

Do Directors Respond to Stock Mispricing? Evidence from CEO Turnovers

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Abstract

This article examines whether and how stock mispricing can affect the probability of CEO turnover. In a sample of 1,573 US public firms, I find that, after controlling for fundamental performance, a 1-standard-deviation negative uninformative stock price shock increases the likelihood of CEO turnover by 10%. The mispricing–turnover sensitivity is stronger at firms with an independent board, and a difference-in-difference analysis further supports that finding. Ancillary results suggest that independent directors’ career concerns may play a role in the response of independent boards to mispricing.

I. Introduction

The stock price guides several important decisions that the board of directors and shareholders make about a firm. Keeping or dismissing the chief executive officer (CEO) is one such decision, as the firm’s stock price reflects the CEO’s ability and affects the wealth of the shareholders that directors represent. At the same time, nonfundamental liquidity-driven shocks routinely make stock prices deviate from fundamental values. Fire sales, in particular, can depress a stock price for several quarters (Coval and Stafford (2007)). Nonfundamental liquidity shocks can have significant implications for asset pricing (e.g., Lou (2012)) and corporate investment (e.g., Lou and Wang (2018), Dessaint, Foucault, Fresard, and Matray (2019)). But despite the recurrence of these nonfundamental stock price shocks, the relevance of stock prices for CEO turnover decisions and the importance of firms’ management for firm performance (Bloom, Eifert, Mahajan, McKenzie, and Roberts (2013), Bennedsen, Perez-Gonzalez, and Wolfenzon (2020)), we currently have a limited understanding of the possible effects of nonfundamental stock price shocks on CEO turnovers.

According to standard economic theory, managers should be sanctioned only for those changes in firm performance that are under their control

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(e.g., Holmström (1979)). To the extent that CEOs cannot prevent stock price deviations from fundamental value, directors should thus not sanction CEOs for a temporary undervaluation of the firm, and nonfundamental stock price shocks should have a negligible effect on CEO replacements. Extending this standard view, however, two theoretical arguments suggest that CEO replacements could be sensitive to nonfundamental stock price movements. Specifically, the likelihood of CEO turnover may be related to nonfundamental stock price movements if directors wrongly interpret a nonfundamental shock as a signal about the CEO's performance, or attempt to accommodate a misinformed director labor market to enhance their reputation and improve their own career prospects. These channels are particularly relevant for independent directors as previous studies document that independent directors typically experience difficulties accessing private information (e.g., Duchin, Matsusaka, and Ozbas (2010)) and attach significant importance to their reputations (Guo and Masulis (2015)).

This article studies whether and how nonfundamental movements in stock prices may affect CEO turnover decisions with a particular attention to the role independent directors may play in this relationship. To empirically examine these questions, I exploit the price pressure that results from the forced sale of stocks by mutual funds as a source of temporary undervaluation (cf. Coval and Stafford (2007), Lou (2012)) and relate it to CEO turnover events and directors' characteristics in a sample of large U.S. public firms. As proposed by Wardlaw (2020), I calculate stock price pressure in number of shares rather than in market values throughout the analysis. This avoids the mechanical effect of contemporaneous stock returns on the pressure measure.

Price pressure-induced mispricing offers an interesting setting to assess the sensitivity of CEO turnover to shocks against which a CEO has little control. Mispricing shocks are well suited to study possible misattribution by the board of directors or the director labor market, as the stock price is a salient signal for directors and shareholders, and a CEO has limited scope to influence the exposure of a large public firm to these shocks. Mispricing shocks also tend to be firm-specific and are unlikely to systematically influence CEOs' outside options (e.g., Eisfeldt and Kuhnen (2013) show how, in a competitive assignment framework, CEO turnovers could be sensitive to industry shocks as a result of changes in outside options). Finally, mispricing shocks allow to directly examine the possible effect of stock market trading on CEO turnover, providing possible evidence for a link between public listing and firm productivity.

The analysis yields three sets of findings. First, the central results show that nonfundamental downward movements in stock prices significantly increase the probability of CEO turnover at affected firms. In particular, after controlling for fundamental performance, a 1-standard-deviation nonfundamental stock price shock results in a 0.94 to 1.06 percentage point increase in the likelihood of involuntary CEO turnover, that is a 10%–11% relative increase over the unconditional likelihood of involuntary CEO turnover. This finding is consistent across various robustness tests and alternative econometric specifications. It does not change when I include firm fixed effects, estimate a logit rather than a linear probability model, or restrict the sample of firms to those that experience at least

one severe stock mispricing shock during the sample period. These results suggest that on average mispricing affects boards' assessment of CEOs.

Second, in light of theories that may explain the sensitivity of CEO turnover to stock mispricing, I examine how the results vary with board independence. I establish that firms with an independent board (i.e., boards where the majority of directors are independent) drive the sensitivity of CEO turnover to mispricing. Two further analyses alleviate the concern that this board independence result is driven by an omitted variable correlated with board independence. In the first test, I assess whether firm characteristics that might be correlated with board independence are confounding the board independence result. Reassuringly, controlling for the interactions between stock mispricing and board size, shareholder rights, firm size, leverage, research and development (R&D) expenditures, and fraction of institutional ownership has little effect on the regression coefficient measuring the effect of board independence. As a second test, I exploit the change in listing rules around the passage of the Sarbanes-Oxley Act (SOX) as a plausibly exogenous regulatory shock to board independence. Implemented in 2001, the new rules required any firm with an insider-dominated board to increase its fraction of independent directors to at least 50%. Compared to firms whose boards were already independent, the rule changes increased the sensitivity of CEO turnover to stock mispricing at affected firms.

The third set of results sheds some light on two channels that could be at play in the mispricing-turnover sensitivity at firms with an independent board. A first possible channel recognizes that independent directors may, on average, receive little private information about the firms they monitor (Adams and Ferreira (2007), Harris and Raviv (2008), and Duchin et al. (2010)) and rely on stock prices when assessing the CEO's performance. The average board tends to not fully filter out common industry shocks from firm performance when deciding on a CEO's fate (Jenter and Kanaan (2015)) and rewards CEOs for changes in macroeconomic conditions that are, in fact, beyond their control (Bertrand and Mullainathan (2001)). If a misinformed independent board infers CEO performance from stock prices but fails to filter out mispricing, then it may misattribute an undervalued stock to CEO underperformance and consequently sanction the CEO. Examining how the sensitivity of CEO turnover to stock mispricing relates to the difficulty of acquiring information about the firm, however, I do not find much support for this channel in the data.

