

# Director Connections in the Mutual Fund Industry

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**Abstract:** The executives of publicly traded firms often sit on mutual fund boards. This paper provides empirical evidence about the influence these executives exert on the investment decisions of the fund. It shows that funds concentrate their holdings in and trade informatively in the stock of the executive's firm. Specifically, funds hold approximately 25 percent larger stakes in the executive's firm. When the fund purchases the stock of the executive's firm, the stock, on average, earns an abnormal return of 2.07 percentage points over the following quarter, and when the fund sells the stock of the executive's firm, the stock, on average, underperforms by 3.76 percentage points over the following quarter. Furthermore, the paper shows that abnormal trading returns in the executive's firm, are associated with positive career outcomes for the executive. These results are robust to controlling for fund and firm specific factors and suggest that the influence of fund directors extends beyond their formal monitoring responsibilities.

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## I. Introduction

Mutual fund boards are primarily composed of independent directors. From 1996 to 2008, in response to the failure of the boards to protect shareholders - notably in the stale-price trading scandal of 2003 - the percentage of fund boards with over 75 percent of their seats held by independent directors increased from 46 percent to 88 percent.<sup>2</sup> Prior empirical evidence suggests that more independent mutual fund boards are associated with lower shareholder fees and fewer scandals.<sup>3</sup> Yet, little attention has been given to the possibility that the impact of independent directors on the fund extends beyond their formal monitoring responsibilities.

This paper explores the potential for independent directors to influence the investment decisions of the fund. Shiller and Pound (1989) present survey evidence that reveals information diffuses to investors through informal communication networks, i.e., whom you know influences how you invest.<sup>4</sup> As independent fund directors are often executives of publicly traded firms, the mutual fund boardroom represents an ideal setting for fund management to form communication networks with fund directors. From the director's perspective, career concerns may provide an incentive to form networks with fund management. In the words of former SEC chairman Arthur Levitt, "being on a mutual fund board is the most comfortable position in corporate America."<sup>5</sup> As fund management is

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<sup>2</sup> Investment Company Institute, Overview of Fund Governance Practices: 1994 to 2008. [http://www.ici.org/pdf/pub\\_09\\_fund\\_governance.pdf](http://www.ici.org/pdf/pub_09_fund_governance.pdf)

<sup>3</sup> For empirical evidence on the role of independent directors on fund governance see, Tufano and Sevick (1997), Del Guercio, Dann and Partch (2003), Ferris and Yan (2007), Khorana, Tufano and Wedge (2007), Cremers, Driessen, Maenhout and Weinbaum (2009).

<sup>4</sup> Communication networks based on geographical proximity (Coval and Moskowitz (1999, 2001), Huberman (2001)), business ties (Cohen and Schmidt (2009)), and shared education (Cohen, Frazzini and Malloy (2008)) have been found to influence investment decisions.

<sup>5</sup> Sterngold, J. (2012, June 6). Is Your Fund's Board Watching Out for You? *The Wall Street Journal*. Retrieved from <http://online.wsj.com/article/SB10001424052702303753904577450243418998540.html>

responsible for allocating board appointments, the building blocks for a mutually beneficial relationship exist within the fund boardroom. The existence of similar mutual beneficial relationships within funds has precedence in the context of the stale-price trading scandal of 2003 (McCabe (2009)) and fund contracting decisions (Cohen and Schmidt (2009), (Kuhnen (2009)).

In light of the observed growth in independent boards, information flow through communication networks, career concern incentive faced by directors, and mutually beneficial relationships within mutual funds, the question arises: do communication networks form within mutual funds between fund directors and fund management? If so, do these networks alter the fund's investment decisions and returns? Do they influence the director's career concerns? For example, if Jane Doe is a director at Windsor Fund and also the chief financial officer of General Electric, does Windsor Fund bias their holdings towards General Electric? Are these holdings associated with abnormal returns? Is Jane Doe's continued appointment as a director of Windsor Fund related to Windsor Fund's holdings and returns in General Electric stock?

To study these questions, I create a unique database of independent director employment history using an automated web crawler algorithm. The algorithm searches over 130,000 mutual fund filings in the electronic archives (EDGAR) of the U.S. Securities and Exchanges Commission (SEC) for the names of 33,000 executives listed in the Compustat ExecuComp database. If a named executive in ExecuComp is also a fund director, as seen in the SEC mutual fund filing for a given year, I define the fund and firm as "director connected" for that year. This process identifies 856 unique fund-firm director connections over the period 1994-2011. Each year, on average, 17.10 percent of mutual funds

are director connected to at least one S&P 1500 firm, and 2.52 percent of S&P 1500 firms are director connected to at least one mutual fund.

To examine the impact of director connections on fund portfolio choice, I merge the director connections database with the Thomson Financial CDA/Spectrum Mutual Fund holdings database. Using pooled OLS regressions that control for fund, firm and time specific factors, I find that funds hold 25 percent larger stakes in the stock of a connected firm.

Next, I examine whether this concentration of holdings is associated with information transfers. If so, I expect that a fund's trades in a connected stock in quarter  $t$ , will anticipate the stock's price movements in quarter  $t+1$ . I find that in the quarter after a fund increases its holdings in a connected stock, the stock, on average, earns an abnormal return of 2.07 percentage points, and in the quarter after a fund decreases its holdings in a connected stock, the stock, on average, earns a negative abnormal return of 3.76 percentage points. If investors extract private information from director connections, they should make the majority of their returns when information asymmetry is the highest. Consistent with this view, I find fund trades anticipate the earnings announcements of connected stocks, and connected trading returns are the highest when there is a high dispersion in analyst earnings forecasts. These findings are robust to controlling for firm and time specific factors, as well as to the benchmark used to calculate the abnormal return of the stock. That the trading of connected stocks anticipates future stock returns and earnings announcements suggests likely information advantages of funds in connected stocks.

If boardroom communication networks impact director career concerns, I expect to find that a fund holding and trading informatively in a connected stock will influence the likelihood that the director, who connects the fund to that stock, remains at the fund in year  $t+1$ . Using Logit regressions that control for director and firm specific factors, I find no significant relationship between a fund holding the director's stock, and the likelihood the director remains at the fund. However, with respect to trading returns, I find that higher trading returns in the director's stock are associated with a significantly higher probability the director remains at the fund. This result suggests that the formation of communication networks within the fund positively influences the career concerns of the director.

Because mutual funds actively select their directors, it is unclear if the director connection is the cause of the bias holdings towards connected firms. Alternately, a common factor, such as the belief the director's firm is well run or a preexisting social connection between the fund and firm, may drive funds to both overweight holdings in a firm's stock and to select directors from that firm. While funds can control the firm they connect to when they first select a director, they have little control over where they connect to if the director changes jobs. For example, if Windsor Fund director Jane Doe leaves her position at General Electric to join IBM, Windsor Fund will exogenously connect to IBM. Thus, to control for director selectivity, I examine fund portfolio decisions in connections that form when an established director changes jobs, i.e., Windsor Fund and IBM. Using OLS regressions to control for fund, firm and time specific factors, and a quasi-experimental matched sample approach, I find that when an established director changes jobs, funds increase their holdings in the stock of the newly connected firm. This result suggests that director connections cause funds to bias their holdings towards the stock of the connected firms.

I also test and control for potential endogeneity in fund returns. For each fund-firm connection, I examine if the fund trades informatively in the connected firm before the connection forms. I find no evidence of informative trading in this period. This finding suggests that director connections are the source of the information advantages.

The evidence presented in this paper points to an unexplored role of mutual fund directors. Previous research on fund directors has concentrated on their fiduciary responsibilities to the fund; factors that align director incentives with shareholders facilitate better monitoring. The results presented in this paper highlight the directors' potential role in information acquisition and fund investment performance.

Past research has emphasized the role communication networks play in investor portfolio choice and information acquisition (Shiller and Pound (1989), Coval and Moskowitz (1999, 2001), Hong, Kubik and Stein (2005) Cohen, Frazzini and Malloy (2008) and Cohen and Schmidt (2009)). This paper shows that director connections represent an additional mechanism that connects investors to firms. This is one of the first papers to study a network composed of individuals who are simultaneously employed by the investor and the target investment.

Kuhnen (2009) examines the relationships that form within mutual funds between fund directors and fund management. She finds director-management relationships lead to favoritism in fund contracting decision; directors are more likely to hire advisers if they have worked together in the past and vice versa. My paper complements Kuhnen (2009) by analyzing the role of directors in the portfolio

choices of the fund's management, and by exploring additional factors that drive board appointments and the formation of mutually beneficial relationships between the management and directors of funds.

The remainder of the paper is organized as follows. Section II provides a brief review of the literature that motivates this paper and develops the paper's hypotheses. Section III describes the construction of the director connection dataset and provides descriptive statistics of the sample. Section IV presents evidence exploring the impact of director connections on fund investment decisions. Section V examines the impact of director connections on the investment returns of the fund. Section VI explores how the magnitude of connected trading returns varies by information environment, regulatory regime, fund, firm and director. Section VII considers the impact the director connection has on the career concerns of the director. I conclude the paper in Section VIII.

## **II. Literature Review and Hypothesis Development**

Two distinct literatures inform this paper, works examining the impact of mutual fund directors on fund behavior, and works examining the impact of communication networks on fund portfolio choices and investment returns.

### **2.1 The Role of Mutual Fund Directors**

Fund boards exist to protect shareholder interests from mutual funds that are paradoxically required to maximize profits for their outside owners, while simultaneously minimizing the costs charged to fund shareholders. To protect shareholders, directors are formally responsible for *"approving the fund's major contracts with service providers (including, notably, the fund's investment manager), approving fund policies and procedures to ensure the fund's compliance with federal securities laws, and*

*undertaking oversight of the performance of the fund’s operations.” To execute these responsibilities they “meet regularly, request and review numerous reports relating to fund matters (including investment performance and the compliance function), and engage in discussions with the adviser, counsel, and others.”<sup>6</sup>*

The SEC takes several steps to insure that director interests align with the shareholder. They require mutual funds to disclose the independence, employment history, tenure, number of funds overseen, compensation and fund ownership of the fund’s directors. Furthermore, under the Investment Company Act of 1940, mutual funds are required to have a board composed of at least 40 percent independent directors, and only the independent directors of funds are allowed to select and nominate future independent directors. The SEC defines an independent director as an individual who does not currently have, or, at any time during the previous two years, has had, a significant business relationship with the fund’s adviser.

Previous research has focused on how factors related to director independence impact the director’s ability to carry out his formal fiduciary responsibilities. Factors that align director interests with those of the shareholder have been found to improve the director’s ability to protect the shareholder. The presence of SEC defined independent directors is associated with lower fund expenses (Tufano and Sevick (1997), Del Guercio, Dann and Partch (2003), Ferris and Yan (2007)), a willingness to accept value enhancing restructurings and mergers (Khorana, Tufano and Wedge (2007)), and a lower probability of being implicated in a fund scandal (Ferris and Yan (2007)). Prior work also finds that higher

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<sup>6</sup> Investment Company Institute, Frequently Asked Questions About Mutual Fund Directors  
[http://www.ici.org/idc/policy/governance/faq\\_fund\\_gov\\_idc](http://www.ici.org/idc/policy/governance/faq_fund_gov_idc)



director ownership is associated with better fund performance (Cremers, Driessen, Maenhout and Weinbaum (2009)). However, higher director compensation is associated with higher shareholder fees (Tufano and Sevick (1997), Del Guercio, Dann and Partch (2003)), and a higher probability of a fund scandal (Ferris and Yan (2007)). My paper contributes to the fund governance literature in two ways. First, it identifies a new director characteristic, employment history, that may affect the fund. Second, it identifies a new area, portfolio choice, where the director may influence fund behavior.

