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RESEARCH ARTICLE

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Are performance explanations credible or strategic? Evidence from a large sample of MD&As[1]

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Abstract

This paper examines managers' explanations of firm performance (i.e., management attributions) in a large sample of the Management's Discussion and Analysis (MD&A) section of annual reports. We find that managers of poorly performing firms tend to attribute firm performance to external factors. We further propose a prediction model to decompose management external attributions into a credible part and a strategic part and find that both components are negatively related to firm performance. This evidence suggests that management external attributions partially reflect the actual impact of external conditions on firm performance and are not entirely subject to managerial opportunism. Additionally, we find that investors react more strongly to firm performance when managers provide credible external attributions, especially for firms without a bad reputation for strategic external attributions. We also show that executive compensation is less sensitive to firm performance when managers make more strategic external attributions.

KEYWORDS

executive compensation, firm performance, management attributions, market reaction, textual analysis

1 | INTRODUCTION

This study examines managers' attribution patterns in explaining firm performance. Specifically, we investigate whether and how managers' external attributions vary with firm performance. In addition, we study whether investors' reactions to firm performance (i.e., the valuation role of earnings) and the pay-performance sensitivity of executive compensation (i.e., the stewardship role of earnings) are associated with management attribution patterns. The Management Discussion and Analysis (MD&A) section of annual reports is an ideal disclosure outlet for exploring these questions because the United States Securities and Exchange Commission (SEC) requires managers to provide informative and accurate explanations of firm performance in the MD&A (SEC, 2003). These performance explanations, also known as management attributions, convey managers' knowledge and understanding of the reasons underlying a firm's operating results.

Earlier psychological studies have documented self-serving attribution bias when people offer causal explanations for their performance (e.g., Kelley, 1967). The theoretical model of social psychology suggests that people tend to attribute unsuccessful results to external factors

(Kelley & Michela, 1980; Weiner, 1985). Earlier empirical studies in accounting and management demonstrate that self-serving attributions exist in the corporate environment when managers explain firm performance to shareholders (e.g., Bettman & Weitz, 1983; Staw et al., 1983). This stream of research primarily highlights attribution bias, implying that managers make strategic explanations of firm performance.

More recent studies in the accounting literature explore attribution behavior from an economic standpoint. Under rational expectations theory, managers weigh the benefits against the costs when they disclose private information to outsiders (Healy & Palepu, 2001; Verrecchia, 2001). Baginski et al. (2000, 2004) find that managers offer credible explanations of firm performance to enhance the usefulness of earnings numbers. Kimbrough and Wang (2014) note that managers do not make attributions that market participants can easily refute. Generally, this literature provides empirical evidence that management attributions convey useful information to market participants.

In this paper, we attempt to resolve the different viewpoints and evidence presented in the social psychology, management, and accounting literature by examining management attribution patterns in a large sample. Using textual analysis techniques, we first obtain MD&As to capture managers' overall tendency of external attribution. We find that managers of poorly performing firms tend to attribute firm performance to external factors, consistent with the stream of literature that primarily highlights managers' self-serving attribution bias.

Nevertheless, in a repeated game setting, it is not plausible that managers can constantly make self-serving attributions without losing a reputation for credible disclosure. To better understand management attribution behavior, we further attempt to extract the credible part of external attributions. We assume that managers' external attributions are perceived as more credible when these attributions can be explained by the actual dependence of firm performance on the economy or industry situation. We propose a prediction model of external attributions and define the predicted values (residuals) from the regression as credible (strategic) external attributions.[2] We find that both the credible and the strategic components of external attributions are negatively related to firm performance. This evidence suggests that management external attributions, at least to some extent, are supported by the inherent link between firm performance and external conditions and are not entirely subject to opportunism.

