovative	06 Consumer goods	4.02	3.48
	13 Fabricated products and machinery	4.67	2.72
	22 Personal and business services	2.15	2.25
	23 Business equipment	4.02	3.48
	24 Business supplies and shipping containers	2.78	2.39
Less innovative	All others	≤ 2.25	≤ 2.10

Table A3. Variables for classification of fund-firm relation

This table presents a description of all variables used in the factor analysis conducted to classify the different types of firm-fund relation. Variables are based on Bushee (1998), and adapted to reflect a fund-firm relation instead of an institutional investor type. Definitions and sources of the variables used can be found in Table A1 of the Appendix.

Variable	Definition	
$w_{f,i,t}$	Mutual fund's equity invested in the firm	$Shares_{f,i,t}$ *stock $price_{i,t}$
Equity (EQ)	Average market value of the mutual fund's equity invested in the firm in the 3 years prior to addition.	$1/t * \Sigma\ w_{f,i,t}$
Concentration (CONC)	Average percentage of the mutual fund's equity invested in the firm in the 3 years prior to addition.	$1/t * \Sigma\ w_{f,i,t} / Assets_{f,t}$
Percentage holding (PH)	Average size of the mutual fund's ownership position in the firm in the 3 years prior to addition.	$1/t * \Sigma(Shares_{f,i,t}/Shares\ outstanding_{i,t})$
Large block holding (LBH)	Dummy that takes the value 1 if the average mutual fund's ownership position in the firm in the 3 years prior to addition is greater than 0.001 and zero otherwise.	$1\mid 1/t\ \Sigma\ PH_{f,i,t} > 0.001;\ 0\mid 1/t\ \Sigma\ PH_{f,i,t} \leq 0.001$
Turnover (TURN)	Average absolute change in the mutual fund's position in the firm, scaled by the total position of the mutual fund in the firm in the 3 years prior to addition.	$1/t\ \Sigma\ [\lvert\Delta\ w_{f,i,t}\rvert/(\ w_{f,i,t} + w_{f,i,t-1})]$
Instability (INSTAB)	Number of years in which the mutual fund invested in the firm in the 3 years prior to addition (x -1)	$-\ \Sigma\ n_t;\ n_t=1 \mid PH_{f,i,t} >0;\ n_t=0 \mid PH_{f,i,t} =0$
Trading sensitivity to current earnings (CETS1)	Average of the interaction between the change of the mutual fund's position in the firm and the change in net income per share of the firm, scaled by the absolute value of the change in the mutual fund's position in the firm in the 3 years prior to addition.	$1/t\ *\Sigma\ (\Delta Shares_{f,i,t}*\Delta NIps_{i,}/\lvert\ \Delta Shares_{f,i,t}\rvert)$
Average earnings change of buys vs sells (CETS2)	Difference between the average change in net income per share of the firm when the change in the mutual fund's position in the firm was positive in the 3 years prior to addition and the average change in net income per share of the firm when the change in the mutual fund's position in the firm was negative in the 3 years prior to addition.	$1/t\ *\Sigma\ \Delta NIps_i \mid \Delta Shares_{f,i,t}>0 -$ $1/t\ *\Sigma\ \Delta NIps_i \mid \Delta Shares_{f,i,t}<0$
Change in holding when earnings are positive vs. negative (CETS3)	Difference between the change in the mutual fund's ownership position in the firm when the firm had positive net income change per share and the change in the mutual fund's ownership position in the firm when the firm had negative net income change per share, scaled by the absolute value of the change in the mutual fund's ownership position in the firm in the 3 years prior to addition.	$1/t * \Sigma\ [(\Delta PH_{f,i,t} \mid \Delta NIps_i>0 -$ $\Delta PH_{f,i,t} \mid \Delta NIps_i>0) / \lvert\Delta PH_{f,i,t}\rvert]$

Table A4. Impact of family ties with index funds on non-index ownership using family fixed effects