## 2.2 The Role of Networks

Shiller and Pound (1989) present survey evidence that suggests interpersonal communication helps inform the portfolio decisions of investors. Previous research has identified geographical proximity (Coval and Moskowitz (1999, 2001) Huberman (2001)), professional connections (Hong, Kubik and Stein (2005), Cohen and Schmidt (2009), and Duan, Hotchkiss and Jiao (2011)), and education connections (Cohen, Frazzini and Malloy (2008)) as mechanisms of interpersonal connection that influence portfolio choice. Investors tend to overweight their holdings in in-network connected stocks. The question arises, why do they overweight these holdings? Per Treynor and Black (1973), one possible explanation is that funds overweight holdings in connected stocks when they receive positive information signals about these stocks. Cohen, Frazzini and Malloy (2008) study the fund-firm network that forms when mutual fund managers and senior officers at public companies have attended the same university. They find that funds hold larger stakes in connected stocks, and generate abnormal returns - concentrated in the days surrounding corporate news events - from these holdings. They conjecture fund-firm education connections lower the fund's cost of gathering information about the connected firm, which in turn leads to the observed abnormal returns in connected holdings. These findings are consistent with Coval

and Moskowitz (2001) who show mutual funds trade informatively in the stock of geographically local firms. Alternatively, the presence of connections can breed familiarity effects between funds and firms. Huberman (2001) presents evidence that investors who connect to firms through geographically proximity and customer relationships, bias their holdings towards these firms. However, he finds the bias holdings are unrelated to an information advantage.

Director connections also provide a mechanism that connects investors to publicly traded firms. In contrast to previously studied networks, fund directors are directly compensated by and often have an ownership stake in the funds they oversee. As of 2011, the average compensation for a director of the 25 largest mutual fund families was \$258,000.<sup>7</sup> Chen, Goldstein, and Jiang (2008) estimate, on average, directors own a \$267,000 stake in the funds they oversee. The more direct nature of director connections may result in different impacts on the fund than previously studied connections. Kuhn (2009) documents favoritism in the appointment of board positions; directors who have worked with a fund's management in the past, are more likely to be appointed to new board positions. If director connections are also associated with board appointment, director career concerns may provide an incentive that increases the flow of information to fund management. Conversely, the directness and formality of the relationship between the director and fund management may discourage investment-related communication, resulting in fewer information exchanges and reduced holdings in the connected firm (Griffin, Shu and Topaloglu (2012)). Whether director connections influence fund investment decisions, returns and director career concerns is ultimately an empirical question.

Specifically:

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<sup>7</sup> Sterngold, J. (2012, June 6). Is Your Fund's Board Watching Out for You? *The Wall Street Journal*. Retrieved from <http://online.wsj.com/article/SB10001424052702303753904577450243418998540.html>

#### Hypothesis 1.

If director connections influence fund portfolio decisions in connected firms, fund holdings in connected firms will differ from benchmark levels.

#### Hypothesis 2.

If director connections facilitate information transfers, then funds will make informative trades in connected firms, i.e., the purchases of connected stocks will anticipate positive stock returns, and the sales of connected stocks will anticipate negative stock returns.

#### Hypothesis 3.

If information transfers are associated with director career concerns, then directors who facilitate information transfers will experience positive career concern outcomes.

### **III. Data**

I collect a unique database that maps fund-firm director connections.<sup>8</sup> The first step in the data collection process is to identify the executives of publicly trading firms using the Compustat ExecuComp database. The database contains the full name of the top five compensated executive officers of S&P 1500 firms on an annual basis.

Next, I identify which firm executives sit on fund boards. The board of directors is located within the fund company – herein referred to as “FC.” Each FC may oversee several mutual funds and is the unit of SEC filings. Each year, FCs are required to disclose the names of their directors to the SEC in Form

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<sup>8</sup> Due to the lack of a comprehensive database of mutual fund directors, previous research on fund directors has relied mainly on hand-collected data, and as a result has been limited to small samples.

N-CSR. There are approximately 7,000 N-CSR filings per year. I use a web crawler algorithm developed by Engelberg and Sankaraguruswamy (2007) to search for the Compustat Executive Names in all N-CSR filings.<sup>9</sup> In total, I search for 33,000 executive names in over 130,000 mutual fund filings. The period of analysis spans from 1994, the first year the SEC's Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) is available, to 2011. If a named executive in ExecuComp is also a fund director, as seen in the N-CSR filing for a given year, I treat the fund and the firm as "connected" for that year. In total, the process identifies 1,642 unique fund-firm director connections.

I take several steps to insure the robustness of the sample. To mitigate concerns that I may be identifying a different individual with the same name, i.e., John Smith of Vanguard and a different John Smith of General Electric, I omit executives from the sample who do not have a middle initial and executives who have the same full name (first name, middle initial and last name) as another corporate executive. To avoid instances where the mutual fund and executive's firm are affiliated, i.e., an executive at Goldman Sachs who sits on the board of a Goldman Sachs mutual fund, I exclude all financial firms from the sample.<sup>10</sup> Last, I manually check the employment history of the remaining ExecuComp executives to verify the year they started and ended employment at the firm. While the ExecuComp database contains a variable that identifies the year the executive joined and left the firm, its value is missing for approximately one-third of the sample. Manually searching the employment history of these individuals in the firm's 10-K SEC filings resolves this issue. Combined, these robustness measures reduce the number of unique fund-firm director connections in the sample from 1,642 to 856.

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<sup>9</sup> Prior to 2003, FCs disclosed information about their directors in Form N-30D. The web crawler algorithm also searches these forms.

<sup>10</sup> I identify financial firms by their two-digit NAICS code, 52.

Panel A of Table 1 reports descriptive statistics of the sample at the FC level. In total, I identify 1,681 unique FCs over the 18 years sample, or 877 FCs, on average, per year. Of the identified FCs, 157 have at least one director connection each year. Because some FCs have multiple director connections, the average total number of connections observed each year is higher, 213. Among FCs with at least one connection, this equates to 1.34 connections per FC per year.

**(Insert Table 1 about Here)**

Panel B of Table 1 reports descriptive statistics of the sample at the mutual fund level. I search Form N-SAR in the SEC filings to identify which mutual funds each FC oversees. The average FC oversees 2.74 mutual funds each year. The sample contains 4,875 unique mutual funds, or 2,403 mutual funds, on average, per year, of which 410 have at least one director connection each year. In total, there are 2,625 unique mutual fund-firm connections over the course of the sample, or 645, on average, per year. To analyze the impact of director connections on portfolio choice, I merge the director connections database with the Thomson Financial CDA/Spectrum database, which contains mutual fund holdings data.<sup>11</sup> If a mutual fund holds the stock of a connected firm in a given quarter, it is referred to as a held connection, if not, it is referred to as an unheld connection. On average, of the 645 identified mutual fund-firm connections each year, only a small amount, 31, are held by a connected mutual fund each quarter. The remaining 614 connections are unheld by the connected mutual funds. This equates to 1.53 director connections for each mutual fund with at least one connection. On average, 0.07 of the 1.53

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<sup>11</sup> Index funds are excluded from this sample. Index Funds are identified using the Index Fund Flag variable contained in the CRSP Mutual Fund Database, and as funds with the word “Index” in their name.

director connections are held by the mutual fund each quarter, while the remaining 1.46 connections are unheld.

**(Insert Table 2 about Here)**

Panel A of Table 2 presents data describing the scope of the director network. Each year, on average, 2.52 percent of S&P 1500 firms are connected to a fund. This represents 5.43 percent of the outstanding S&P1500 market capitalization. As mentioned earlier, not all of the connected firms are held by mutual funds. I find that the connected firms that are held by connected funds each quarter account for 0.44 percent of the stocks in the S&P 1500 or 1.67 percent of the outstanding S&P 1500 market capitalization. Panel B of Table 2 presents summary statistics describing the size of connected firms. The average market capitalization of connected firms each year, \$12.77 billion, was larger than the average size of S&P 1500 firms, \$5.85 billion. It is not surprising that connected firms tend to be larger than unconnected firms. The executives of large firms may be more desirable as potential directors compared to the executives of smaller firms. Similarly, the average size of held firms, \$22.32 billion, is larger than the average size of unheld connected firms, \$10.78 billion.

#### **IV. Results: Director Connections and Mutual Fund Portfolio Choice**

This section examines the influence director connections have on mutual fund holdings. If communication networks form within fund boardrooms, then we should observe that funds take aggressive positions in director connected stocks to capitalize on information advantages (Treyner and Black (1973)). However, in practice, short sale constraints limit the ability of most funds to capitalize on negative information. Because of the asymmetry in a fund's ability to act on information, the primary

focus of this section is on the stocks funds actively hold. As most funds hold a small fraction of the available stocks in the investable universe, an active holding in a stock suggests the fund has a positive outlook in that stock. The more confident the fund's outlook the larger the stake they will hold. Thus, if director connections facilitate informational advantages, when a fund receives positive information about a connected stock, they should hold relatively larger stakes in that stock compared to other stocks in which they have less precise information. In the analysis that follows, I test if funds hold larger stakes in director connected stocks.

#### 4.1 Active Holdings

I use pooled OLS regressions to measure the effect of director connections on mutual fund holdings. The level of observation in the regression is fund-firm-quarter. Each quarter, the sample contains, on average, 1660 funds<sup>12</sup> that each hold 46 S&P 1500 firms. Over 72 quarters, this equates to approximately 5.5 million observations. The dependent variable in the analysis is "Conditional Portfolio Weight," which measures the proportion of a fund's portfolio invested in the specified stock, conditional on the fund actively holding that stock. For example, if the fund total holdings of \$100,000,000 and holds \$1,000,000 of a specific stock, that stock would have a conditional portfolio weight of one percent ( $\$1,000,000/\$100,000,000$ ). If the fund does not hold the stock, the observation is excluded from the sample. The independent variable of interest is a dummy variable that identifies the fund-firm pair as director connected.

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<sup>12</sup> The number of mutual funds reporting holdings each quarter is less than the number of fund per year in the sample reported in the summary statistics as some funds report holdings data semi-annually. Additionally, there are less than 1500 firms in the S&P 1500 sample as financial firms are omitted.

It is necessary to control for factors, other than director connection, that influence fund holdings. To control for firm specific factors that influence portfolio choices, the regression includes variables that measure each firm’s size, value, and 12-month return momentum quintile.<sup>13</sup> To control for fund specific factors that influence portfolio choices, a variable that measures the number of stocks each fund holds is included, and two variables that measure the fund’s style, are included. The first style variable, styleholdings, measures the percentage of the fund’s assets invested in the style corresponding to the specified stock. The dimensions of style considered are value, size and 12-month return momentum. Each dimension is measured in quintiles, resulting in 125 unique fund styles. The second style variable, industryholdings, measures the percentage of the fund’s assets invested in the industry corresponding to the specified stock. I identify industry using the stock’s two-digit NAICS code. Furthermore, quarter fixed effects are included and standard errors are clustered at the quarter level.<sup>14</sup>

$$\text{Conditional Portfolio Weight}_{Fund,Firm,T} = B_0 + B_1 \text{Connected} + \text{Controls} + FE_T + \varepsilon_{Fund,Firm,T}$$

The first column of Panel A of Table 3 presents the results of the model. The positive and statistically significant coefficient on the connected dummy variable provides evidence that funds place larger bets in director-connected stocks - consistent with funds having information advantages in director connected stocks.

**(Insert Table 3 about Here)**

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<sup>13</sup> The DGTW benchmarks are available via <http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm>

<sup>14</sup> This approach is consistent the approach used by Cohen Frazzini Malloy (2008) who examines the role education connections play in mutual fund holdings and returns.



Observable and unobservable factors influence fund portfolio decisions. The effect of observable factors, e.g., firm size, can be isolated using control variables as in the previously developed model, while fixed effects, e.g. time, fund and firm, can control for the unobservable common shocks that influence portfolio choices. However, using fixed effects to capture unobservable common shocks in panel data assumes that the effects of the shocks are homogenous across all dimensions. This assumption may not be realistic. Consider the example of using firm fixed effects to capture the influence of investor sentiment on holdings of Apple stock. Is it valid to assume that the sentiment towards Apple in 2003, when the stock was priced at \$10 a share, was equivalent to the sentiment towards it in 2010 when it was priced at \$300 dollars a share?

