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Are All Independent Directors Equally Informed? Evidence Based on Their Trading Returns and Social Networks

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We study the impact of social networks on the ability of independent directors to obtain private information from their firms' executives. We find that independent directors socially connected to their firms' senior executives earn significantly higher returns than unconnected independent directors in stock sales transactions. The network effect on independent directors' trading profitability is stronger in firms with higher information asymmetry and with more powerful executives. In addition, the trading returns of independent directors previously unconnected with firm executives increase after the arrival of a connected executive and drop after the connected executive leaves the firm. Moreover, the net stock sales by connected directors predict future negative news for up to three quarters. As a comparison, the trading returns of connected and unconnected independent directors do not differ significantly in stock purchases. Taken together, our results suggest that social connections help independent directors gain access to private bad news information from firms' senior executives.

Keywords: social networks; insider trading; independent directors
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1. Introduction

We examine whether independent directors obtain and trade on firm-specific information through a special channel, their social connections with their firms' senior executives.[1] Building on research examining the effect of social networks on information sharing among the connected parties, we predict that independent directors socially connected with their firms' senior executives (chief executive officer (CEO) or chief financial officer (CFO)) obtain more firm-specific information than do independent directors without such connections. Following the literature on insider trading (Ke et al. 2003, Piotroski and Roulstone 2005, Jagolinzer 2009, Ravina and Sapienza 2010, Skaife et al. 2012), we measure the amount of firm-specific information possessed by an independent director by the returns that she earns from trading her firm's stocks.

Consistent with Fracassi and Tate (2012), our measure of social connections between directors and senior executives incorporates four aspects of their biographical information. Specifically, a director is identified as having social connections with the firm's senior executives if she and a senior executive (CEO or CFO) (1) currently work in the same entity other than the firm being examined; (2) worked in the same firm (other than the firm being examined) in the past; (3) have served in executive positions in the same not-for-profit organization such as a club, charity, or other professional organization; or (4) attended the same school during the same years. Our sample consists of 40,807 stock sales transactions and 54,593 stock purchase transactions made by 19,534 unique independent directors from 4,419 unique firms in the period from 2000 to 2010.

[1] We use the terms *social connections*, *social ties*, and *social networks* interchangeably.

We find that independent directors who have social connections with their firms' senior executives on average earn returns that are approximately 3% higher than the returns earned by unconnected directors in the 180 days after the open-market sales.[2] The results are robust to controlling for various transaction-level and director-level characteristics and firm fixed effects. The results are also robust to controlling for various firm characteristics that influence insider trading profits such as size, book-to-market ratio, board size, and the firm's corporate governance features such as board independence and institutional ownership.

In contrast, we do not find any difference in the trading returns between connected and unconnected independent directors in open-market purchases. To the extent that insiders are likely to sell firm shares when they have bad news about the firm and purchase when they have good news, our results suggest that connected independent directors acquire superior bad news information but not superior good news information from the connected executives. This asymmetric effect is likely driven by managers' strong incentives to withhold bad news information from the board out of career or compensation concerns until they have to disclose it (Berger and Hann 2007, Kothari et al. 2009, Benmelech et al. 2010, Sletten 2012). Specifically, although the incentives to delay reporting bad news to the board of directors are prevalent, they are likely mitigated by the social connections between managers and independent directors. Compared with independent directors who are socially distant, socially connected directors are likely to be friendlier and more sympathetic, and are more prone to provide advice than to monitor and interfere with management's decisions when receiving bad news information from management. On the other hand, managers would be willing to share good news information with all directors of the board to demonstrate their capability, establish their reputation and authority, and boost their compensation. As such, connected independent directors do not have an informational advantage over unconnected directors when there is good news.

If connected directors do possess an informational advantage due to greater and timelier access to executives' private information, we would expect this advantage to vary with the degree of information asymmetry between management and the board of directors. To verify this conjecture, we follow Boone et al. (2007), Coles et al. (2008), and Duchin et al. (2010) to measure information asymmetry by the degree of noisiness or uncertainty of a firm's information environment, proxied by analyst earnings forecast dispersion and stock return volatility. Empirical evidence supports our conjecture, namely, higher information asymmetry is associated with a greater impact of social ties on independent directors' trading returns in sales transactions. Meanwhile, we do not observe any systematic pattern of return difference between connected and unconnected directors in insider purchases.

In making selective disclosures between connected and unconnected directors, a manager will trade off the relevant costs and benefits. The benefits include the augmentation of friendship and increased loyalty and trust from the connected directors, which will help the manager to gain more support from the connected directors in the boardroom. The costs are also obvious: the unconnected directors that are disadvantaged in information access are likely to seek retribution and apply more stringent monitoring on the manager. We conjecture that when executives are more powerful in the firm, they will be less concerned about potential punishments from unconnected independent directors. Moreover, ex ante, the unconnected directors will be less likely to challenge powerful executives. As a result, the effect of social ties on connected directors' trading returns will be more pronounced in the presence of a powerful executive. On the other hand, if the unconnected directors are more influential in the boardroom, the executives will be more concerned about the potential punishment, and, as a result, the effect of social ties will be mitigated. We identify a powerful executive as a CEO who also assumes the position of the chairman of the board, or an executive (CEO or CFO) who has a relatively long tenure in the firm. We also assume that directors' influence in the firm increases with their tenure. Supporting our conjectures, we find that the effect of social ties is significantly stronger when the connected CEO is also the chairman of the board and when the connected CEO/CFO has a relatively long tenure, but weaker when the unconnected directors, on average, have a relatively long tenure in the firm. Consistent with these findings, we also find that unconnected directors are more likely to resign from the firm than connected directors.

To reduce the impact of potential correlated omitted variables that reflect directors' innate attributes (such as intelligence and risk preference) on our tests, we examine the impact of the establishment and the break of social ties on directors' informational advantage. Supportive results from this analysis will lend additional support to a causal link between social connections and directors' information advantage. Our evidence based on a difference-in-difference design shows that, relative to independent directors who were never connected with the firm's executives, an independent director who was previously unconnected but becomes connected with the new CEO or CFO makes a factor-adjusted

[2] Following prior research, we measure the returns for sales transactions as the post-transaction stock returns multiplied by −1, namely, the losses avoided by the director through selling the stock.

(buy-and-hold) return in stock sales that is 16.4 (15.2) percentage points higher than returns made from sales executed before the new CEO/CFO took position. Similarly, a previously connected director earns a return that is 13.7 (13.9) percentage points lower than before (after) the connected executive leaves the firm.

In our main analyses we treat each trade as an observation and examine its predictability of future returns. As an alternative test, we start by measuring news in future periods and then examine whether directors' trades are predicative of such news. This test has the advantage of including nontrade observations, which were excluded in earlier tests. Nontrade can be informative about directors' lack of information in the presence of significant news. We use stock returns in future quarters or surrounding future earnings announcement dates to proxy for news and treat nontrade as zero trading volume. We find that connected directors' net sales (i.e., sales minus purchases) can predict future bad news for up to three quarters. In contrast, unconnected directors' net sales lack such a predictive power.

In additional tests, we find that our results are robust to explicitly controlling for various firm characteristics and litigation risk. Finally, to shed light on the cost–benefit trade-off of social ties from the shareholders' perspective, we examine how the market reaction to the announcement of departure or appointment of directors and executives varies with their respective social connections to the other party. We find some evidence that the market reacts negatively to the departure of independent directors socially connected to executives and positively to the appointment of executives with social connections to incumbent independent directors. These results provide some preliminary evidence that investors perceive social connections between board members and executives as beneficial to firm value, which differs from that in prior research (e.g., Hwang and Kim 2009, Nguyen 2011, Cohen et al. 2012, Fracassi and Tate 2012) suggesting social ties to be value reducing. However, we hasten to add that the net effect of social ties between independent directors and executives warrants a more comprehensive analysis and is beyond the scope of this study.

Our study is the first to provide empirical evidence that independent directors who have social ties to firms' executives obtain more firm-specific information than those without such connections. Hermalin and Weisbach (2003) call for research to understand the inner workings of corporate boards with the notion that boards consist of individual directors with heterogeneity. Responding to this call, our study documents a specific channel through which independent directors obtain private information from management. This information channel is unique because it is outside the boardroom and yet reflects the daily interactions between corporate executives and board members. This channel also reveals the differential ability of independent directors to acquire firm-specific information, extending the work of Ravina and Sapienza (2010), who find that independent directors on average are able to obtain firm-specific information from management. The findings in this study should be of interest to managers, board directors, and regulators who are concerned with the role of social ties in corporate governance.

Our study is also related to the recent research on social networks in the capital market (Cohen et al. 2008, 2010; Hochberg et al. 2007; Brochet et al. 2014). We extend this line of research by demonstrating the information transmission role of social networks within a firm, a function that has been largely ignored in the past.