Next, we examine how stock price reactions to firm performance vary with management attributions. For credible external attributions, tension exists because, on the one hand, investors could view these attributions as informative about a firm's operating environment. If investors believe that a firm's performance results reflect economic or industry conditions, they will place a higher weight on its current performance when assessing its prospects and thus react more strongly to its earnings. On the other hand, if investors are more interested in a firm's relative performance than the market or its industry peers, credible external attributions may mitigate the impact of firm-specific earnings perceived by investors and, therefore, mute investors' reactions to the firm's earnings. For strategic external attributions, investors could interpret these in a similar way to credible external attributions if they cannot distinguish between the two components. Alternatively, investors might disregard the strategic attributions if they believe such attributions lack a factual basis. Our empirical tests show a stronger price reaction to earnings when managers provide more credible external attributions. In contrast, we do not find a significant relation between market reactions to firm performance and strategic attributions. These results suggest that credible external attributions help investors establish a stronger link between current firm performance and future cash flows, while strategic external attributions do not.

To substantiate our argument that credible external attributions help investors understand a firm's financial results, we conducted a cross-sectional test of the market reactions to credible external attributions. Specifically, we partition our sample based on firms' recent history of strategic attributions. We find that the role of credible external attributions is attenuated for firms with a history of strategic attributions. This evidence supports the notion that the credibility of external attributions builds on reputation and managers who constantly make strategic external attributions can undermine their reputation for credible disclosure.

Finally, we investigate whether management attributions relate to the sensitivity of executive compensation to firm performance. Prior studies show that executive compensation is primarily driven by firm performance (e.g., Armstrong et al., 2010). However, under many circumstances, managers are not penalized when the firm performs poorly (e.g., Bebchuk et al., 2002; Shaw & Zhang, 2010). Since board members assess the capability of top management based on periodic financial results, managers have incentives to use attributions to avoid punishment for poor performance (Hermalin & Weisbach, 2007). Whether managers' external attribution tactic, be it credible or strategic, helps them avoid punishment depends on how board members interpret these attributions. Our empirical findings reveal that when managers make strategic external attributions, their compensation becomes less sensitive to the firm's performance. In contrast, we find no impact of the credible portion of external attributions on executive compensation. These results indicate that strategic

external attributions could serve as excuses that help managers avoid punishment for poor performance.

This study contributes to the literature in two aspects. First, we extend the attribution literature by employing computer-based algorithms to construct attribution measures for a large sample of firms and provide additional evidence on managers' self-serving attribution bias. More importantly, prior studies (e.g., Bettman & Weitz, 1983; Staw et al., 1983) do not differentiate credible attributions (those supported by the link between firm performance and the economy or industry conditions) from strategic attributions (those more likely to reflect managerial opportunism).[3] We partially address this issue by employing a prediction model to isolate the predicted component (interpreted as managers' credible attributions) of external attributions from the residuals (interpreted as strategic attributions). Furthermore, this study provides additional evidence on the market reaction to management attributions in corporate disclosures. Baginski et al. (2004) find that management attributions in earnings forecasts, especially external attributions, strengthen the connection between forecast news and market reactions. With a large sample of firms, we can isolate the effect of credible attributions by showing that the credible component of external attributions, rather than the strategic component, strengthens the market reaction to performance results.

Second, this paper fills a gap in the disclosure literature by investigating how managers' career concerns relate to their attributions. Earlier studies have often overlooked the influence of managers' career concerns (defined as managers' concerns about the impact of current performance on executive compensation) on their disclosure choices (Beyer et al., 2010; Healy & Palepu, 2001). Recent studies have started to pay attention to this question. For example, Baginski et al. (2018) examine how managers' career concerns affect the delay of bad news in earnings forecasts. Schloetzer et al. (2021) examine how managers' career concerns affect their disclosure propensity after material adverse events. Our study delves deep into the narratives of annual reports and finds meaningful relationships between executive compensation and managers' strategic external attributions. The empirical results show that managers could benefit from making strategic attributions to avoid pecuniary punishment for poor firm performance.

The remainder of this paper proceeds as follows. Section 2 discusses the related literature and develops hypotheses. Section 3 articulates the research design and describes the key variables. Section 4 presents the sample collection process and descriptive statistics. Section 5 presents multivariate empirical findings and their implications. Section 6 concludes the paper.

