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INDEPENDENT DIRECTOR REPUTATION INCENTIVES AND STOCK PRICE INFORMATIVENESS

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Abstract

We link the reputation incentives of independent directors to the informativeness of stock prices. We show that when more independent directors rank a directorship high, the firm-specific information content in a firm's stock price increases. Further, independent directors with high reputation incentives serve firms that voluntarily disclose more information and display lower crash risk. We find similar results when using plausibly exogenous shocks to the reputation incentives of independent directors. Our results therefore support a causal interpretation of the positive influence that independent directors with reputation incentives exert on corporate transparency.

Keywords: Director reputation; financial reporting quality; information asymmetry

JEL Classification: D82, G10, G34

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1 Introduction

A key function of financial markets is the production and aggregation of information into market prices. Information contained in securities prices guides important decisions by managers, investors and other participants in the real economy. However, information asymmetries between managers and outside investors prevent investors from pricing firm-specific information accurately. Therefore, understanding how firms can facilitate and maintain high levels of corporate transparency is an important issue.

Independent directors monitor managers and lower the information advantages that managers have over outside investors. Consistent with this, studies show that boards with a greater proportion of independent directors increase the quality of financial reporting and improve a firm's information environment (Chen, Cheng and Wang, 2015; Armstrong, Core, and Guay, 2014; Beekes, Pope and Young, 2004). However, what motivates independent directors to improve corporate transparency is largely unknown and is the focus of our study. In this paper, we link the reputation concerns of independent directors to firm transparency. We show that the stronger the reputation concerns of independent directors, the higher the firm-specific information content in stock prices.

Our reputation measure is from Masulis and Mobbs (2014) and is based on the size of a firm relative to other firms that an independent director also serves. Masulis and Mobbs rank the directorships of individual directors by market value and argue firms confer higher reputation benefits to independent directors when more independent directors rank a directorship high (defined as the firm's market capitalization being at least 10% larger than their smallest directorship) relative to other independent directorships they hold.

The rationale behind this measure is straightforward. Independent directors have incentives to maintain and enhance their reputation as effective monitors (Fama and Jensen, 1983), and large firms offer greater opportunities for reputation building (Adams and Ferreira, 2008), higher visibility (Shivdasani, 1993) and higher compensation (Ryan and Wiggins, 2004). Various previous studies present results consistent with the notion that firm size is a proxy for reputation incentives and that independent directors

allocate more effort to larger firms (Masulis and Mobbs, 2014; Knyazeva, Knyazeva and Masulis, 2013; Fahlenbrach, Low and Stulz, 2010; Adams and Ferreira, 2008).¹

We argue that independent directors with strong reputation incentives improve firm transparency. This is because independent directors rely on a transparent information environment and accurate firm-specific information to monitor and advise effectively (Adams and Ferreira, 2007; Kaplan and Reishus, 1990). The need for firm-specific information means that independent directors with reputation incentives will be wary of private information volunteered by managers since managers may be hesitant to disclose information that could be used to discipline them (Jin and Myers, 2006; Jensen, 1993). When facing higher reputation incentives, publicly available information – that is subject to scrutiny by analysts, auditors, regulators, and the media (Armstrong, Core and Guay, 2014; Miller, 2006) – will become more important to independent directors. Therefore, independent directors will elicit greater corporate transparency as their reputation incentives increase.

We test these propositions using an unbalanced panel of US firms between 1996 and 2012. Our findings confirm a positive link between the reputation incentives of independent directors and firm transparency. We show that the proportion of independent directors who rank a directorship high relative to the other independent directorships they hold is positively associated with stock price informativeness. By the same token, the proportion of independent directors for whom the directorship is of relatively low rank is negatively associated with stock price informativeness. These effects on price informativeness are economically meaningful. For instance, a 10% increase in our directorship rankings measure (approximately the same as one additional director on a nine-person board ranking the directorship high) is associated with a 3.43% increase in stock price informativeness.

¹ Specifically, Adams and Ferreira (2008) find that the likelihood that a director exhibits attendance problems decreases with firm size, which suggests that directors care more about attending meetings in larger firms. Fahlenbrach, Low and Stulz (2010) suggest that CEOs see prestigious boards as those of ‘firms of similar or larger size relative to their own’. Knyazeva, Knyazeva and Masulis (2013) argue that directors are more willing to accept non-local board appointments if the firm is large because board seats in larger firms offer ‘greater reputation benefits, career building opportunities, and networking benefits’. Masulis and Mobbs (2014) show that independent directors with multiple appointments put more effort—in the form of higher attendance and more board committee memberships—into the largest firms in their portfolio of directorships.

Importantly, our results are not explained by the presence of independent directors. The presence of independent directors with high reputation incentives, but not the proportion of independent directors, explains variation in stock price informativeness. Our results are robust to alternative measures for reputation incentives, alternative measures for stock price informativeness, and additional board characteristics (including measures for the expertise, diversity and social ties of board members) that could explain the relationship between director appointments and a firm's information environment.

Establishing a causal relationship between reputation incentives and stock informativeness is challenging. Our results could be driven by firm-level unobservables that correlate with the information environment and board characteristics. To address this, we exploit a plausibly exogenous change in our reputation incentive variable. Following Masulis and Mobbs (2014), we identify a group of treatment firms in which at least one director experiences an increase in her directorship ranking that is due to a decrease in the value of *other* firms in their directorship portfolio. The reduction in firm size is due to reasons that are specific to other firms (e.g. poor performance or divestitures) and therefore unrelated to the firm under investigation.

We match treatment firms with a group of control firms that are in the same industry and are nearest to our treatment firms in terms of size.² We then carry out a difference-in-difference analysis with firm-level fixed effects. Our empirical set-up captures the average change in price informativeness *within* treatment firms compared to the average change in price informativeness within control firms. This set-up alleviates concerns that our results are influenced by unobserved between-firm heterogeneity or by firm size (since treatment and control firms are matched on size). We find that, following an increase in the directorship ranking that is caused by a decrease in the size of other firms, treatment firms experience an increase in the level of price informativeness relative to our matched control firms. This supports a causal

² Specifically, we use nearest neighbor matching with replacement and require that our treatment and control firms are in the same industry (based on two-digit SIC code) and are nearest in market capitalization. Additionally, we stipulate that firms in the control group do not employ independent directors who also serve firms in our treatment group. We also exclude firms from our control group that experience a substantial (>10%) change in market valuation in the treatment year and firms in which any independent director gains or loses a directorship in a given year.

interpretation of the effect that changes in the reputation incentives of independent directors have on firm transparency.

We also rule out that our results are due to a workload effect, where independent directors devote more time to larger firms because larger firms are more complex. We exploit shocks to the reputation incentives of individual directors that result when mergers cause independent directors to lose one of their *other* directorships. Our results indicate that the termination of other directorships only leads to an improvement in price informativeness if the merger causes an improvement in reputation incentives. We do not find any effect when mergers lower director workloads without an increase in reputation incentives. We interpret this as evidence that reputation incentives and not director workloads explain our results.

In the final part of our paper, we provide direct evidence on how reputation incentives improve transparency. We first show that the more independent directors rank a directorship high, the more information firms disclose to investors on a voluntary basis. Following Carter and Soo (1999) and Gul, Srinidhi and Ng (2011), we focus on category #8 ('other events') of 8-K regulatory filings. We show that when independent directors with strong reputation incentives serve firms in weak information environments (proxied by fewer stock analysts covering a firm, greater analyst disagreements regarding the future performance of a firm, or less arbitrage-based trading), the number of voluntary disclosures made by these firms increases. Specifically, for firms operating in a weak information environment, an increase in the reputation incentives of one independent director is associated with a 20% increase in the number of category #8 filings over the next three years.

Finally, to highlight the economic implications of director reputation incentives for investors, we link corporate transparency to the prospect of large stock price losses. We hypothesize that if information asymmetry permits managers to hide and accumulate bad news (Kim et al., 2011; Hutton et al., 2009), a growing discrepancy between intrinsic and current share prices is likely (Jin and Myers, 2006). The latter should mean a higher risk of substantial wealth losses for shareholders when previously concealed information is suddenly priced. Consistent with this expectation, we find that, following an increase in reputation incentives at a firm, various measures of crash risk decrease.

This paper makes two main contributions to the literature. We are the first to identify the reputation incentives of independent directors as a determinant of firm transparency. Our paper therefore adds to the literature on corporate transparency (Leuz and Wysocki, 2016; Lang et al., 2012; Bushman et al., 2004) and more specifically to the literature on transparency and corporate governance (Chen et al., 2015; Armstrong et al., 2012; Ferreira and Laux, 2007). More broadly, our paper also contributes to the literature that analyzes the effects of director networks and their effect on firm outcomes (Renneboog and Zhao, 2014; Larcker, So and Wang, 2013; Chiu, Teoh, and Tian, 2012). We add to this literature by providing evidence of the *incentives* of individual directors to exert effort within their networks of directorships. In essence, our results identify reputation incentives as one reason for why directors improve transparency.