2. Prior Literature and Hypothesis

The sociology literature documents that social ties built up through shared past work experience or other nonbusiness activities foster mutual friendship and trust between the connected parties, which in turn facilitate information dissemination along the network (Marsden 1987, McPherson et al. 2001, Shane and Cable 2002). Recent research in finance provides evidence on the effects of social networks on information sharing in capital markets. For example, Cohen et al. (2008) find that fund managers hold more stocks in firms run by executives who attended the same schools as did the fund managers, and that they perform significantly better on these holdings relative to their other holdings. The evidence suggests that social networks may have facilitated information flow from firm management to fund managers. Similarly, Hochberg et al. (2007) document that better-networked venture capital firms (VCs) in investment syndication experience significantly better fund performance, presumably because they can make better use of the information provided by the investment syndication than poorly networked VCs. Research also shows that social networks affect investment decisions of industrial firms. For example, Fracassi (2014) finds that two firms that share more social connections among their key executives and directors tend to have a similar level of investment.

The information sharing effects of social networks also benefit financial analysts. Cohen et al. (2010) show that stock recommendations issued by sell-side equity analysts who have school ties to the covered firms' senior officers earn significantly higher returns than recommendations of analysts who do not have such ties. In a similar vein, Horton and Serafeim (2009) find that analysts with better social networks make more accurate and timelier forecasts.

Although recent studies investigate the information sharing effect of social ties in the capital markets, little

research examines such an effect of social ties *within* a firm. In particular, there is little research on whether social ties between firm executives and independent directors allow for more information communication, a question bearing important implications for our understanding of the behavior of directors and executives. On the basis of sociological research, we conjecture that social relationships can moderate the tension between firm executives and independent directors and hence make the executives less hesitant in sharing information. In addition, social ties lead to more frequent social interactions (McPherson et al. 2001), which, in turn, produce more opportunities for firm executives and directors to share information. Therefore, we expect that independent directors who have social ties to executives are able to gain more information than those without such ties.[3]

The only extant study that examines the informational effect of social networks between executives and directors of the board within a firm is that by Schmidt (2014). He finds that the social ties between the CEO and board members are associated with higher bidder announcement returns in acquisitions when the firm's advisory needs are high, but associated with lower returns when the firm's monitoring needs are high. These results are consistent with the notion that senior executives are more willing to share private information with independent directors with whom they are socially connected and that such information sharing can benefit shareholders in certain circumstances. Our study provides direct evidence on the information sharing effect of social networks in a more general setting.

We follow the insider trading literature and use the returns that directors earn from trading their firms' shares as a proxy for the amount of information that they possess. Thus, our main hypothesis is as follows:

Hypothesis 1. *Ceteris paribus, independent directors who have social ties to their firms' senior executives earn higher returns when trading their firms' stocks than do independent directors without such social ties.*

Note that when deciding whether to selectively share information with connected directors, the executive needs to trade off the benefits with the relevant costs. The benefits include the enhancement of the friendship and trust of the connected directors, which would increase their loyalty and support in the boardroom. On the cost side, the unconnected directors, after realizing that they are discriminated against in information disclosure, could penalize the executive by imposing more stringent monitoring. Only if the benefits outweigh the costs will the executive disclose private information to connected directors. Moreover, for the superior information of the connected directors to materialize into their superior trading returns, the connected directors need to consider the potential litigation risk. We expect the effect of social ties on directors' trading returns to be lower when the directors face higher litigation risk. We incorporate these factors into our empirical analyses in additional analyses in §5.

3. Methodology and Data

3.1. Measurement of Social Connections

We use information from the BoardEx database to construct our measure of the social connections between independent directors and firms' executives.[4] BoardEx provides detailed biographical profiles of executives and directors of public and private firms in the United States and the rest of the world from year 2000, which include information on employment history, education, and non-business-related activities (such as club memberships and charity activities). BoardEx's information sources include firms' filings with the U.S. Securities and Exchange Commission (SEC) and press releases, corporate websites, and stock exchanges, supplemented by reliable press sources such as the *Wall Street Journal* and the *Financial Times*.

Following Fracassi and Tate (2012) and Fracassi (2014), we measure social ties in four dimensions: current employment, past employment, education, and other activities. Current employment connections are present when the director and a senior executive (i.e., CEO or CFO) of the firm both take positions in another firm (e.g., both serve as board directors of another firm, or an interlocking relationship exists, where the director of the current firm is the executive of another firm and the executive of the current firm serves as a director of that firm). Past employment connections exist if the director and an executive worked together in the same firm (other than the concerned one) in the past. Educational ties exist if the director and a senior executive attended the same school in the same years.[5] Connections through other activities exist if the director and a senior executive served in executive positions in the same not-for-profit organization, such as a club, charity entity, or other professional organization.[6] Our social ties measure,

[3] Note that we do not assume that the private information will never be disclosed to unconnected directors; rather, we only argue that connected directors are likely to learn about bad news information earlier than unconnected directors.

[4] See Cohen et al. (2008) and Fracassi and Tate (2012) for more details on the BoardEx database.

[5] When only the graduation year is available for the individual, BoardEx assumes that the director studied in her school for two years prior to graduation. This relatively conservative estimate generates noise biasing against our results.

[6] We require that both the director and the executive serve in executive positions of the same organization to avoid the situation where the

Ties, is an indicator variable that equals 1 if the director shares at least one social connection with the CEO or CFO of the firm when she executes the stock trade and 0 otherwise.

3.2. Measurement of Insider Trading Profitability

We obtain insider trading information from Thomson Reuters' Insider Filing Data Feed, which contains the trading activities of all corporate insiders (such as officers and directors) as reported on SEC Forms 3, 4, and 5 since 1986.[7] Following prior research, we restrict our analyses to open-market transactions, which do not follow mechanically from option grants and hence are more likely to be information-driven.[8] In addition, we exclude sales transactions that are fully or partially related to option exercises. Finally, if an insider makes multiple transactions on the same day, we combine them and treat them as a single trade.

To compute the abnormal returns earned by directors' stock trading, we follow Jagolinzer et al. (2011) and estimate the Fama and French (1993) and Carhart (1997) four-factor model over the 180 days following each stock trade. The intercept, or alpha, of the model represents the average daily risk-adjusted return earned by the director. The choice of the 180-day estimation period is consistent with Rule 16(b) of the Securities Exchange Act of 1934 that requires insiders to surrender any profits made in short-swing trading, namely, purchasing and then selling or selling and then purchasing within six months. To be consistent with Jagolinzer (2009) and Ravina and Sapienza (2010), we also report our results using market-adjusted buy-and-hold returns, calculated by subtracting the compounded market return from the compounded individual stock return over the 180 days following each trade. For sales transactions, we multiply the abnormal returns by -1 and treat the loss avoided as the trading return.

3.3. Sampling Process and Data

Our definition of independent directors follows that of stock exchanges on which the firm is listed. We obtain this information from BoardEx, who collects the data from firms' filings with the SEC. For the period from 2000 to 2010, we identify 37,382 independent directors from 5,974 unique firms in the BoardEx database.[9] Merging with the Thomson Reuters' insider filing data results in a sample of 30,083 independent directors from 5,186 firms. We exclude observations with missing information on the identity of the CEO or CFO or on key variables used in our main analyses. We obtain all information on directors and boards from BoardEx, supplemented by data in the Corporate Library and RiskMetrics databases. We obtain financial data from Compustat, stock data from the Center for Research in Security Prices (CRSP), and analyst forecast data from the Institutional Brokers' Estimate System. Our final sample consists of 19,534 independent directors from 4,419 unique firms. In total, these directors executed 40,807 open-market sales transactions and 54,593 open-market purchase transactions in our sample period.

Table 1 displays the trading activities of each type of independent director. As shown in panel A, independent directors with ties ($Ties = 1$) make 10,760, or 26.4%, of all the sales transactions. Independent directors without ties ($Ties = 0$) make 30,047, or 73.6%, of all the sales transactions. The relative proportions of trades by the two types of independent directors are comparable to the relative proportions of the number of directors in each group (untabulated),[10] suggesting that the two types of directors do not differ significantly in the likelihood of trading.[11] In terms of trading volume, independent directors sell an average of 26,592 shares (5,000 shares at the median) with a total dollar value of \$663,988 (\$111,250 at the median) on each day of trading (note that we combine multiple trades executed on the same day). On average, unconnected independent directors trade more shares with greater value than connected directors. However, untabulated tests reveal that these differences are not statistically significant.

director or the executive is merely a common member of a large organization, making it unlikely that the director and the executive know each other.

[7] Form 3 is the initial statement of beneficial ownership of the corporate officer. Form 4 contains changes in ownership positions, such as stock purchases, sales, option grants, option exercises, gifts, or any other transaction that causes a change in ownership position. Form 5 is the annual statement of change in beneficial ownership.

[8] To be included in our analyses, we require the transaction data to be cleansed with a high level of confidence by Thomson Reuters (i.e., the cleanse indicator is *R*, *H*, or *L* in the insider filing data).

[9] Because the Sarbanes–Oxley Act (SOX) enacted in 2002 could potentially change corporate insiders' trading behaviors, in untabulated analyses we partition our sample into a pre-SOX period (2000–2001) and a post-SOX period (2003–2010) and find that the effect of social ties on insider sales returns is significant in both periods, but the difference between the two periods is not statistically significant.

[10] All untabulated analyses are available from the authors upon request.