Bai (2009) demonstrates that interactive fixed effects can control for the heterogeneous impacts of unobservable common shocks in panel data. Thus, to isolate the effect of director connections on portfolio choices from other firm and fund specific factors that influence portfolio choices each quarter, I introduce Fund\*Quarter and Firm\*Quarter interactive fixed effects to the previous holdings model. As these variables control for the heterogeneous impacts of both the observable and unobservable fund and firm specific effects that influence fund holdings each quarter, the fund and firm specific control variables used in the previous specification are subsumed.<sup>15</sup>

$$\text{Conditional Portfolio Weight}_{Fund,Firm,T} = B_0 + B_1 \text{Connected} + FE_{Fund*T} + FE_{Firm*T} + \varepsilon_{Fund,Firm,T}$$

The second column of Panel A of Table 3 presents the results of the interactive fixed effects model with standard errors clustered at the quarter level. The 0.0030 coefficient on the connected

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<sup>15</sup> The styleholdings and industryholdings control variables, which are specific to each fund-style-quarter observation are not subsumed by the model, but omitted for simplicity. The results presented are robust to the inclusion of these variables.

dummy variable ( $t=7.84$ ) represents a relative increase of 23.36 percent in the conditional portfolio weight of connected firms. Peterson (2009) highlights the risk of biased standard error estimates in Panel data due to inappropriate standard error clustering. For robustness, we cluster standard errors at the fund\*firm level (column 3) and the fund and firm level (column 4). In both robustness specifications, the coefficient on the connected dummy variable remains statistically significant. Taken together these results suggest that after controlling for fund, firm and time specific factors, funds place larger bets on connected stocks relative to unconnected stocks. This result is consistent with informational advantages in director connected stocks.

#### 4.2 Endogeneity Robustness Tests

While the results thus far suggest that funds hold larger stakes in director connected firms, it is unclear if the director connection is the cause of the overweight holdings. Because funds actively choose their directors, it is plausible that funds select directors from the firms whose holdings they overweight. This could occur if a common factor drives both director selection and portfolio choice. For example, suppose Windsor Fund believes IBM is a well run company. This belief may cause Windsor Fund to overweight its holdings in IBM and to select directors from IBM. If this occurs, we would observe that Windsor Fund holds larger stakes in connected stocks, however the cause of the overweight holdings is not the connection, but the factor driving the connection, i.e., a belief the firm is well run. A preexisting fund-firm network may also drive director selection and portfolio choice. Past research finds that funds hold elevated levels of geographically (Coval and Moskowitz (1999)), socially (Cohen, Frazzini and Malloy (2008)), and business (Cohen and Schmidt (2009)) tied firms. If these relationships also drive

director selection, the observed bias holdings in connected firms may be a symptom of the preexisting network, rather than the director connection.

We can control for director selectivity by identifying the firms with which funds exogenously connect. While funds actively choose their directors, they do not always choose the firms that employ their directors. Specifically, when a director first joins a fund, the director's place of employment may influence the fund's decision to hire the director, e.g., Windsor Fund choosing a director from IBM because they believe it is well run. However, once the director is hired, the fund has little control over the director's future place of employment, should they change jobs, e.g., if the director leaves IBM and joins GE. If we find that Windsor Fund also biases its holdings towards GE, with which it does not actively choose to connect, we can infer that the connection, and not a factor related to the selection of the director, causes Windsor Fund to overweight its holdings in GE. Thus, to control for director selectivity issues, I distinguish between connections where the director's tenure at the firm precedes their tenure at the fund, termed "firm-first" connections, and connections formed when an established director changes job, termed "fund-first" connections. Of the 856 unique fund-firm connections in the sample, 577 are identified as firm-first connections, and 132 are identified as fund-first connections.<sup>16</sup> Finding a strong impact of director connections on investment decisions in the subsample of fund-first connections, where the effect of the connection is isolated from director selectivity issues, will provide support for the hypothesis that director connections cause the observed bias towards connected holdings.

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<sup>16</sup> There are an additional 147 connections where it is unclear if the connection is fund-first or firm-first. Of these, 107 cannot be identified because their formation occurred prior to 1994, and thus predates the SEC Edgar Database. The remaining 40 connections cannot be identified as fund-first or firm-first because the director joined the firm and fund in the same year.

#### 4.2.1 Fund Holdings Before and After Connection Formations

I use two approaches to examine the impact of fund-first and firm-first director connections on the investment decisions of the fund. First, I build on the interactive fixed-effects pooled OLS model used in the previous section by introducing four new independent variables of interest. The variables distinguish between fund-first and firm-first connections and between the period prior to and during the director connection. Specifically, “Fund-First Connected” is a dummy variable that identifies a stock as being fund-first connected to the fund. “Fund-First Preconnected” is a dummy variable that identifies if the fund and firm form a fund-first director connection in the following two years. “Firm-First Connected” is a dummy variable that identifies a stock as being firm-first connected to the fund. Finally, “Firm-First Preconnected” is a dummy variable that identifies if the fund and firm form a firm-first director connection in the following two years. The preconnected variables act as a placebo group and help infer the direction of causality in the connection-holdings relationship. If director connections influence investment decisions, we should observe that fund holdings in connected firms are different from their holdings in those firms during the preconnected period. Conversely, if funds connect to the firms whose holdings they overweight, we should observe that they bias their holdings towards these firms in the preconnected period.

$$\begin{aligned} \text{Portfolio Weight}_{Fund,Firm,T} = & B_0 + B_1 \text{FundFirst Connected} + B_2 \text{FundFirstPreconnected} \\ & + B_3 \text{FirmFirst Connected} + B_4 \text{FundFirstPreconnected} + FE_{Fund*T} + FE_{Firm*T} + \varepsilon_{Fund,Firm,T} \end{aligned}$$

**(Insert Table 4 about Here)**

The results presented in Table 4 suggest that funds hold elevated stakes in the connected firms they do not actively choose – fund-first director connections. Furthermore, the coefficient on the fund-first connected variable is larger than the coefficient on the fund-first preconnected variable, which is statistically indistinguishable from zero. This result suggests that funds bias their holdings towards fund-first connected stocks following the formation of director connections. In contrast, among the firms funds actively choose to connect to – firm-first director connections - the results suggest that funds bias their holdings towards the connected firm, both before and after the connection formation. Though this suggests some director selection effects, it does not explain all the results – of overweighting connected stocks. The results indicate that the formation of an exogenous fund-first director connection causes funds to place larger bets in the fund-first connected stock.

#### 4.2.2 Quasi-Experimental Matched Sample Analysis

Next, I use a quasi-experimental matched sample approach to control for director selectivity issues. This approach assigns treatment status to connection formations, i.e., I classify all year-fund-firm<sup>17</sup> observations where the fund and firm form a director connection in year<sub>t+1</sub>, as treated. For example, if Fidelity Magellan connects to IBM in 1999, the 1998-Fidelity Magellan-IBM observation is categorized as treated. Next, for every observation in the treated group, I find a set of control funds that did not form a director connection with the specified firm. I match control funds to treated funds by common year, investment style<sup>18</sup> and firm holding status (held or unheld). For example, if Fidelity Magellan was a large growth fund and held IBM in 1998, I identify a set of control funds for the 1998-

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<sup>17</sup> I aggregate the fund holdings data to the annual level to account for the fact that prior to 2004 funds were only required to record holdings data on a semi-annual basis.

<sup>18</sup> Fund style is characterized using the CRSP objective codes provided by the CRSP Mutual Fund Database.

Fidelity Magellan-IBM observation that are also large growth funds that held IBM's stock in 1998, but did not form a director connection with IBM. I then use the Abadie-Imbens (2002) matching estimator<sup>19</sup> to match each observation in the treatment group with its four<sup>20</sup> "nearest neighbors" in the control group. The nearest neighbor distance between observations in the treatment and control group is based on the portfolio weight holdings of the fund in the specified firm, the total number of stocks the fund holds, and the fund's styleholdings. As before, styleholdings measures the fund's total portfolio weight in stocks with similar size, value and momentum characteristics as the stock of interest. The difference in portfolio weight changes between the treated and control funds is calculated over the following one, two, and three years. Statistical significance is calculated using heteroskedasticity-robust standard error.<sup>21</sup>

**(Insert Table 5 about Here)**

Panel A of Table 5 presents the results of this approach around the formation of fund-first connections. The results suggest that following fund-first connection formations, funds increase their holdings towards the connected firms. The increase in holdings is gradual. There is no significant effect from the year prior to the formation of the connection to the year of the formation ( $p=0.414$ ), a 0.0022 percentage point effect in the year after the formation of the connection ( $p=0.006$ ), and a 0.0030 percentage point effect two years after the formation of the connection ( $p=0.004$ ). Panel B of Table 5

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<sup>19</sup> The Abadie-Imbens estimator typically lowers the bias of the estimate, at the cost of increased variance, compared to simple matching estimators and regression estimators (Abadie and Imbens (2002)).

<sup>20</sup> I use four matches per the advice of Abadie, Drukker, Herr and Imbens (2004) who state: "use four matches because it offers the benefit of not relying on too little information without incorporating observations that are not sufficiently similar."

<sup>21</sup> The Abadie-Imbens estimator is implemented using the `nmatch` command in Stata (Abadie Drukker Herr and Imbens (2004)).

focuses on the subsample of director connections that the fund can actively choose, firm-first director connections. When firm-first connections form, the average treatment effect is significantly negative the year of ( $p=0.000$ ) and the year following ( $p=0.002$ ) the connection formation, but not significantly different from zero two years following the formation of the connection ( $p=0.618$ ).

Taken together, while these results provide support that following the formation of fund-first director connections funds increase their holdings in these stocks. This result suggests that the formation of exogenous connections cause funds to take larger stakes in connected stocks – consistent with funds acquiring information advantages in these stocks. Again, we find selectivity issues in the firm-first connected subsample.

#### 4.3 Alternate Holdings Explanations

Alternate, non-information related, hypotheses exist that may explain why funds hold elevated levels of director connected stocks. Past research suggests that funds may bias their holdings towards connected stocks due to familiarity biases (Huberman (2001)) or price support considerations (Cohen and Schmidt (2009)) associated with the connection.

##### 4.3.1 The Familiarity Bias Explanation

Investors are drawn to familiar stocks. Thus, if a familiarity bias drives the observed elevated holdings in connected stocks, then the probability a fund holds a connected stock will be higher than the probability they hold unconnected stocks. To test if this is empirically true, I introduce a new variable, *Held*, that takes the value of one if a fund holds the stock, and zero otherwise. As we are now

measuring whether a fund does, or does not, hold the stock of a firm, we must include all fund-firm pairs in the sample, rather than just the firms a fund actively holds, in the regression.<sup>22</sup>

**(Insert Table 6 about Here)**

Table 6 presents the results when Held replaces Conditional Portfolio Weight as the dependent variable in the previously developed regression models.<sup>23</sup> The results presented in Panel A provide mixed evidence on the probability funds hold director connected stocks. The coefficient on the connected dummy is negative in the control variable specification, but positive in the interactive-fixed effects specifications. Panel B presents results when the four fund-first/firm-first and connected/preconnected independent variables are introduced to the model to help infer the direction of causality. Here, a more consistent pattern emerges. The coefficients on the fund-first connected and preconnected variable are statistically indistinguishable in all four specifications. Inconsistent with the familiarity hypothesis, this result suggests that the probability a fund holds a stock is unaffected by the formation of exogenous fund-first connections. With respect to firm-first connections, in all four specifications the coefficient on the preconnected variable is significantly positive and significantly larger than the coefficient on the firm-first connected variable. That funds are more likely to hold fund-first connected firms before the formation of the connection suggests that funds are familiar with the firms with which they choose to connect. However, following the formation of the connection, the results suggest that they become more selective in their choice to hold the stock. This result runs contrary to

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<sup>22</sup> To maintain computational flexibility, I restrict the sample to the 318 S&P 1500 firms that at one point have a director connection to a fund. This results in a dataset that contains approximately 13.6 million observations.

<sup>23</sup> As the dependent variable is binary, I estimate the control variable model (column 1) using a binary logistic regression. The interactive-fixed effects model (column 2 through 4) uses an OLS estimation technique as its high-dimensionality (over 100,000 fixed effects variables) makes a logistic model computationally impractical.



the increase in holdings probability we would expect to observe if director connections cause a familiarity biases.

**(Insert Table 7 about Here)**

For robustness, Table 7 presents the results of the matched sample analysis when Held replaces Conditional Portfolio Weight as the dependent variable. Consistent with the results of the regression analysis, and inconsistent with the familiarity hypothesis, the matched-sample results suggest that following the formation of both fund-first and firm-first connections, the probability funds hold the stock of connected firms does not increase.