2 | RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

Earlier studies in social psychology have documented the existence of self-serving attribution bias when people draw causal inferences about their performance (e.g., Kelley, 1967). The egotism model of self-serving attribution bias suggests that people tend to attribute unsuccessful results to external factors (e.g., poor environment, other people's interference, or lack of outside guidance). Earlier empirical studies in accounting and management show that self-serving attributions exist in the corporate environment when managers explain firm performance to shareholders (e.g., Bettman & Weitz, 1983; Staw et al., 1983). Bettman and Weitz (1983) analyze attributions in letters to shareholders and find that unfavorable outcomes are more likely attributed to external factors. Staw et al. (1983) provide evidence that self-serving attributions could arise when managers attempt to influence investors' expectations or serve their personal trading incentives. This stream of research is primarily based on the psychological theory that highlights the self-serving bias of management attributions.

The US SEC requires firms to provide informative and accurate explanations of firm performance in the MD&A section of their annual reports (SEC, 2003). However, considering the extensive body of literature on self-serving attribution bias, we expect to observe more external attributions among firms with poorer operating performance. We state this prediction in the following hypothesis.

Hypothesis 1. In MD&As, managers make more external attributions when firm performance is poorer.

More recent studies view attribution behavior from an economic perspective (e.g., Baginski et al., 2000, 2004; Barton & Mercer, 2005; Jayamohan et al., 2017; Kimbrough & Wang, 2014; Schloetzer et al., 2021). Well-established agency theory suggests that information asymmetry exists between managers and outsiders (e.g., Fama, 1980; Jensen & Meckling, 1976). Managers possess superior information about the underlying determinants of firm performance because they are the ones who make business decisions that lead to the firm's financial results. The SEC requires managers to provide performance explanations in annual reports to facilitate outsiders' interpretations of firm performance (Cole & Jones, 2005).

Tension exists when managers explain firm performance. Verrecchia (1983) argues that managers face various incentives before making disclosure choices. Under rational expectations theory, managers weigh the benefits against the costs when they disclose private information to outsiders (Healy & Palepu, 2001; Verrecchia, 2001). On

the one hand, managers may provide credible information in their causal explanations of firm performance. Baginski et al. (2000, 2004) find that managers make credible attributions of firm performance because biased attributions can impair their disclosure reputation. If managers conceal the real reasons behind the firm's performance, they may lose a reputation for credible disclosure when the firm's stakeholders eventually realize that material information was withheld. Kimbrough and Wang (2014) find that managers do not make attributions that market participants can easily refute. Generally, this literature provides empirical evidence that managers' performance explanations are credible, and these attributions enhance the information to market participants.

On the other hand, when managers face benefits greater than the costs, they may make strategic disclosures (e.g., Hermalin & Weisbach, 2007; Kothari et al., 2009; Verrecchia, 2001). The qualitative nature of performance explanations gives managers substantial discretion when explaining the underlying reasons for firm performance. Even though the macroeconomy and industry situations are observable, how these factors have impacted a specific company is unobservable to outsiders (e.g., Barton & Mercer, 2005; Bettman & Weitz, 1983). Because narrative disclosures are subjective, difficult to verify, and not strictly audited by public accountants (Davis & Tama-Sweet, 2012; Schloetzer et al., 2021), the costs of making strategic attributions could be lower than the benefits. Therefore, managers may benefit from biased attributions by influencing the compensation decisions of board members, as well as the valuation by investors.[4]

Taken together, the theoretical framework and empirical evidence offered by the social psychology, management, and accounting literature imply that managers' performance explanations could contain both credible and strategic parts. We use computerized textual analysis algorithms to create a large sample of management attributions and propose a prediction model based on prior research regarding the determinants of managers' external attributions. Our efforts in data collection and empirical design allow us to extend the existing literature, in which the sample size often restricts researchers from distinguishing between the credible and strategic parts of external attributions. Following the literature on the credibility of voluntary disclosures (e.g., Hutton et al., 2003; Jennings, 1987; Pownall & Waymire, 1989), we define the credibility of external attributions as the extent to which these attributions are explained by the links between a firm's performance and the economy or industry conditions. We predict that managers' external attributions can include credible and strategic components, and both components are positively related to firm performance. We thus develop the following hypotheses.