[11] It is possible that connected directors make more profitable trades but trade less often, such that their profitability is actually indistinguishable from that of unconnected directors. To examine this issue, we run regressions of the number of trades (i.e., trading frequency) and the total trading profits (in dollar amount) made by all directors on the board per year on the proportion of connected independent directors on the board, controlling for various firm characteristics such as firm size, return on assets, leverage, book-to-market ratio, and board size. The evidence (untabulated) shows that the proportion of connected independent directors on a board is not significantly associated with the trading frequency, but is positively related to the dollar amount profit from stock sales. Thus, connected directors do not seem to trade less frequently than unconnected directors, and they do earn more profits in dollar amount. These results are consistent with our main findings based on trading returns.

Table 1 Summary Statistics of Insider Trading

	No. of trades		Shares			Value ($)		
	N	%	Mean	Std	Median	Mean	Std	Median
				Panel A: Sales				
	40,807		26,592	74,295	5,000	663,988	2,045,106	111,250
Ties = 0	30,047	73.6	27,448	75,030	5,000	686,526	2,065,216	117,573
Ties = 1	10,760	26.4	24,203	72,151	5,000	601,049	1,986,614	96,532
				Panel B: Purchases				
	54,593		8,978	28,895	1,357	88,319	278,217	15,540
Ties = 0	33,624	61.6	10,293	30,989	2,000	98,881	296,497	19,303
Ties = 1	20,969	38.4	6,869	25,034	1,000	71,383	245,146	10,745
				Panel C: Share holdings of the directors prior to each transaction				
	95,400		427,591	1,403,009	28,773	7,672,536	27,888,199	422,333
Ties = 0	63,671	66.7	482,253	1,503,736	31,206	8,855,695	30,751,190	457,658
Ties = 1	31,729	33.3	317,899	1,167,441	24,687	5,298,276	20,794,934	372,697

Notes. This table reports statistics of sales and purchase transactions made by connected and unconnected independent directors and independent directors' shareholdings prior to each transaction. The sample consists of 19,534 unique independent directors from 4,419 unique firms for the period from 2000 to 2010. The variable *Ties* equals 1 if the director shares at least one social connection with the CEO or CFO of the firm at the time of trading, and 0 otherwise. A director is identified as having social connections with senior officers in her firm if she and the CEO or the CFO of the firm (1) both took positions in another firm; (2) worked in the same firm (other than the firm being examined) in the past; (3) served in executive positions in the same not-for-profit organization such as a club, charity, or other professional organization; or (4) attended the same school in the same years.

Panel B of Table 1 summarizes the statistics of open-market purchases. Overall, the trading size of purchase transactions, measured in both number of shares and dollar amount, is significantly smaller than that of sales transactions. The evidence is consistent with the findings in the literature that insider sales are often driven by liquidity or portfolio rebalancing needs after executives accumulate a substantial amount of firm shares through stock-based compensation plans. Panel B also shows that connected independent directors tend to execute trades in smaller sizes compared with unconnected independent directors. Panel C of Table 1 reports the average shareholding of independent directors prior to each transaction. On average, connected independent directors have a smaller holding than unconnected independent directors do, and we control for shareholding (*Ownership*) in all regressions.

4. Empirical Results

4.1. Model Specification

Our base empirical model is as follows:

$$Trading\ return = intercept + \beta 1 * Ties + \varepsilon. \quad (1)$$

The dependent variable, *Trading return*, is the average daily four-factor adjusted return, or the market-adjusted buy-and-hold return (multiplied by −1 for sales), in the 180-day period subsequent to each stock trade. The unit of analysis is the individual purchase or sale transaction, aggregated by trading day. *Ties* is an indicator variable that equals 1 if the director is socially connected with the CEO or CFO of the firm when she executes the trade, and equals 0 otherwise.[12] A significant positive coefficient of $\beta 1$ will support our hypothesis. In an alternative specification, we measure *Ties* using a continuous variable, i.e., the number of social ties, and find similar conclusions.

Because the trading returns earned by directors of the same firm trading on the same day are not independent, we cluster by transaction date when calculating standard errors. In addition, we cluster by firm because directors of the same firm trading on close dates will also have correlated trading returns. Furthermore, we control for firm fixed effects by demeaning observations by firm. Ravina and Sapienza (2010) suggest that it is important to control for firm fixed effects for several reasons. First, there may be omitted firm characteristics that drive both the selection of directors and their ability to acquire information. Second, if certain corporate governance policies correlate with the existence of connected directors in a firm, then our results could be confounded by such policies. Note, however, that we explicitly control for corporate governance in the robustness analysis. Finally, including firm fixed effects allows us to control for any time-invariant differences across firms. To avoid the undue influence of extreme values, we winsorize all continuous variables at the highest and lowest one percentiles.

[12] Defining *Ties* at the time the director or the officer, whoever is later, joins the firm does not affect our conclusions. Under this alternative definition, ties established after both individuals have joined the firm (but prior to the insider trade) are not counted. In robustness tests, we find that social ties established during the tenure of the director and the officer in the firm are also associated with greater returns for stock sales by the connected director.

We include a number of control variables to isolate the effect of social ties. First, a director socially connected with other directors on the board of the firm is likely to obtain more information from these directors about the firm and about other firms whose operations may affect the current firm and its stock price. Thus, we include an indicator variable, *Internal ties*, that equals 1 if the director is socially connected with other directors of the firm and 0 otherwise. We control for the age of the director (*Age*) because older directors possibly have more business/investment experience and more information sources. We also include the tenure of the director in the firm (*Tenure*) because a longer tenure is likely to make the director more familiar with the firm's operation and the management team. We further include indicators on whether the director is on the audit committee (*Audit committee*) or on either the nomination committee or the compensation committee (*Nomin/Comp committee*). A position on one of these committees may grant the director additional privileges in accessing inside information. In addition, directors sitting on multiple boards are likely to spend less time on a single firm and obtain less firm-specific information. On the other hand, these directors are also likely to have more external social connections, which could potentially grant them more access to information about the current firm. Hence, we include an indicator *Multiboard* that equals 1 if the director sits on more than one board and 0 otherwise.[13] We include a director's shareholdings (*Ownership*) to ensure that the director has enough wealth at stake to trade on her private information and to control for the potential signaling effect of a stock trade by a large shareholder. We include *Transaction size* to control for the price impact of the trade. In addition, a larger trade by an insider also constitutes a stronger signal to other shareholders on the development of pending corporate events. Finally, we include an indicator variable, *Blackout window*, to differentiate between directors' trades executed in the blackout window and those outside of it. Jagolinzer et al. (2011) show that the average length of blackout windows is 48 days, lasting from 46 days before to 1 day after the earnings announcement. Hence, we code *Blackout window* as 1 if the stock trade occurs in the calendar-day window $[-46, +1]$, with day 0 being the quarterly earnings announcement date, and 0 otherwise. In our main tests we only control for director-level and transaction-level characteristics because we already control for firm fixed effects. In robustness tests, we further include various firm characteristics that could influence insider trading profits, and our results remain basically unchanged.[14]

4.2. Empirical Analyses

Table 2 exhibits descriptive statistics for variables used in later analyses. For brevity, we only report for the sample of sales transactions, which is the focus of most of our analyses. Several observations are noteworthy. First, the negative means of the risk-adjusted returns, *RETff180*, and the market-adjusted buy-and-hold returns, *RET180*, suggest that, on average, independent directors lose money when selling stocks. At the median, *RETff180* is negative, but *RET180* is positive. In addition, more than 40% of the independent directors have social connections with at least one other independent director on the board (mean of *Internal ties* $= 0.437$), suggesting that the board of directors tends to be closely knit. Independent directors in our sample are 60 years old on average (corresponding to the mean of *Age* $= 4.090$) and have worked with the firm for approximately seven years (corresponding to the mean of *Tenure* $= 1.98$). Approximately one-third (33.6%) of them are on an audit committee (*Audit committee*), and 43.9% are on either a nomination committee or a compensation committee (*Nomin/Comp committee*). Approximately 27% of these directors sit on at least two boards (*Multiboard*). Furthermore, we find that 27.7% of independent directors' stock sales in our sample occur in the blackout window (*Blackout window*), similar to the finding of 24% in Jagolinzer et al. (2011). Finally, in slightly over half (0.514) of the firms, the CEO is also the chairman of the board (*Dual chair CEO*).

We start our regression analysis with open-market purchases and report the results in panel A of Table 3. Note that because we demean observations by firm to control for firm fixed effects, the intercept is not reported in the regression output.[15] Results in columns I and II are based on factor-adjusted (average daily) returns, and results in columns III and IV are based on market-adjusted buy-and-hold returns. For our main interest, *Ties*, the variable measuring the difference of insider purchase returns between connected and unconnected independent directors, is not statistically different from zero in any of the regressions. Thus, the evidence suggests that connected independent directors do not have an informational advantage over unconnected independent directors in insider purchase transactions.

[13] In robustness tests, we further include the total number of external ties in the regression, measured as the (natural logarithm of the) total number of directors employed by the director's prior employers (limited to publicly traded firms only). This variable captures the potential external connections that a director has built up through past work experience. Our conclusions are not affected by including this additional control variable.

[14] In untabulated analyses we also control for industry fixed effects or remove industries with relatively more observations (the manufacturing industry and the finance and insurance industry) and find that the results are similar to those reported.

[15] Untabulated regressions without demeaning show significantly positive intercepts in all regressions, and our main results hold without demeaning.