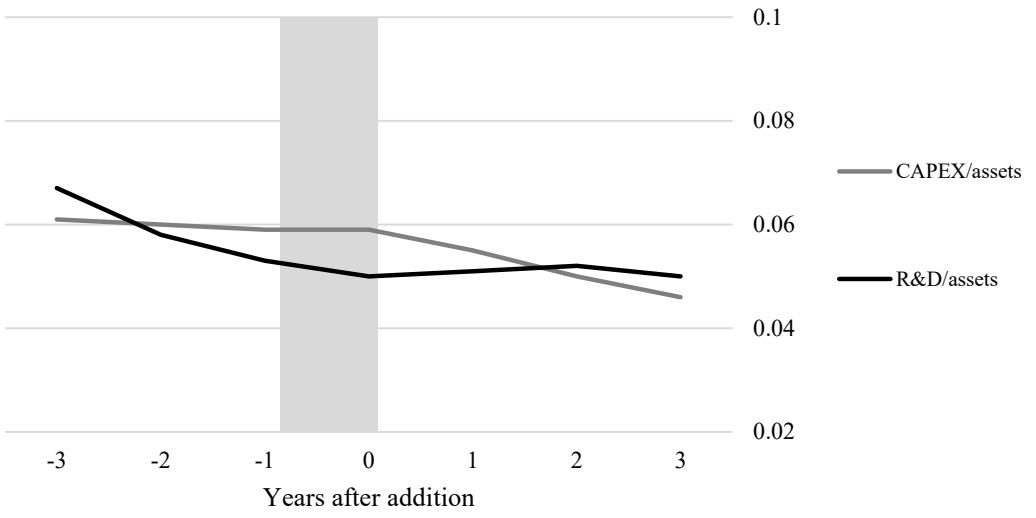
This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on changes in the ownership stake of non-index funds. The treatment group is composed by non-index fund-firm relations if an index fund in the family starts holding the firm after its addition to an index. The control group is composed by non-index fund-firm relations if no index fund in the family starts holding the firm after its addition to an index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table A1 of the Appendix. All standard errors are clustered at the mutual fund family-addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

	% Ownership							
	Family ties dummy				**Family ties measured by log % ownership index funds**			
	All non-index funds		**Dedicated**	**Transient**	**All non-index funds**		**Dedicated**	**Transient**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.02*** (19.86)**	**0.02*** (22.27)**	**0.10*** (13.04)**	**0.01*** (14.99)**	**1.74*** (6.87)**	**1.72*** (6.72)**	**7.40*** (7.15)**	**0.55*** (5.33)**
Treatment	-0.02*** (-23.79)	-0.02*** (-20.83)	-0.08*** (-14.69)	-0.01*** (-22.05)	-0.17 (-0.78)	-0.05 (-0.21)	-2.82*** (-3.10)	-0.54*** (-6.95)
Post	-0.04*** (-102.08)	-0.04*** (-85.87)	-0.28*** (-69.29)	-0.00*** (-13.50)	-0.05*** (-114.17)	-0.04*** (-96.98)	-0.31*** (-67.99)	-0.01*** (-27.65)
Log fund assets	0.04*** (188.41)	0.04*** (185.61)	0.03*** (21.95)	0.01*** (122.61)	0.03*** (176.49)	0.03*** (173.63)	0.03*** (17.25)	0.01*** (108.03)
Log firm assets	-0.01*** (-72.74)	-0.01*** (-71.19)	-0.02*** (-11.35)	-0.01*** (-53.60)	-0.01*** (-76.82)	-0.01*** (-72.76)	-0.02*** (-10.32)	-0.01*** (-52.97)
Log firm age		0.001*** (4.67)	0.01*** (6.39)	0.0001* (1.81)		0.00 (0.09)	0.01*** (3.72)	0.00 (0.02)
Log average spread		-0.02*** (-25.81)	-0.08*** (-18.08)	-0.003*** (-13.88)		-0.01*** (-17.65)	-0.07*** (-13.37)	-0.002*** (-8.28)
Log CAPEX/assets		-0.04*** (-10.38)	-0.02 (-0.79)	-0.01*** (-7.46)		-0.04*** (-10.05)	-0.04 (-1.27)	-0.01*** (-6.23)
Inst. Ownership		-0.02*** (-12.40)	-0.19*** (-15.18)	0.01*** (8.95)		-0.01*** (-4.90)	-0.16*** (-10.88)	0.01*** (13.02)
Top 5 Inst. Own.		0.07*** (13.90)	0.38*** (9.23)	-0.01*** (-6.73)		0.03*** (6.58)	0.25*** (5.25)	-0.02*** (-10.76)
Mutual fund own.	0.13*** (65.74)	0.15*** (61.21)	0.80*** (40.00)	0.04*** (41.25)	0.12*** (59.77)	0.13*** (52.75)	0.74*** (33.01)	0.03*** (36.86)
Index fund ownership		-0.51*** (-16.99)	-1.23*** (-4.65)	-0.14*** (-12.72)		-0.29*** (-10.07)	-0.51* (-1.76)	-0.08*** (-7.40)
Constant	-0.18*** (-40.29)	-0.14*** (-29.59)	0.34*** (10.79)	-0.03*** (-16.96)	-0.13*** (-28.75)	-0.10*** (-21.02)	0.35*** (10.50)	-0.02*** (-12.28)
Observations	1,550,961	1,493,448	73,590	1,131,645	1,170,900	1,126,922	47,950	866,668
R-squared	0.20	0.20	0.27	0.09	0.18	0.18	0.29	0.08
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Mff FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Figure A1. Investment, profitability and valuation around year of addition

The figures below depict the development of the measures of investment (Panel A), and profitability and valuation (panel B) used in this paper, in the 7-year window around the year of addition to the index. Definitions of the variables are presented in Appendix A1.