#### 4.3.2 The Price Support Explanation

Price support considerations may also explain the observed elevated holdings in connected stocks. Cohen and Schmidt (2009) presents evidence that suggests when a fund manages a firm's 401(K) plan, the fund overweighs holdings in and provides price support for the client firm's stock. When other funds sell the client firm's stock, the 401(K) connected fund increases its holdings in the client firm's stock, mitigating potential price decreases associated with the sell-off. With respect to director connections, this finding raises the question: do funds provide price support for director connected stocks? If so, price support rather than information considerations may drive the observed elevated holdings in director connected stocks.

I use pooled OLS regressions to test if director connected funds provide price support for the connected firm when the firm experiences a negative shock. The unit of observation in the regression is

the fund-firm-quarter.<sup>24</sup> The dependent variable is the change in fund holdings in the specified stock over the specified quarter. The measure used to gauge the change in holdings varies across model specification. The negative shock I focus on is a sell off at the specified firm, defined as a quarter where the aggregate mutual fund universe decreases their ownership stake in the stock by more than one percentage point. If this occurs, the dummy variable, Sell Off, takes a value of one. The variable Agg Ownership Change measures the aggregate mutual fund universe's ownership stake change over the previous quarter. Connected is again a dummy variable that takes the value of one if the fund and firm are connected and Connected\*Sell Off is the interaction of the Connected and Sell Off variables. If director connections are associated with price support following negative shocks, then the coefficient on the Connected\*Sell Off interaction variable will be positive. To control for factors other than connection status that influence a fund's trading decisions in the firm, I included variables for the firm's size, the quintile of the firm's book to market ratio, the return on the firm's stock over the three quarter prior to the specified quarter, the change in the firm's CRSP market weight over the quarter, and the styleholdings and industryholdings variables used in the previous regression models. Furthermore, quarter fixed effects are included and standard errors are clustered at the firm level.

$$\begin{aligned}
 \text{HoldingsChange}_{Fund,Firm,T} = & B_0 + B_1 D_{SellOff} + B_2 X_{AggOwnershipChange} + B_3 D_{Connected} \\
 & + B_4 D_{Connected*SellOff} + Controls + \varepsilon_{Fund,Firm,T}
 \end{aligned}$$

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<sup>24</sup> Rather than focusing on all S&P 1500 firms, the analysis focuses on the subsample of firms that were at one point director connected to a fund. For example, I examine fund trading in CVS Corporation, who have an executive on the board of Principle Funds, but omit from the analysis trading returns in Quorum Health Group, who at no point in the sample connects to a fund. I introduce this restriction so that we can compare the trades of connected funds in connected firms, to the trades of unconnected funds in those same connected firms. At all points in the paper where this restriction is imposed, the results are consistent with and without the restriction.

**(Insert Table 8 about Here)**

The first column of Table 8 presents the results of the regression when the dependent variable is a dummy variable that indicates if the fund bought the firm in the specified quarter. The significantly negative coefficient on the connected\*sell off interactive term indicates when a sell off occurs in the stock of the connected firm, the connected fund also sells the stock of the connected firm. This result suggests that funds do not provide price support for director-connected firms. For robustness, the second through fifth column of Table 8 measure holdings changes using the change in the fund's portfolio weight (2), log of the dollar holdings change (3), ownership stake change (4) and  $\ln(\text{Shares}_t/\text{Shares}_{t-1})$  (5) respectively. These alternate specifications fail to produce evidence that funds provide price support for director connected stocks. This result suggests price support considerations do not drive the observed elevated holdings in director connected stocks.

#### **V. Results: Director Connections and Mutual Fund Trading Returns**

The results presented thus far – elevated holding stakes in connected firms unrelated to familiarity biases or price support considerations – are consistent with director connections facilitating the formation of communication networks within fund boardrooms. However, examining fund holdings in connected stocks is ultimately limited as it can only provide circumstantial evidence on the subject of private information. Examine fund trading returns will provide more direct evidence that information advantages do, or do not, drive the observed elevated holdings of connected stocks. Specifically, if managers extract information from connected directors and use the information when they make their

portfolio decisions, purchases of connected stocks should precede positive returns, and sales of connected stocks should precede negative returns.

### 5.1 Trading Returns Regression Methodology

The analysis that follows uses pooled OLS regressions to test if director connections affect mutual fund trading returns. The unit of observation in the regression is the fund-firm-quarter. The dependent variable is the abnormal stock of the stock in quarter  $t+1$ . The abnormal return of each stock is calculated by subtracting the return of the CRSP value weighted portfolio from the return of the specified stock each quarter. In each specification, there are four independent interactive variables of interest that capture the connection status between the fund and firm, and if the fund most recently increased or decreased its holdings in the specified stock: connected purchase, connected sale, unconnected purchase, and unconnected sale. Connected indicates if a director connection exists between the fund-firm pair, and unconnected indicates if the fund-firm pair are not connected at any point in the sample period. The unconnected variables are included as a benchmark against which we can compare the trades of connected firms. Again the sample is restricted to include only firms that have at least one director connection to a fund over the sample period.

To control for factors other than fund-firm connection status and trading status that influence future stock returns, I included variables that measure the firm's size, the quintile of the firm's book to market ratio, the return of the stock over the previous quarter, the return of the stock over the three quarters preceding the previous quarter ( $t-2$  to  $t-4$ ) and the stock price of the firm. Additionally, quarter fixed effects are included and standard errors are clustered at the firm level.

$$\begin{aligned}
\text{Abnormal Return}_{Fund,Firm,T+1} = & B_0 + B_1 X_{ConnectedBuy} + B_2 X_{ConnectedSell} + B_3 X_{UnconnectedBuy} \\
& + B_4 X_{UnconnectedSell} + Controls + \varepsilon_{Fund,Firm,T}
\end{aligned}$$

## 5.2 Stock Return Regression Results

The first column of Table 9 presents the results of the regression when the four independent variables of interest are dummy variables indicating the connection status of the fund-firm pair and if the firm bought or sold<sup>25</sup> the stock of interest over the previous quarter. For example, if a fund bought the stock of a connected firm, the connected buy dummy variable would take a value of one, and all other variables would take a value of zero.<sup>26</sup> The positive coefficient on the connected buy dummy variable indicates that when a fund purchases the stock of a connected firm, the stock on average gains 2.07 percentage points above its benchmark over the following quarter. Similarly, the negative and statistically significant (t=-2.71) coefficient on the connected sell dummy variable indicates when a fund sells the stock of a connected firm, the stock on average underperforms by 3.76 percentage points over the following quarter. The 5.83 percentage point difference between the coefficient on the connected purchases and connected sales is statistically significant at the five percent level. If director connections cause informative trading, then trades in director connected stocks should be more informative than trades in unconnected stocks. To test if this is empirically true, I compare the difference between the

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<sup>25</sup> A buy (sell) is defined as an instance where a fund increased (decreased) its number of shares owned, portfolio weight, and ownership stake in the stock of interest. If not all three of these conditions are met, the observation is treated as neither a buy nor a sell.

<sup>26</sup> To be considered a purchase, the fund must have increased the number of shares it held, increased its portfolio weight and increased its ownership stake in the specified firm over the previous quarter, and vice versa for sales. Thus, a holdings where the number of shares held increased, but the portfolio weight decreased, would be considered neither a purchase nor a sale.

coefficients on the connected buy and sell variables, to the difference between the coefficients on the unconnected buy and sell variables.

*i. e. Informative Trading in Connected Stocks if:*

$$(Connected\ Buy - Connected\ Sell) > (Unconnected\ Buy - Unconnected\ Sell)$$

The 5.77 percentage point difference between connected and unconnected trades is statistically significant at the five percent level. These results indicate that the trades of connected stocks are more informative than the trades of unconnected stocks.

**(Insert Table 9 about Here)**

In the previous specification, the dummy variable approach treats all purchases and sales equally. For robustness, in the second through fifth columns I distinguish between purchases and sales of different sizes. Per Black and Treynor (1973), these specifications are motivated by the assumption that the stronger the information signal the manager receives, the more aggressively they will act to capitalize on the information. Specifically, I examine only initial purchases and total sales of a stock (2), the change in portfolio weight (3), log of the dollar holdings change (4), and the change in ownership stake (5). Across all specifications, the results indicate that the purchases of connected stocks precede positive abnormal returns, the sales of connected stocks precede significantly negative abnormal returns, and the trades of connected stocks produces significantly higher returns than the trades of unconnected stocks. Furthermore, the results suggest that connected sales contain more information than connected purchases. This finding is consistent with the results of Duan, Hotchkiss and Jiao (2011) who find that large sales in pension businesses tied firms precede lower future returns, but contradicts

the results of Cohen, Frazzini and Malloy (2009) who find only positive information is transferred through education connections.

For robustness, I also calculate abnormal returns using the Daniel, Grinblatt, Titman and Wermers (1997) (DGTW) characteristic based benchmarks.<sup>27</sup> Specifically, the abnormal return is calculated by subtracting the return of an equal-weighted benchmark portfolio composed of all stocks in the same size, value and momentum quintile as the specified stock, from the return of the specified stock.

**(Insert Table 10 about Here)**

The results presented in Table 10 show that the trading return results are robust to calculating returns using the DGTW-adjusted benchmarks. In all five specifications, the returns of connected purchases are significant larger than the returns of connected sales, and the trades of connected stocks produces larger returns than the trades of unconnected.

Next, for robustness, I measure the abnormal returns associated with connected trading using a calendar time portfolio approach. This approach measures the returns one would earn by forming portfolios that replicate the trades fund managers make in connected stocks.<sup>28</sup> Each quarter, all fund-firm holdings are assigned to one of four portfolios based on their connection status (Connected, Unconnected) and their trading status (Buy, Sell). The quarterly abnormal return of each stock is

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<sup>27</sup> "The DGTW benchmarks are available via <http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm>"

<sup>28</sup> Because mutual funds typically disclose their quarterly stock positions to the public with a 60 day lag, this does approach does not represent a trading strategy that can be implemented real time. In results not shown, I find that majority of abnormal returns associated with connected trading take place during the 60 day grace period before the trade is revealed to the public.

calculated by subtracting the return of the appropriate DGTW benchmark (based on the stock's size, book value and return momentum quintiles), from the return of the stock. The portfolio returns are then calculated by weighting the abnormal returns of each stock within the portfolio equally (Buy, Sell), or by their change in portfolio weight, log change in dollar holdings or change in ownership stake, as specified.<sup>29</sup>

**(Insert Table 11 about Here)**

The results presented in Table 11 suggest that portfolios composed of connected stocks fund's purchase earn positive abnormal returns. Similarly, portfolios composed of the connected stocks fund's sell earn significant negative abnormal returns, ranging from -4.1 percent to -4.9 percent over the following quarter. The connected trading portfolio, i.e., the portfolio that is long connected purchases and short connected sales, produces positive abnormal returns in all specifications, ranging from 5.3 (t=1.96) to 7.9 (t=2.67) percent per quarter depending on the specification. Furthermore, the connected trading portfolio outperforms the unconnected trading portfolio in all specifications.

### 5.3 Earnings Announcement CARs Following Stock Purchases and Sales

If fund managers trade on information, they should make the majority of their returns when information asymmetry is the highest. In line with Cohen, Frazzini and Malloy (2008), who find 91 percent of the premium earned from education connections is earned in the days surrounding corporate news announcements, I examine the returns of connected stocks around earning announcements.

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<sup>29</sup> Due to a limited number of observations, I do not include portfolios weighted by the Initial Buy/Complete Sell measure.



Table 12 repeats the pooled OLS analysis of the previous section with the exception that the dependent variable is the cumulative abnormal returns (CAR) in the days surrounding the earnings announcements of the firm in quarter  $t+1$ . To calculate abnormal returns a window of seven trading days  $[t=-1, t=5]$  around the scheduled quarterly earnings announcement is used. The date of the earnings announcement is obtained from the Compustat database. Each day, the abnormal return is computed by subtracting the return of the CRSP value-weighted portfolio from the return of the firm's stock. To calculate the CAR, I sum the abnormal returns over the seven days.