An alternative possible channel builds on the observation that, even as directors monitor the CEO, they are themselves disciplined by the firm's shareholders and by the wider labor market for directors (Fama (1980), Fos, Li, and Tsoutsoura (2018)). Independent directors have strong incentives to develop their reputations, in the corporate directorship market, as skilled monitors (Guo and Masulis (2015)). So, if they expect stock mispricing to affect that market's evaluation of their performance – since, overall, the market seems unaware of stock mispricing – then they might respond to uninformative price movements irrespective of their own mispricing awareness (Fisman, Khurana, Rhodes-Kropf, and Yim (2014)). Aligned with the idea that career concerns may play a role in independent directors' reactions to stock mispricing, I find that independent boards whose independent directors plausibly care relatively more about the director labor market (i.e., boards

on which independent directors are young, close to reelection, and have few board seats) are more sensitive to stock mispricing than less career-conscious independent boards.¹

While these last results are consistent with the notion that independent directors' career concerns play a role in the sensitivity of CEO turnover to stock mispricing, a caveat to their interpretation is that they rely on nonexogenous variation in board characteristics and that these characteristics could be correlated with an omitted variable. Controlling for the interaction between stock mispricing and several observable board and firm characteristics, as I do here, helps mitigate this concern. Yet, in the absence of a source of exogenous variation in board characteristics, these results on the channel should be primarily interpreted as descriptive.

Collectively, the article's findings contribute to several strands of the literature on corporate governance, organizational economics, and the real effects of the stock market. They first relate to the literature on CEO turnover and its sensitivity to firm performance (for a summary, see Brickley (2003)) and to outside factors. Whereas Jenter and Kanaan (2015) document that boards tend to discipline CEOs following industry shocks, this article shows that boards may also impose discipline in response to firm-specific shocks that are largely beyond the CEO's control, and that the composition of the board of directors may affect the sensitivity of turnover to these firm-specific shocks.

The article also contributes to the literature on independent directors. Although independent directors are presumed to be beneficial and effective monitors of CEO behavior (Weisbach (1988), Guo and Masulis (2015)), several studies offer a more nuanced view by highlighting the costs of independent boards. For example, independent directors may have greater difficulty accessing strategic information about the firm (Duchin et al. (2010)) and be less effective at advising executives (Adams and Ferreira (2007)).² The results here suggest that career concerns may contribute to independent directors acting on nonfundamental stock price movements. The association between independent boards' career concerns and the sensitivity of CEO turnover to stock mispricing is also consistent with the predictions of theoretical models in which unentrenched agents (e.g., directors) respond to noise to cater to their uninformed monitors (Brandenburger and Polak (1996), Fisman et al. (2014)). Exploiting the heterogeneous response to mispricing

¹Consistent with a role played by directors' career concerns, additional results (available in the [Supplementary Material](#)) suggest that 3 years after a CEO turnover independent directors involved in the turnover hold on average more external seats than otherwise similar independent directors sitting on the board of similar firms (in terms of size, profitability, and mispricing). The sensitivity of CEO turnover to stock mispricing is also driven by cases where the CEO's successor is a firm insider; that is, where one can expect firms to already have a credible candidate for the CEO position at the time of the turnover decision, thereby reducing directors' replacement search cost for a new CEO.

²Two related papers study the interactions between stock price informativeness and board monitoring. Ferreira, Ferreira, and Raposo (2011) examine the relationship between such informativeness and board structure. They find that, on average, firms with more informative stock prices have less independent boards. Along the same lines, Gorton, Huang, and Kang (2017) show that when the board's monitoring intensity and informed traders' knowledge are both endogenized, there is a negative relationship between stock price informativeness and board monitoring. I extend these results by documenting the effect of well-defined, yet uninformative stock mispricing shocks on CEO turnover and by assessing how and why the effect varies with the board's independence.

shocks, as I do in this article, yields novel results consistent with a mechanism underlying those models.

Finally, the extent to which stock prices affect firms' investment decisions has long been subject to debate (Barro (1990), Morck, Shleifer, and Vishny (1990), Blanchard, Rhee, and Summers (1993)). Several measures of stock mispricing are related to firm investment either through equity issues (Baker and Wurgler (2002)) or through catering to market sentiment (Polk and Sapienza (2009)). More recent research shows that plausibly exogenous mispricing shocks induced by mutual fund forced sales affect capital issues (Kahn, Kogan, and Serafeim (2012)), as well as takeover decisions (Edmans, Goldstein, and Jiang (2012)) and investment levels (Hau and Lai (2013), Lou and Wang (2018), and Dessaint et al. (2019)). I show that these nonfundamental shocks also affect leadership choices, a determinant of firm value and productivity.

The rest of the article is organized as follows: [Section II](#) describes the data. [Section III](#) discusses the empirical methodology and [Section IV](#) presents the results. [Section V](#) concludes.

II. Data

The data on CEO turnover come from Peters and Wagner (2014), Jenter and Kanaan (2015), and Jenter and Lewellen (2021) who track these events until 2009. Algorithms that describe turnovers as “forced” or “voluntary” based on press releases are notoriously imprecise (Kaplan and Minton (2012), Jenter and Lewellen (2021)), and the majority of CEO turnovers are difficult to classify (Eisfeldt and Kuhnen (2013)). Replacements of a CEO that are triggered by nonfundamental movements in stock prices may also be less likely to be reported in press releases as clear-cut dismissals. For these reasons, I consider all CEO turnovers except for those of CEOs beyond the retirement age of 65 (Jenter and Lewellen (2021)). I require that CEOs be in the sample for at least 2 years.

The data on stock returns and firm characteristics are from the Center for Research in Security Prices (CRSP) and Compustat. The data on board characteristics and directors' independence are available from 1997 from ISS/RiskMetrics. These data cover large firms that belong to the S&P 1500 index. I use the linking table provided by Coles, Daniel, and Naveen (2014) to merge Compustat and ISS/RiskMetrics. I exclude firms in the finance and utility industries (SIC codes 6000–6700 and 4000–4900). The final sample includes 1,573 unique firms.

To isolate nonfundamental movements in stock prices, I exploit the price pressure-induced by the forced sales of mutual funds (Edmans et al. (2012), Kahn et al. (2012), Lou and Wang (2018), and Dessaint et al. (2019)). Stock sales by diversified mutual funds in response to investor outflows generate large demand shocks on stocks in those funds' portfolios. As a result, these stocks experience substantial price declines (Coval and Stafford (2007)). Since only diversified mutual funds are considered in the construction of the measure, the investor outflows are unlikely to reflect investors' private information about a given firm. Nevertheless, fund managers have some discretion regarding which stocks to sell

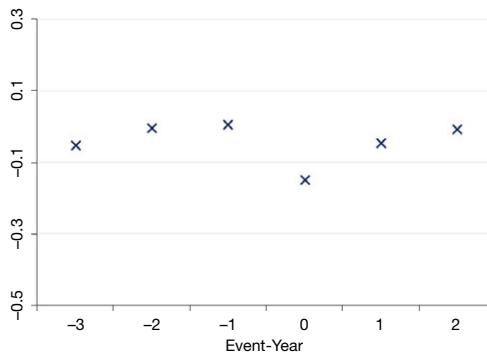
following outflows. A concern in this setting is that managers act on private information and choose to sell stocks that would have performed badly even in the absence of fund outflows. I address that concern by measuring only hypothetical sales that depend on the fund's holdings before a large investor outflow occurs. So, by construction, this measure avoids any correlation between the mutual fund's actual sales and the manager's private information. The measure includes only those funds that experience severe outflows; that is, flows that fall in the bottom 10% of the distribution (this amounts to considering outflows of at least 8% of total assets). In line with previous studies, I exclude all mutual funds specializing in a single sector to avoid the possibility that outflows are driven by negative views of one particular sector. As proposed by Wardlaw (2020), I compute the measure in "number of shares" rather than market values to avoid a mechanical relation between the measure and stock returns. I also implement robustness tests that address the concern of sample selection bias in the firms affected by mispricing shocks (Berger (2017)).