Second, our study contributes to work on the information content of stock prices (e.g., Ben-Nasr and Cosset, 2014; Kim et al., 2014; Chan and Hameed, 2006; Bushman, Piotroski, and Smith, 2004). These studies find that better availability of firm information leads to more informed trading and to more informative pricing. However, the determinants of price informativeness that this literature has identified range from analyst coverage to disclosure rules and are largely outside the immediate control of firms.³ A key contribution of this study is therefore that we identify a determinant of a firm's price informativeness that is not exogenous to the firm and that firms can actively manage by recruiting certain independent directors.

2 Background: reputation incentives and firm-specific information

Firms structure their board of directors according to their needs for monitoring and advising (Fama and Jensen, 1983). Independent directors may be appointed to satisfy a firm's needs for expertise (Masulis, Wang, and Xie, 2012; DeFond, Hann, and Hu, 2005), diversity in the boardroom (e.g. Adams and Ragunathan, 2015), or because of social ties to other board members (Coles, Daniel, and Naveen, 2014; Hwang and Kim, 2009). Likewise, firms may appoint independent directors for their networks of

³ Specifically, previous studies have examined the effects on price informativeness linked to analyst coverage (Chan and Hameed, 2006), cross-listings (Fernandez and Ferreira, 2008), disclosure rules (Bushman, Piotroski, and Smith, 2004; Rajgopal and Venkatachalam, 2011), press freedom (Kim et al., 2014), and government ownership (Ben-Nasr and Cosset, 2014).

directorships (Akbas, Meschke, and Wintoki, 2016; Coles et al., 2012) or to suit their own information environment (Ferreira, Ferreira, and Raposo, 2011; Coles et al., 2008).

The previous literature has mostly focused on the determinants of board structure from a demand perspective. However, board structure is also determined by a director's willingness to serve a board and expend effort (Fahlenbrach, Low and Stulz, 2017). Reputation incentives could offer one supply side explanation for why some independent directors are more effective in their role. Theoretical work has long pointed to the importance of supply side arguments in the director labor market. For instance, Fama (1980) argues that a strong reputation increases the value of directors' human capital and opens up opportunities for additional appointments.

Various studies report evidence in line with the view that reputation incentives are linked to firm size. Adams and Ferreira (2008) argue that large firms offer independent directors opportunities to enhance their reputation. Consistent with this, Masulis and Mobbs (2014) demonstrate that independent directors with multiple appointments show increased board attendance and more board committee memberships at the relatively largest firms they serve. Masulis and Mobbs (2016) show that independent directors will act more vigorously at the relatively largest firms which is associated with less earnings management, option backdating and other negative outcomes that could damage a director's reputation.

Reputation concerns also explain why independent directors value public firm information despite having privileged access to private information from management (e.g. through access to internal financial reports and informal communications with managers). Independent directors are likely to be wary of private information volunteered by management. The contents and timing of such information may be opportunistic since managers have few incentives to share information that is detrimental to their interests (Jin and Myers, 2006; Jensen, 1993). By contrast, public information is subject to scrutiny by outside parties such as analysts, auditors, regulators and the media (Armstrong, Core and Guay, 2014; Miller, 2006). Public information is therefore a trustworthy source of firm-specific information for directors and a useful way of validating the accuracy of information that directors have obtained through private channels.

In contrast to the arguments made above, the findings of Fahlenbrach et al. (2017) suggest that reputation incentives may not motivate independent directors to monitor more effectively. The authors show that independent directors may exit a firm to protect their reputation before bad news are published. Therefore, whether reputation incentives boost corporate transparency is an empirical question and the question we address in this paper.

If independent directors with stronger reputation incentives have greater needs for accurate firm-specific information, we argue that these independent directors will elicit greater corporate transparency. We thus expect price informativeness to increase with the proportion of directors who rank a directorship high relative to all other directorships they hold. By the same token, independent directors who rank a directorship low will not be incentivized to reduce firm information asymmetry. We therefore expect price informativeness to decrease with the proportion of directors who rank a directorship low relative to all other directorships they hold.

3 Key variables and data

3.1 Stock price informativeness

We employ idiosyncratic volatility as our key proxy for stock price informativeness (Gul et al., 2011; Ferreira and Laux, 2007). Developed by Roll (1988), this measure reflects *firm-specific* stock return variation or the variation in the return on a stock that cannot be explained by market returns.

Stock price informativeness for a generic firm i in year t is defined as

$$\psi_{i,t} = \ln \left(\frac{1-R_{i,t}^2}{R_{i,t}^2} \right). \quad (1)$$

$R_{i,t}^2$ is estimated from the following single-factor market model, $r_{i,d} = \alpha_i + \beta_i r_{m,d} + e_{i,d}$ where $r_{i,d}$ is the daily return on stock i on day d and $r_{m,d}$ is the value-weighted market return on day d .⁴ A high (low) level of stock price informativeness can be interpreted as stock price having a greater (smaller) level

⁴ Market returns are derived using the CRSP NYSE/Amex/NASDAQ Value-Weighted Market Index.

of firm-specific information content because the market return explains a smaller (greater) component of stock volatility.

3.2 *Independent director reputation incentives*

To construct our measures of independent director reputation incentives, we follow Masulis and Mobbs (2014) and collect director information from the universe of Institutional Shareholder Services (ISS) firms between 1996-2012. We follow ISS criteria to determine which board members are independent. ISS require that independent directors do not have any other material affiliation with the company (apart from the board seat). This includes any relation to the company's current or former executives or any professional, financial, or charitable relationship with the company.

For each independent director, we rank all directorships in her portfolio by firm market capitalization.⁵ We hypothesize that the firms that are more highly ranked are more important for a director and, correspondingly, that lower-ranked firms are less important.

We then consolidate the director data into firm-level variables. As in Masulis and Mobbs (2014), *%High (Low) Ranked* is the proportion of independent directors for whom the firm's directorship is at least 10% *larger (smaller)* than their *smallest (largest)* directorship. These variables capture the relative importance of the firm's directorship to the directors within the firm.

Figure 1 illustrates how the variables are constructed using Office Depot in 2012 as an example. Office Depot's board has six independent directors, three of which hold multiple appointments (Hedrick, Gaines and Mason). Hedrick serves both Office Depot and Hot Topic as an independent director. At \$937m, the market capitalization of Office Depot is significantly greater than Hot Topic's \$447m capitalization. Hedrick therefore ranks the Office Depot directorship high. In contrast, Gaines and Mason rank the Office Depot's low as they each hold another directorship with a significantly larger firm. Out of Office Depot's

⁵ Our reputation incentives measure is an in-sample measure that is computed using directorship information from ISS. This is unlikely to bias our results. ISS collects data on firms in the S&P 1500 Index. The S&P 1500 covers the largest US firms (approximately 90% of the market capitalization of all US firms). Since our reputation incentives measure is constructed based on market capitalization, any omitted (out-of-sample) directorships are directorships at small and arguably less prestigious firms, which are likely to have little effect on the reputation of independent directors.

six independent directors, one director has high reputation incentives and two directors have low reputation incentives. Consequently, %High Ranked is 1/6 whilst %Low Ranked is 2/6.

3.3 *Sample*

Our data is an unbalanced panel of 12,813 firm-year observations relating to 1,357 US firms between 1996 – 2012.⁶ The data are from the following sources. Director data and data on a firm's anti-takeover provisions are from the Institutional Shareholder Services (ISS, formerly RiskMetrics), which covers S&P 1500 firms. Financial accounting variables are constructed using Compustat. Our stock price informativeness measure is calculated using daily stock price information from the Centre for Research in Security Prices (CRSP). Analyst coverage data is obtained from I/B/E/S.

[Table 1 about here]

Table 1 reports summary statistics. The average market-model R^2 among our sample firms is 0.282, suggesting that 71.8% (1-0.282) of an average firm's return variations cannot be explained by market returns. The average *Price Informativeness*, which is the logistic transformation of market-model R^2 is 1.225. The mean for %*High Ranked* is 12.6%. This suggests that an average board of nine directors has about one independent director who ranks the firm as more important in her portfolio of independent directorships. The average for %*Low Ranked* is slightly higher at 15.5%. The average proportion of independent directors is 71.5%. Finally, only 0.5% of our sample firm years have busy boards (where the majority of directors hold three or more directorships), while about 60% of sample firm years have a majority of directors who only sit on a single board. The distribution of our sample firm characteristics is also shown in **Table 1** (see **Table A1** for variable descriptions).

⁶ Following prior literature, we exclude financial services (SIC code 4900-4999) and utility firms (SIC code 6000-6999) from the sample.

4 Baseline Results

4.1 Independent director reputation incentives and stock price informativeness

We test the relation between the reputation incentives of independent directors and stock price informativeness using the following model:

$$\psi_{it} = \beta_0 + \beta_1 \%High\ Ranked_{it} + \beta_2 \%Low\ Ranked_{it} + \mathbf{CONTROL}_{it}\boldsymbol{\Pi} + \varepsilon_{it} \quad (2)$$

Based on prior literature, we include a number of board and firm characteristics in $\mathbf{CONTROL}_{it}$. We include board size because Gul, Srinidhi and Ng (2011) find that stock price informativeness increases in board size. We also include board independence. Ferreira, Ferreira and Raposo (2011) find that independent directors improve the quality of financial reporting, while Armstrong et al. (2014) find that price informativeness decreases with board independence.