Hypothesis 1a. Managers make more credible external attributions in MD&As when firm performance is poorer.

Hypothesis 1b. Managers make more strategic external attributions in MD&As when firm performance is poorer.

The accounting literature recognizes that the usefulness of information depends on its credibility (e.g., Jennings, 1987; Sobel, 1985). Prior research has extensively examined the link between the credibility of financial disclosures and stock price reactions, whereas empirical evidence on the relationship between management attributions and stock returns is relatively sparse (Beyer et al., 2010; Kothari, 2001). Given that credible external attributions contain useful information for assessing a firm's operating environment and risk, these attributions could enhance investors' knowledge about the firm's future cash flow and, therefore, trigger more significant market reactions.

Baginski et al. (2004) argue that management external attributions are credible because these attributions are associated with stronger stock price reactions. Barton and Mercer (2005) use experiments to demonstrate that plausible external attributions enhance stock valuations. Jayamohan et al. (2017) find that the stock market reacts more negatively when family firms make more external attributions for poor performance. We investigate this research question from a different perspective. We provide the first attempt to explore the credibility of external attribution using a prediction model. We assume that managers' external attributions are perceived as more credible when these attributions can be explained by the firm's dependence on the economy or industry situation. In contrast, investors will likely view external attributions as less credible when such attributions are not explained by the firm's long-term association with the external environment. Because the informativeness of disclosure depends on its credibility, we may observe stronger price reactions to financial results when managers provide credible performance explanations.

An opposing view of credible attributions is that such attributions can reinforce investors' confidence in the disclosing firm. The rationale is that firms are not isolated entities, and investors often assess a firm's performance relative to the market or industry conditions. For example, if managers credibly explain a firm's poor performance by demonstrating that it performs better than its peers, we may observe a weaker negative price reaction to the firm's poor performance.

As for the strategic component of management external attributions, it is ex-ante unclear whether investors can differentiate it from credible external attributions. If investors pool the strategic and credible components of attributions together, we expect investors to react similarly to

these two components. On the other hand, if investors see through strategic external attributions, they will not consider them when assessing a firm's current performance and prospects.

The above arguments suggest an unclear association between credible/strategic external attributions and investors' reactions to firm performance. We thus state our predictions in the following hypotheses in null form.

Hypothesis 2a. The credible portion of external attributions is not associated with stock price reactions to current firm performance.

Hypothesis 2b. The strategic portion of external attributions is not associated with stock price reactions to current firm performance.

To further investigate the implications of performance explanations, we examine how executive compensation relates to management attributions. Baginski et al. (2018) define career concerns as managers' concerns about the impact of current performance on their contemporaneous and future compensation. In an efficient compensation framework, managers should be penalized for their responsibility for poor firm performance. Empirical studies in the accounting and finance literature show that executive compensation is primarily driven by firm performance (e.g., Armstrong et al., 2010; Beyer et al., 2010). However, under many circumstances, managers are not punished for the firm's poor performance (Matsunaga & Park, 2001; Mergenthaler et al., 2012).[5] Prior research shows that the cash compensation of the chief executive officer (CEO) is less sensitive to poor earnings performance than to good earnings performance (Bebchuk & Fried, 2004; Shaw & Zhang, 2010). One possible reason for this asymmetry is the lack of an efficient corporate governance system (Core et al., 1999). Another possible reason is that shareholders and board members do not punish managers when they believe that the poor firm performance is caused by external factors.[6] Because board members exert their judgment in determining executive compensation (Bushman et al., 1996; Gibbs et al., 2004), performance explanations in the MD&A may affect board members' decisions when they are finalizing executive compensation for the current period.[7]