Table 2 Descriptive Statistics of Main Characteristics for Sales Transactions

Variable	Mean	Std	P25	P50	P75	*N*
RETff180	−0.013	0.243	−0.137	−0.011	0.110	40,807
RET180	−0.007	0.305	−0.150	0.017	0.171	40,807
Ties	0.264	0.441	0.000	0.000	1.000	40,807
Internal ties	0.437	0.496	0.000	0.000	1.000	40,807
Age	4.090	0.174	3.989	4.111	4.220	40,807
Tenure	1.980	0.797	1.386	2.079	2.565	40,807
Audit committee	0.336	0.472	0.000	0.000	1.000	40,807
Nomin/Comp committee	0.439	0.496	0.000	0.000	1.000	40,807
Multiboard	0.271	0.445	0.000	0.000	1.000	40,807
Ownership	14.580	2.073	13.110	14.420	16.010	40,807
Transaction size	11.620	1.956	10.390	11.620	12.870	40,807
Blackout window	0.277	0.448	0.000	0.000	1.000	40,807
Analyst forecast dispersion	0.002	0.004	0.000	0.001	0.002	30,424
Stock return volatility	0.032	0.017	0.020	0.028	0.039	40,804
Dual chair CEO	0.514	0.500	0.000	1.000	1.000	40,807
Executive long tenure	0.512	0.500	0.000	1.000	1.000	40,807
Director long tenure	0.759	0.428	1.000	1.000	1.000	40,807
Number of ties	0.332	0.588	0.000	0.000	0.693	40,807
Size	6.408	1.808	5.250	6.274	7.557	40,807
BM	0.521	0.439	0.245	0.429	0.679	40,807
Board size	2.135	0.325	1.946	2.079	2.303	40,807
Board independence	0.738	0.141	0.667	0.750	0.857	40,807
Institutional ownership	0.609	0.331	0.346	0.674	0.919	40,807
Pret	0.294	0.746	−0.070	0.122	0.426	40,807

Notes. This table exhibits various characteristics of the trade, the director, and the firm for inside sales transactions conducted by independent directors. *RETff180* is the average daily alpha (intercept) from the four-factor Fama and French (1993) and Carhart (1997) model estimated over the 180 days following each transaction, measured in percentage. *RET180* is the market-adjusted buy-and-hold returns over the 180 days following the transaction date. For sales transactions, both return measures are multiplied by −1. *Ties* equals 1 if the director shares at least one social connection with the CEO or the CFO of the firm at the time of the trading, and 0 otherwise. *Internal ties* equals 1 if the director is socially connected with other directors in the firm, and 0 otherwise. *Age* is the natural logarithm of the director's age. *Tenure* is the natural logarithm of the director's tenure in the company. *Audit committee* equals 1 if the director is a member of the audit committee of the firm's board of directors and 0 otherwise. *Nomin/Comp committee* equals 1 if the director is a member of the compensation committee or the nomination committee of the firm's board and 0 otherwise. *Multiboard* is an indicator equal to 1 if the director is serving as a director in more than one firm and 0 otherwise. *Ownership* is the logarithm of (number of shares held by the trading director before the transaction × closing price of the day preceding the insider trading date). *Transaction size* is the logarithm of the dollar value of the transaction. *Blackout window* equals 1 if the trading occurs in the calendar-day window [−46, 1], with day 0 being the quarterly earnings announcement date, and 0 otherwise. *Analyst forecast dispersion* is the annual average of quarterly standard deviations of analyst forecasts based on individual analysts' quarterly earnings forecasts divided by stock price at the beginning of the quarter, as defined in Duchin et al. (2010). *Stock return volatility* is the standard deviation of the firm's daily stock returns in the fiscal year in which the stock trade is executed. *Dual chair CEO* equals 1 if the connected CEO is also the chairman of the board and 0 otherwise. *Executive long tenure*, for a trade by a connected director, equals 1 if the connected executive's tenure (or the longer if both executives are connected) is greater than six years (sample median), and 0 otherwise. For a trade by an unconnected director, the variable equals 1 if either the CEO or the CFO of the firm has a tenure of more than six years, and 0 otherwise. *Director long tenure* equals 1 if the average tenure of the firm's unconnected independent directors is greater than three years (median of the sample of unconnected directors), and 0 otherwise. *Number of ties* is the natural logarithm of the sum of one and the number of social ties between the concerned independent director and the CEO and CFO. *Size* is the natural logarithm of the firm's market capitalization, measured at the beginning of the year. *BM* is the book value of the firm's equity/market value of equity, measured at the beginning of the year. *Board size* is the logarithm value of the number of board members. *Board independence* is the fraction of independent directors on the firm's board. *Institutional ownership* is the fraction of the firm's ownership held by institutional investors. *Pret* is the six-month buy-and-hold return prior to the transaction date.

Panel B of Table 3 reports the results for open-market sales by independent directors. Our main variable, *Ties*, is significantly positive in all four columns using both return measures, with or without control variables. More specifically, independent directors with social connections to senior executives earn a factor-adjusted (market-adjusted buy-and-hold) return that is 3.4 (3.1) percentage points more than that earned by the unconnected independent directors during a 180-day period.[16] The evidence supports our hypothesis that independent directors socially connected with senior officers obtain superior information about the firm.[17] Although the insider trading literature finds that insider sales are in general likely to be driven by non-profit-making incentives such as liquidity needs or portfolio rebalancing, a number of studies find that insiders do sell in

[16] $3.4\% = 0.019/100 \times 180$.

[17] In an untabulated analysis, we examine the effect of each of the four types of social connections on independent directors' trading returns and find that connections developed through current employment, past employment, and other activities are all significantly positively associated with independent directors' sales returns. Connection through education is nonetheless insignificant, likely due to the relatively low frequency of occurrence (only about 1%) and low test power.

Table 3 Social Ties and Independent Directors' Trading Returns

	Dep. var.: *RETff180*		Dep. var.: *RET180*	
Variables	I	II	III	IV
	Panel A: Purchases transactions			
Ties	0.000	−0.001	−0.001	−0.001
	(0.959)	(0.775)	(0.935)	(0.883)
Internal ties		0.004		0.003
		(0.298)		(0.653)
Age		−0.004		0.011
		(0.735)		(0.508)
Tenure		0.009***		0.013***
		(0.000)		(0.000)
Audit committee		0.004		0.001
		(0.337)		(0.847)
Nomin/Comp committee		0.008**		0.003
		(0.036)		(0.627)
Multiboard		0.005		0.001
		(0.280)		(0.857)
Ownership		−0.000		−0.001
		(0.274)		(0.379)
Transaction size		−0.005***		−0.012***
		(0.000)		(0.000)
Blackout window		0.000		−0.001
		(0.925)		(0.874)
N	54,593	54,593	54,593	54,593
Adj. R^2	−0.000	0.001	−0.000	0.003
	Panel B: Sales transactions			
Ties	0.021***	0.019***	0.030***	0.031***
	(0.001)	(0.002)	(0.000)	(0.000)
Internal ties		0.007		−0.006
		(0.205)		(0.362)
Age		0.046***		0.067***
		(0.003)		(0.001)
Tenure		0.020***		0.028***
		(0.000)		(0.000)
Audit committee		−0.006		−0.004
		(0.227)		(0.551)
Nomin/Comp committee		0.002		0.002
		(0.696)		(0.756)
Multiboard		−0.003		0.007
		(0.545)		(0.216)
Ownership		0.003**		0.009***
		(0.019)		(0.000)
Transaction size		0.006***		0.010***
		(0.000)		(0.000)
Blackout window		−0.007**		−0.009**
		(0.017)		(0.022)
N	40,807	40,807	40,807	40,807
Adj. R^2	0.001	0.006	0.001	0.018

Notes. This table reports the results from regressions of independent directors' trading returns (*RETff180* or *RET180*) on *Ties* and other control variables. All variables are defined in Table 2. The standard errors are calculated by clustering by firm and transaction date. The observations are demeaned by firm to control for firm fixed effects. The *p*-values are given in parentheses.
**Significant at the 5% level; ***significant at the 1% level.

advance of negative events (Ke et al. 2003, Jagolinzer 2009, Ravina and Sapienza 2010, Skaife et al. 2012), suggesting that at least some insiders possess and trade on superior information that contains bad news. Our evidence here indicates that independent directors connected with the firm's executives are likely to be among such insiders due to their special information channels.

Notably, directors who are older (*Age*) and who have longer tenure in the firm (*Tenure*) earn higher returns in sales, likely reflecting their longer experience or better information sources. The positive coefficient on stock ownership (*Ownership*) is consistent with directors with greater wealth at stake having greater incentives to make profits from insider trading, and with the signaling effect of stock sales by large shareholders. The positive coefficient on *Transaction size* could be driven by the signaling effect and the price impact of large trades. Finally, trades executed within the blackout period (*Blackout window*) earn lower returns.

Overall, the results in panels A and B of Table 3 indicate that independent directors gain an advantage through their social ties to senior executives in accessing information that helps them avoid losses in stock sales. However, such connections do not provide the independent directors an informational advantage in stock purchases.