Panel A. Investment



Panel B. Profitability and valuation

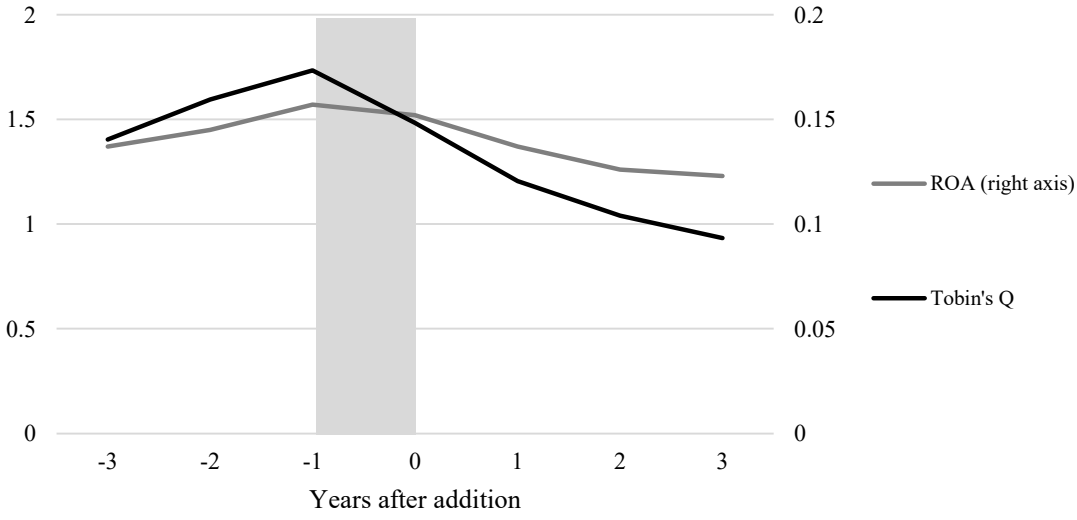
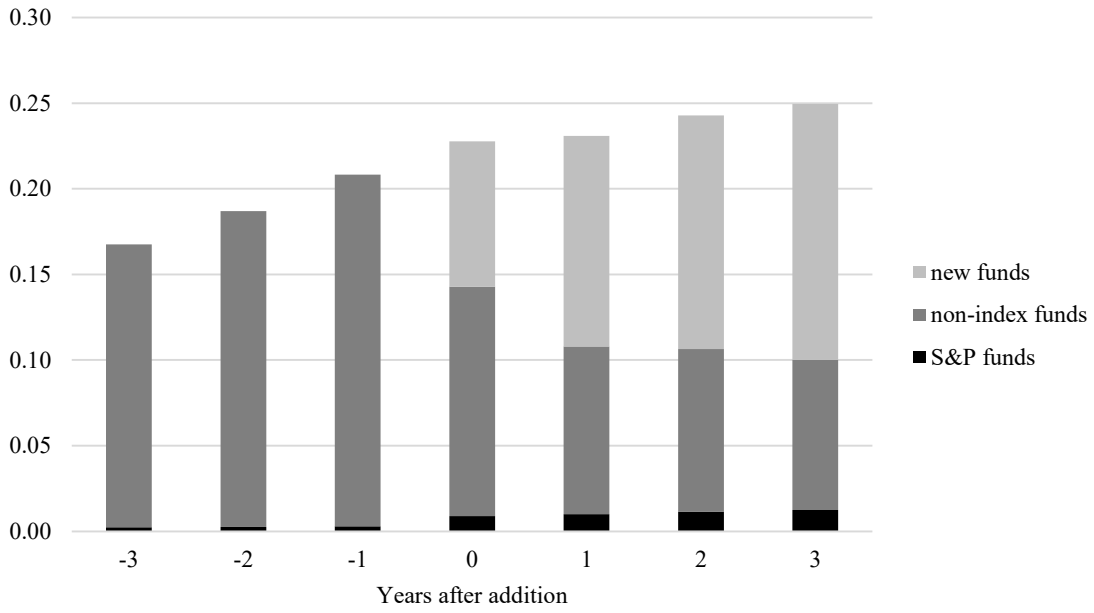


Figure A2. Mutual fund ownership around year of addition

The figures below depict fund-firm ownership according to the categories of "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it), in the 7-year window around the year of addition. Panel A depicts the average ownership of each type of fund-firm relation. Panel B depicts the average number of funds for each type of fund-firm relation.