**(Insert Table 12 about Here)**

The results presented in Table 12 suggest that fund trades anticipate the earnings announcements of connected stocks. The earnings announcement CARs following the purchases of connected stocks are significantly larger than the earnings announcement CARs following the sales of connected stocks. Furthermore, in all specifications the trades of connected stocks significantly outperform the trades of unconnected stocks.

Next, I use a calendar time approach, to measure the earnings announcement CAR  $[t-1, t+5]$  associated with connected trading. The results presented in Table 13 suggest that the portfolios composed of connected purchases earn positive earnings announcement CARs. These returns range from 1.6 percent to 2.1 percent per quarter, and their statistical significance ranges from marginally ( $t=1.53$ ) to highly ( $t=3.08$ ) significant. Similarly, portfolios composed of the connected stocks fund's sell earn negative earnings announcement CARs, ranging from -0.6 percent to -1.5 percent over the following quarter. The connected trading portfolio, i.e., the portfolio that is long connected purchases

and short connected sales, produced significantly positive CARs in all specifications. Furthermore, the connected trading portfolio outperforms the unconnected trading portfolio across all specifications. These results provide further support that funds trade informatively in the stock of connected firms.

**(Insert Table 13 about Here)**

#### 5.4 Trading Returns in Director Connected Stocks before the Connection Formation

The finding that funds overweight their holdings in firm-first connected stocks before the formation of the connection suggests that a common factor drives director selection and portfolio choice. In light of previous research that points to other fund-firm connections that facilitate private information transfers (Coval and Moskowitz (2001) and Cohen, Frazzini and Malloy (2008)), this section explores if the observed informed trading in director connected stocks also extends to the period before the connection. If so, the informed trading or a preexisting communication network may drive the connection formation. Conversely, finding no informed trading in the period before the connection will provide evidence that the director connection is the cause of the observed informed trading.

**(Insert Table 14 about Here)**

The results presented in Table 14 expand upon the OLS regression model used in the previous section by introducing two independent variables that identify purchases and sales of connected stocks, before the fund connects to those stocks. Due to the noisiness of return data (relative to holdings data), I analyze trading in the entire preconnected period, rather than the two-year preconnected period used

in the holdings analysis.<sup>30</sup> Panel A of Table 14 presents the results of the OLS regressions when the dependent variable is the abnormal return calculated using the CRSP Value Weighting Index. In Panel B, the dependent variable is the seven day  $[t=-1,t+5]$  cumulative abnormal return following earnings announcement. The results across all specifications paint a consistent picture; funds trade more informatively in the stock of connected firms when they are connected to those firms compared to the period before they are connected to those firms. Although not shown for brevity, these results are robust to using DGTW adjusted abnormal returns as the dependent variable and a calendar time portfolio approach.

In the preconnected period, I find that funds are more likely to hold the stock of connected firms, but do not trade informatively in these firms. This result is consistent funds having a familiarity bias towards the firms from which they select their directors. However, following the formation of the director connection, the nature of the fund-firm relationship seems to change. Funds become more selective in their holdings of director connected stocks, and trade informatively in these stocks. This finding suggest that the director connection, and not a common factors that drives director selection and informed trading, causes the observed informed trading in director connected stocks.

## **VI. Results: Cross-Sectional Trading Return Tests**

The fund boardroom is essentially a black box. The results of this paper suggest that connected directors enter that box, and managers exit it in possession of private information. Yet, the nature of their interaction remains unclear. Despite the boardroom's opaqueness, we can gain insight into the

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<sup>30</sup> Using a two-year preconnected period leads to similar coefficient estimates, but a lower level of statistical significance, compared to using the entire preconnected period.

mechanisms that drive boardroom information transfers by exploring where connected trading returns are the strongest (and weakest). For example, consider the introduction of a new regulation. If connected trading returns weaken after the introduction of the regulation, we can infer that subject targeted by the regulation is related to connected information transfers. In this section, I examine how connected trading returns vary by information environment, regulatory regime, fund, firm and director.

First, I examine if connected trading returns are higher in informationally opaque environments. If connected investors trade on private information, they should capture larger returns when information asymmetry is greater. I use the dispersion in analyst quarterly earnings forecasts to measure the information opaqueness of each stock. Each quarter, I classify firms above the median dispersion level as “High Dispersion” firms. To test if connected funds earn higher trading returns in high dispersion environments, I supplement the previously developed OLS regression model used in Table 9 to include a “High Dispersion” dummy variable that interacts with the connected buy and sell variables. If connected trading returns are different in the high and low dispersion environments, then the connected trading interaction - defined as the difference between the coefficient on the connected buy\*High Dispersion interactive variable and the coefficient on the connected sell\*High Dispersion - will be significantly different from zero. An alternate explanation for the existence of cross-sectional differences in returns is that the trading returns of all funds, not just the connected funds, vary by information environment. To address this concern, I also interact the High Dispersion variable with the unconnected buy and sell variables, and refer to the difference between these interactions as the Unconnected Trading Interaction. If the Connected Trading Interaction is significantly larger than the

Unconnected Trading Interaction, then we can conclude the cross-sectional effect is unique to the trading of connected stocks.

**(Insert Table 15 about Here)**

The first column of Table 15 presents results when the High Dispersion variable is introduced to the OLS regression model. The Connected Trading Interaction is positive and statistically significant, which suggests that funds captured larger trading returns in informationally opaque environments. Furthermore, the Connected Trading Interaction is significantly larger than the Unconnected Trading Interaction, which suggests that the result is not driven by all funds trading more informatively in these environments.

Next, I examine the impact the Regulation Fair Disclosure rule of August 2000 - hereafter referred to as RegFD - had on the trading returns of connected stocks. RegFD sought to reduce information asymmetry among investors by limiting selective disclosure of information by publicly traded companies.<sup>31</sup> If RegFD was effective, and mechanisms that drive boardroom information transfers are of the nature targeted by RegFD, we would expect to find that trading returns in director connected stocks are lower in the post RegFD period.

The second column of Table 15 presents results when a dummy variable Post RegFD variable – which indicates if the period is after the implementation of RegFD - is introduced into the OLS regression model. The Connected Trading Interaction is positive and statistically significant at the ten percent level, and is significantly larger than the Unconnected Trading Interaction. This result suggests that connected

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<sup>31</sup> “Final Rule: Selective Disclosure and Insider Trading.” <http://www.sec.gov/rules/final/33-7881.htm>

investors are able to extract information from meetings with firm executives in the post RegFD environment.

This finding raises the question, how do investors profit if not through the selective disclosers targeted by RegFD? Solomon and Soltes (2013) also find evidence that investors obtain private information from one-on-one meetings with firm management in the post RegFD period, and propose a mosaic theory of investing to explain it. The mosaic theory posits that the information gained from meetings is not valuable in and of itself. Instead, investor ability or additional pieces of information are required to profit

If a mosaic theory of investing also drives boardroom information transfers, we should observe that more skilled fund managers earn higher returns in connected stocks. Berk and Green (2004) present evidence that suggests a competitive market for capital provisions exists in which larger funds have more skilled managers. Consistent with Berk and Green (2004), I use fund size to proxy for the skill of the fund's manager. The third column of Table 15 introduces a cross-sectional dummy variable "Large Fund" – which indicates if the fund is larger than the median sized fund in the specified quarter - to the regression model. The Connected Trading Interaction is positive, statistically significant, and significantly larger than the Unconnected Trading Interaction. Under the assumption of a competitive market for capital provisions, this result suggests that skilled fund managers capture larger trading returns in connected stocks.

While the results of the RegFD and Large Fund cross-sectional analysis are consistent with a mosaic theory of investing, they are a necessary but not sufficient condition in proving that the mosaic

theory drives boardroom information transfers, and do not rule out the possibility that alternate mechanisms are responsible for the transfers. The fund boardroom is ultimately a black box, and any attempt to determine how managers acquire information in director connected firms should be approached with caution.

Next, I examine if fund and firm connectedness are related to connected trading returns. Presumably, if a fund trades profitably in a connected stock, they should hoard connections, leading to the observation that funds with many connections have higher connected trading returns. The fourth column of Table 15 introduces the dummy variable “Highly Connected Fund” – which indicates if the fund has more than the median number of director connections in a specified quarter - into the regression model. The Connected Trading Interaction is positive, statistically significant, and is significantly larger than the Unconnected Trading Interaction, indicating that funds with many director connections trade more profitably than funds with fewer director connections. Similarly, if funds tend to trade profitably in a certain connected firm, other funds will seek out connections to that firm, leading to the observation that funds trade more profitably in firms with many director connections. The fifth column of Table 15 introduces the dummy variable “Highly Connected Firm” – which indicates if the firm has more than the median number of director connections in a specified quarter – to the regression model. Again, the Connected Trading Interaction is positive, statistically significant, and is significantly larger than the Unconnected Trading Interaction. This result indicates that funds trade more profitably in firms with many director connections and implies a relationship between connected trading returns and the career concerns of the connected director. Section XII explores the relationship between connected trading returns and director career concerns in more detail.

Lastly, the sixth column of Table 15 uses executive ownership data contained in the Compustat ExecuComp dataset to explore the relationship between connected director ownership stakes in their firms and connected trading returns. To test this relationship, I introduce a dummy variable “High Executive Ownership” – which indicates if the connected director owns more than the median ownership stake among connected directors in the specified quarter - into the regression model. In this specification, the Connected Trading Interaction is negative and is significantly smaller than the Unconnected Trading Interaction. This result suggests that funds earn larger trading returns in connections in which the director forming connection has a low ownership stake.

## **VII. Results: Director Career Concerns and the Director Network**

With an average annual compensation of approximately \$258,000,<sup>32</sup> fund directors have an interest in preserving their board appointments. In contrast to previously examined information networks (e.g. geographic and education networks) where it is unclear what incentives the information source has to facilitate information transfers, career concerns provide a possible incentive mechanism for the director to facilitate information transfers to funds.

This section uses pooled OLS regressions to examine the relationships between information transfers and director career concern outcomes. The level of observation is the year-director-FC. An observation exists for each year a director was on the board of a FC. The dependent variable, Left FC, is a dummy variable that identifies if the director leaves the FC’s board in year t+1. The independent variables of interest gauge the information transfers that occur between the fund and firm. Because information transfers are unobservable, I focus on fund holdings and trading returns in the connected

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<sup>32</sup> Sterngold, J. (2012, June 6). Is Your Fund’s Board Watching Out for You? *The Wall Street Journal*. Retrieved from <http://online.wsj.com/article/SB10001424052702303753904577450243418998540.html>



director’s stock to proxy for the level of information transfers facilitated by the connected director. Specifically, I posit that the frequency with which a fund holds the connected director’s stock and the trading returns they capture from the stock is positively associated with information transfers. The first independent variable, Proportion Held, measures the proportion of quarters in the previous three years<sup>33</sup> that the funds, within the director’s FC, held the connected stock. The second independent variable, Trading Return, measures the cumulative DGTW abnormal return gained by the FC from trades in the connected stock over the previous three years. For example, if a fund sold a connected stock, and the stock subsequently earned an abnormal negative return of negative five percent, positive five percent would be counted towards the FC’s cumulate trading return in that stock and vice versa. The third independent variable, EA Trading CAR, measures the earnings announcement CAR gained, by the FC, from trades in the connected stocks over the previous three years.

To control for director specific factors that influence future career concerns, I include a dummy variable that identifies if the director leaves his outside firm, a variable that measures the director’s tenure at the FC, and a dummy variable that identifies if the director has been at the FC since its formation. To control for firm specific factors, I include the log of the director’s firm’s market capitalization and its return for the year. Additionally year fixed effects are included and standard errors are clustered at the year level.

$$Career\ Outcome_{Director,FC,T} = B_0 + B_1 InformationTransfer + Controls + FE_T + \varepsilon_{Director,FC,T}$$

**(Insert Table 16 about Here)**

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<sup>33</sup> For each variable, if the director has been at the fund less than three years, then the time between them joining the FC and the year of the observation is used. For example, if Jane Doe joined Windsor Fund Company in 2003, the 2004-Jane Doe-Windsor observation would focus only on holdings and trading returns in 2003 and 2004, and exclude holdings and trading returns from 2002.