Notably, ample theories and empirical evidence lend support to the conjecture that the informational advantage of connected directors is more likely to be observed for bad news than for good news. This is because information asymmetry between managers and investors/boards is most severe in bad times when managers have strong incentives to hide bad news. For example, Kothari et al. (2009) note that managers face asymmetric payoffs to releasing good versus bad news. Bad news not only reduces CEO compensation, but, more importantly, leads to quicker termination of contracts, loss of postretirement benefits, and reduced future employment opportunities. Supporting this argument, Kothari et al. (2009) find that managers on average delay the release of bad news to investors. Berger and Hann (2007) also find that managers tend to withhold information of segments with relatively poor performance to avoid external monitoring. In addition, Benmelech et al. (2010) show analytically that stock-based compensation can motivate management to conceal bad news about future growth options, and various studies provide empirical evidence that mangers boost the value of their equity portfolios by accelerating the recognition of good news and/or delaying the recognition of bad news (Cheng and Warfield 2005, Bergstresser and Philippon 2006).[18]

[18] Managers also have incentives to disclose bad news early under certain circumstances such as prior to receiving stock options (Aboody and Kasznik 2000) or buying company shares (Cheng and Lo 2006), or when the litigation risk is high (Kasznik and Lev 1995, Skinner 1994). However, these incentives apply to specific situations and are less prevalent than managers' career or compensation concerns.

On the other hand, the literature on advice seeking (Rosen 1983, Ashford and Northcraft 1992) suggests that employees seeking advice from their superiors need to expose the problem and admit that they are incapable of resolving it, resulting in a loss of status in the organization. However, because socially connected directors are likely to be more sympathetic and understanding and are more likely to provide advice than to use the information for punishment purposes, managers are likely to share bad news with connected directors but withhold it from unconnected directors until they have to make the disclosure. Hence, connected independent directors are likely to have an informational advantage in bad times, leading to greater trading returns in their sales transactions compared with unconnected directors. Consistent with this view, Adams and Ferreira (2007) demonstrate that a friendly board could obtain more information from the manager by committing not to monitor the manager too intensively. Because bad news is much more likely to drive intensive monitoring than good news, the theory of Adams and Ferreira (2007) is hence likely to be more relevant for the sharing of bad news than for the sharing of good news.

5. Additional Tests

In this section, we provide cross-sectional analyses and robustness tests of the effect of social ties between independent directors and senior executives. For brevity, we only tabulate results for sales transactions and discuss the results for purchase transactions.

5.1. Social Network Effect and Information Environment

Coles et al. (2008), Linck et al. (2008), and Duchin et al. (2010) argue that the cost of obtaining corporate information is higher for outsiders when there is greater information asymmetry between management and the board. In such a situation, directors will rely more on management for accessing firm-specific information, and directors socially connected with firm executives are likely to have an informational advantage. We thus expect social ties to have a larger effect on directors' trading returns when information asymmetry between management and the board is higher. Following prior studies, we measure information asymmetry by the uncertainty in a firm's information environment and use the dispersion of analyst earnings forecasts (Duchin et al. 2010) and daily stock return volatility (Boone et al. 2007, Linck et al. 2008) as the empirical proxies. We then estimate regression Equation (1) by including the respective information asymmetry variable and its interaction with *Ties*.

Results in Table 4 show that the interaction term *Info asymmetry* × *Ties* is significantly positive for both returns measures and for both information asymmetry proxies. Specifically, a one standard deviation change of analyst forecast dispersion is associated with a 3.02 (2.27) percentage point increase of factor-adjusted (buy-and-hold) returns earned by connected independent directors in the 180-day period subsequent to their sales transactions. Similarly, a one standard deviation change of stock return volatility is associated with a 2.66 (2.16) percentage point increase of factor-adjusted (buy-and-hold) returns earned by the connected independent directors in stock sales. Hence, consistent with our expectation, higher information asymmetry is associated with a greater impact of social ties on independent directors' trading returns in sales transactions.

In untabulated analyses, we repeat the above tests for purchase transactions, but do not find a significant difference in trading returns between connected and unconnected independent directors conditional on the level of information uncertainty.

5.2. Impact of the Power of Executives

By selectively sharing information with connected directors, executives can build a stronger friendship with and win greater loyalty and trust from the connected directors, which will help the executives to gain greater support from these directors in the boardroom and more helpful advice in times of difficulty. However, the selective disclosure of information could also trigger retribution from the unconnected directors. The potential punishments that the unconnected directors can impose on the executives include tightening the monitoring, voting against the executives in board meetings, or even publicly criticizing the executives for selective disclosures. Hence, executives will trade off such costs with the potential benefits. We conjecture that executives that are more powerful and influential in the firm will be less concerned about the potential penalty from the unconnected directors. Meanwhile, independent directors are less likely to challenge powerful executives because not only is it more difficult for them to win, but doing so also may threaten their directorship in the firm. On the other hand, if unconnected directors have a greater influence in the boardroom, executives will be restrained in selective information disclosure. Empirical evidence on these conjectures will enhance our understanding of the rationale underlying the working of social ties.

We test these conjectures by employing three alternative proxies for the relative power of the senior executives. The first proxy, *Dual chair CEO*, identifies whether the firm's CEO is also the chairman of the board of directors. A CEO holding dual positions conceivably wields greater power than a CEO not holding the chairman post. The second proxy is the tenure of the CEO or CFO in the firm. Executives with a longer tenure are likely to be more networked and influential in the firm. *Executive long tenure* is an

Table 4 Social Ties and Independent Directors' Stock Sales Returns: Impact of Information Environment

	Info asymmetry = *Analyst forecast dispersion*		*Info asymmetry* = *Stock return volatility*	
	I	II	III	IV
Variables	Dependent var.: *RETff180*	Dependent var.: *RET180*	Dependent var.: *RETff180*	Dependent var.: *RET180*
Ties	0.011*	0.023***	−0.008	−0.009
	(0.084)	(0.004)	(0.484)	(0.469)
Info asymmetry	0.072	−2.102	−1.675***	−0.013
	(0.945)	(0.106)	(0.000)	(0.967)
Info asymmetry × *Ties*	4.203**	5.678***	0.871**	1.272***
	(0.017)	(0.002)	(0.017)	(0.002)
Internal ties	0.006	−0.009	0.006	−0.006
	(0.295)	(0.220)	(0.260)	(0.431)
Age	0.042***	0.055**	0.039**	0.069***
	(0.008)	(0.011)	(0.011)	(0.001)
Tenure	0.015***	0.022***	0.019***	0.028***
	(0.000)	(0.000)	(0.000)	(0.000)
Audit committee	−0.008	−0.010	−0.006	−0.004
	(0.132)	(0.211)	(0.271)	(0.521)
Nomin/Comp committee	−0.003	−0.007	0.002	0.002
	(0.547)	(0.293)	(0.661)	(0.762)
Multiboard	−0.002	0.001	−0.002	0.007
	(0.652)	(0.826)	(0.671)	(0.220)
Ownership	0.000	0.004**	0.002**	0.009***
	(0.923)	(0.017)	(0.046)	(0.000)
Transaction size	0.005***	0.008***	0.006***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)
Blackout window	−0.010***	−0.010**	−0.008**	−0.009**
	(0.002)	(0.030)	(0.011)	(0.030)
N	30,424	30,424	40,804	40,804
Adj. R^2	0.005	0.012	0.012	0.018

Notes. This table reports the results from regressions of independent directors' trading returns from sales transactions on *Ties*, the interaction of *Ties* and a proxy of information asymmetry (*Info asymmetry*), and other control variables. In columns I and II, *Info asymmetry* is measured by *Analyst forecast dispersion*, and in columns III and IV, *Info asymmetry* is measured by *Stock return volatility*. All variables are defined in Table 2. The standard errors are calculated by clustering by firm and transaction date. The observations are demeaned by firm to control for firm fixed effects. The *p*-values are given in parentheses.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

indicator variable measuring whether the executive's tenure is greater than six years, which is the sample median. The third measure, *Director long tenure*, is an indicator variable measuring whether the average tenure of the unconnected independent directors in a firm is greater than the sample median of three years. This variable gauges the relative power of unconnected independent directors in the firm based on their service tenure in the firm.

Table 5 reports the regression results. In columns I to IV, the coefficients on the interaction terms *Dual chair CEO* × *Ties* and *Executive long tenure* × *Ties* are significantly positive, suggesting that the effect of social ties on independent directors' trading returns becomes stronger as the executive becomes more powerful. On the other hand, the coefficients on *Director long tenure* × *Ties* in columns V and VI are significantly negative, indicating that a board with more powerful unconnected independent directors can constrain the selective disclosure behavior of senior executives.

Finally, an ensuing question to the above analysis is how unconnected directors would react to executives' selective disclosure behavior. An apparent option is to resign from the firm. In an untabulated analysis, we find this is indeed the case. Results from a logit model suggest that in any given year, unconnected directors are more likely to resign than connected directors. In addition, results from a Cox proportional hazards model indicate that the tenure of a connected director is significantly longer than that of an unconnected director before exiting a firm.