Further, we control for profitability (defined as return on book equity) and profit variability (the variance of a firm's return on equity). Chan and Hameed (2006) argue that firms with more volatile returns produce more firm-specific information. We include leverage as more levered firms may exhibit higher idiosyncratic volatility due to the higher likelihood that these firms experience distress (Rajgopal and Venkatachalam, 2011). Following Ferreira and Laux (2007), we also include the Market-to-Book ratio, which is defined as the ratio between market and book equity, and a dividend dummy variable which equals one for dividend-paying firms and zero otherwise.

We include firm size as Roll (1988) finds that large firms tend to incorporate more market-wide information compared to small firms. Firm size is measured as the logarithm of total market capitalization. We also control for size to alleviate concerns that (absolute) firm size rather than relative size rankings by directors explain our results. Larger firms are more likely to have more independent directors that will rank these firms high relative to the other firms they serve.⁷

⁷ Further, we document that size is negatively related to stock price informativeness in our sample. Therefore, any remaining effect of size is likely to make the magnitude of our coefficients smaller than reported.

We also include firm age (in log form) and a dummy variable indicating whether the firm is diversified (defined as operating in more than one industry). The stock volatility of diversified firms will more closely resemble market volatility and have a smaller idiosyncratic component (Roll, 1988). We therefore expect a negative relation between diversification and stock price informativeness.

We proxy for liquidity using stock turnover, which is defined as the number of trades divided by the number of shares outstanding. Stock liquidity may facilitate informed trading and thus increase stock price informativeness (Chordia and Subramanyam, 2008); alternatively, liquidity may boost uninformed order flows and thus lower stock price informativeness (Ferreira, Ferreira and Raposo, 2011; Easley, Hvidkjaer and O'Hara, 2002).

We also control for *Discretionary Accruals* as the absolute value of the residuals from Jones' (1991) accrual model. A high value of *Discretionary Accruals* indicates low earnings quality, and we anticipate a negative relation between this variable and stock price informativeness (Rajgopal and Venkatachalam, 2011).

We control for *Analyst Coverage*, defined as the number of earning forecasts made by security analysts in each financial year, to proxy for information dissemination by security analysts (Fernandes and Ferreira, 2008; Chen, Goldstein and Jiang, 2007; Chan and Hameed, 2006). We also control for Bebchuk et al.'s (2007) manager entrenchment index (*E-Index*). Ferreira and Laux (2007) argue that firms with fewer takeover provisions (i.e. more entrenched management) have higher stock price informativeness because they encourage more informed trading by investors.

[Table 2 about here]

Table 2 reports OLS regression results with industry and year fixed effects. Standard errors are robust to heteroskedasticity and serial correlations within firm-level clusters. In Column 1, we regress our stock price informativeness variable on *Busy Board*, which is a dummy variable that takes the value of one when the majority of directors hold three or more directorships. We find that the coefficient for *Busy Board*

is negative and statistically significant.⁸ This is consistent with the view that busy boards are detrimental to firm transparency.

In Column 2, we estimate the model from Equation 2, which includes the reputation incentive measures. Consistent with our expectations, we find a positive and statistically significant relationship between stock price informativeness and the proportion of directors who rank a directorship high. Also consistent with our expectations, price informativeness is negatively and significantly related to the proportion of directors who rank a directorship low.

A 10% increase in *%High Ranked* (approximately the equivalent to one additional director on a nine-person board finding the directorship at least 10% larger than the smallest firm she serves) is associated with a 3.42% increase in the stock price informativeness. Conversely, a 10% increase in *%Low Ranked* is associated with 2.18% decrease in stock price informativeness. The economic effects of these two key variables are larger than any other board variable included in the model. To illustrate this, an increase in board size by one director is associated with a mere 0.22% increase in stock price informativeness.

Column 3 includes both reputation incentive variables and the *Busy Board* dummy variable. Both the *Busy Board* dummy and reputation incentive measures remain significant determinants of stock price informativeness. This suggests that although busy independent directors may have an adverse effect on stock price informativeness, this effect can be negated when these busy independent directors see the firm as relatively more important. This also confirms that *Busy Board* and our board-level measures of reputation incentives capture different effects that directors have on firm transparency.

The estimated coefficients for *Board Independence* are similar across different specifications. This suggests that the reputation incentive variables capture different information from the conventional board independence proxy. Similar to Gul, Srinidhi, and Ng (2011), we do not find the coefficient for *Board Independence* to be statistically significant nor economically meaningful, yet the coefficients for our reputation incentives measures are statistically significant in all specifications. These results confirm that

⁸ We also find that the measure of stock price informativeness is negatively related with the proportion of busy directors. The results are unreported for brevity.

the mere presence of independent directors does not affect firm transparency; instead, variation in the reputation incentives of independent directors affects transparency.

In Column 4, we introduce *Single Directorship* as a control variable that equals one when the majority of independent directors only hold one directorship. These directors arguably have the greatest reputation incentives, as they wish to protect their only directorship. However, *Single Directorship* does not enter the model significantly. In contrast, both reputation incentive measures (*%High Ranked* and *%Low Ranked*) remain statistically significant.

Finally, in **Table A2** of the Appendix, we analyze the relation between stock price informativeness and reputation incentives when directors serve on one of four board committees: audit, corporate governance, compensation and nomination committees. We find the results are stronger when independent directors with reputation incentives serve on the audit and compensation committees. Arguably, these two committees require relatively more commitment and input from independent directors (Masulis and Mobbs 2014). Our results are therefore consistent with the view that higher information demands of independent directors with reputation incentives motivates them to make more firm-specific information public.

Overall, our results are complimentary to prior studies that show that the presence of independent directors increase corporate transparency (e.g. Chen, Cheng and Wang, 2015; Armstrong, Core, and Guay, 2014; Beekes, Pope and Young, 2004). However, we extend their findings further by showing that it is the presence of independent directors with high reputation incentives that enhance the firm's information environment and increase the level of firm-specific information in stock prices.

4.2 *Alternative measures and alternative model specifications*

In **Table 3**, we verify that our key finding is not sensitive to changes in our model specification, the reputation incentive measures, or the stock price informativeness measures.

[Table 3 about here]

Panel A employs alternative measures of reputation incentives. Column 1 uses lagged reputation to alleviate simultaneity concerns between reputation measures and price informativeness. The reputation

measures in Columns 2 and 3 use total assets and sales as ranking variables, instead of market capitalization. In Columns 4 and 5, we alternate the company size threshold from 10% to 5% and 20%. As large/small firms may be underrepresented in certain industries, our reputation measures may capture cross-industry influences that change over time. To alleviate this concern, we compute our ranking variable using industry-adjusted size measures in Column 6. That is, we demean each firm's market capitalization by its yearly industry average before computing the reputation ranking variable. We find our results remain similar to our baseline results.

In Panel B, we show that our results hold under different alternative measures for price informativeness. Column 7 employs weekly data to compute price informativeness and Column 8 uses the residuals from the Fama and French model. To alleviate concerns that idiosyncratic volatility is associated with noise rather than firm-specific information (Dasgupta et al., 2010), we proxy for price informativeness using the illiquidity measure of Amihud (2002) in Column 9 and the probability of informed trading of Easley and O'Hara (2004) in Column 10.

Board characteristics are not random variables and independent directors are chosen by firms to suit their own information environment and the bargaining power of stakeholders. Panel C of Table 3 tests whether the documented relation between reputation incentives and stock price informativeness is confounded by other characteristics of independent directors.

Column 11 controls for *#Board Connections*, which is defined as the total number of independent directors' other board appointments. This alleviates concerns that our measures, which rely on independent directors with multiple board appointments, capture the quality of information transmitted through the network of directors (Akbas, Meschke, and Wintoki, 2016). As some CEOs may appoint independent directors based on social ties (Hwang and Kim, 2009) and this may inhibit their ability to perform their board functions, we include (in Column 12) *%Co-opted Independent Directors*, which is defined as the proportion of independent who are appointed after the CEO assumes office (Coles, Daniel, and Naveen,

2014).⁹ As female directors and directors with a minority status tend to hold more board seats (e.g. Adams and Raganathan, 2015), in Columns 13 and 14, we include *%Female Independent Directors* and *%Non-Caucasian Independent Directors* in the model. Finally, Columns 15 and 16 control for international expertise (Masulis, Wang, and Xie, 2012) and financial expertise (DeFond, Hann, and Hu, 2005) of independent directors. We find that our findings continue to hold in all results.

5 Identification: shocks to reputation incentives

Establishing causality between the reputation incentives of independent directors and stock price informativeness is challenging. For instance, it is recognized in the literature that, rather than boards shaping the corporate information environment, the information environment may instead determine the make-up of the board (e.g. Coles et al., 2008; Armstrong et al., 2014). More generally, our results could be driven by unobserved between-firm heterogeneity that could explain why independent directors with high reputation incentives match with more transparent firms. For instance, independent directors with multiple directorships could opt to serve more transparent firms if more transparency means less monitoring efforts for them (see Ferreira, Ferreira and Raposo, 2011).