The first column of Table 16 presents results of an OLS regression when the dependent variable is Left FC, and the independent variable of interest is Proportion Held. The coefficient on the Proportion Held variable is positive but statistically insignificant, indicating that how often a FC holds the stock of the director's firm, is unrelated to the probability that the director leaves the FC. The second column includes the Trading Return variable to measure the impact of fund trading returns in the connected director's stock on the directors career concerns. The coefficient on the trading returns variable takes a value of -3.60 ( $z=-3.13$ ), indicating a FC's trading returns in a connected stock are negatively related to the probability the director forming the connection leaves the FC. The third column examines the asymmetric impact of trading returns on director career concerns. The trading return variable is split into two new variables, Positive Trading Return and Negative Trading Return. The Positive Trading Return takes the value of the Trading Return variable if it is positive, and zero otherwise. Similarly, the Negative Trading Return takes the absolute value of the Trading Return variable if it is negative and zero otherwise. The results of the regression show that the coefficient on the Positive Trading Return variable is negative but statistically insignificant, while the coefficient on the Negative Trading Return variable is positive and statistically significant at the ten percent level. These results suggest that positive trading returns in the director's firm by the FC are associated with positive career outcomes for the director, but negative trading returns are associated with negative career outcomes for the director. The fourth and fifth column of Table 16 measure the impact of returns around earnings announcements on the career concerns of the director. The results of these regressions are consistent with the results when the of the Trading Return variable is used; EA Trading CAR in the directors firm is positively related to the directors career concerns.

A situation exists within funds where the director controls something the fund will benefit from – private information – and the fund controls something the director will benefit from – board appointments. Taken together the results of this section suggest the existence of a quid pro quo relationship within funds where private information is exchanged for board appointments. This finding adds to the mutual fund literature, which has perviously identified quid pro quo relationships at funds in the context of the stale-price trading scandal of 2003 (McCabe (2009)) and fund contracting decisions (Cohen and Schmidt (2009) and (Kuhnen (2009))).

### **VIII. Conclusion**

This paper investigates the impact of fund directors, who are simultaneously executives at publicly traded companies, on the portfolio decisions of the fund. It presents evidence that suggests funds take larger positions in the stock of their director's firm. With respect to investment performance, it finds that purchases of the director's stock anticipate positive returns and earnings announcements for the firm, and that sales of the director's stock anticipate negative returns and earnings announcements for the firm. As a corporate executive is likely to possess private information about his firm, this finding suggests that the presence of the director facilitates a transfer of private information from the firm to the fund.

Because funds actively select their directors, any study of mutual fund directors is susceptible to endogeneity. To control for endogeneity, the paper identifies instances when an established director changes jobs. While a fund has control over the firm that employs the director, when they first hire the director, they have little control over where the director will work in the future. The results suggest that when a director changes jobs, funds increase their holdings in the director's new firm. This finding

suggests that the director connection causes the fund to alter investment decisions in the connected firm. Similar endogeneity concerns exist with respect to informed trading in connected stocks. The results suggest that informed trading by funds, in connected firms, is limited to the years the fund and firm are connected, and does not occur before the connection period. This finding suggests the director connection causes the observed informed trading in the connected stock.

Being a mutual fund director is a desirable position. As a result, directors have an incentive to preserve their board appointments. The paper addresses if bias holdings and informed trading in a connected stock is associated with positive career concern outcomes for the director who forms the connection. The results of the paper suggest that the more profitably a fund trades in a connected stock, the more likely the director will retain their board appointment at the fund.

That director connections influence fund investment decisions has wider implications for the mutual fund industry. Over the past two decades, there has been a push towards more independent fund boards with the intent of improving fund governance quality. However, more directors who are independent, means more directors who are simultaneously employees of publicly traded firms, and thus more potential for directors to influence the fund beyond their formal monitoring responsibilities. Overall, the results of this paper suggest legislation requiring independent directors has led to unintended consequences at the fund.

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Table 1: Sample Overview  
 Summary Statistics: Director Connections, 1994-2011

Panel A: FC Level Data	Mean	Median	Min	Max	N
FCs per Year	877	893	659	1036	18
FCs with at least one connection per Year	157	153	87	207	18
FC Connections per Year	213	211	107	321	18
Connections per FC Company per Year	1.34	1.31	1.02	1.84	18
Panel B: Mutual Fund Level Data	Mean	Median	Min	Max	N
Mutual Funds per Year	2403	2604	1238	2933	18
Mutual Funds with at least one connection per Year	410	424	122	537	18
Mutual Fund Connections per Year	645	596	182	1131	18
Held Mutual Fund Connections per Quarter	31	22	1	107	72
Unheld Mutual Fund Connections per Quarter	614	579	169	1050	72
Connections per Mutual Fund per Year	1.53	1.44	1.06	2.29	72
Held Connections per Mutual Fund per Quarter	0.07	0.06	0.01	0.21	72
Unheld Connections per Mutual Fund per Quarter	1.46	1.40	0.92	2.16	72

Note - Table 1 reports summary statistics for the sample. Panel A presents data at the FC level. Results are present at the quarter or year level as specified. Panel B presents data at the Mutual Fund level. Most Fund Companies are comprised of many mutual funds, with an average of approximately three.

Table 2: Connected Firm Characteristics  
 Summary Statistics: Director Connections, Firm Data, 1994-2011

Panel A: Firm-Connections	Mean	Median	Min	Max	N
Percent of S&P 1500 Connected per Year					
of Stocks	2.52	2.68	0.52	3.34	18
of Total Market Value	5.43	5.11	1.11	9.64	18
Percent of S&P 1500 Connected & Held per Quarter					
of Stocks	0.44	0.62	0.07	0.79	72
of Total Market Value	1.67	1.51	0.13	5.62	72
Panel B: Connected Firm Size (\$Billions)	Mean	Median	Min	Max	N
Connected Firm Size per Year	12.77	12.57	3.41	27.36	18
Average Firm Size in S&P 1500 per Year	5.85	6.36	2.30	8.46	18
Held Connected Firm Size per Quarter	22.01	21.66	4.14	53.49	72
Unheld Connected Firm Size per Quarter	10.78	9.52	2.55	29.61	72

Note - Table 2 presents summary statistics on the scope of connected firms, the size of connected firms and the funds that hold connected firms. Panel A shows the proportion of S&P 1500 stocks that are connected to funds, and the proportion of S&P 1500 stocks that are held by at least one connected fund. The data is presented as the proportion of stocks and as the total market value of all stocks. Panel B shows the market capitalization of connected firms, held connected firms and stocks within the mutual fund sample, expressed in billions.



Table 3: OLS Regression: The Holdings of Connected Stocks

	(1)	(2)	(3)	(4)
Connected Dummy	0.00220 5.35	0.00300 7.84	0.00300 2.73	0.00300 2.31
R <sup>2</sup>	0.629	0.690	0.690	0.690
N	5493889	5493889	5493889	5493889
Controls	Yes	No	No	No
Fixed Effects	Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter
Clustered SE	Quarter	Quarter	Fund*Firm	Fund, Firm

Note - Table 3 presents results from pooled OLS regressions to measure the effect of director connections on mutual fund holdings. The unit of observation in the regression is fund-firm-quarter. The dependent variable, "Conditional Portfolio Weight," is the weight of a stock within a fund's portfolio. The independent variable of interest is a dummy variable that identifies a stock as being connected. The control variables included are the number of stocks a fund holds, the percentage of the fund's total net assets invested in the style corresponding to the stock being considered, and quintiles of market value of equity, book to market, and past 12-month return (DGTW '97). Inclusion of the control variables, fixed effects and the level of standard error clustering are specified. T-Stats are reported below the coefficient estimates.

Table 4: OLS Regression: Holdings and the Timeline of Connection Formations

	(1)	(2)	(3)	(4)
Fund-First Connected Dummy	0.0072	0.0066	0.0066	0.0066
	6.64	6.27	2.71	3.99
Fund-First Preconnected Dummy (t-2,t-1)	0.0037	0.0001	0.0001	0.0001
	1.57	0.02	0.03	0.06
Firm-First Connected Dummy	0.0010	0.0020	0.0020	0.0020
	2.88	5.21	1.43	1.83
Firm-First Preconnected Dummy (t-2, t-1)	0.0022	0.0017	0.0017	0.0017
	2.45	2.07	1.36	1.05
R <sup>2</sup>	0.629	0.690	0.690	0.690
N	5493889	5493889	5493889	5493889
Controls	Yes	No	No	No
Fixed Effects	Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter
Clustered SE	Quarter	Quarter	Fund*Firm	Fund, Firm
Fund-First Connected - Fund-First Preconnected	0.0035	0.0066	0.0066	0.0066
	0.185	0.009	0.013	0.000
Firm-First Connected - Firm-First Preconnected	-0.0011	0.0004	0.0004	0.0004
	0.245	0.690	0.797	0.764

Note - Table 4 presents results from pooled OLS regressions to measure the effect of director connections on mutual fund holdings. The analysis partitions the sample of director connections into "fund-first" director connections, where the director joined the connected firm, after becoming a director at the fund, and "firm-first" director connections, where the director joined the fund, after becoming an executive at the firm. The unit of observation in the regression is fund-firm-quarter. The dependent variable, "Conditional Portfolio Weight," is the weight of a stock within a fund's portfolio. The independent variable of interest is a dummy variable that identifies a stock as being connected. The independent variables of interest are, fund-first connected, a dummy variable that identifies a stock as being fund-first connected, firm-first connected, a dummy variable that identifies a stock as being firm-first connected, fund-first preconnected, a dummy variable that takes the value of one if the firm will become connected to the fund in the next two years, and firm-first preconnected, a dummy variable that takes the value of one if the firm will become firm-first connected to the stock in the next two years. The control variables included are the number of stocks a fund holds, the percentage of the fund's total net assets invested in the style corresponding to the stock being considered, and quintiles of market value of equity, book to market, and past 12-month return (DGTW '97). Inclusion of the control variables, fixed effects and the level of standard error clustering are specified. T-Stats are reported below the coefficient estimates.

Table 5: Matched Sample Analysis

Table 5: Matched Sample Analysis			
<hr/>			
Panel A: Fund-First Connections	t-1,t	t-1, t+1	t-1,t+2
Portfolio Weight	0.0003	0.0022	0.0030
	0.414	0.006	0.004
Exact Matching Variables	Year, Firm, Fund Style, Held	Year, Firm, Fund Style, Held	Year, Firm, Fund Style, Held
Matching Variables	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings
N	7812	7812	7812
<hr/>			
Panel B: Firm-First Connections	t-1,t	t-1, t+1	t-1,t+2
Portfolio Weight	-0.0013	-0.0009	0.0002
	0.000	0.002	0.618
Exact Matching Variables	Year, Firm Held Fund Style	Year, Firm Held Fund Style	Year, Firm Held Fund Style
Matching Variables	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings
N	25493	25493	25493

Note - Table 5 presents results from a quasi-experimental approach using the Abadie and Imbens (2002) matching estimator to estimate the average treatment effect between the treatment and control group. The approach assigns treatment and control (non-treatment) status to the formation of a director connected. Panel A focuses on fund-first director connections, Panel B focuses on firm-first connections. The level of observation is Year-Fund-Firm. Observations are matched based on common firm, year, investment style and holding status. From the set of possible matches, the closest match is selected using the nearest neighbor distance calculated between each fund-firm pair in the treatment and control group based on the portfolio weight holdings of the fund in the specified firm, the total number of holdings by the fund, the fund's size, and the fund's Styleholdings. This average treatment effect is then calculated over the over the following 1, 2, and 3 years using the change in Portfolio Weight measure as the dependent variables. P-Values are reported below the coefficient estimates, which are adjusted to be heteroskedasticity-robust.