Panel A. Mutual fund ownership



Panel B. Number of mutual funds

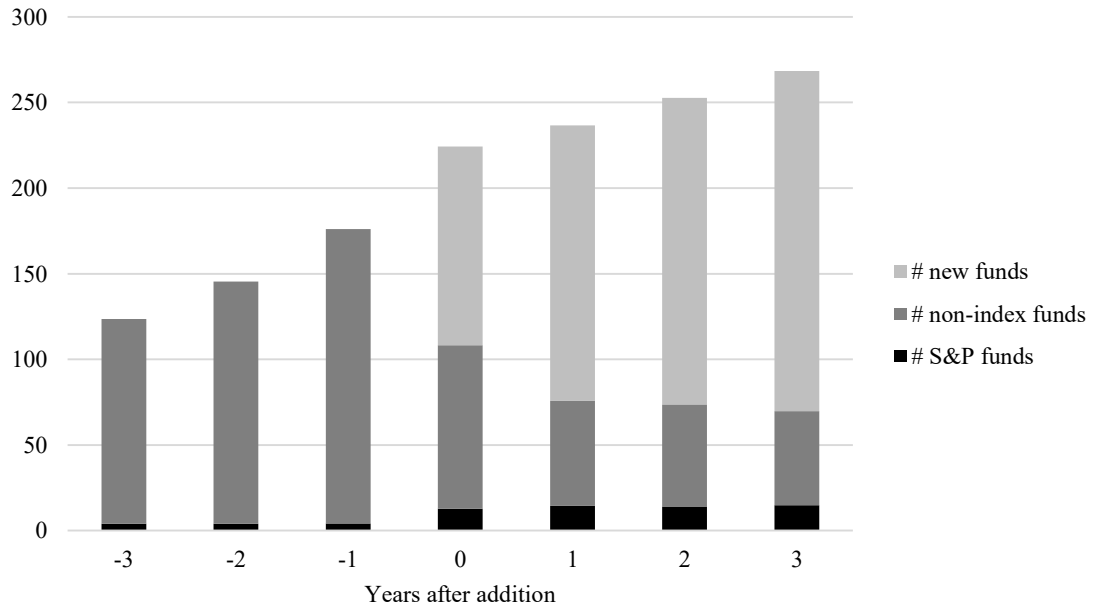
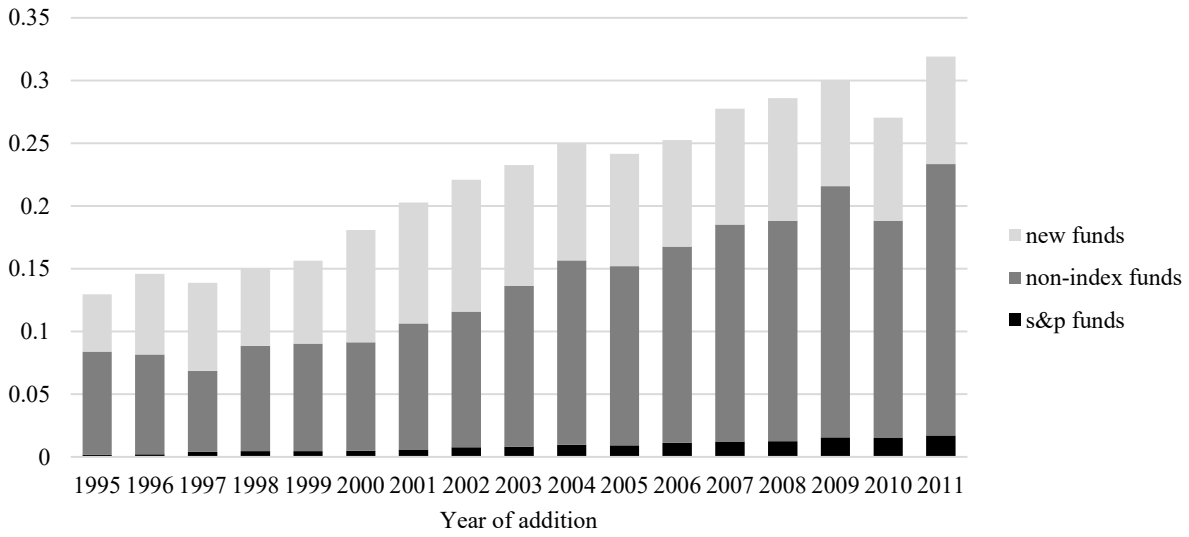


Figure A3. Mutual fund ownership by year of addition

The figures below depict fund-firm ownership according to the categories of "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it), in the 1995-2011 period, when the represented year is the year of addition. Panel A depicts the average ownership of each type of fund-firm relation. Panel B depicts the average number of funds for each type of fund-firm relation.