Construction of the forced sales mispricing measure (MISPRICING) proceeds as follows. I first calculate quarterly mutual fund flows from the CRSP mutual fund database. Then, for each stock in each quarter, I use Thomson Reuters-CDA Spectrum data to compute the previous quarter total holdings (i.e., number of shares) of funds that experience at least 8% of outflows; that is, flows in the 10th percentile in the quarter. These holdings are next summed and divided by the number of shares outstanding (in the quarter preceding the severe outflows) for the focal stock. Finally, I sum the quarterly measures over the 4 quarters of the firm's fiscal year.

In Figure 1, I plot the sample firms' yearly cumulative average abnormal returns around forced sales events for the first annual mispricing measure falling below the 10th percentile. I regress firms' 12-month stock returns on the leads and

FIGURE 1
Returns Around Severe Mispricing Events in the Sample

Figure 1 presents cumulative average abnormal returns around the first severe mispricing event (i.e., MISPRICING in the 10th percentile) experienced by firms in the sample. Yearly stock returns are regressed on the event dummy and its leads and lags. The regression includes time-fixed effects to control for aggregate shocks. The figure shows the cumulative coefficients in event-year.



lags of the event dummy and include time-fixed effects to control for aggregate shocks. The figure shows the cumulative coefficients in event time. It exhibits no significant abnormal decline before the event and an abrupt drop in stock returns immediately after the event. The returns reach about -10% in the year of the event and about $+10\%$ the following year. The price recovery, too, is consistent with these forced sales generating uninformative shocks.

Figure 2 presents the sample average of the mispricing measure and frequency of CEO turnover by year and industry. On average, 9.7% of CEOs are replaced before age 65. Stock mispricing occurs throughout the sample period and is not distinctly clustered, although there is a significant increase in the measure in both 1999 and 2009. I include year-fixed effects in the regressions to ensure that the inferences are not affected by aggregate shocks. Stock mispricing and CEO turnovers affect stocks across a wide variety of industries. Table 1 displays the summary statistics for this sample of large public firms.

FIGURE 2
Sample Average of CEO Turnover and Mispricing Over Time and by Industry

Figure 2 presents the sample average of CEO_TURNOVER and MISPRICING (before dividing by its standard deviation) over time (Graph A) and by industry 2-digit SIC (Graph B).

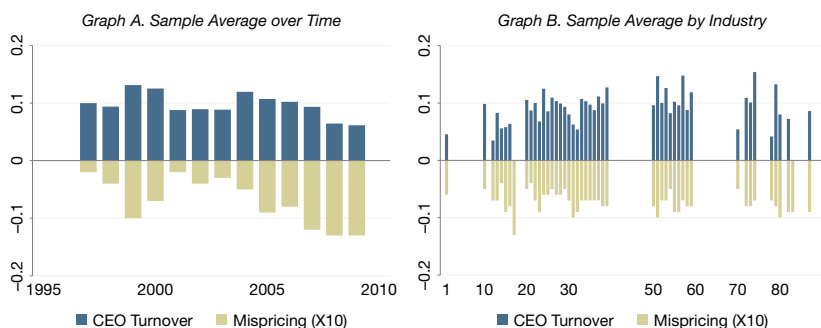


TABLE 1
Descriptive Statistics

Table 1 presents summary statistics of the main variables used in the analysis. For each variable, the statistics are computed across pooled observations for the entire sample period (1997–2009).

	Mean	Median	Std. Dev.
RETURN_12M	0.121	0.066	0.488
MISPRICING	-0.007	-0.005	0.007
CEO_TURNOVER	0.097	0.000	0.296
CEO_AGE (Years)	51.163	51.000	7.378
DUAL_CEO_COB	0.611	1.000	0.487
ASSETS (millions of dollars)	5,067.347	1,350.637	14,105.011
ROA	0.099	0.101	0.099
R&D_ASSETS	0.034	0.006	0.056
LEVERAGE	0.210	0.201	0.169
INSTIT_OWN	0.730	0.749	0.198
BOARD_SIZE	9.007	9.000	2.360
INDEPENDENT	0.685	0.714	0.171
OPACITY	0.448	0.000	0.497
CAREER_CONCERNS	0.504	1.000	0.500

III. Methodology

To assess how sensitive CEO turnover is to nonfundamental shocks to the stock price, I implement a 2-step procedure similar to that used by Dessaint et al. (2019).

The first step decomposes firms' 12-month stock return into a nonfundamental component (MISPRICING), which is based on stock price shocks due to mutual fund outflows, and a fundamental residual component (v). That regression is:

$$(1) \quad \text{RETURN}_{it} = d_t + n_s + \psi(\text{MISPRICING})_{it} + v_{it},$$

where i indexes firms, t indexes years, and d_t and n_s represent year and industry (2-digit Standard Industrial Classification, SIC2) fixed effects, respectively. In a second step, I build on this decomposition to estimate the sensitivity of CEO turnover to such nonfundamental movements in stock price. For this purpose, I use the following linear probability model:

$$(2) \quad P(\text{CEO_TURNOVER}_{it+1}) = d_t + n_s + \beta(\text{MISPRICING})_{it} + \gamma v_{it} + \rho \text{ROA}_{it} + \Phi X_{it} + \varepsilon_{it},$$

where v_{it} is the fundamental residual of equation (1) and ε is an error term. ROA is the firm's accounting performance (return on assets, calculated as the ratio of earnings before interests and taxes over total assets), and X is a vector of control variables that includes firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable for whether or not the CEO is also chairman of the board (COB). Standard errors are clustered at the firm level. The coefficient of interest is β , which measures the sensitivity of CEO turnover to nonfundamental movements in stock prices. Since MISPRICING is a negative number (greater mispricing implies a MISPRICING that is more negative), it follows that a negative β coefficient indicates that nonfundamental declines in stock prices increase the likelihood of CEO turnover. To ease the interpretation of the coefficients, I scale MISPRICING, v , and ROA by their sample standard deviation.