5.1 Plausibly exogenous increases in directorship rankings

To alleviate concerns that our results could be driven by these alternative explanations, we exploit a plausibly exogenous shock to the reputation incentives of independent directors. Our empirical set-up is similar to Masulis and Mobbs (2014). Specifically, we identify 228 treatment firms that satisfy the following criteria. The firm has at least one independent director (a ‘treatment director’) who experiences an increase in the ranking of this directorship relative to the other directorships she holds. Crucially, this ranking increase is plausibly exogenous because it is caused by a decrease in the market capitalization of *other* firms in her portfolio of directorships. To ensure that this condition is satisfied, we exclude cases

⁹ Informal social ties between directors could arguably affect the monitoring effort of independent directors. However, social ties linked to director education or employment history are difficult to measure and can only be estimated with significant error. Absent verifiable data on informal social director networks, we use data on informal ties between the CEO and independent directors based on observable appointment data in the form of *% Co-opted Independent Directors*.

where a change in directorship ranking is caused by changes in the valuation of the treatment firm and cases where treatment directors gain or lose a directorship during the event year. We also exclude treatment firms that experience a size change that is greater than 10% in a single year.

We match treatment firms with control firms using nearest neighbor matching method (Abadie, Drukker, Herr, and Imbens, 2004). Specifically, control firms are in the same industry as treatment firms (as defined by two-digit SIC code) and are nearest in size (based on market capitalization), but do not have any treatment director on their boards. Matching based on size is important, because it diminishes concerns that our results are driven by size.¹⁰ Firms that change more than 10% in size over a single year are also excluded from the control group.

We then investigate the change in price informativeness due to a plausibly exogenous increase in the ranking of a directorship using a difference-in-difference analysis. For each firm, we include three years prior to the change in directorship ranking and three years after the change in directorship ranking.

The estimation model is as follows:

$$\begin{aligned} \psi_{i,t} = & \beta_0 + \beta_1(Ranking\ Increase_{i,t} \times Post\ Period_{i,t}) + \beta_2 Ranking\ Increase_{i,t} \\ & + \beta_3 Post\ Period_{i,t} + \mathbf{CONTROL}_{it}\mathbf{\Pi} + \eta_i + \varepsilon_{it} \end{aligned} \quad (3)$$

The variable *Ranking Increase*_{*i,t*} equals one for treatment firms and zero for control firms. The variable *Post Period*_{*i,t*} equals one for the three years after the plausibly exogenous shock in director ranking and zero for the three years before. **CONTROL**_{*it*} represents the same set of control variables as Equation 2. To alleviate the concern that our results are biased by unobserved between-firm heterogeneity, we include firm fixed effects (η_i) in our estimation.

The coefficient of interest is the interaction between *Ranking Increase*_{*i,t*} and *Post Period*_{*i,t*} (β_1). If monitoring by directors with reputation incentives leads to more firm-specific information in stock prices,

¹⁰ The average market capitalization of the treatment group is \$11,032m whereas the average market capitalization of the control group is \$9,556m.

we expect a higher level of price informativeness in treatment firms after an exogenous increase in reputation incentives.

[Table 4 about here]

The difference-in-difference results in **Table 4** show that the coefficients on $Ranking\ Increase_{i,t} \times Post\ Period_{i,t}$ are positive and significant. In Column 1, the average idiosyncratic volatility of treatment firms is 11.2% higher than the control firms after a positive shock to directorship rankings. Interestingly, the effects of an increase in reputation incentives on price informativeness under this identification are greater than the results presented in **Table 2**. Although this effect is attributed to an increase of a single high-ranked director, this is a large increase because an average board only has one high-ranked director.¹¹ In Column 2, we introduce board and firm control variables and find that the coefficient remains statistically significant ($p < 0.05$) and of similar economic magnitude. Therefore, the results in this section show that an exogenous increase in director reputation incentives leads to an increase in firm transparency.

5.2 Can reputation incentives be explained by workload effects?

Another potential concern is that the reputation measures capture a workload effect rather than the effect of reputation incentives. It is conceivable that, because large firms are more complex and require more monitoring efforts than small firms, independent directors devote a greater proportion of their time to large firms.

To disentangle reputation incentive effects from possible workload effects, we exploit shocks to the reputation incentives of individual directors that result when mergers cause the termination of entire boards and independent directors lose one of their other directorships (Hauser, 2013). The rationale for this test is as follows. While the loss of any directorship will result in a workload reduction, only the loss of a directorship at a large firm will increase reputation incentives due to the increase in the relative size of the remaining firms.

¹¹ The mean for %High Ranked is 0.126, which approximately equal to one high-ranked independent director on a board of nine directors.

To this end, we implement a difference-in-difference estimation and identify treatment firms that satisfy the following criteria. First, treatment firms must have at least one independent director who loses one of her *other* directorships due to an M&A transaction (treatment directors). Second, we manually verify that each merger leads to the termination of the entire board¹² and that the affected directors do not gain additional directorships in the subsequent year. Using these criteria, we obtain 108 treatment firms. Control firms are those without any treatment directors nor have they participated in any merger event.

The empirical set up is the same as in our previous analysis in **Table 4**. We require that treatment and control firms are in the same industry and match them by market capitalization using nearest neighbor matching with replacement (Abadie, et al., 2004).

Table 5 reports the results using a difference-in-difference estimation with firm fixed effects. We find that the interaction between *Other Directorship Terminated_{i,t}*, which equals one for our treatment firms and zero otherwise, and *Post Period_{i,t}*, which equals one in the three years after the M&A event and zero in the three years before, are positive and significant. We find that the loss of other directorships is associated with 10.7% increase in stock price informativeness in subsequent years.

We further support our interpretation that the increase in price informativeness is due to reputation incentives by analyzing two subsamples of treatment firms: (i) firms where independent directors lose their largest directorship; and (ii) firms where independent directors lose their smallest directorships. We find that price informativeness only increases when directors lose their largest directorship. These cases are associated with a 26.7% increase in price informativeness (Column 2 of **Table 5**). In contrast, we do not find evidence that losing directorships in small firms is associated with a change in stock price informativeness (Column 3 of **Table 5**). More importantly, the coefficient for the interaction variable is very close to zero (0.012). Jointly, our results suggest that the increase in stock price informativeness is due to an increase in reputation incentives rather than a decrease in the workload for independent directors.

¹² Typically, this means that the target firm disappears from the ISS Riskmetrics database or that the whole board is replaced by new directors. We exclude cases where some independent directors remain on the board as these choices of remaining directors may be based on their ability.

6 Other implications of stronger reputation incentives: voluntary disclosures and crash risk

6.1 Director reputation incentives and voluntary firm disclosures

In this section, we explore voluntary disclosures as a mechanism through which firm independent directors are related to stock price informativeness. Following prior literature (e.g. Gul et al., 2011; Carter and Soo, 1999), we examine Form 8-K filings as a means by which companies voluntarily disclose additional information to investors. If independent directors with stronger reputation incentives were to improve a firm's information environment by increasing the amount of firm-specific information available to the public, we expect to find a positive link between the reputation incentives of independent directors and how frequently firms disclose information on a voluntary basis.

The Securities and Exchange Commission (SEC) requires public firms to file Form 8-K to disclose certain material events on an ongoing basis. Events that trigger the filing of 8-Ks can be grouped into nine categories (see **Table A3**). We focus on category #8 ('other events') and use this category as our proxy for voluntary disclosure.¹³ Specifically, we define *Voluntary Disclosure_{it}* as the natural logarithm of one plus the number of category #8 events in 8-Ks of firm *i* in fiscal year *t*.

In order to evaluate the effect of a plausible exogenous shock to reputation incentives on the level of voluntary disclosures, we conduct difference-in-difference estimation with firm fixed effects using *Voluntary Disclosure_{it}* as the outcome variable. The empirical set-up follows Section 5.1. In addition to the previously included control variables, we follow Gul et al. (2011) and control for *Other Disclosure_{it}* (which is defined as the natural logarithm of one plus the number of events in other categories on a firm's 8-K forms). This controls for the possibility that a firm may file category #8 items to supplement their other disclosure items.

[Table 6 about here]

¹³ Unlike the other categories in 8-K filings, category #8 allows the firm 'to report events that are not specifically called for by Form 8-K, that the registrant considers to be of importance to security holders'. In the absence of an unambiguous definition of what constitutes materiality, managers and directors may exercise substantial discretion with regards to disclosure under this category.

Table 6 reports the results. In Column 1, we do not find an increase in category #8 filings in 8-K reports following an exogenous increase in directorship ranking (the coefficient for $Ranking\ Increase_{i,t} \times Post\ Period_{i,t}$ is not statistically significant). However, independent directors will be particularly reliant on transparency when firms operate in a weak information environment (see Armstrong et al., 2014; Jin and Myers, 2006). Thus, independent directors may only need to improve transparency and manage their reputation risk in a weak information environment.

To test this conjecture, we estimate extended difference-in-difference models where we interact the impact that independent directors with reputation incentives have on transparency with three indicators for weak information environments: *Low Analyst Coverage*¹⁴, *High Analyst Disagreements*¹⁵, and *High Entrenchment (E-Index)*¹⁶. The results in Columns 2-4 of Table 6 support our conjecture. For instance, we find that when a treated firm's level of analyst coverage is below the industry median, the number of voluntary disclosures increases by 18.9% in the period that follows an increase in the directorship ranking (Column 2).