Beyer et al. (2010) argue that managers' career concerns could affect their disclosure decisions. Kothari et al. (2009) and Schloetzer et al. (2021) both find that managers delay the disclosing bad news when facing greater career concerns. Because board members assess managers' capability based on the firm's periodic financial results, managers may have incentives to provide credible or strategic external attributions to avoid punishment for poor firm performance (Gibbons & Murphy, 1992). In this case, we expect to observe executive compensation being less sensitive to the firm's earnings performance. In contrast, it is also possible that the board punishes executives for poor firm performance regardless of their explanations. We would thus make non-directional predictions for the relation between management attributions and pay-performance sensitivity. We state our predictions in the following hypotheses in null form.

Hypothesis 3a. The credible portion of external attributions is not related to the pay-performance sensitivity of executive compensation.

Hypothesis 3b. The strategic portion of external attributions is not related to the pay-performance sensitivity of executive compensation.

3 | VARIABLES AND EMPIRICAL MODELS

3.1 | Measures of attributions

Most prior studies manually code the textual disclosures of a random group of firms to identify management attributions (e.g., Baginski et al., 2000, 2004; Bettman & Weitz, 1983; Kimbrough & Wang, 2014; Staw et al., 1983).[8] This study creates a large sample of attributions using computerized textual analysis algorithms that are developed based on the manual coding methods suggested by prior studies. The large sample size enables us to further conduct regressions of the overall attribution on its determinants to separate the credible and strategic components of external attributions.

Specifically, we develop the attribution measures in the following way. First, we follow prior studies to select a random sample of 500 MD&As and manually code the primary reasons for firm performance given by managers (see the manual coding examples in Appendix 1).[9] According to the manually coded sample, we find that the two most frequently mentioned external determinants of firm performance are the economy and the industry, and we create a list of *external factor words* accordingly. Next, we follow Staw et al. (1983) to identify *external attribution sentence groups* when *causality words* and *external factor words* appear in the same sentence or two adjacent sentences of the MD&A. *Causality words* are defined as words or phrases indicating causal links, such as "due to," "because of," "impacted by," and "attributable to." See Appendix 1 for the entire dictionary of causality words and external factor words. We construct a continuous variable (*Freq_Ext*) to capture the overall frequency of managers'

TABLE 1 Descriptive statistics and correlation matrices.

Panel A: Descriptive statistics						
Variable	***N***	**Mean**	**Std Dev**	**Q1**	**Median**	**Q3**
Freq_Ext	38,889	.476	.796	0	.150	.639
Total_Words	38,889	8364.39	4258.94	5295	7474	10,297
Total_Sentences	38,889	367.30	183.55	237	329	449
GDP_Corr	38,889	.219	.290	.031	.235	.428
Revenue_Corr	38,889	.148	.264	−.011	.145	.329
Total Assets	38,889	1683.99	4829.48	78.69	271.15	1060.96
Length	38,889	8.926	.450	8.575	8.919	9.240
Size	38,889	5.728	1.823	4.378	5.606	6.968
Predict_Ext	38,889	.477	.350	.233	.390	.622
Residual_Ext	38,889	−.000	.720	−.360	−.172	.171
ΔROA	38,889	−.003	.168	−.045	.000	.037
ROA_Increase	38,889	.498	.500	0	0	1
MB	38,889	3.462	5.221	1.238	2.124	3.732