5.3. Establishment and Break of Social Ties

One concern with our measure of social connections is that it may capture alternative attributes of directors, such as knowledge, expertise, intelligence, sophistication, or risk preference, that may be correlated with their trading profitability. To ease this concern, we include various variables in the regression model such as age, tenure, memberships on board committees, ties

Table 5 Social Ties and Independent Directors' Stock Sales Returns: Impact of the Power of Executives

	Powerful executive = Dual chair CEO		*Powerful executive = Executive long tenure*		*Powerful executive = Director long tenure*	
	RETff180	*RET180*	*RETff180*	*RET180*	*RETff180*	*RET180*
Variables	I	II	III	IV	V	VI
Ties	0.001	0.017	0.009***	0.014***	0.060***	0.064***
	(0.913)	(0.190)	(0.332)	(0.209)	(0.000)	(0.000)
Powerful executive	−0.010	−0.007	0.015**	0.009	0.063***	0.067***
	(0.170)	(0.405)	(0.010)	(0.229)	(0.000)	(0.000)
Powerful executive × Ties	0.032***	0.024*	0.020**	0.035***	−0.051***	−0.040**
	(0.007)	(0.092)	(0.042)	(0.003)	(0.000)	(0.011)
Internal ties	0.006	−0.006	0.006	−0.007	0.006	−0.006
	(0.215)	(0.357)	(0.256)	(0.308)	(0.205)	(0.358)
Age	0.047***	0.068***	0.045***	0.067***	0.042***	0.063***
	(0.002)	(0.001)	(0.003)	(0.001)	(0.007)	(0.002)
Tenure	0.020***	0.028***	0.019***	0.027***	0.016***	0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Audit committee	−0.006	−0.004	−0.006	−0.004	−0.005	−0.003
	(0.208)	(0.531)	(0.236)	(0.533)	(0.345)	(0.684)
Nomin/Comp committee	0.002	0.002	0.002	0.002	0.003	0.003
	(0.696)	(0.756)	(0.720)	(0.807)	(0.552)	(0.649)
Multiboard	−0.003	0.007	−0.002	0.008	−0.002	0.008
	(0.498)	(0.229)	(0.606)	(0.194)	(0.701)	(0.158)
Ownership	0.003**	0.009***	0.003**	0.009***	0.003**	0.009***
	(0.019)	(0.000)	(0.019)	(0.000)	(0.016)	(0.000)
Transaction size	0.006***	0.010***	0.006***	0.010***	0.006***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Blackout window	−0.007**	−0.009**	−0.007**	−0.009**	−0.007**	−0.009**
	(0.015)	(0.021)	(0.013)	(0.018)	(0.018)	(0.022)
N	40,807	40,807	40,807	40,807	40,807	40,807
Adj. R^2	0.007	0.018	0.007	0.012	0.010	0.021

Notes. This table reports results from regressions of independent directors' trading returns from sales transactions on *Ties*, the interaction of *Ties* and a proxy of managerial power (*Powerful executive*), and other control variables. *Powerful executive* is measured by *Dual chair CEO* in columns I and II, by *Executive long tenure* in columns III and IV, and by *Director long tenure* in columns V and VI. All variables are defined in Table 2. The standard errors are calculated by clustering by firm and transaction date. The observations are demeaned by firm to control for firm fixed effects. The *p*-values are given in parentheses.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

with other directors of the firm, and directorships in other firms. In this subsection we further control for director-level characteristics by analyzing a sample of directors whose information access via social ties improves (breaks) due to the arrival (departure) of the connected executives. If the superior trading returns of connected independent directors are driven by private information that they obtain from the connected senior executives, we expect their trading returns to increase after the establishment of such ties and decrease after the ties break. On the other hand, if the superior trading returns are primarily driven by innate attributes of connected directors, we should not observe significant changes in the trading returns subsequent to the establishment or the break of social ties.

To measure the establishment of social ties, we identify a sample of firms with executive (CEO or CFO) turnovers and require the independent directors in these firms to be unconnected with the departing executive but connected with the incoming executive. In addition, the director must make at least one sales trade both before and after the executive turnover event. We then employ a difference-in-difference approach by using unconnected independent directors from the same firm as the control group. We also require directors in the control group to trade both before and after the executive turnover event. Finally, we require that each treatment director must have at least one control director. In total, we identify 15 treatment directors affected by 15 executive turnover events in 15 companies. These directors execute 123 sales trades before the event and 112 after, and they are matched with 17 control directors making a total of 187 sales trades before and 80 sales trades after the event. Columns I and II of Table 6 present the empirical results for the establishment of social ties. The indicator variable *Affected director* equals 1 if the director belongs to the treatment group and 0 otherwise. *Post* equals 1

Table 6 Social Ties and Independent Directors' Stock Sales Returns: The Effect of the Establishment/Break of Social Ties

	Test on the establishment of ties: The director was previously not connected to either the CEO or the CFO, but has social ties with the incoming CEO or CFO		Test on the break of ties: The director was previously connected with the CEO or CFO, but was unconnected with either the current CEO or CFO after the turnover event	
	RETff180	*RET180*	*RETff180*	*RET180*
Variables	I	II	III	IV
Affected director	−0.068**	−0.182***	0.039	0.116***
	(0.045)	(0.000)	(0.172)	(0.001)
Post	−0.032	0.014	0.092***	0.152***
	(0.567)	(0.862)	(0.002)	(0.000)
Affected director × *Post*	0.091*	0.152**	−0.076**	−0.139***
	(0.055)	(0.013)	(0.013)	(0.000)
Internal ties	−0.002	−0.032	0.007	0.006
	(0.957)	(0.588)	(0.790)	(0.856)
Age	0.330	0.376	0.176**	0.274**
	(0.145)	(0.278)	(0.024)	(0.039)
Tenure	0.018	0.019	−0.005	0.031
	(0.684)	(0.737)	(0.713)	(0.138)
Audit committee	0.117	0.164	−0.031	−0.033
	(0.258)	(0.153)	(0.191)	(0.382)
Nomin/Comp committee	0.031	−0.012	−0.047*	−0.019
	(0.677)	(0.902)	(0.094)	(0.628)
Multiboard	−0.027	−0.000	−0.015	−0.000
	(0.352)	(0.996)	(0.470)	(0.988)
Ownership	0.049**	0.093***	−0.006	0.004
	(0.017)	(0.000)	(0.286)	(0.669)
Transaction size	0.027**	0.066***	0.006	0.014*
	(0.016)	(0.001)	(0.254)	(0.098)
Blackout window	−0.026	−0.054	0.029	0.032
	(0.445)	(0.360)	(0.116)	(0.278)
N	502	502	1,142	1,142
Adj. R^2	0.049	0.113	0.019	0.033

Notes. This table reports results from regressions of independent directors' trading returns from sales transactions on *Affected director* and *Post*, where *Affected director* equals 1 if the director belongs to the treatment group (that is, the group of directors who had a connection either before or after the executive turnover event) and 0 otherwise, and *Post* equals 1 if the trade occurs after the executive turnover event and 0 otherwise. All other variables are defined in Table 2. The standard errors are calculated by clustering by firm and transaction date. The observations are demeaned by firm to control for firm fixed effects. The *p*-values are given in parentheses.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

if the trade occurs after the executive turnover event and 0 otherwise. The significantly positive coefficients on the interaction term *Affected director* × *Post* support our prediction that the newly established ties help the independent directors to access superior firm-specific information.

For the test of the break of social ties, we identify a treatment director as one who was previously connected with the departing CEO/CFO but is not connected with either the firm's CEO or CFO after the replacement. To be included in the sample, the treatment director must have at least one control director who works in the same firm and whose connection with the CEO/CFO is not affected by the executive turnover. In addition, all directors in the sample must make at least one sales trade both before and after the turnover event. These requirements result in 53 treatment independent directors matched with 54 control independent directors corresponding to 47 executive turnover events in 40 firms. The treatment directors make 261 sales trades before and 301 sales trades after the event, and the control directors make 255 and 325 sales trades, respectively. We estimate a regression model similar to that for the establishment of ties above, except that *Affected director* and *Post* are now defined for the executive departure events.

Columns III and IV of Table 6 report the regression results. The significantly negative coefficients on *Affected director* × *Post* suggest that independent directors losing social ties due to departure of the connected executive suffer a deterioration of information access and make lower inside sales returns after the executive turnover. As a comparison, we perform a similar analysis for insider purchases and find that neither the establishment nor the break of social ties affects connected independent directors' insider purchase

returns (untabulated). Additionally, in an unreported analysis we also add trading by the CEO or the CFO as a control benchmark in the above tests and find that our conclusions remain similar. Overall, the evidence in this subsection corroborates our main findings in §4.