We also find similar results for firms in which EPS forecast dispersion is above the industry median (Column 3) and for firms with a high E-Index (Column 4). These results are particularly noteworthy because they are consistent with the view that independent directors act in self-interest when improving firm transparency. For instance, the fact that independent directors improve transparency in environments with fewer arbitrage investors suggests they do so to manage their higher reputation risk in weak information

¹⁴ *Low Analyst Coverage* equals 1 when the number of EPS forecasts made by equity analysts for the firm is below the industry median (based on 2-digit SIC codes) and zero otherwise. Piotroski and Roulstone (2004) link analyst coverage to increased firm-specific information in stock prices.

¹⁵ *High Analyst Disagreement* is a dummy variable which equal one if the standard deviation of EPS forecasts scaled by the mean EPS forecast is above the industry-median, and zero otherwise.

¹⁶ To proxy for arbitrage-motivated investing, we follow Ferreira and Laux (2007) and Armstrong, Balakrishnan and Cohen (2012) and use the Bebchuk et al., (2009) Entrenchment index. Arbitrage-oriented investors have higher incentives to collect private firm information when operating under a less entrenched and more shareholder-friendly regime. Directors with reputation incentives should thus be more incentivised when the Bebchuk et al. (2009) entrenchment index is high (i.e. fewer minority shareholder rights and hostile takeovers). *High E-Index* is a dummy variable which equals 1 if the E-Index is above the industry median, and zero otherwise.

environments rather than to meet investor demands for more transparency. After all, investor demands for more transparency should be low when firms are entrenched and the scope for informed trading is low.

Overall, the results indicate that a plausibly exogenous increase in the reputation incentives of independent directors is associated with more voluntary 8-K disclosures in firms that operate in weaker information environments. This evidence is consistent with the view that independent directors with reputation incentives use voluntary disclosures as a way to release firm specific information into the market.

6.2 *Director reputation incentives and firm crash risk*

In this final section, we test the association between reputation incentives and an outcome linked to a lack of corporate transparency in the form of large stock price losses (Kim et al., 2011; Hutton et al., 2009). We refer to the latter as crash risk.

Information asymmetry increases future crash risk by allowing managers to hide and accumulate bad news (Kim et al., 2011; Hutton et al., 2009). Managers may hide bad news from investors for a variety of reasons such as career or compensation concerns (Ball, 2009; Kothari et al., 2009). As the amount of bad news that remains hidden accumulates, there will be a growing discrepancy between intrinsic and current share prices (Jin and Myers, 2006). When a sudden release of the hidden news occurs, the result will be a large firm-specific shock and long tails in the distribution of stock returns. We therefore expect to find a negative association between independent director reputation incentives and crash risk.

Consistent with prior studies, we calculate firm-specific daily returns¹⁷ and use them to construct three measures of firm-specific stock price crash risk. The first measure, *COUNT*, is the number of crashes (extreme downside returns) and jumps (extreme upside returns) for each firm in each fiscal year (Jin and Myers, 2006).¹⁸ The second measure is *NCSKEW*, defined as the coefficient of skewness of firm specific daily returns multiplied by minus one (Kim et al. 2011). The third measure, *DUVOL*, is the natural log ratio

¹⁷ Defined as the natural log of one plus the residual return from the expanded market model regression i.e $R_{i,d} = \ln(1 + \varepsilon_{i,d})$ where $\varepsilon_{i,d}$ is the estimated residual.

¹⁸ Crash and jump incidents are defined as a 3.2 standard deviation return above and below the mean daily returns over each fiscal year (corresponding to a 0.1% probability event under the normal distribution).

of firm-specific return volatility in a “down” sample to volatility in an “up” sample (Chen, Hong, and Stein, 2001).¹⁹ An increase in these three variables indicates that the firm’s stock price is more prone to crashes.

Similar to our analysis in Section 6, we employ difference-in-difference estimations with firm fixed effects to analyze the relation between a plausibly exogenous increase in reputation incentives and stock price crash risk. The control variables include busy directors and directors without other directorships. Additionally, we include other variables that have been found to affect stock price crashes. These include annual stock returns and the standard deviation of daily returns (Chen, Hong and Stein, 2001). To control for persistence in stock return skewness, we introduce the lag value of the negative coefficient of skewness into all our models. We also control for discretionary accruals, firm size, the market-to-book ratio, leverage and return on equity.

[Table 7 about here]

The results are presented in Table 7. The sample period comprises three years before and three years after a shock to a directorship ranking. We find that crash risk decreases in the post shock period for treatment firms. The coefficients on $Ranking\ Increase_{i,t} \times Post\ Period_{i,t}$ are negative and significant for all crash risk measures. Therefore, the evidence is consistent with our expectation that the presence of directors with high reputation incentives is negatively associated with firms experiencing crash incidents in a financial year (Column 1). Also, the results show that the returns of the firms in which directors have high reputation incentives are less negatively skewed (Column 2) and their negative returns are less volatile (Column 3).

7 Conclusions

Understanding how firms can facilitate and maintain high levels of corporate transparency is an important issue. In this paper, we find that the proportion of independent directors who rank their directorship high is positively associated with more firm-specific information content in stock prices. We argue that directors

¹⁹ For each firm-year, firm specific daily returns are divided into “down” and “up” samples, where the “down” (“up”) sample comprises firm specific daily returns that are below (above) the annual mean.

who wish to preserve their reputation in the director labor market will improve the information environment of the firm by encouraging managers to release more firm-specific information. Our findings are robust to alternative proxies for firm-specific information content and to treatment for endogeneity. Finally, we document some evidence that director reputation incentives are linked to lower incidents of firm-specific stock price crash.

Our findings show that the reputation concerns of individual directors can influence the firm-level information environment. This has several important implications, not least that a component of a firm's information environment is not exogenous to firms but can be actively shaped by a firm through recruitment of independent directors with reputation incentives. Our findings also shine some light on the discussion of whether independent directors should hold multiple appointments at the same time. While some research views the effectiveness of these directors critically, our results show evidence that multiple directorships can have beneficial effects for stockholders in relatively large firms. We show that shareholders should benefit from greater price informativeness and lower crash risk provided appointments of independent directors are made by firms that are among the largest firms that directors serve.

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Table 1 Summary Statistics

The full sample comprises 12,984 observations from 1,366 S&P 1500 firms from 1996-2012. *Market-model R-Squared* and *Stock Price Informativeness* are computed using daily stock price data from the Center of Research and Security Prices. NYSE/Amex/NASDAQ value-weighted market index (inclusive of dividends) is the proxy for stock market portfolio. Director data and corporate governance index are obtained from the Institutional Shareholder Services database. Firm characteristics are from Compustat. Analyst coverage data is from I/B/E/S. Variable definitions are provided in Table A1.

Variable	N	Mean	S.D.	p25	p50	p75
<i>Market-Model R-Squared</i>	12,813	0.282	0.176	0.145	0.261	0.401
<i>Stock Price Informativeness</i>	12,813	1.225	1.281	0.399	1.042	1.773
<i>%High Ranked</i>	12,813	0.126	0.161	0.000	0.091	0.200
<i>%Low Ranked</i>	12,813	0.155	0.153	0.000	0.125	0.250
<i>Busy Board</i>	12,813	0.005	0.072	0.000	0.000	0.000
<i>Single Directorship</i>	12,813	0.620	0.485	0.000	1.000	1.000
<i>Board Size</i>	12,813	9.151	2.334	7.000	9.000	11.000
<i>Board Independence</i>	12,813	0.715	0.160	0.625	0.750	0.846
<i>Profitability</i>	12,813	0.071	7.214	0.058	0.125	0.192
<i>S.D.(Profitability)</i>	12,813	0.324	7.154	0.020	0.044	0.096
<i>Leverage</i>	12,813	0.182	0.165	0.025	0.164	0.281
<i>Market-to-Book</i>	12,813	3.143	3.156	1.541	2.339	3.710
<i>Firm Size</i>	12,813	7.675	1.572	6.564	7.507	8.638
<i>Dividend</i>	12,813	0.556	0.497	0.000	1.000	1.000
<i>Stock Turnover</i>	12,813	2.113	1.801	0.973	1.642	2.682
<i>Firm Age</i>	12,813	3.164	0.646	2.708	3.178	3.761
<i>Diversification</i>	12,813	0.642	0.479	0.000	1.000	1.000
<i>Discretionary Accruals</i>	12,813	0.115	0.157	0.032	0.072	0.136
<i>Analyst Coverage</i>	12,813	9.334	8.276	3.000	8.000	14.000
<i>E-Index</i>	12,813	2.137	1.347	1.000	2.000	3.000

Table 2: Price informativeness on reputation incentive measures

The dependent variable is *Stock Price Informativeness*, the logistic transformation of $1-R^2$ from a market model regression. *%High Ranked* (*%Low Ranked*) is the proportion of independent directors for whom this directorship is at least 10% larger (smaller) than their smallest (largest) directorship. Other control variables are defined in Table A1. In brackets are cluster-robust standard errors. Industry and fiscal year fixed effects are included in all specifications. Intercept included but not reported for brevity. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