These baseline regressions are comparable to the standard CEO turnover regressions estimated in the literature. In some tests, I further tighten the specifications (equations (1) and (2)) by including industry-year fixed effects (which control for any industry-specific, time-varying factor) or firm fixed effects (which control for time-invariant firm characteristics). To address the concern that outflow-driven mispricing may affect only certain types of firms, I follow Berger (2017) and rerun my regressions on the sample of firms affected at least once by a severe mispricing event (i.e., MISPRICING falling below various thresholds). I also implement robustness tests where I further control for analysts' projection of the firm's growth prospects. The results are little affected by these variations.³

The stock return regression results in Table 2 confirm that the mutual fund hypothetical sales measure is a strong predictor of declines in firms' raw and abnormal stock returns. An increase of 1-standard-deviation in the annual stock mispricing measure is associated with a 4%–5% reduction in stock returns, where the exact percentage by which that value falls depends on which fixed effects are included in the specification.

³The results are also robust to estimating a logit model rather than a linear probability model.

TABLE 2
Stock Returns and Price Pressure

Table 2 presents results from the regressions of 12-month stock returns on MISPRICING. Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. FE, fixed effects. MISPRICING, and ROA are divided by their standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	RETURN_12M				
	1	2	3	4	5
MISPRICING	0.0456*** (0.0043)	0.0511*** (0.0061)	0.0502*** (0.0061)	0.0452*** (0.0059)	0.0497*** (0.0067)
ROA		0.0863*** (0.0054)	0.0903*** (0.0057)	0.0800*** (0.0057)	0.1397*** (0.0092)
Year FE	No	Yes	Yes	No	Yes
Industry FE	No	No	Yes	No	No
Industry FE × year FE	No	No	No	Yes	No
Firm FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
No. of obs.	11,244	11,244	11,244	11,225	11,166

IV. Results

A. Baseline Results

I start by estimating the sensitivity of CEO turnover to stock mispricing using the 2-step approach described by equations (1) and (2). Recall that in equation (1), the variation in firm stock returns is decomposed into a nonfundamental component associated with the forced sales of mutual funds (MISPRICING) and a fundamental residual component v (denoted FUNDAMENTAL in the tables). In equation (2), an indicator for CEO turnover is then regressed on these two components. If CEO turnover is sensitive to nonfundamental movements in stock prices, then the coefficient for MISPRICING will be negative and statistically significant.

Table 3 presents the main results. When regressing CEO turnover on the fundamental and nonfundamental components of firm stock returns, both terms are strongly associated with CEO turnover. I first use the specification introduced in equation (2), without the industry-fixed effects. The coefficient for MISPRICING in column 1 is negative and statistically significant (coeff. = -0.0101 , t -stat. = 2.68). I next add the industry fixed effects and then the industry-year fixed effects to account for time-varying industry shocks; these additional terms do not really affect the coefficients in column 2 (coeff. = -0.0094 , t -stat. = 2.49) or column 3 (coeff. = -0.0106 , t -stat. = 2.67), respectively. I then tighten the baseline specification by incorporating firm fixed effects. The coefficient in column 4, which is now estimated within firms, remains robust in magnitude and statistical significance (coeff. = -0.0105 , t -stat. = 2.46).

The effect of stock mispricing on CEO turnover is economically meaningful. In the industry fixed effects specification (column 2), an increase of 1-standard-deviation in the nonfundamental shock increases the probability of CEO turnover by 0.94 percentage points; this amounts to a 9.7% increase over the unconditional probability of CEO turnover. In comparison, a 1-standard-deviation decline in stock returns due to fundamental reasons increases CEO turnover by 1.95 percentage

TABLE 3
Stock Mispricing and CEO Turnover

Table 3 presents results from the estimation of equation (2). Nonfundamental movements in stock returns are measured by MISPRICING (mutual fund hypothetical sales). ROA is the firm's return on assets. Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. Fundamental movements in stock returns are measured as residuals (v) from the estimation of equation (1). FE, fixed effects. MISPRICING, FUNDAMENTAL, and ROA are divided by their standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	CEO_TURNOVER			
	1	2	3	4
MISPRICING	-0.0101*** (0.0038)	-0.0094** (0.0038)	-0.0106*** (0.0040)	-0.0105** (0.0043)
FUNDAMENTAL	-0.0209*** (0.0032)	-0.0195*** (0.0030)	-0.0202*** (0.0030)	-0.0136*** (0.0030)
ROA	-0.0152*** (0.0031)	-0.0148*** (0.0032)	-0.0153*** (0.0034)	-0.0260*** (0.0056)
Year FE	Yes	Yes	No	Yes
Industry FE	No	Yes	No	No
Industry FE × year FE	No	No	Yes	No
Firm FE	No	No	No	Yes
Controls	Yes	Yes	Yes	Yes
No. of obs.	11,244	11,244	11,225	11,166

points (a 20.1% increase in the probability of CEO turnover), and a 1-standard-deviation decline in the return on assets increases CEO turnover by 1.48 percentage points (a 15.3% increase in the probability of CEO turnover). On average, non-fundamental movements in stock prices affect boards' assessment of CEOs.

Table 4 presents robustness test results on the sensitivity of CEO turnover to stock mispricing. The results in columns 1–6 address the concern that CEO turnover sensitivity to stock mispricing may be driven by selection bias. Following Berger (2017), I reestimate the regression on the sample of firms that are affected at least once by a severe mispricing event. A mispricing event is defined as severe if the price pressure measure falls within the 33rd percentile (columns 1 and 2), the 20th percentile (columns 3 and 4), or the 10th percentile (columns 5 and 6). I find that, despite the reduction in sample size, there is little effect on the magnitude of the coefficient for MISPRICING; that coefficient also remains statistically significant at conventional levels. In column 7, the results show that using a logit model instead of a linear probability model does not materially affect the finding either. To further mitigate the concern that the mispricing shocks may be correlated with fundamental performance, I show in Table A.1 of the Supplementary Material that the results are also robust to controlling for analysts' long-term growth forecast, which proxies for fund managers' information about the firm's prospects.

B. Board Independence

After establishing the main result, I now examine the role of the board of directors and study board characteristics that are associated with a sensitivity of CEO turnover to nonfundamental movements in stock prices.