5.4. Connected Directors' Trading and Future News

Our results above are conditional on the occurrence of trade by directors, and the nontrade, which would reveal directors' lack of information, is excluded from the analysis. In this section we perform a test in which we first measure future news and then examine whether directors' trades are predicative of such news.[19] Although connected directors' superior information could be related to various aspects of the firm such as operation, financing, investing, and strategies, eventually it will be reflected in the firm's future earnings and stock returns. We calculate the number of shares traded by directors over the period between two earnings announcement dates. Directors who do not trade in the concerned period are coded to have zero trading volume. However, we do require that firms in this analysis have at least one connected director and one unconnected director that, respectively, made at least one trade in the three-year period surrounding the concerned quarter to ensure that the treatment and control directors of the firm have the potential/capacity to trade upon obtaining news. Then, we follow Jagolinzer et al. (2011) and use the three-day, i.e., $[-1, +1]$, CAR, surrounding the earnings announcement date to measure the news in the forthcoming earnings announcement ($CAR3_t$). News in still future periods (say, quarter $t+1$) is measured by factor-adjusted returns over the period from the second day of the current earnings announcement date (announcement made in quarter $t+1$ about earnings in quarter t) till one day after the next earnings announcement date (announcement made in quarter $t+2$ about earnings in quarter $t+1$).[20, 21]

Table 7 exhibits the empirical results. Panel A shows that the net sales (i.e., shares sold minus shares purchased, scaled by total shares outstanding) by connected directors in quarter t ($Connected\ sales_t$) are significantly negatively associated with the news in the forthcoming quarterly earnings announcement ($CAR3_t$), and they also predict negative news in quarters $t+1$ ($CARffQ_{t+1}$) and $t+3$ ($CARffQ_{t+3}$). The relation is insignificant for quarter $t+2$ though. Results in still future periods are not significant (untabulated). As such, the superior information possessed by connected independent directors seems to be related to relatively short-term performance of the firm. In contrast, the net sale by unconnected directors is either insignificantly correlated with future news or correlated in the opposite direction. The positive relation between net sales by unconnected directors and future news in quarters $t+2$ and $t+3$ is consistent with the evidence in Ravina and Sapienza (2010) that independent directors on average make a loss in insider sales. *F*-tests show that the difference in the strength of the trading–news relation between connected and unconnected independent directors is also statistically significant for both the forthcoming earnings announcement and for news measured over quarters $t+1$ and $t+3$. In panel B we examine the trading–news relation separately for sales and purchases. The evidence corroborates that in panel A: stock sales by connected directors are more strongly associated with future negative news than stock sales by unconnected directors. Although stock purchases by connected directors can significantly predict positive news in the forthcoming earnings announcement, the difference of the predictive power between connected and unconnected directors is not statistically significant.

[19] We conduct three alternative analyses (untabulated) by examining directors' trading prior to significant news. First, following Ravina and Sapienza (2010), we define significant bad (good) news as the top 10% drops (increase) in the firm's four factor-adjusted stock returns during the 2000–2010 period. We find that, consistent with our main results, connected directors earn significantly greater returns than unconnected directors in the 180 days prior to the bad news but not prior to the good news. To further investigate the timing advantage of connected directors, we examine the association between social ties and a variable that captures early insider sales preceding significant news, measured as the fraction of sales (in either number of shares or dollar value) executed by a director in the $(-180, -90)$ period over the total amount of sales by the director in the $(-180, 0)$ period. We find a positive association for bad news, but not for good news, suggesting that connected directors know and trade on bad news earlier than do unconnected directors. Finally, we also find that social ties are positively associated with sales returns prior to extraordinary bad news related to earnings, measured as earnings announcements with a three-day cumulative abnormal return (CAR) lower than −2% (following Ravina and Sapienza 2010). We do not report these results as our main findings because the bad news returns identified beforehand could confound insiders' trading returns as an information measure (although affecting both connected and unconnected directors).

[20] Using buy-and-hold returns yields similar results.

[21] For periods that are two quarters or more into the future, tests based on earnings forecast errors could potentially be confounded by noise because it is difficult to identify a proper earning expectation benchmark as related to directors' trading. Time-series models such as the seasonal random walk model provide earnings expectations that are relatively stale compared to directors' trading measured in the current quarter. It is also difficult to select a proper measurement time if we use analyst forecasts to calculate the earnings expectation. Potentially because of the measurement noise, we do not find significant evidence when using forecast errors of future quarters. In untabulated tests we use only three-day CARs surrounding future earnings announcement dates to measure earnings news and find results similar to those reported. A potential problem with this short-window approach is that a significant amount of earnings-related news has been leaked out by the earnings announcement date (Ball and Brown 1968).

Table 7 Trading of Connected Directors and Future News

Variables	$CAR3_t$	$CARffQ_{t+1}$	$CARffQ_{t+2}$	$CARffQ_{t+3}$
	I	II	III	IV
	Panel A: Net sales			
Connected net sales$_t$	−4.232***	−15.136**	3.125	−11.417**
	(0.005)	(0.035)	(0.679)	(0.021)
Unconnected net sales$_t$	2.298	2.376	11.757**	17.901*
	(0.167)	(0.745)	(0.029)	(0.086)
Size$_t$	−0.000	−0.004	−0.006**	−0.004
	(0.421)	(0.106)	(0.012)	(0.200)
BM$_t$	−0.000	0.013	0.013	0.007
	(0.768)	(0.114)	(0.101)	(0.274)
Constant	0.005*	0.043**	0.057***	0.050*
	(0.056)	(0.025)	(0.002)	(0.066)
N	23,571	23,571	23,320	23,138
F test (*p*): *Connected net sales* = *Unconnected net sales*	7.09 (0.008)	3.34 (0.068)	0.68 (0.410)	4.91 (0.027)
	Panel B: Sales vs. purchases			
Connected sales$_t$	−3.113**	−15.671***	3.542	−13.365*
	(0.036)	(0.010)	(0.591)	(0.062)
Unconnected sales$_t$	3.838**	12.151**	11.756**	24.112
	(0.046)	(0.047)	(0.021)	(0.104)
Connected purchases$_t$	7.048**	11.421	−1.957	3.027
	(0.032)	(0.444)	(0.921)	(0.804)
Unconnected purchases$_t$	1.480	23.058	−11.775	−0.491
	(0.648)	(0.214)	(0.438)	(0.963)
Size$_t$	−0.000	−0.003	−0.006**	−0.004
	(0.615)	(0.137)	(0.010)	(0.206)
BM$_t$	−0.000	0.013	0.013	0.007
	(0.676)	(0.120)	(0.100)	(0.285)
Constant	0.004	0.039**	0.057***	0.048*
	(0.124)	(0.035)	(0.002)	(0.065)
N	23,571	23,571	23,320	23,138
F test (*p*): *Connected sales* = *Unconnected sales*	6.43 (0.011)	10.7 (0.001)	0.72 (0.396)	3.45 (0.063)
F test (*p*): *Connected purchases* = *Unconnected purchases*	1.33 (0.249)	0.26 (0.607)	0.15 (0.697)	0.04 (0.838)

Notes. This table reports results from regressions of firms' future news (proxied by short-window returns around earnings announcement or quarterly returns) on the dollar value of trades by connected and unconnected directors. The unit of analysis is firm-quarters. Panel A reports the results for net sales. *Connected net sales* (*Unconnected net sales*) and the net stock sales in shares (i.e., shares sold minus shares purchased, divided by total shares outstanding) by connected (unconnected) independent directors executed in the period from the second day after the date of earnings announcement for quarter $t-1$ (i.e., the announcement was made in t for earnings in $t-1$) through two days before the date of earnings announcement for quarter t. Panel B reports the results with sales and purchase transactions separately included in the model. *Connected sales/Unconnected sales* and *Connected purchases/Unconnected purchases* are defined similarly as *Connected net sales*, but for total sales and total purchases, respectively. We require the calculation period for insider trading, i.e., the time gap between two earnings announcement dates, to have a minimum of 30 days and a maximum of 120 days. $CAR3_t$ is the three-day, i.e., $[-1, +1]$, CAR surrounding the date of earnings announcement for quarter t (i.e., the announcement was made in quarter $t+1$ for earnings in t). $CARffQ_{t+1}$ ($CARffQ_{t+2}$, $CARffQ_{t+3}$) is the (average daily) four factor-adjusted abnormal returns for the period from the second day after the date of earnings announcement for quarter t (i.e., the announcement was made in $t+1$ about earnings in t) ($t+1$, $t+2$) through one day after the date of earnings announcement for quarter $t+1$ ($t+2$, $t+3$). The analysis is limited to firms with at least one connected director and one unconnected director that, respectively, made at least one trade in the three years surrounding quarter t's earnings announcement date to ensure the directors of the firm have the potential/capacity to trade after obtaining private information. Other variables are defined in Table 2. The standard errors are calculated by clustering by firm and by quarter. The *p*-values are given in parentheses.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

5.5. Litigation Risk

Connected directors face litigation risk if they exploit their inside information to make abnormal trading profits. In this section we analyze the impact of litigation risk on our results. First, we search through the SEC litigation releases related to insider trading to examine how frequently independent directors are sued for insider trading. We are able to find only nine cases for firms covered by Compustat/CRSP over our sample period.[22] This result is not surprising because regulators have noted that "insider trading

[22] We identify 57 litigation cases against outside directors in total, but in 39 cases the firms involved are not covered by CRSP or Compustat, indicating the small size of these firms. Another nine cases occurred before our sample period. Of the nine cases with sufficient data in our sample period, we can only match three cases

is an extraordinary difficult crime to prove"(see SEC 1998). As such, the ex post (realized) litigation risk on independent directors' insider trading does not appear significant. Regardless, in our main tests we include a variable, *Blackout window*, to control for the relatively high litigation risk for trades made in the blackout window. To further examine how litigation risk can affect directors' trading returns, we follow Rogers and Stocken (2005) and estimate an ex ante measure of litigation risk. Under this approach we assume that directors face higher litigation risk from insider trading if their firms are more likely to be pursued by investors in securities-related class action lawsuits. We estimate a probit model by regressing an indicator variable, measuring whether the firm appears in the list of securities class action lawsuits provided by Stanford Law School's Securities Class Action Clearinghouse in a given year, on a number of variables that are hypothesized to be related to litigation risk, including firm size, average daily trading volume, beta, buy-and-hold returns, indicators for high-risk industries, and standard deviation, skewness, and the minimum of daily returns. We then include the predicted litigation probability from the probit model as a control variable in Equation (1). Untabulated results show that the interaction term of litigation probability and social ties is significantly negative, suggesting that firm-level litigation risk mitigates the effect of social ties on directors' trading returns.