Table 6: OLS Regression: Holdings and the Timeline of Connection Formations

Panel A: All Connections	(1)	(2)	(3)	(4)
Connected Dummy	-0.2152 -2.56	0.0124 2.59	0.0124 2.02	0.0124 1.51
R <sup>2</sup>	0.2245	0.1506	0.1506	0.1506
N	13626922	13626922	13626922	13626922
Controls	Yes	No	No	No
Fixed Effects	Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter
Clustered SE	Quarter	Quarter	Fund*Firm	Fund, Firm
Model	Logit	OLS	OLS	OLS
Panel B: Endogeneity Robustness Check	(1)	(2)	(3)	(4)
Fund-First Connected Dummy	0.3097 2.57	0.0112 1.55	0.0112 0.73	0.0112 0.69
Fund-First Preconnected Dummy (t-2,t-1)	0.5299 2.57	-0.0051 -0.37	-0.0051 -0.26	-0.0051 -0.36
Firm-First Connected Dummy	-0.2425 -2.28	0.0165 2.78	0.0165 2.13	0.0165 1.79
Firm-First Preconnected Dummy (t-2, t-1)	0.3476 4.81	0.0423 6.58	0.0423 3.88	0.0423 2.33
R <sup>2</sup>	0.2245	0.1507	0.1507	0.1507
N	13626922	13626922	13626922	13626922
Controls	Yes	No	No	No
Fixed Effects	Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter	Fund*Quarter Firm*Quarter
Clustered SE	Quarter	Quarter	Fund*Firm	Fund, Firm
Model	Logit	OLS	OLS	OLS
Fund-First Connected - Fund-First Preconnected	-0.2202 0.362	0.0163 0.287	0.0163 0.316	0.0163 0.332
Firm-First Connected - Firm-First Preconnected	-0.5901 0.000	-0.0258 0.011	-0.0258 0.022	-0.0258 0.032

Note - Panel A of Table 6 replicates the OLS regressions presented in Tables 3, when Held, a dummy variable that takes the value of one if a fund holds the stock, and zero otherwise, replaces Conditional Portfolio Weight as the dependent variable. As we are now measuring whether a fund does, or does not, hold the stock of a firm, we must include all fund-firm pairs in the sample, rather than just the firms a fund actively holds, in the regression. To maintain computational flexibility, we restrict the sample to the 318 S&P 1500 firms that at one point have a director connection to a fund. Panel B of Tables 3 replicates Table 4 using Held as the dependent variable. Inclusion of control variables, fixed effects and the level of standard error clustering are specified. T-Stats are reported below the coefficient estimates.

Table 7: Matched Sample Analysis

Table 7: Matched Sample Analysis			
Panel A: Fund-First Connections	t-1,t	t-1, t+1	t-1,t+2
Held Dummy	-0.0411	0.0845	0.0000
	0.062	0.010	1.000
Exact Matching Variables	Year, Firm, Fund Style, Held	Year, Firm, Fund Style, Held	Year, Firm, Fund Style, Held
Matching Variables	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings
N	7812	7812	7812
Panel B: Firm-First Connections	t-1,t	t-1, t+1	t-1,t+2
Held Dummy	-0.0361	-0.0068	0.0542
	0.032	0.72	0.003
Exact Matching Variables	Year, Firm Held Fund Style	Year, Firm Held Fund Style	Year, Firm Held Fund Style
Matching Variables	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings	Portfolio Weight # of Holdings Style Holdings Industry Holdings
N	25493	25493	25493

Note - Table 7 presents results from a quasi-experimental approach using the Abadie and Imbens (2002) matching estimator to estimate the average treatment effect between the treatment and control group. The approach assigns treatment and control (non-treatment) status to the formation of a director connected. Panel A focuses on fund-first director connections, Panel B focuses on firm-first connections. The level of observation is Year-Fund-Firm. Observations are matched based on common firm, year, investment style and holding status. From the set of possible matches, the closest match is selected using the nearest neighbor distance calculated between each fund-firm pair in the treatment and control group based on the portfolio weight holdings of the fund in the specified firm, the total number of holdings by the fund, the fund's size, and the fund's Styleholdings. This average treatment effect is then calculated over the over the following 1, 2, and 3 years using the change in Held as the dependent variable. P-Values are reported below the coefficient estimates, which are adjusted to be heteroskedasticity-robust.

Table 8: OLS Regression: Price Support in Connected Stocks following Negative Shocks

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	Buy Dummy	$\Delta$ Portfolio Weight	$\ln(\Delta$ Dollar Holdings)	$\Delta$ Ownership Stake	$\ln(\text{Shares}_t/\text{Shares}_{t-1})$
Connected*Sell Off	-0.0964	-0.0010	-3.0038	0.000088	-0.1013
	-2.32	-1.70	-3.07	0.80	-2.49
Connected Dummy	-0.0091	-0.0003	-0.4801	-0.000084	0.0095
	-0.22	-1.30	-0.43	-2.15	0.70
Sell Off	-0.0072	-0.0004	-0.3055	-0.000019	0.0145
	-1.02	2.87	-1.98	-0.65	2.10
Agg Ownership Change	1.7324	0.0493	50.0814	0.011070	0.7169
	11.20	9.38	13.26	10.50	5.70
Controls	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.015	0.031	0.016	0.019	0.009
N	695849	695849	695849	695849	527910

Note - Table 8 uses pooled OLS regressions to test if director connected fund provide price support for the connected firm. The unit of observation in the regression is the fund-firm-quarter, and the dependent variable is the change in fund holdings in the specified stock over the previous quarter. The measure used to gauge the change in holdings varies across model specification. In Panel A, the independent variables of interest are Sell Off, a dummy variable that takes the value of one if the aggregate mutual fund universe decreases their ownership stake in the stock by more than one percentage point over the previous quarter; Agg Ownership Change, the aggregate mutual fund universe ownership stake change over the previous quarter; Connected, a dummy variable that takes the value of one if the fund and firm are connected, and Connected\*Sell Off, the interaction of the connected and sell off variables. To control for factors other than connection status that influence a fund's trading decisions in the firm, I included variables for the firm's size, the quintile of the firm's book to market ratio, the return on the firm's stock over the three quarter prior to the specified quarter, the fund's holdings in firms in the same industry as the firm of interest, the fund's holdings in the same DGTW style as the firm of interest, the change in the firm's CRSP market weight over the previous quarter and quarter fixed effects. Standard errors are clustered at the firm level.

Table 9: OLS Regression: Informative Trading and Director Connections

	(1)	(2)	(3)	(4)	(5)
Trading Metric	Buy & Sell Dummy	Initial Buy, Complete Sell	$\Delta$ Portfolio Weight	$\ln(\Delta$ Dollar Holdings)	$\Delta$ Ownership Stake
Connected Buy	0.0207 0.53	0.1209 1.48	3.3419 1.39	0.0017 0.62	7.1955 0.73
Connected Sell	-0.0376 -2.72	-0.0533 -1.94	-1.8239 -2.62	-0.0026 -2.59	-21.8789 -3.53
Unconnected Buy	0.0008 0.70	0.0011 0.58	0.0681 1.03	0.0001 0.86	0.3818 0.76
Unconnected Sell	0.0003 0.24	0.0017 0.73	-0.0733 -1.47	0.0000 -0.09	-0.1689 -0.46
Controls	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.030	0.031	0.030	0.030	0.030
N	484734	484734	484734	484734	484734
Connected Buy - Connected Sell	0.0583	0.1742	5.1658	0.0043	29.0744
Connected Buy - Unconnected Buy	0.0199	0.1198	3.2738	0.0016	6.8137
Connected Sell - Unconnected Sell	-0.0379	-0.0549	-1.7506	-0.0026	-21.7100
(Connected Buy-Connected Sell) - (Unconnected Buy - Unconnected Sell)	0.0578	0.1747	5.0244	0.0042	28.5238

Note - Table 9 uses pooled OLS regressions to test if director connections affect mutual fund returns. The unit of observation in the regression is the fund-firm-quarter, and the dependent variable is the abnormal stock returns over the following quarter. The abnormal stock return is computed using the the CRSP value-weighted portfolio as a benchmark. In each specification, there are four independent variables of interest: connected purchase, connected sale, unconnected purchase, unconnected sale. These variables are interactive, capturing the connection status between the fund and firm, and if the fund most recently bought or sold the specified stock. Two different connection states are assigned to each fund-firm pair, connected, if a director connection exists between the fund-firm pair, and unconnected, if the fund and firm are never director connected over the sample period. The trading metric used to identify purchases and sales varies across each specification and is identified in the first row of the table. To control for factors other than the fund-firm connection status that influence future stock returns, I included variables that measure the firm's size, the quintile of the firm's book to market ratio, the return of the firm over the previous quarter, the return of the stock over the three quarters preceding the previous quarter, the stock price of the firm and quarter fixed effects. Standard errors are clustered at the firm level. T-Statistics are reported below the coefficient estimates. \*, \*\* and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 10: OLS Regression: Informative Trading and Director Connections

Trading Metric	(1)	(2)	(3)	(4)	(5)
	Buy & Sell Dummy	Initial Buy, Complete Sell	$\Delta$ Portfolio Weight	$\ln(\Delta$ Dollar Holdings)	$\Delta$ Ownership Stake
Connected Buy	0.0219	0.1165	3.0687	0.0018	8.1111
	0.54	1.34	1.21	0.63	0.81
Connected Sell	-0.0326	-0.0492	-1.3064	-0.0022	-18.7767
	-2.67	-1.90	-1.97	-2.54	-3.09
Unconnected Buy	0.0006	-0.0006	0.0840	0.0001	0.3401
	0.56	-0.34	1.23	0.82	0.74
Unconnected Sell	0.0000	0.0025	-0.0643	0.0000	0.0499
	0.04	1.29	-1.38	-0.12	0.15
Controls	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.033	0.033	0.033	0.033	0.033
N	484734	484734	484734	484734	484734
Connected Buy - Connected Sell	0.0544	0.1658	4.3750	0.0040	26.8878
Connected Buy - Unconnected Buy	0.0213	0.1171	2.9847	0.0017	7.7710
Connected Sell - Unconnected Sell	-0.0326	-0.0518	-1.2421	-0.0022	-18.8266
(Connected Buy-Connected Sell) - (Unconnected Buy - Unconnected Sell)	0.0539	0.1689	4.2268	0.0040	26.5976

Note - Table 10 uses pooled OLS regressions to test if director connections affect mutual fund returns. The unit of observation in the regression is the fund-firm-quarter, and the dependent variable is the abnormal stock returns over the following quarter. The abnormal stock return is computed using the Daniel, Grinblatt, Titman and Wermers (1997) (DGTW) characteristic based benchmarks. In each specification, there are four independent variables of interest: connected purchase, connected sale, unconnected purchase, unconnected sale. These variables are interactive, capturing the connection status between the fund and firm, and if the fund most recently bought or sold the specified stock. Two different connection states are assigned to each fund-firm pair, connected, if a director connection exists between the fund-firm pair, and unconnected, if the fund and firm are never director connected over the sample period. The trading metric used to identify purchases and sales varies across each specification and is identified in the first row of the table. To control for factors other than the fund-firm connection status that influence future stock returns, I included variables that measure the firm's size, the quintile of the firm's book to market ratio, the return of the firm over the previous quarter, the return of the stock over the three quarters preceding the previous quarter, the stock price of the firm and quarter fixed effects. T-Statistics are reported below the coefficient estimates. \*, \*\* and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.



Table 11: Calendar Time Returns of Connected Stocks: Following Purchases and Sales: 1994-2011

Trading Metric		Purchases	Sales	L/S	vs. Unconnected Trades
Buy & Sell Dummy		0.007	-0.041	0.053	0.055
	T-Stat	0.37	-2.50	1.96	1.88
	N	50	47	42	42
$\Delta$ Portfolio Weight		0.033	-0.047	0.079	0.060
	T-Stat	1.46	-2.72	2.67	1.86
	N	55	52	48	48
ln( $\Delta$ Dollar Holdings)		0.002	-0.049	0.057	0.047
	T-Stat	0.09	-2.86	2.09	1.57
	N	54	52	48	48
$\Delta$ Ownership Stake		0.012	-0.048	0.068	0.062
	T-Stat	0.52	-2.79	2.36	1.85
	N	55	52	48	48

Note - Table 11 presents calendar time portfolio returns following the purchase and sales of connected. Each quarter the holdings of each connected stock are aggregated across all funds that hold the stock. The specified trading metric is then used each quarter to identify a stock as having experienced buying or selling activity, and to weight the holdings of each stock in the purchased and sales portfolio. The abnormal stock return is computed using the Daniel, Grinblatt, Titman and Wermers (1997) (DGTW) characteristic based benchmarks. The first column presents the abnormal returns of connected stocks following stock purchases. The second column presents the abnormal returns of connected stocks following stock sales. The third column presents the abnormal return of the portfolio connected trading portfolio, i.e., a portfolio that takes a long position in connected stock purchases, and a short position in connected stock sales. The fourth column compares the connected trading portfolio to the unconnected trading portfolio. The fifth column compares the connected trading portfolio to the onceconnected trading portfolio. T-Stats and sample size are reported below the coefficient estimates.