Panel B: Correlation matrices						
No.	**Variable**	**1**	**2**	**3**	**4**	**5**
1	*Freq_Ext*	–	.404	.731	.149	.153
2	*Predict_Ext*	.428	–	−.230	.271	.212
3	*Residual_Ext*	.898	−.014	–	−.034	.013
4	*GDP_Corr*	.124	.282	−.001	–	.403
5	*Revenue_Corr*	.126	.208	.038	.370	–
6	*Size*	.093	.184	.013	.211	.198
7	*Length*	.003	.043	−.018	.082	.085
8	*ΔROA*	−.047	−.029	−.038	.016	−.001
9	*ROA_Increase*	−.064	−.047	−.048	.027	.011
10	*MB*	−.100	−.113	−.056	−.019	−.078
No.	**Variable**	**6**	**7**	**8**	**9**	**10**
1	*Freq_Ext*	.156	.114	−.057	−.051	−.174
2	*Predict_Ext*	.188	.041	−.033	−.027	−.175
3	*Residual_Ext*	.014	.039	−.040	−.038	−.064
4	*GDP_Corr*	.232	.091	.025	.027	.026
5	*Revenue_Corr*	.211	.100	.007	.012	−.035
6	*Size*	–	.423	.015	.023	.068
7	*Length*	.437	–	.022	.025	.063
8	*ΔROA*	.007	.009	–	.866	.140
9	*ROA_Increase*	.023	.024	.568	–	.126
10	*MB*	−.027	.022	.067	.062	–

Note: The sample period is from 1996 to 2019. All variables are defined in Appendix 2. In Panel B, Pearson (Spearman) correlations are reported below (above) the diagonal.

Abbreviation: MB, market-to-book ratio.

external attributions as the number of *external attribution sentence groups* scaled by the total number of sentences in the MD&A.

3.2 | Decomposition of external attributions

To decompose external attributions into credible and strategic components, we identify the strength of the links between a firm's performance and the macroeconomic or industry conditions. The dependence of a firm's performance on the macro economy can be measured by *GDP_Corr*, the correlation between changes in its quarterly revenue and changes in the United States GDP. A positive correlation suggests that the firm's performance moves in the same direction as the United States economy (i.e., procyclicality). Managers of firms with procyclical revenues are expected to make more attributions to

TABLE 2 Regression of overall external attributions on firm performance.

	Dependent variable = $Freq\_Ext_{it}$	
	(1)	(2)
ΔROA_{it}	−.182***	
	(−4.56)	
$ROA\_Increase_{it}$		−.097***
		(−5.63)
$Length_{it}$	−.013	−.013
	(−.72)	(−.71)
$Size_{it}$	−.011	−.016
	(−.68)	(−.96)
MB_{it}	−.001**	−.001**
	(−2.18)	(−1.99)
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
N	38,889	38,889
Adjusted R^2	.354	.356

Note: The sample period is from 1996 to 2019. The *t*-statistics reported in parentheses are based on standard errors clustered by firm and year. Significance levels are based on two-tailed tests: * $p < .10$, ** $p < .05$, *** $p < .01$. All variables are defined in Appendix 2.

Abbreviation: MB, market-to-book ratio.

external factors because their operating results are affected more strongly by the macro economy. Additionally, the dependence of a firm's performance on the industry situation can be measured by *Rev_Corr*, the correlation between changes in its quarterly revenue and changes in the total revenue of all other firms in the same industry. The economic intuition of *Rev_Corr* is that when a firm's operations rely more heavily on the industry situation, its performance results would be more strongly associated with peer performance. Thus, managers of firms with a higher value of *Rev_Corr* are expected to make more external attributions for their performance. These two variables are demonstrated by previous studies to reveal how external factors have likely affected a firm's operating results (e.g., Aguerrevere, 2009; Gong et al., 2013; Hutton et al., 2012; Podolny, 1993; Porter, 1979). Higher values of these variables indicate greater influences of external factors on firm performance and, in turn, more credible management external attributions.

Next, we estimate the following regression model for each industry-year (based on two-digit Standard Industrial Classification) to separate the predicted attributions from the residuals.

$$Freq\_Ext = \beta_0 + \beta_1 GDP\_Corr + \beta_2 Rev\_Corr + \beta_3 Length + \beta_4 Size + \varepsilon \quad \text{(Model 1)}$$

In Model 1, we include *GDP_Corr* and *Rev_Corr* to capture the influences of external factors on firm performance. We expect positive coefficients of β_1 and β_2 because procyclical firms and firms in industries with higher performance resonance are affected more by external factors. We add *Size* and *Length* to the regression model to control for the impacts of firm size (defined as the natural logarithm of total assets) and the length of MD&A (defined as the natural logarithm of the total word count), respectively. These controlling variables are documented by prior studies to significantly affect the content of qualitative disclosures and the level of management attributions (e.g., Brown & Tucker, 2011; Li, 2010), and we do not have a ground to expect such relations to reflect management opportunism.