	Dependent Variable = <i>Stock Price Informativeness</i>			
	(1)	(2)	(3)	(4)
%High Ranked		0.343*** (0.108)	0.359*** (0.109)	0.289** (0.121)
%Low Ranked		-0.225*** (0.086)	-0.206** (0.086)	-0.281*** (0.100)
<i>Busy Board</i>	-0.385*** (0.099)		-0.381*** (0.099)	-0.375*** (0.100)
<i>Single Directorship</i>				-0.039 (0.033)
<i>Board Size</i>	0.020*** (0.007)	0.022*** (0.007)	0.022*** (0.007)	0.022*** (0.007)
<i>Board Independence</i>	0.083 (0.100)	0.084 (0.108)	0.073 (0.108)	0.104 (0.108)
<i>Profitability</i>	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
<i>S.D.(Profitability)</i>	0.001 (0.002)	0.000 (0.002)	0.000 (0.002)	0.000 (0.002)
<i>Leverage</i>	0.233*** (0.081)	0.241*** (0.080)	0.242*** (0.080)	0.242*** (0.080)
<i>Market-to-Book</i>	0.002 (0.005)	0.002 (0.005)	0.002 (0.005)	0.002 (0.005)
<i>Firm Size</i>	-0.248*** (0.016)	-0.277*** (0.018)	-0.276*** (0.018)	-0.276*** (0.018)
<i>Dividend</i>	-0.048 (0.030)	-0.043 (0.030)	-0.044 (0.030)	-0.044 (0.030)
<i>Stock Turnover</i>	-0.012 (0.008)	-0.010 (0.008)	-0.010 (0.008)	-0.010 (0.008)
<i>Firm Age</i>	-0.043* (0.025)	-0.047* (0.025)	-0.046* (0.025)	-0.046* (0.025)
<i>Diversification</i>	-0.101*** (0.028)	-0.101*** (0.028)	-0.101*** (0.028)	-0.100*** (0.028)
<i>Discretionary Accruals</i>	-0.114 (0.081)	-0.119 (0.079)	-0.118 (0.079)	-0.118 (0.079)
<i>Analyst Coverage</i>	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
<i>E-Index</i>	-0.024** (0.012)	-0.023* (0.012)	-0.023* (0.012)	-0.023* (0.012)
Observations	12,813	12,813	12,813	12,813
R-squared	0.533	0.534	0.535	0.535

Table 3: Alternative measures and model specifications

Panel A presents the results using alternative measures for independent director reputation incentives. In Column 1, reputation measures enter the model as lagged variables. In Column 2 and 3, director reputation incentives are ranked by assets and sales respectively. In Column 4, % *High (Low) Ranked* is the proportion of independent directors for whom the firm's directorship is at least 5% larger (smaller) than their smallest (largest) directorship. In Column 5, %*High Ranked* and %*Low Ranked* are constructed using a 20% threshold. Column 6 uses demeaned market capitalization (by industry year) as a ranking variable. **Panel B** employs alternative measures for stock price informativeness. In Column 7, weekly returns are used instead of daily returns. In Column 8, the residuals from the Fama and French three-factor model are used instead of market model residuals. Column 9 employs Amihud's (2002) illiquidity measure as the measure for stock price informativeness and Column 10 employs the PIN measure from Easley and O'Hara (2004). **Panel C** controls for additional board characteristics: # of independent directors' other board appointments, the % of independent directors who are appointed after the CEO assumes office, % of female independent directors, % of non-Caucasian independent directors, % of non-US independent directors, and % of independent directors with financial expertise. Other control variables are the same as Column 4 in Table 2. Cluster-robust standard errors are in brackets. Industry and fiscal year fixed effects are included in all specifications. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Panel A: Alternative measures for independent director reputation incentives						
	Lagged Reputation Measures	Reputation Measures Based on Total Assets	Reputation Measures Based on Sales	5% High/Low Ranked Threshold	20% High/Low Ranked Threshold	Industry-demeaned Market Cap
	(1)	(2)	(3)	(4)	(5)	(6)
%High Ranked	0.234** (0.102)	0.241** (0.114)	0.181* (0.104)	0.201* (0.103)	0.219** (0.104)	0.382*** (0.097)
%Low Ranked	-0.116 (0.080)	-0.125 (0.094)	-0.224** (0.095)	-0.283*** (0.091)	-0.284*** (0.090)	-0.313*** (0.090)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,137	12,813	12,813	12,813	12,813	12,813
R-squared	0.562	0.565	0.565	0.565	0.565	0.567
Panel B: Alternative measures for stock price informativeness						
	Weekly Returns	Fama and French Model	Illiquidity (Amihud, 2002)	PIN (Easley & O'Hara, 2004)		
	(7)	(8)	(9)	(10)		
%High Ranked	0.196** (0.089)	0.184** (0.091)	0.019*** (0.004)	0.009** (0.004)		
%Low Ranked	-0.143** (0.071)	-0.206*** (0.076)	-0.007** (0.003)	-0.014*** (0.004)		
Other Controls	Yes	Yes	Yes	Yes		
Observations	12,813	12,813	7,509	10,377		
R-squared	0.392	0.570	0.177	0.683		
Panel C: Additional board variables						
	(11)	(12)	(13)	(14)	(15)	(16)
%High Ranked	0.286** (0.132)	0.339*** (0.118)	0.439*** (0.123)	0.419*** (0.122)	0.431*** (0.123)	0.315*** (0.120)
%Low Ranked	-0.275** (0.125)	-0.219** (0.092)	-0.217** (0.099)	-0.230** (0.099)	-0.204** (0.098)	-0.391*** (0.100)
# Board Connections	0.005 (0.007)					
%Co-opted Independent Directors		-0.073** (0.033)				
%Female Independent Directors			0.375** (0.155)			
%Non-Caucasian Independent Directors				0.637*** (0.161)		
%Foreign Independent Directors					-0.319 (0.257)	
%Independent Directors with Financial Expertise						-0.146 (0.091)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,813	11,712	11,290	11,290	11,290	4,660
R-Squared	0.566	0.562	0.561	0.562	0.561	0.485

**Table 4: Exogenous increase in directorship ranking
(difference-in-difference with firm fixed effects)**

Treatment firms (indicated by the dummy variable *Ranking Increase*) are firms that have at least one treatment director. Treatment directors are independent directors with multiple directorships, at least one of their other directorships is in a firm that decreases in size, and the decrease in size of this other firm leads to an increase in directorship ranking in the current firm. Control firms are firms without any treatment director. Control and treatment firms are in the same industry and are matched by market capitalization using nearest neighbor matching with replacement. The dummy variable *Post Period* equals zero (one) in the three years before (after) the change in directorship ranking. Firm and fiscal year fixed effects are included in all specifications. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Dependent Variable = <i>Stock Price Informativeness</i>	(1)	(2)
<i>Ranking Increase × Post Period</i>	0.112** (0.048)	0.094** (0.048)
<i>Ranking Increase</i>	-0.038 (0.063)	-0.026 (0.063)
<i>Post Period</i>	-0.061* (0.036)	-0.074** (0.037)
<i>Busy Board</i>		-0.352 (0.482)
<i>Single Directorship</i>		-0.008 (0.043)
<i>Board Size</i>		-0.007 (0.013)
<i>Board Independence</i>		-0.493** (0.193)
<i>Profitability</i>		0.042 (0.244)
<i>S.D.(Profitability)</i>		-0.003 (0.012)
<i>Leverage</i>		0.261 (0.193)
<i>Market-to-Book</i>		-0.073*** (0.019)
<i>Firm Size</i>		-0.171*** (0.048)
<i>Dividend</i>		0.098* (0.056)
<i>Stock Turnover</i>		0.061** (0.028)
<i>Firm Age</i>		0.725*** (0.184)
<i>Diversification</i>		-0.180** (0.074)
<i>Discretionary Accruals</i>		-0.126 (0.230)
<i>Analyst Coverage</i>		0.009* (0.005)
<i>E-Index</i>		-0.010 (0.020)
Firm Fixed Effects	Yes	Yes
Observations	3,646	3,646
R-squared	0.680	0.691

**Table 5: Termination of other directorships
(difference-in-difference with firm fixed effects)**

Treatment firms (indicated by the dummy variable *Other Directorship Terminated*) are firms that have at least one treatment director. Treatment directors in **Column 1** are independent directors with multiple directorships who experience the loss of one of their other directorships because that firm is an acquisition target. Treatment directors in **Column 2 (Column 3)** are independent directors whose terminated directorship is the *largest (smallest)* firm in her portfolio of directorships. Control firms are firms with no treatment director. Control and treatment firms are in the same industry and are matched by market capitalization using nearest neighbor matching with replacement. The dummy variable *Post Period* equals zero (one) in the three years before (after) the M&A event. Firm and fiscal year fixed effects are included in all specifications. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