Table 12: OLS Regression: Earnings Announcements and the Trading of Director Connected Stocks

Trading Metric	(1) Buy & Sell Dummy	(2) Initial Buy, Complete Sell	(3) $\Delta$ Portfolio Weight	(4) $\ln(\Delta$ Dollar Holdings)	(5) $\Delta$ Ownership Stake
Connected Buy	0.0121 1.01	0.0375 1.25	1.4267 1.72	0.0010 1.15	5.6745 1.72
Connected Sell	-0.0090 -1.24	-0.0139 -1.04	-0.5351 -1.24	-0.0007 -1.29	-11.8606 -3.47
Unconnected Buy	0.0006 1.13	-0.0003 -0.26	0.0163 0.41	0.0001 1.14	0.3619 1.42
Unconnected Sell	0.0012 2.18	0.0020 2.24	0.0192 0.84	0.0001 2.05	0.1954 0.98
Controls	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.023	0.023	0.023	0.023	0.023
N	484734	484734	484734	484734	484734
Connected Buy - Connected Sell	0.0211	0.0514	1.9618	0.0016	17.5350
Connected Buy - Unconnected Buy	0.0115	0.0378	1.4104	0.0009	5.3126
Connected Sell - Unconnected Sell	-0.0102	-0.0159	-0.5543	-0.0008	-12.0560
(Connected Buy-Connected Sell) - (Unconnected Buy - Unconnected Sell)	0.0217	0.0537	1.9647	0.0017	17.3686

Note - Table 12 uses pooled OLS regressions to test if director connections affect mutual fund returns. The unit of observation in the regression is the fund-firm-quarter, and the dependent variable is the earnings announcement CAR [-1,+5] over the following quarter. The date of the earnings announcement is obtained from the Compustat database. Each day the abnormal return is computed by subtracting the return of CRSP value-weighted portfolio from the return of the firm. To calculate the CAR, the abnormal returns over the seven days are summed. In each specification, there are four independent variables of interest: connected purchase, connected sale, unconnected purchase, unconnected sale. These variables are interactive, capturing the connection status between the fund and firm, and if the fund most recently bought or sold the specified stock. Two different connection states are assigned to each fund-firm pair, connected, if a director connection exists between the fund-firm pair, and unconnected, if the fund and firm are never director connected over the sample period. The trading metric used to identify purchases and sales varies across each specification and is identified in the first row of the table. To control for factors other than the fund-firm connection status that influence future stock returns, I included variables that measure the firm's size, the quintile of the firm's book to market ratio, the return of the firm over the previous quarter, the return of the stock over the three quarters preceding the previous quarter, the stock price of the firm and quarter fixed effects. T-Statistics are reported below the coefficient estimates. \*, \*\* and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 13: Calendar Time Earnings Announcement Returns of Connected Stocks: Following Purchases and Sales: 1994-2011

Trading Metric		Purchases	Sales	L/S	vs. Unconnected Trades
Buy & Sell Dummy		0.021	-0.009	0.033	0.030
	T-Stat	2.13	-1.00	2.25	1.91
	N	52	47	43	43
$\Delta$ Portfolio Weight		0.029	-0.006	0.038	0.038
	T-Stat	3.08	-0.81	2.98	2.92
	N	55	52	47	47
$\ln(\Delta$ Dollar Holdings)		0.016	-0.014	0.029	0.025
	T-Stat	1.53	-1.64	2.07	1.67
	N	56	51	49	49
$\Delta$ Ownership Stake		0.019	-0.015	0.033	0.023
	T-Stat	1.73	-1.66	2.18	1.38
	N	56	51	49	49

Note – Table 13 presents calendar time portfolio returns following the purchase and sales of connected. Each quarter the holdings of each connected stock are aggregated across all funds that hold the stock. The specified trading metric is then used each quarter to identify a stock as having experienced buying or selling activity, and to weight the holdings of each stock in the purchased and sales portfolio. The earnings announcement CARs computed from  $[-1,+5]$  over the following quarter for each stock. The date of the earnings announcement is obtained from the Compustat database. Each day the abnormal return is computed by subtracting the return of CRSP value-weighted portfolio from the return of the firm. To calculate the CAR, the abnormal returns over the seven days are summed. The first column presents the abnormal returns of connected stocks following stock purchases. The second column presents the abnormal returns of connected stocks following stock sales. The third column presents the abnormal return of the portfolio connected trading portfolio, i.e., a portfolio that takes a long position in connected stock purchases, and a short position in connected stock sales. The fourth column compares the connected trading portfolio to the unconnected trading portfolio. The fifth column compares the connected trading portfolio to the once-connected trading portfolio. T-Stats and sample size are reported below the coefficient estimates.

Table 14: OLS Regression: Informative Trading and Director Connections

Panel A: Abnormal Returns					
	(1)	(2)	(3)	(4)	(5)
Trading Metric	Buy & Sell Dummy	Initial Buy, Complete Sell	$\Delta$ Portfolio Weight	$\ln(\Delta$ Dollar Holdings)	$\Delta$ Ownership Stake
Connected Buy	0.0203	0.1206	3.3408	0.0017	7.1847
	0.52	1.47	1.39	0.61	0.73
Connected Sell	-0.0380	-0.0536	-1.8236	-0.0026	-21.8956
	-2.78	-1.96	-2.62	-2.64	-3.35
Preconnected Buy	0.0030	0.0002	-1.8972	0.0001	-10.6928
	0.16	0.02	-1.45	0.11	-5.00
Preconnected Sell	-0.0109	-0.0041	0.6985	-0.0008	6.9390
	-0.48	-0.16	0.39	-0.47	0.39
Controls	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.030	0.031	0.030	0.030	0.030
N	484734	484734	484734	484734	484734
Connected Buy - Connected Sell	0.0583	0.1742	5.1644	0.0043	29.0803
Connected Buy - Unconnected Buy	0.0173	0.1204	5.2380	0.0015	17.8775
Connected Sell - Unconnected Sell	-0.0271	-0.0495	-2.5221	-0.0019	-28.8346
(Connected Buy-Connected Sell) - (Unconnected Buy - Unconnected Sell)	0.0445	0.1699	7.7601	0.0034	46.7121
Panel B: EA CAR [t-1,+5]					
	(1)	(2)	(3)	(4)	(5)
Trading Metric	Buy & Sell Dummy	Initial Buy, Complete Sell	$\Delta$ Portfolio Weight	$\ln(\Delta$ Dollar Holdings)	$\Delta$ Ownership Stake
Connected Buy	0.0114	0.0374	1.4218	0.0009	5.6494
	0.95	1.25	1.72	1.10	1.71
Connected Sell	-0.0097	-0.0141	-0.5389	-0.0007	-11.8989
	-1.34	-1.06	-1.25	-1.38	-3.47
Preconnected Buy	-0.0025	-0.0001	-1.0956	-0.0002	-3.5167
	-0.32	-0.01	-1.49	-0.44	-2.27
Preconnected Sell	-0.0035	-0.0021	-0.0930	-0.0003	3.8807
	-0.52	-0.19	-0.16	-0.63	0.57
Controls	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.023	0.023	0.023	0.023	
N	484734	484734	484734	484734	484734
Connected Buy - Connected Sell	0.0211	0.0515	1.9607	0.0016	17.5483
Connected Buy - Unconnected Buy	0.0139	0.0375	2.5174	0.0012	9.1661
Connected Sell - Unconnected Sell	-0.0062	-0.0120	-0.4459	-0.0004	-15.7796
(Connected Buy-Connected Sell) - (Unconnected Buy - Unconnected Sell)	0.0201	0.0495	2.9634	0.0016	24.9457

Note - Table 14 uses pooled OLS regressions to test if director connections affect mutual fund returns. The unit of observation in the regression is the fund-firm-quarter, and the dependent variable is the earnings announcement CAR [-1,+5] over the following quarter. The date of the earnings announcement is obtained from the Compustat database. Each day the abnormal return is computed by subtracting the return of CRSP value-weighted portfolio from the return of the firm. To calculate the CAR, the abnormal returns over the seven days are summed. In each specification, there are four independent variables of interest: connected purchase, connected sale, onceconnected purchase, onceconnected sale. These variables are interactive, capturing the connection status between the fund and firm, and if the fund most recently bought or sold the specified stock. Two different connection states are assigned to each fund-firm pair, connected, if a director connection exists between the fund-firm pair, and onceconnected, if the fund-firm are not currently connected but are connected at another time in the sample period. The trading metric used to identify purchases and sales varies across each specification and is identified in the first row of the table. To control for factors other than the fund-firm connection status that influence future stock returns, I included variables that measure the firm's size, the quintile of the firm's book to market ratio, the return of the firm over the previous quarter, the return of the stock over the three quarters preceding the previous quarter, the stock price of the firm and quarter fixed effects. T-Statistics are reported below the coefficient estimates. \*, \*\* and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 15: OLS Regression: Cross-Sectional Tests of Informed Trading in Connected Firms

Market Adjusted Returns	(1)	(2)	(3)	(4)	(5)	(6)
Interaction Variable	High Dispersion	Post RegFD	Large Fund	Highly Connected Fund	Highly Connected Firm	High Executive Ownerhip
Connected Buy*Interaction	0.0507 1.01	0.0494 0.88	0.0398 1.44	0.1247 2.28	0.0657 1.51	-0.0477 -0.83
Connected Sell*Interaction	-0.0478 -1.49	-0.1135 -1.34	-0.0216 -1.87	0.0581 1.77	-0.0231 -0.67	0.0154 0.63
Connected Trading Interaction	0.0985***	0.1629*	0.0614**	0.0665**	0.0889*	-0.0631*
Connected Trading Interaction - Unconnected Trading Interaction	0.1097***	0.1628*	0.0613**	0.0661*	0.0822*	-0.0630*

Note - Table 15 uses pooled OLS regressions to test if the impact of director connections on informative trading varies in the cross-section. The model adds cross-sectional variables that interact with the connected buy and sell dummy variable to the previously developed OLS regression model. The stock's value weighted adjusted return in the specified quarter is the dependent variable. T-stats are reported below the coefficient estimates. \*, \*\* and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Table 16: Logit Regression: Information Transfers and Director Career Concerns

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Left FC	Left FC	Left FC	Left FC	Left FC
Proportion Held	1.084	1.071	1.338	0.795	1.050
	1.25	1.27	1.70	0.85	1.14
Trading Return		-3.600			
		-3.13			
Positive Trading Return			-11.474		
			-1.33		
Negative Trading Return			2.71		
			1.86		
EA Trading CAR				-12.938	
				-2.61	
Positive EA Trading CAR					-38.626
					-2.32
Negative EA CAR					9.04
					1.44
Pseudo R <sup>2</sup>	0.142	0.157	0.158	0.158	0.162
N	510	510	510	510	510
Model Type	Logit	Logit	Logit	Logit	Logit
Fixed Effects	Year	Year	Year	Year	Year
Clustered SE	Year	Year	Year	Year	Year
Controls	Yes	Yes	Yes	Yes	Yes

Note - Table 16 uses pooled OLS regression to examine the relationships between director facilitated information transfers and their career concern outcomes. The level of observation is the year-director-FC. The dependent variable, Left FC, is a dummy variable that identifies if the director leaves the FC's board in year t+1. The first independent variable, Proportion Held, measures the proportion of quarters in the previous three years that the fund's, within the director's FC, held the connected stock. The second independent variable, Trading Return, measures the cumulative DGTW abnormal return gained by the FC from trades in connected stocks over the previous three years. The third independent variable, EA Trading CAR, measures the earnings announcement CAR gained by the FC from trades in the connected stocks over the previous three years. For each variable, if the director has been at the fund less than three years, then the time between them joining the FC and the year of the observation is used. To control for director specific factors that influence future career concerns I include a dummy variable that identifies if the director leaves his outside firm, a variable that measures the director's tenure at the FC, and a dummy variable that if the director has been at the FC since its formation. To control for firm specific factors, I include the log of the director's firm's size, and its return for the year. Additionally year fixed effects are included and standard errors are clustered at the year level.