Directors' independence may play a key role in the sensitivity of CEO turnover to stock mispricing. First, it might be difficult for independent boards to access

TABLE 4
Mispricing and CEO Turnover: Robustness

Table 4 presents the results of several robustness tests on the sensitivity of CEO turnover to stock mispricing. Nonfundamental movements in stock returns are measured by MISPRICING (mutual fund hypothetical sales). ROA is the firm's return on assets. Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. Fundamental movements in stock returns are measured as residuals (ν) from the estimation of equation (1). Columns 1–6 display to the results of the baseline regression estimated on the sample of firms affected by at least one severe mispricing event, defined as an event for which MISPRICING falls below the 33rd percentile (columns 1 and 2), the 20th percentile (columns 3 and 4), or the 10th percentile (columns 5 and 6). Column 7 displays the results of the baseline regression estimated with a logit model rather than a linear probability model. FE, fixed effects. MISPRICING, FUNDAMENTAL, and ROA are divided by their standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	CEO_TURNOVER						
	Selection Bias						
	p33		p20		p10		Logit
	1	2	3	4	5	6	7
MISPRICING	-0.0103*** (0.0039)	-0.0118*** (0.0044)	-0.0101** (0.0041)	-0.0112** (0.0045)	-0.0116** (0.0047)	-0.0121** (0.0050)	-0.1145*** (0.0433)
FUNDAMENTAL	-0.0197*** (0.0032)	-0.0149*** (0.0031)	-0.0197*** (0.0036)	-0.0134*** (0.0034)	-0.0155*** (0.0046)	-0.0105** (0.0044)	-0.2871*** (0.0528)
ROA	-0.0127*** (0.0035)	-0.0249*** (0.0058)	-0.0145*** (0.0039)	-0.0288*** (0.0064)	-0.0174*** (0.0050)	-0.0309*** (0.0072)	-0.1756*** (0.0384)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	9,819	9,783	8,034	8,014	5,370	5,361	11,174

inside information about the firm (Adams and Ferreira (2007), Harris and Raviv (2008), and Duchin et al. (2010)). Lacking sufficient strategic information, independent boards may rely more (than other boards) on public signals, such as the stock price, when assessing CEO performance. To the extent that independent directors might not filter out noise from the stock price, they may react to non-fundamental movements. Second, independent directors are disciplined by their own labor market (Fama (1980)). In a director labor market that rewards monitoring, independent directors may count on the labor market offering them additional board seats (as in, e.g., Fos et al. (2018)). Hence, they may be more inclined to act on nonfundamental declines in the stock price so that they appear to be effective monitors. For this dynamic to play out, it may be sufficient for these directors to believe that the market will rely on public signals to assess their monitoring effectiveness but will not filter out mispricing in making that assessment (Fisman et al. (2014)).

In Table 5, I evaluate the possible role of board independence in the association between CEO turnover and stock mispricing. I measure board independence using a dummy variable that is set to 1 if independent directors represent at least 50% of the board, and 0 otherwise.

Column 1 reports the estimation results based on interacting nonfundamental performance with board independence. The interaction coefficient for nonfundamental performance is negative and statistically significant, which indicates that firms with independent boards are more sensitive to stock mispricing when it comes to CEO replacement. Adding industry, industry-year, or firm fixed effects (in columns 2, 3, and 4, respectively) barely changes the coefficients. In column 5,

TABLE 5
Board Independence and Stock Mispricing

Table 5 presents the results from regressions that assess the role of independent directors. Nonfundamental movements in stock returns are measured by MISPRICING (mutual fund hypothetical sales), and Fundamental movements in stock returns are measured as residuals (v) from the estimation of equation (1). ROA is the firm's return on assets. Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. The dummy variable INDEPENDENT (INDEP.) is set to 1 when independent directors account for more than half of the board. In the regression for the results in column 5, I control for the interaction between MISPRICING and 3-year period dummies (1998–2000, 2001–2003, 2004–2006, and 2007–2009). In column 6, the sample ends in 2006. FE, fixed effects. MISPRICING, FUNDAMENTAL, and ROA are divided by their standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	CEO_TURNOVER					
	1	2	3	4	5	6
MISPRICING	0.0103 (0.0084)	0.0119 (0.0085)	0.0105 (0.0091)	0.0109 (0.0096)	0.0411 (0.0251)	0.0096 (0.0088)
MISPRICING × INDEP.	-0.0230*** (0.0087)	-0.0240*** (0.0089)	-0.0236** (0.0095)	-0.0241** (0.0102)	-0.0225** (0.0095)	-0.0273*** (0.0097)
FUNDAMENTAL	-0.0209*** (0.0032)	-0.0196*** (0.0030)	-0.0202*** (0.0030)	-0.0136*** (0.0030)	-0.0196*** (0.0030)	-0.0196*** (0.0034)
ROA	-0.0149*** (0.0031)	-0.0145*** (0.0032)	-0.0150*** (0.0034)	-0.0259*** (0.0056)	-0.0146*** (0.0032)	-0.0136*** (0.0037)
INDEPENDENT	-0.0032 (0.0114)	-0.0049 (0.0116)	-0.0022 (0.0121)	-0.0120 (0.0156)	-0.0041 (0.0119)	-0.0068 (0.0120)
Year FE	Yes	Yes	No	Yes	Yes	Yes
Industry FE	No	Yes	No	No	No	Yes
Industry FE × year FE	No	No	Yes	No	No	No
Firm FE	No	No	No	Yes	No	No
MISPRICING × 3-year FE	No	No	No	No	Yes	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample end-year	2009	2009	2009	2009	2009	2006
No. of obs.	11,244	11,244	11,225	11,166	11,244	8,695

I augment the baseline model by adding the interaction of MISPRICING and dummies capturing 3-year periods to control for possible time-series changes in the relationship between mutual fund forced sales and CEO turnover, which may be correlated with trends in board independence. The inclusion of these interactions does not materially change the magnitude of the regression results. In column 6, I end the sample in 2006 because there is little variation in board independence across firms after that year. The results remain robust.

A potential concern with the results in Table 5 is that board independence might be correlated with other firm characteristics that drive the association between board independence and the sensitivity of CEO turnover to stock mispricing. I address this concern in two ways. First, I study the determinants of board independence and assess whether predictors of that independence are also associated with the turnover-mispricing sensitivity. I use the first year in which each CEO takes office and regress both dichotomous and continuous measures of board independence on several firm characteristics: board size, shareholder rights as proxied by the G-index of Gompers, Ishii, and Metrick (2003), firm size, leverage, R&D expenditures over assets, and institutional ownership. The results in Table 6 show that board independence is significantly related to firm size, G-index, R&D expenditures over assets, and institutional ownership. Next, I reestimate the baseline regressions but now interact MISPRICING with the firm characteristics introduced above. Focusing on each variable in turn, in Table 7 I find little association