	All Directorships	Large Directorships	Small Directorships
		Reputation-enhancing	Reputation-neutral
Dependent Variable = <i>Stock Price Informativeness</i>	(1)	(2)	(3)
<i>Other Directorship Terminated</i> × <i>Post Period</i>	0.107*	0.267**	0.012
	(0.062)	(0.134)	(0.086)
<i>Other Directorship Terminated</i>	-0.170	0.502	-0.069
	(0.130)	(0.783)	(0.248)
<i>Post Period</i>	-0.168**	-0.426**	-0.074
	(0.070)	(0.213)	(0.098)
<i>Busy Board</i>	0.184	-0.320	
	(0.418)	(0.483)	
<i>Single Directorship</i>	-0.092	0.021	-0.118
	(0.060)	(0.098)	(0.077)
<i>Board Size</i>	-0.045**	-0.127***	-0.035
	(0.023)	(0.046)	(0.031)
<i>Board Independence</i>	0.449	0.798	-0.188
	(0.280)	(0.496)	(0.387)
<i>Profitability</i>	0.002	-0.036**	-0.014
	(0.009)	(0.015)	(0.026)
<i>S.D.(Profitability)</i>	0.005	0.028	0.036
	(0.012)	(0.022)	(0.034)
<i>Leverage</i>	-0.533**	-0.607	-0.669**
	(0.210)	(0.502)	(0.294)
<i>Market-to-Book</i>	0.000	-0.005*	-0.005
	(0.001)	(0.002)	(0.007)
<i>Firm Size</i>	-0.005	-0.039	0.060
	(0.054)	(0.118)	(0.076)
<i>Dividend</i>	-0.079	-0.055	-0.241*
	(0.092)	(0.176)	(0.134)
<i>Stock Turnover</i>	0.176***	0.194***	0.065**
	(0.032)	(0.067)	(0.027)
<i>Firm Age</i>	0.390	1.015	1.127**
	(0.346)	(1.004)	(0.509)
<i>Diversification</i>	0.196*	0.183	0.283
	(0.101)	(0.151)	(0.178)
<i>Discretionary Accruals</i>	0.210	0.661	0.202
	(0.235)	(0.535)	(0.280)
<i>Analyst Coverage</i>	0.007	0.023	0.002
	(0.005)	(0.019)	(0.006)
<i>E-Index</i>	0.044*	-0.008	0.059**
	(0.023)	(0.058)	(0.030)
Firm Fixed Effects	Yes	Yes	Yes
Observations	1,314	234	774
R-squared	0.725	0.816	0.718

**Table 6: Voluntary disclosures
(difference-in-difference with firm fixed effects)**

The dependent variable is a logarithm of one plus the number of voluntary disclosures (Item 8) in the firm's 8-K reports which each fiscal year. Treatment firms (indicated by the dummy variable *Ranking Increase*) are firms that have at least one treatment director. Treatment directors are independent directors who have multiple directorships; at least one of their other directorships is in a firm that decreases in size; and, the decrease in size of this other firm leads to an increase in directorship ranking in the current firm. Control firms are firms without any treatment director. Control and treatment firms are in the same industry and are matched by market capitalization using nearest neighbor matching with replacement. The dummy variable *Post Period* equals zero (one) in the three years before (after) the change in directorship ranking. *Low Analyst Coverage* is a dummy variable which equals 1 if the number of EPS forecasts made by equity analysts for the firm is below the industry median. *High E-Index* is a dummy variable which equals 1 if the E-Index is above the industry median. *High Analyst Disagreement* is a dummy variable which equal one if the standard deviation of EPS forecasts scaled by the mean EPS forecast is above the industry-median. The variable *Other Disclosures* is the logarithm of one plus the number of other disclosure items in 8-K reports. Firm and fiscal year fixed effects are included in all specifications. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Dependent Variable = <i>Voluntary Disclosures</i>	(1)	(2)	(3)	(4)
<i>Ranking Increase × Post Period × Low Analyst Coverage</i>		0.189** (0.089)		
<i>Ranking Increase × Post Period × High Analyst Disagreement</i>			0.150* (0.090)	
<i>Ranking Increase × Post Period × High E-Index</i>				0.195** (0.099)
<i>Ranking Increase × Post Period</i>	0.069 (0.042)	-0.009 (0.057)	-0.001 (0.059)	-0.076 (0.084)
<i>Ranking Increase × Low Analyst Coverage</i>		-0.039 (0.076)		
<i>Post Period × Low Analyst Coverage</i>		-0.099 (0.065)		
<i>Low Analyst Coverage</i>		0.087 (0.057)		
<i>Ranking Increase × High Analyst Disagreement</i>			-0.104 (0.069)	
<i>Post Period × High Analyst Disagreement</i>			0.054 (0.065)	
<i>High Analyst Disagreement</i>			0.024 (0.051)	
<i>Ranking Increase × High E-Index</i>				-0.064 (0.084)
<i>Post Period × High E-Index</i>				-0.149** (0.073)
<i>High E-Index</i>				0.025

<i>Ranking Increase</i>	0.522*** (0.032)	0.525*** (0.032)	0.520*** (0.032)	(0.070) 0.521*** (0.032)
<i>Post Period</i>		0.189** (0.089)		
<i>Other Disclosures</i>			0.150* (0.090)	
Other Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,496	2,496	2,496	2,496
R-squared	0.529	0.531	0.532	0.530

Table 7 Crash Risk (difference-in-difference with firm fixed effects)

The dependent variables are *COUNT* (the number of stock price crashes minus the number of jumps), *NCSKEW* (negative coefficient of skewness) and *DUVOL* (the log ratio of volatility in the down sample to volatility in the up sample). Treatment firms (indicated by the dummy variable *Ranking Increase*) are firms that have at least one treatment director. Treatment directors are independent directors who have multiple directorships; at least one of their other directorships is in a firm that decreases in size; and, the decrease in size of tis other firm leads to an increase in directorship ranking in the current firm. Control firms are firms without any treatment director. Control and treatment firms are in the same industry and are matched by market capitalization using nearest neighbor matching with replacement. The dummy variable *Post Period* equals zero (one) in the three years before (after) the change in directorship ranking. Firm and fiscal year fixed effects are included in all specifications. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Dependent Variable =	<i>COUNT</i> (1)	<i>NCSKEW</i> (2)	<i>DUVOL</i> (3)
<i>Ranking Increase × Post Period</i>	-0.266*** (0.094)	-0.290*** (0.098)	-0.074*** (0.022)
<i>Ranking Increase</i>	0.159* (0.095)	0.120 (0.145)	0.034 (0.033)
<i>Post Period</i>	0.047 (0.076)	0.059 (0.079)	0.008 (0.017)
<i>Busy Board</i>	0.476 (0.299)	0.245 (0.365)	0.080 (0.103)
<i>Single Directorship</i>	-0.008 (0.087)	0.080 (0.102)	0.002 (0.021)
<i>Board Size</i>	-0.007 (0.023)	-0.030 (0.023)	-0.004 (0.005)
<i>Board Independence</i>	-0.167 (0.351)	-0.611 (0.376)	-0.087 (0.079)
<i>Stock Turnover</i>	0.012 (0.051)	0.038 (0.038)	0.013 (0.008)
<i>NCSKEW (Lag)</i>	-0.067*** (0.018)	-0.142*** (0.021)	-0.028*** (0.005)
<i>Stock Return Volatility</i>	5.703 (7.929)	42.140*** (7.393)	7.658*** (1.515)
<i>Stock Return</i>	1.227 (1.176)	3.870*** (0.881)	0.707*** (0.189)
<i>Firm Size</i>	-0.101 (0.096)	-0.200** (0.087)	-0.044** (0.019)
<i>Market to Book</i>	-0.037*** (0.014)	-0.059*** (0.016)	-0.012*** (0.004)
<i>Leverage</i>	-0.207 (0.430)	-0.329 (0.504)	-0.076 (0.107)
<i>Profitability</i>	0.002 (0.027)	-0.007 (0.020)	-0.000 (0.004)
<i>Discretionary Accruals</i>	-0.395 (0.335)	-0.247 (0.386)	-0.129 (0.087)
Firm Fixed Effects	Yes	Yes	Yes
Observations	4,116	4,116	4,116
R-Squared	0.217	0.232	0.248

Table A1 Variable Definitions

Variable	Definition
<i>Price Informativeness</i>	Annual logistic transformed idiosyncratic volatility estimated from the market model.
<i>%High Ranked</i>	Proportion of directors who are independent, as classified by the Institutional Shareholder Services, and for whom this directorship is at least 10% <i>larger</i> than their <i>smallest</i> directorship.
<i>%Low Ranked</i>	Proportion of directors who are independent, as classified by the Institutional Shareholder Services, and for whom this directorship is at least 10% <i>smaller</i> than their <i>largest</i> directorship.
<i>Busy Board</i>	Indicator variable that equals one if the majority of the board is populated by directors who hold three or more additional directorship and zero otherwise.
<i>Single Directorship</i>	Indicator variable that equals one if the majority of the board is populated by directors whose directorship is their only directorship and zero otherwise.
<i>Board Size</i>	Number of directors on board.
<i>Board Independence</i>	Number of directors classified as independent scaled by total number of directors. Independent directors are classified by the Institutional Shareholder Services. To be classified as an independent director by ISS, the director must have no material connection to the company other than a board seat. Material connections include having been and being related to a former executive (including the CEO and the founder), having any transactional, professional, financial, and charitable relationship of over \$10,000 per year with the company, or being attested by the board as not being independent.
<i>Profitability</i>	Net income scaled by total value of common equity.
<i>S.D.(Profitability)</i>	Standard deviation of the firm's profitability in the current year and the previous two years.
<i>Leverage</i>	Total long-term debt divided by total assets.
<i>Market-to-Book</i>	Product of number of common shares outstanding and share price at the end of fiscal year divided by total common equity.
<i>Firm Size</i>	Natural logarithm of firm market capitalization.
<i>Dividend</i>	Indicator variable which equals one if the firm pays dividends and zero otherwise.
<i>Firm Age</i>	Natural logarithm of one plus firm age measured as the number of years since the firm's inclusion in the Compustat database.
<i>Diversification</i>	Indicator variable that equals one if the firm operates in more than one business segment and zero otherwise.
<i>Stock Turnover</i>	Number of trades divided by number of shares outstanding.
<i>Discretionary Accruals</i>	Absolute value of the residual from the Jones (1991) accrual prediction model.
<i>Analyst Coverage</i>	The number of forecasts made by analysts in each financial year.
<i>E-Index</i>	This index is based on six corporate governance provisions, four of which potentially prevent minor shareholders from 'having their way' (i.e. staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, and supermajority requirements for charter amendments), while two of which can curb the possibility of a hostile takeover (i.e. poison pills and golden parachutes) (Bebchuk et al., 2009).