5.6. Additional Control Variables

In our main analyses, we include firm fixed effects by demeaning observations by firm to control for the impacts of time-invariant firm characteristics on directors' trading returns. In this section we explicitly identify and control for firm-specific characteristics that have been found to influence insiders' trading returns. Specifically, we control for firm size (*Size*), book-to-market ratio (*BM*), and corporate governance variables including board size (*Board size*), proportion of independent directors in the board (*Board independence*), and institutional ownership (*Institutional ownership*), all measured at the beginning of the year. We also include the six-month buy-and-hold return prior to the transaction date (*Pret180*) to control for insiders' contrarian trading strategy (Piotroski and Roulstone 2005).[23]

Table 8 reports the regression results. Our main variable, *Ties*, remains significantly positive, and the magnitude of the coefficient is comparable to that in Table 2. *Size* is significantly positive, consistent with larger firms earning lower returns.[24] In addition, *BM* is significantly positive. One possibility is that high *BM* firms tend to be more distressed than low *BM* firms, and thus have more negative news on average, which will lead to greater negative returns following insider sales due to the signaling effect. Finally, the significantly positive coefficient on *Pret* supports the notion that

Table 8 Social Ties and Independent Directors' Stock Sales Returns: Additional Control Variables

Variables	*RETff180*	*RET180*
Ties	0.016***	0.026***
	(0.005)	(0.000)
Internal ties	0.000	−0.017***
	(0.987)	(0.007)
Age	0.004	0.005
	(0.769)	(0.778)
Tenure	0.008***	0.011***
	(0.004)	(0.003)
Audit committee	−0.007	−0.007
	(0.137)	(0.283)
Nomin/Comp committee	0.001	−0.001
	(0.908)	(0.916)
Multiboard	−0.003	0.007
	(0.541)	(0.227)
Ownership	−0.000	0.002
	(0.683)	(0.192)
Transaction size	0.002*	0.002
	(0.082)	(0.104)
Blackout window	−0.007**	−0.007*
	(0.025)	(0.070)
Size	0.100***	0.188***
	(0.000)	(0.000)
BM	0.028***	0.055***
	(0.003)	(0.000)
Board size	0.032*	−0.053**
	(0.075)	(0.012)
Board independence	0.011	0.040
	(0.686)	(0.291)
Institutional ownership	0.033*	0.007
	(0.063)	(0.726)
Pret	0.016***	0.052***
	(0.000)	(0.000)
N	40,807	40,807
Adj. R^2	0.055	0.108

Notes. This table reports results from regressions of independent directors' trading returns from sales transactions on *Ties*, control variables in the main regression model, and additional firm and board characteristics (*Size*, *BM*, *Board size*, *Board independence*, *Institutional ownership*, and *Pret*). All variables are defined in Table 2. The standard errors are calculated by clustering by firm and transaction date. The observations are demeaned by firm to control for firm fixed effects. The *p*-values are given in parentheses.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

with the directors in our sample. The rest involve foreign or retired directors.

[23] Using the past 360-day buy-and-hold returns as an alternative does not materially change our results.

[24] Recall that the dependent variable is firm stock return multiplied by −1, thus a positive coefficient on size means a negative relationship between size and the stock return of the company in the concerned period.

Table 9 Market Reaction to the Announcement of Turnovers of Directors or Senior Executives (CEO or CFO), Conditional on the Existence of Social Ties

		CAR: Market adjusted returns (measured in percentage)		*CARff*: Market adjusted using market model beta: Estimation window is [−300, −50] (measured in percentage)	
	N	Mean	Median	Mean	Median
Panel A: Market reaction to the announcement of independent directors' departure					
Total	6,763	0.06	−0.07*	−0.11 $p = (0.154)$	−0.13***
Ties = 0	5,384	0.15**	−0.05	−0.04*	−0.13*
Ties = 1	1,379	−0.27 $(p = 0.165)$	−0.12***	−0.40 $p = (0.154)$	−0.18***
Difference		−0.42 $(p = 0.113)$	−0.07***	−0.36 $p = (0.159)$	−0.05*
Panel B: Market reaction to the announcement of independent directors' appointment					
Total	8,777	0.13***	0.00	−0.16	−0.10
Ties = 0	7,588	0.12**	−0.01	−0.14	−0.11*
Ties = 1	1,189	0.17	0.02	−0.31	−0.07
Difference		0.05	0.03	−0.17	0.04
Panel C: Market reaction to the announcement of CEO/CFO departure					
Total	1,239	−0.39**	−0.20***	−0.42**	−0.25***
Ties = 0	754	−0.26	−0.06	−0.31	−0.10
Ties = 1	485	−0.60**	−0.44***	−0.59**	−0.43***
Difference		−0.35	−0.38 $(p = 0.139)$	−0.29	−0.32 $(p = 0.107)$
Panel D: Market reaction to the announcement of CEO/CFO appointment					
Total	1,643	0.20	0.01	0.14	0.04
Ties = 0	1,140	0.00	−0.10	−0.01	−0.07
Ties = 1	503	0.67***	0.19**	0.47**	0.17**
Difference		0.67**	0.29***	0.47*	0.24**

Notes. This table reports the short-window market reaction to the announcement of turnover of CEO/CFO and independent directors. Data on executive departure/announcement are from BoardEx. Panels A and B report the market reaction to the departure and appointment of independent directors, respectively, and panels C and D report the market reaction to the departure and appointment of the firm's executives (CEO or CFO), respectively. Market reaction is measured by market-adjusted buy-and-hold return (*CAR*) in the [−1, 0] window, or by the four-factor adjusted returns (*CARff*) with an estimation window of [−300, −50]) in the [−1, 0] window, where day 0 is the announcement day. We use the *t*-test (Wilcoxon test) to examine the difference in the mean (median) value. All other variables are defined in Table 2.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

independent directors take a contrarian strategy: they tend to sell when the stock price has climbed to a high level and their sales are followed by a price decline.

6. Extension

Although prior literature has focused on the costs of social ties to shareholders as a result of less effective board monitoring and weaker corporate governance, social ties can also create value by facilitating information sharing between management and the board. Adams and Ferreira (2007) demonstrate analytically that a management-friendly board can be optimal because it can induce management to disclose more information, allowing the board to make more informed decisions. In addition, the information sharing through social ties can be particularly important for the board to play its advisory role. For example, survey evidence (Adams 2009) reveals that directors who have a stronger personal relationship with the firm's CEO view themselves playing a more important advisory role than directors without such a relationship. Moreover, Schmidt (2014) finds that when the firm's advisory needs are high, social ties are associated with higher bidder announcement returns, suggesting a friendly board can add value under certain circumstances.

Although the cost–benefit trade-off is not the focus of this study,[25] we provide some preliminary evidence using the market reaction to the announcements of the departure or appointment of connected independent directors or executives. Panel A of Table 9 provides some evidence that the market reacts significantly more negatively to the departure announcements of socially connected independent directors than to the departure announcements of unconnected independent directors. Nonetheless, the appointment announcements of socially connected directors are not accompanied by significant market reactions (panel B). With regard to turnovers of executives, the market reacts marginally more negatively to the departure announcements of

[25] Considering that, on average (at the median), a connected independent director sells shares worth \$168,000 each year, a trading return of about 3% yields a profit of about \$5,000. If we assume that an independent director's average annual salary of about \$170,000 (Hewitt Associates LLC 2010) represents her value to the firm in a competitive labor market, the additional (direct) cost imposed by the connected independent director's inside trading does not appear substantial.

CEOs/CFOs that are socially connected with independent directors than to the departure announcements of unconnected CEOs/CFOs (panel C), but reacts significantly more positively to the appointment announcements of CEOs/CFOs socially connected with existing independent directors than to the appointment announcements of unconnected CEOs/CFOs (panel D). In regression analyses that control for various firm and director characteristics (untabulated), we find that the market reaction continues to be significantly negative for the departure of connected independent directors, and positive for the appointment of connected executives. These results suggest that investors value social connections between independent directors and executives. However, alternative interpretations are also possible.[26] A full understanding of the value impact of independent directors' social ties warrants a comprehensive analysis that is beyond the scope of this study.

7. Conclusion

This study investigates the impact of social networks on the sharing of information between firms' management and independent directors. We find that independent directors who are socially connected to their firms' senior executives earn significantly higher returns than those without such connections in stock sales, but not in stock purchases. These results suggest that the connected independent directors are able to obtain private information that contains bad news through their social connections with executives. Future research can examine the impacts of this special information communication channel between directors and executives on firm value. Finally, as generally does the line of literature on social networks, we assume that the interactions between parties on the social networks are, at least on average, positive (or pleasant). However, the validity of this assumption warrants further exploration.

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[26] For example, the negative market reaction to the departure of connected directors could be a signal of material bad news in the company such that even directors loyal to the management "abandon the sinking ship."

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