TABLE 6
Determinants of Board Independence

Table 6 presents the results of cross-sectional regressions designed to assess the determinants of board independence. For each firm's executive, I use the first year in which that executive becomes the firm's CEO. In column 1, the dependent variable is a dummy set to 1 when independent directors account for more than half of the board; in column 2, the dependent variable is the continuous measure of the fraction of board directors that are independent. Robust standard errors are given in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Fraction of Independent Directors ≥ 0.50		Fraction of Independent Directors	
	1	2	1	2
BOARD_SIZE	-0.0039 (0.0053)		0.0008 (0.0022)	
GINDEX	0.0156*** (0.0039)		0.0100*** (0.0017)	
ln(ASSETS)	0.0157* (0.0081)		0.0095*** (0.0036)	
LEVERAGE	0.0484 (0.0572)		0.0196 (0.0271)	
R&D_ASSETS	0.4453** (0.1801)		0.1925** (0.0775)	
INSTIT_OWN	0.2934*** (0.0574)		0.1562*** (0.0256)	
Year FE	Yes		Yes	
Industry FE	Yes		Yes	
No. of obs.	1,983		1,983	

TABLE 7
Board Independence: Controlling for Other Interactions

Table 7 presents results from regressions that assess the effect of several firm characteristics that possibly confound the effect of board independence. Nonfundamental movements in stock returns are measured by MISPRICING (mutual fund hypothetical sales). Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. The dummy variable INDEPENDENT (INDEP.) is set to 1 when independent directors account for more than half of the board. The regressions also include MISPRICING, FUNDAMENTAL, and ROA, where fundamental movements in stock returns are measured as residuals (ν) from the estimation of equation (1). FE, fixed effects. MISPRICING is divided by its standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Interaction Variable: CEO_TURNOVER							
	BOARD_SIZE	GINDEX	ln(ASSETS)	LEVERAGE	R&D_ASSETS	INSTIT_OWN	All	
	1	2	3	4	5	6	7	8
MISPRICING \times INDEP.	-0.0239*** (0.0089)	-0.0262*** (0.0092)	-0.0249*** (0.0090)	-0.0239*** (0.0089)	-0.0235*** (0.0088)	-0.0233** (0.0092)	-0.0249** (0.0099)	-0.0254** (0.0114)
MISPRICING \times BOARD_SIZE	-0.0005 (0.0014)						-0.0012 (0.0018)	-0.0008 (0.0022)
MISPRICING \times GINDEX		-0.0012 (0.0008)					-0.0015* (0.0008)	0.0001 (0.0014)
MISPRICING \times ln(ASSETS)			0.0025 (0.0024)				0.0054* (0.0031)	0.0014 (0.0038)
MISPRICING \times LEVERAGE				0.0210 (0.0159)			-0.0041 (0.0193)	0.0279 (0.0240)
MISPRICING \times R&D_ASSETS					-0.0481 (0.0434)		-0.0486 (0.0480)	-0.0551 (0.0731)
MISPRICING \times INSTIT_OWN						-0.0040 (0.0147)	-0.0141 (0.0170)	-0.0050 (0.0208)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Firm FE	No	No	No	No	No	No	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	11,244	9,649	11,244	11,244	11,244	11,244	9,649	9,609

between the CEO turnover-mispricing sensitivity and these characteristics. More importantly, the sensitivity of CEO turnover to nonfundamental movements changes as a function of board independence (row 1), and remains robust to the inclusion of additional interaction terms between stock mispricing and board size, G-index, firm size, leverage, R&D expenditures over assets, or institutional ownership (columns 1–6). Likewise, including all the interactions between these characteristics and stock mispricing does not alter the effect of board independence (column 7). The results are also robust to further including firm fixed effects in the regression (column 8).

Second, I exploit the change in listing rules around the implementation of SOX as a further test of how independent directors may affect the CEO turnover-mispricing sensitivity. One of the key listing rule provisions was to impose a majority of independent directors on the boards of listed firms. Although some firms (the “control” firms) were already in compliance with that requirement when the regulation was enacted, other firms (the “treatment” firms) were forced to increase the number of their independent directors. I follow Duchin et al. (2010), Guo and Masulis (2015), and Balsmeier, Fleming, and Manso (2017), and adopt a difference-in-differences framework for comparing the sensitivity of CEO turnover to stock mispricing for the treatment and control firms both before and after the listing rule changes. I estimate the following model:

$$\begin{aligned}
 (3) \quad P(\text{CEO_TURNOVER}_{it+1}) = & d_t + n_s + \beta_0(\text{MISPRICING}_{it} \times \text{TREAT}_i \times \text{AFTER}_{it}) \\
 & + \beta_1(v_{it} \times \text{TREAT}_i \times \text{AFTER}_{it}) \\
 & + \beta_2(\text{ROA}_{it} \times \text{TREAT}_i \times \text{AFTER}_{it}) \\
 & + \beta_3(\text{MISPRICING}_{it} \times \text{TREAT}_i) \\
 & + \beta_4(v_{it} \times \text{TREAT}_i) + \beta_5(\text{ROA}_{it} \times \text{TREAT}_i) \\
 & + \beta_6(\text{MISPRICING}_{it} \times \text{AFTER}_{it}) + \beta_7(v_{it} \times \text{AFTER}_{it}) \\
 & + \beta_8(\text{ROA}_{it} \times \text{AFTER}_{it}) + \beta_9 \text{MISPRICING}_{it} \\
 & + \beta_{10} v_{it} + \beta_{11} \text{ROA}_{it} + \beta_8(\text{TREAT}_i \times \text{AFTER}_{it}) \\
 & + \Phi X_{it} + \varepsilon_{it},
 \end{aligned}$$

where the indicator variable TREAT is set to 1 if fewer than half of a firm’s directors were independent in 1999 (the year in which regulatory innovations with regard to directors’ independence started), and AFTER is set to 1 for years after 2001 for control firms and for years after the year of compliance for treatment firms.⁴ This model is estimated on 5 years before and 5 years after the shock. The coefficient of interest is β_0 , which measures the change in the postcompliance sensitivity of CEO turnover to nonfundamental shocks (MISPRICING) at treatment and control firms.

Table 8 reports the results of this difference-in-difference analysis. Column 1 shows that the shock is relevant: treatment firms significantly increased their fraction of independent directors in response to the regulation. Column 3 displays the basic regression results when industry-fixed effects are included. Columns 4 and

⁴Firms were given until 2005 to comply with the change in listing rules that mandates a majority of independent directors on the board.