Table A2 Reputation incentives in board committees

This table presents coefficient estimates and cluster-robust standard errors from multivariate OLS regression analysis of stock price informativeness on independent director reputation incentives. The dependent variable is *Price Informativeness*, the logistic transformation of $1 - R^2$ from market model regression. *Committee Membership – %High Ranked (%Low Ranked)* is the number of committee members who are independent and for whom this directorship is at least 10% larger (smaller) than their smallest (largest) directorship scaled by the total number of committee members. Other control variables are defined in **Table A1**. Industry and fiscal year dummy variables are included in all specifications. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

	Audit Committee (1)	Corporate Governance Committee (2)	Compensation Committee (3)	Nomination Committee (4)
Dependent Variable = Price Informativeness				
<i>Committee Membership – %High Ranked</i>	0.175*** (0.052)	0.102 (0.065)	0.161*** (0.053)	0.017 (0.054)
<i>Committee Membership – %Low Ranked</i>	-0.056 (0.044)	-0.146*** (0.046)	-0.049 (0.042)	-0.045 (0.044)
<i>Board Size</i>	0.021*** (0.007)	0.003 (0.007)	0.022*** (0.007)	0.017** (0.007)
<i>Board Independence</i>	0.032 (0.094)	0.121 (0.114)	0.048 (0.096)	0.083 (0.098)
<i>Profitability</i>	0.001 (0.001)	0.001 (0.004)	0.001 (0.001)	0.012* (0.006)
<i>S.D.(Profitability)</i>	0.001 (0.001)	0.006 (0.004)	0.000 (0.001)	-0.000 (0.001)
<i>Leverage</i>	0.161** (0.082)	-0.178** (0.074)	0.147* (0.082)	0.006 (0.079)
<i>Market-to-Book</i>	-0.003 (0.005)	0.009** (0.004)	-0.001 (0.005)	0.001 (0.005)
<i>Firm Size</i>	-0.255*** (0.016)	-0.147*** (0.015)	-0.253*** (0.016)	-0.203*** (0.015)
<i>Dividend</i>	-0.046 (0.028)	-0.173*** (0.028)	-0.050* (0.029)	-0.091*** (0.028)
<i>Stock Turnover</i>	-0.007 (0.008)	0.047*** (0.007)	-0.006 (0.008)	0.010 (0.009)
<i>Firm Age</i>	-0.054** (0.024)	-0.128*** (0.025)	-0.055** (0.024)	-0.063** (0.025)
<i>Diversification</i>	-0.098*** (0.028)	-0.096*** (0.027)	-0.097*** (0.028)	-0.116*** (0.028)
<i>Discretionary Accruals</i>	-0.082 (0.089)	0.044 (0.083)	-0.097 (0.088)	-0.082 (0.092)
<i>Analyst Coverage</i>	0.011*** (0.002)	0.004* (0.002)	0.010*** (0.002)	0.009*** (0.002)
<i>E-Index</i>	-0.018 (0.011)	-0.003 (0.010)	-0.017 (0.011)	-0.024** (0.011)
Observations	11,040	4,727	10,923	9,598
R-squared	0.577	0.490	0.576	0.567

Table A3: Disclosure Item in Form 8-K

Section 1: Registrant's Business and Operations	
Item 1.01	Entry into a Material Definitive Agreement
Item 1.02	Termination of a Material Definitive Agreement
Item 1.03	Bankruptcy or Receivership
Item 1.04	Mine Safety - Reporting of Shutdowns and Patterns of Violations
Section 2: Financial Information	
Item 2.01	Completion of Acquisition or Disposition of Assets
Item 2.02	Results of Operations and Financial Condition
Item 2.03	Creation of a Direct Financial Obligation or an Obligation under an Off-Balance Sheet Arrangement of a Registrant
Item 2.04	Triggering Events That Accelerate or Increase a Direct Financial Obligation or an Obligation under an Off-Balance Sheet Arrangement
Item 2.05	Costs Associated with Exit or Disposal Activities
Item 2.06	Material Impairments
Section 3: Securities and Trading Markets	
Item 3.01	Notice of Delisting or Failure to Satisfy a Continued Listing Rule or Standard; Transfer of Listing
Item 3.02	Unregistered Sales of Equity Securities
Item 3.02	Material Modification to Rights of Security Holders
Section 4: Matters Related to Accountants and Financial Statements	
Item 4.01	Changes in Registrant's Certifying Accountant
Item 4.02	Non-Reliance on Previously Issued Financial Statements or a Related Audit Report or Completed Interim Review
Section 5: Corporate Governance and Management	
Item 5.01	Changes in Control of Registrant
Item 5.02	Departure of Directors or Certain Officers; Election of Directors; Appointment of Certain Officers; Compensatory Arrangements of Certain Officers
Item 5.03	Amendments to Articles of Incorporation or Bylaws; Change in Fiscal Year
Item 5.04	Temporary Suspension of Trading Under Registrant's Employee Benefit Plans
Item 5.05	Amendment to Registrant's Code of Ethics, or Waiver of a Provision of the Code of Ethics
Item 5.06	Change in Shell Company Status
Item 5.07	Submission of Matters to a Vote of Security Holders
Item 5.08	Shareholder Director Nominations
Section 6: Asset-Backed Securities	
Item 6.01	ABS Informational and Computational Material
Item 6.02	Change of Servicer or Trustee
Item 6.03	Change in Credit Enhancement or Other External Support
Item 6.04	Failure to Make a Required Distribution
Item 6.05	Securities Act Updating Disclosure
Section 7: Regulation FD	
Item 7.01	Regulation FD Disclosure
Section 8: Other Events	
Item 8.01	Other Events (The registrant can use this Item to report events that are not specifically called for by Form 8-K, that the registrant considers to be of importance to security holders.)
Section 9: Financial Statements and Exhibits	
Item 9.01	Financial Statements and Exhibits

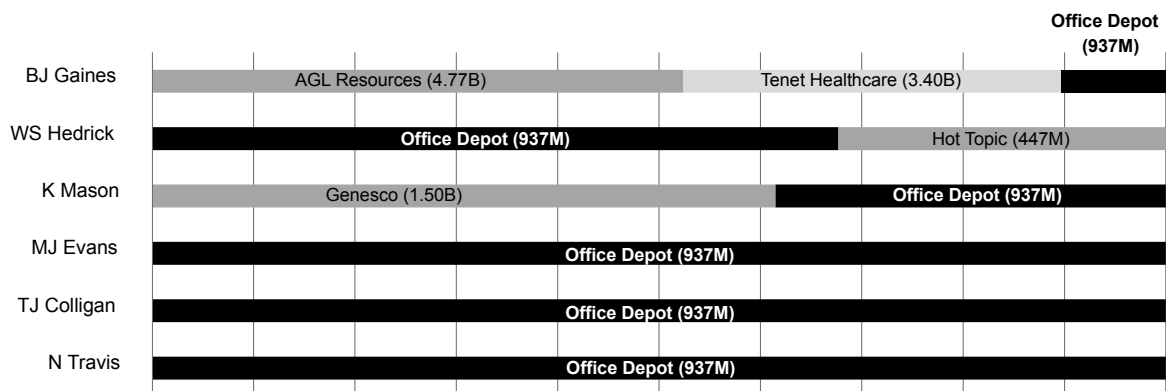


Figure 1 The reputation incentives variables, Office Depot in 2012

The figure illustrates how *%High Ranked* and *%Low Ranked* are constructed using Office Depot in 2012 as an example. Each row represents all independent director positions held by each of the independent directors on the board of Office Depot. The area presents the relative market capitalization (in million US dollars) of each firm that each director serves. Office Depot's board has six independent directors, three of which hold multiple appointments (Hedrick, Gaines and Mason). Hedrick serves both Office Depot and Hot Topic as an independent director. At \$937m, the market capitalization of Office Depot is significantly greater than Hot Topic's \$447m capitalization. Hedrick therefore ranks the Office Depot directorship high. In contrast, Gaines and Mason rank the Office Depot low as they each hold another directorship with a significantly larger firm. Out of Office Depot's six independent directors, one director has high reputation incentives and two directors have low reputation incentives directors. Consequently, *%High Ranked* is 1/6 whilst *%Low Ranked* is 2/6 for Office Depot in 2012.