Panel A. Mutual fund ownership



Panel B. Number of mutual funds

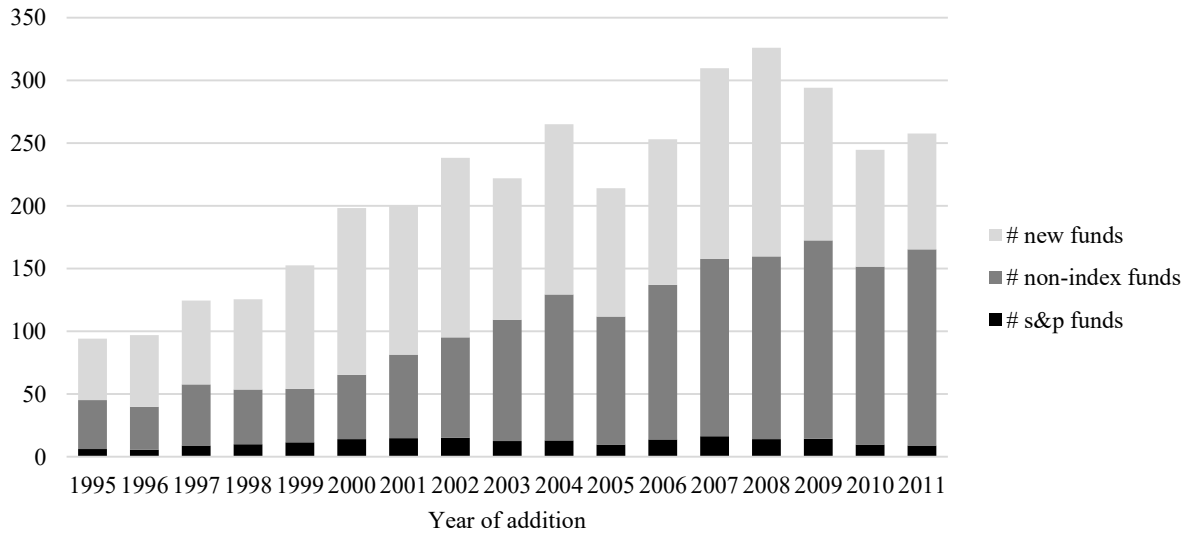
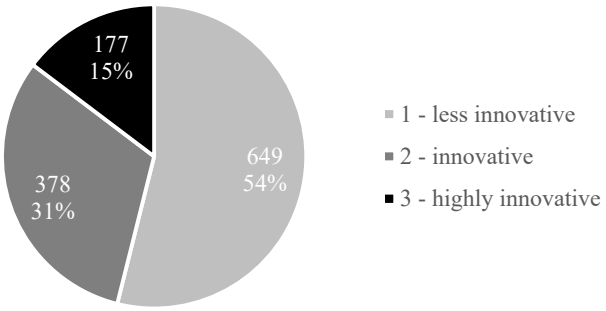


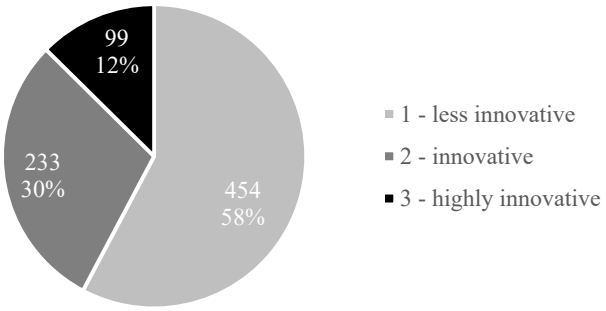
Figure A4. S&P additions by industry innovation intensity

The figures below depict the number and percentage of additions to the three different S&P indices (S&P 600 in panel A, S&P 400 in panel B, and S&P 500 in panel C), according to the innovation intensity of the industry in which the firm operates, as defined in Table A2 of the Appendix.

Panel A. S&P 600 – small cap



Panel B. S&P 400 – mid cap



Panel C. S&P 500 – large cap