TABLE 8
Change in Listing Rules and CEO Turnover Sensitivity to Stock Mispricing

Table 8 presents regression results for equation (3) that assesses the impact of the change in listing rules, which mandated that the majority of a firm's board members be independent directors. Nonfundamental movements in stock returns are measured by MISPRICING (mutual fund hypothetical sales), and fundamental movements in stock returns are measured as residuals (v) from the estimation of equation (1). The indicator variable TREAT is set to 1 for firms that had, in 1999, a board that comprised directors of which fewer than half were independent (and is set to 0 otherwise); AFTER is a dummy set to 1 for years after 2001 (in the case of control firms) and starting in the first year of compliance (in the case of treated firms); otherwise, it is set to 0. Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. In column 6, I estimate the regression on the matched sample described in footnote 5. The regressions include all of equation (3)'s terms, though only TREAT \times AFTER, MISPRICING \times TREAT \times AFTER, FUNDAMENTAL \times TREAT \times AFTER, ROA \times TREAT \times AFTER are reported for brevity. FE, fixed effects. MISPRICING, FUNDAMENTAL, and ROA are divided by their standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	INDEP.	CEO_TURNOVER				
	1	2	3	4	5	6
TREAT \times AFTER	0.1839*** (0.0107)	-0.0114 (0.0296)	-0.0113 (0.0304)	0.0024 (0.0326)	-0.0144 (0.0338)	-0.0197 (0.0321)
MISPRICING \times TREAT \times AFTER		-0.0528** (0.0209)	-0.0507** (0.0214)	-0.0518** (0.0224)	-0.0558** (0.0247)	-0.0446* (0.0240)
FUNDAMENTAL \times TREAT \times AFTER		-0.0439* (0.0256)	-0.0491** (0.0245)	-0.0563** (0.0236)	-0.0464** (0.0229)	-0.0411* (0.0246)
ROA \times TREAT \times AFTER		-0.0280 (0.0178)	-0.0285 (0.0182)	-0.0423** (0.0196)	-0.0099 (0.0216)	-0.0218 (0.0214)
Year FE	Yes	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	No
Firm FE	Yes	No	No	No	Yes	Yes
Industry FE \times year FE	No	No	No	Yes	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Matched sample	No	No	No	No	No	Yes
No. of obs.	7,213	7,219	7,219	7,201	7,213	7,086

5 display the results when industry-year fixed effects and firm fixed effects are added to the regressions, respectively. Column 6 presents the results for the reestimation of the firm fixed effect regression after matching the treatment and control firms, which addresses the imbalance of treatment and control firms regarding several observable characteristics (e.g., treatment firms tend to be smaller).⁵ In columns 2–6, the coefficient of interest, β_0 , is consistently negative and statistically significant. In comparison with control firms, CEO turnover in treatment firms exhibits increased sensitivity to stock mispricing after implementing the change in listing rules. These results reinforce the notion that firms with an independent board are particularly responsive to nonfundamental movements in stock prices.

C. Investigating the Channel

In this section, I explore two theoretical channels that might explain the sensitivity of CEO turnover to stock mispricing, particularly among firms with an independent board: misinformation and career concerns.

A widespread concern with independent boards is that executives may be reluctant to provide independent directors with timely information about the firm.

⁵The matching is performed as follows. I estimate the probability (i.e., the propensity score) that a firm is treated as a function of its size (log of assets), fraction of institutional ownership, leverage, board size, and return on assets, measured in 1999. I then perform a “radius” match (with a standard 0.005 caliper) based on that propensity score.

Independent directors with inferior information may feel impelled to rely on public signals (e.g., stock prices) to monitor executives. If they fail to differentiate between fundamental and nonfundamental shocks to the stock prices, ill-informed independent directors may also (mistakenly) attribute the stock mispricing that is triggered by mutual funds' forced sales to CEO performance.

Under this hypothesis, the sensitivity of CEO turnover to stock mispricing would be greatest in firms with an independent board and in which it is difficult to acquire firm-specific information. To examine this possibility, I compare the sensitivity of CEO turnover to stock mispricing in firms with independent boards across firms with different costs of acquiring information (more and less "opaque" firms). If access to information plays a role in the sensitivity of CEO turnover to stock mispricing, I expect to find a greater sensitivity in the group of firms with high opacity, where information about the firm is more costly to obtain and where independent directors may rely more on the stock price to assess CEO ability. Indeed, Duchin et al. (2010) show that the effect of imposing board independence on firm value is related to the opacity of the firm. I, therefore, follow Duchin et al. (2010) and rely on analyst-based measures, such as minus the number of analysts covering the firm, the standard deviation of analysts' forecasts, and the analysts' average forecast errors as proxies of firm opacity and independent directors' access to firm information. I calculate the principal components of these variables and define an opaque firm as one for which the first principal component is above the median.⁶

The first 3 columns of Table 9 report the results of these tests for firms with an independent board. The point estimates on the interaction between MISPRICING and OPACITY are close to 0 and statistically insignificant, be it with industry fixed effects in column 1 (coeff. = 0.0019, *t*-stat. = 0.32), with industry-year fixed effects in column 2 (coeff. = 0.0027, *t*-stat. = 0.43), or with firm fixed effects in column 3 (coeff. = 0.0018, *t*-stat. = 0.26). On average, information acquisition costs do not appear to play a major role in the sensitivity of CEO turnover to stock mispricing.⁷

Next, I turn to the role of independent directors' career concerns. Fos et al. (2018) document that CEO turnover sensitivity to firm performance tends to increase as directors approach reelection and the director labor market tends to reward directors who replace CEOs with additional board seats. Independent directors are concerned about the labor market for director seats (Guo and Masulis (2015)), and this generalization holds even more for directors who are younger, are

⁶The first principal component loads heavily and positively on the standard deviation of analyst forecasts and analysts' average forecast errors.

⁷In Table A.2 of the Supplementary Material, I also examine directors' trades of the firm's stock during undervaluation episodes to examine, from a different angle, whether directors may misattribute mispricing to information about the CEO. Ali, Wei, and Zhou (2011), Kahn et al. (2012), and Dessaint et al. (2019) document that corporate officers have some awareness of the undervaluation triggered by mutual funds' forced sales, as evidenced by those officers trading the firm's stock against the undervaluation on their own account. Across several measures, I find that, like corporate officers, independent directors of sample firms trade against the undervaluation. While this trading pattern could reflect their awareness of the mispricing, a systematic contrarian strategy toward the firm's stock or learning from the main officers' trading, independent directors' purchase of the undervalued stock is indicative of their belief in the undervaluation and is hard to reconcile with the hypothesis that they respond to mispricing simply because they wrongly interpret the stock price fall for negative information about the firm.

TABLE 9
Channels: Opacity and Career Concerns

Table 9 presents results from regressions designed to assess the effect of independent directors' access to information about the firm (OPACITY) and independent directors' career concerns (CAREER_CONCERNS, denoted C.C.) on the CEO turnover-mispricing sensitivity. Nonfundamental movements in stock returns are measured by MISPRICING (mutual fund hypothetical sales), and fundamental movements in stock returns are measured as residuals (v) from the estimation of equation (1). OPACITY and C.C. represent a dummy variable that is equal to 1 if the opacity or the career concerns measure is greater than the median, and is set to 0 otherwise. The opacity index is an index calculated as the first component principal of minus the number of analysts, the standard deviation of analysts' forecasts, and analysts' average forecast error. The career concerns index is an index calculated as minus the first component principal of directors' average number of years until re-election, average director age, and average director number of seats. Controls are firm size (log of assets), fraction of institutional ownership, leverage, board size, CEO tenure, and a dummy variable indicating whether or not the CEO is also chairman of the board. Regressions are estimated on firm-year observations for which more than half the board is independent and also include the terms FUNDAMENTAL, ROA, OPACITY, and C.C. FE, fixed effects. MISPRICING, FUNDAMENTAL, and ROA are divided by their standard deviation to facilitate the interpretation of the coefficients. Standard errors (in parentheses) are clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	CEO_TURNOVER									
	1	2	3	4	5	6	7	8	9	10
MISPRICING	-0.0113** (0.0054)	-0.0131** (0.0058)	-0.0125** (0.0060)	-0.0058 (0.0047)	-0.0066 (0.0050)	-0.0056 (0.0056)	-0.0046 (0.0058)	-0.0059 (0.0062)	-0.0035 (0.0065)	-0.0005 (0.0382)
MISPRICING × OPACITY	0.0019 (0.0060)	0.0027 (0.0063)	0.0018 (0.0071)				-0.0010 (0.0058)	0.0000 (0.0062)	-0.0016 (0.0070)	-0.0004 (0.0085)
MISPRICING × C.C.				-0.0107* (0.0057)	-0.0124** (0.0059)	-0.0136** (0.0067)	-0.0106* (0.0058)	-0.0126** (0.0061)	-0.0144** (0.0069)	-0.0153** (0.0069)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No
Industry FE × year FE	No	Yes	No	No	Yes	No	No	Yes	No	No
Firm FE	No	No	Yes	No	No	Yes	No	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MISPRICING × controls	No	No	No	No	No	No	No	No	No	Yes
No. of obs.	9,589	9,561	9,463	9,829	9,799	9,724	9,526	9,497	9,403	9,403

closer to the end of their current term, or hold few director seats. If independent directors expect stock mispricing to affect the labor market's evaluation of their performance – since, overall, the market seems unaware of stock mispricing – then they might respond to uninformative price movements irrespective of their own mispricing awareness (Fisman et al. (2014)). I use the average of each characteristic (age, number of years until reelection, and number of seats) across the firm's independent directors to construct an indicator of independent directors' career concerns.

I construct a career concerns index following the same methodology as for the opacity index above. I calculate the first principal component of the individual proxies (age, number of years until reelection, number of seats) to aggregate them into a single indicator. The first principal component loads positively on the three variables, particularly on age and number of years until reelection. I then take the opposite number of (i.e., minus) this first principal component (because age, number of years until reelection, and number of seats are negatively related to career concerns), and I define a board with career concerns as one for which the career concerns index is above the median.

In columns 4–6 of Table 9, I report the results for the effect of directors' career concerns on the sensitivity of CEO turnover to stock mispricing. The coefficient on the interaction between MISPRICING and CAREER_CONCERNS is negative, statistically significant, and robust to the inclusion of industry fixed effects in column 4 (coeff. = -0.0107 , t -stat. = 1.88), industry-year fixed effects in column 5 (coeff. = -0.0124 , t -stat. = 2.09) and firm fixed effects in column 6 (coeff. = -0.0136 , t -stat. = 2.03).

In columns 7–9 of [Table 9](#), I include both the interactions between MISPRICING and OPACITY and MISPRICING and CAREER_CONCERNS in a single regression to assess the two channels jointly. These regressions effectively consider each channel while controlling for the other. Consistent with the results above, OPACITY is not significantly related to the sensitivity of CEO turnover to stock mispricing, but CAREER_CONCERNS is. In column 10, I further saturate the firm fixed effects regression of column 9 by including the interactions between mispricing and the control variables to account for the possible correlation between CAREER_CONCERNS (or OPACITY) and the control variables in assessing their sensitivity to mispricing. These additional interaction terms leave the findings unaffected. Overall, the results of [Table 9](#) are consistent with the notion that independent boards with greater career concerns respond more to nonfundamental stock price shocks than other independent boards.

A career concerns channel might also suggest that independent directors can expect to benefit from participating in a CEO turnover in terms of labor market outcome, while minimizing their private cost of replacing the CEO. Consistent with this, the results in [Table A.3](#) of the Supplementary Material indicate that 3 years after a CEO change, independent directors involved in the CEO turnover hold on average about 15% more seats than matched control directors that experience similar mispricing. [Table A.4](#) of the Supplementary Material shows that the sensitivity of CEO turnover to mispricing primarily comes from firms that, ex post, replace their CEO with a firm insider; that is presumably cases with lower search costs where directors already had a suitable in-house successor at the time of the CEO turnover.

Together, the results of this section point to a possible role of independent directors' career concerns in the sensitivity of CEO turnover to stock mispricing. Although absent exogenous variation in directors' characteristics, these results cannot be interpreted as definitive tests of these channels, the patterns are empirically consistent with the predictions of theoretical models like [Brandenburger and Polak \(1996\)](#) or [Fisman et al. \(2014\)](#) where unentrenched directors are more likely to act on faulty performance signals to accommodate their misinformed monitors and improve expected personal outcomes.⁸

V. Conclusion

This article investigates whether and how stock mispricing may affect the probability of CEO turnover. Using a sample of U.S. firms, I find that nonfundamental downward movements in stock prices significantly increase the probability

⁸Allowing for the possibility that mispricing is in fact somewhat under the CEO's control, an additional possible explanation for the sensitivity of CEO turnover to stock mispricing might be that CEOs are sanctioned for not succeeding to correct the mispricing (e.g., by undertaking share repurchases or purchasing the stock on their own account). I examined this possibility by controlling for these actions and assessing the coefficient on the interaction between MISPRICING and these variables. [Table A.5](#) of the Supplementary Material displays the results. Controlling for such actions does not materially affect the MISPRICING coefficient in [Table 3](#), and the interactions between MISPRICING and these variables are statistically insignificant. In sum, I do not find evidence that these CEO actions affect the turnover-sensitivity.

of CEO turnover. This association between turnover and mispricing is stronger for firms with a majority of independent directors.

Additional results are consistent with the notion that independent directors' career concerns may play a role in the stock mispricing-CEO turnover sensitivity. In contrast, there is little evidence that on average independent boards misinterpret nonfundamental shocks for informative signals when the cost of acquiring firm information is high.

These results constitute novel empirical evidence consistent with theoretical models under which independent directors act on faulty signals and accommodate the misinformed investors who monitor them. In this sense, the results may point to a possible agency conflict between independent directors and the shareholders whom they represent. Further research could examine whether this particular channel may be responsible for other real effects and whether it influences the broader labor market for CEOs.

Supplementary Material

To view supplementary material for this article, please visit <http://doi.org/10.1017/S0022109022001193>.

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