We use the predicted values (*Predict_Ext*) from Model 1 to proxy for credible external attributions because these are the portion of management attributions explained by external factors. The residuals (*Residual_Ext*) contain the strategic portion of external attributions and noise.

3.3 | Empirical models

To test our hypotheses 1, 1a, and 1b, we estimate the following regression of our management attribution measures on the change in earnings.

$$Ext\_Attr = \lambda_i + \delta_t + \beta_1 DROA + \beta_2 Length + \beta_3 Size + \beta_4 MB + \varepsilon \quad \text{(Model 2)}$$

where *Ext_Attr* is the measure of management external attributions (i.e., *Freq_Ext*, *Predict_Ext*, or *Residual_Ext*) of firm *i* in year *t*; ΔROA is the change in income before extraordinary items scaled by the average total assets from year *t*−1 to year *t*; *Length* and *Size* are defined above; *MB* is the ratio of a firm's market-to-book value of equity at the end of year *t*; and λ_i and δ_t denote the firm- and year-fixed effects, respectively. The key variable of interest in Model 2 is ΔROA. We expect a negative coefficient of β_1.

To test our hypotheses 2a and 2b, we estimate the following model, which regresses stock price reactions in the 3-day window of 10-K filings on different measures of management attributions and their interactions with firm performance.

$$BHAR = \lambda_i + \delta_t + \beta_1 DROA + \beta_2 Ext\_Attr + \beta_3 DROA * Ext\_Attr + \beta_4 Size + \beta_5 MB + \beta_6 Consensus + \varepsilon \quad \text{(Model 3)}$$

where *BHAR* is the 3-day (−1, +1) buy-and-hold stock return (size adjusted) around the 10-K filing date. The key

TABLE 3 Decomposition of management external attributions.

Panel A: Prediction model: Regressions of total attributions on external factors					
$Freq\_Ext = \beta_0 + \beta_1 GDP\_Corr + \beta_2 Rev\_Corr + \beta_3 Length + \beta_4 Size$					
	β_1	β_2	β_3	β_4	Adjusted R^2
Mean	.138	.113	.012	.005	.098
(*t*-statistic)	5.40	8.42	1.92	3.56	
Lower quartile	−.141	−.127	−.054	−.042	.039
Median	.077	.095	.046	.005	.073
Higher quartile	.362	.356	.149	.050	.125

Panel B: Regression of predicted and residual external attributions on firm performance				
	Dependent variable =			
	$Predict\_Ext_{it}$		$Residual\_Ext_{it}$	
	(1)	(2)	(3)	(4)
ΔROA_{it}		−.041***		−.141***
		(−2.87)		(−4.90)
$ROA\_Increase_{it}$		−.025**		−.072***
		(−2.45)		(−7.08)
$Length_{it}$	.009	.009	−.022	−.022
	(.87)	(.88)	(−1.31)	(−1.31)
$Size_{it}$	.011**	.010*	−.022	−.026*
	(2.03)	(1.73)	(−1.58)	(−1.82)
MB_{it}	−.001	−.001	−.001*	−.001
	(−.95)	(−.82)	(−1.65)	(−1.52)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
N	38,889	38,889	38,889	38,889
Adjusted R^2	.667	.668	.264	.266

Note: The sample period is from 1996 to 2019. In Panel A, the prediction model is: $Freq\_Ext = \beta_0 + \beta_1 GDP\_Corr + \beta_2 Rev\_Corr + \beta_3 Length + \beta_4 Size$. We estimate this model for each industry-year, where industries are defined by two-digit SIC codes. The *t*-statistics reported in parentheses are based on standard errors clustered by firm and year. Significance levels are based on two-tailed tests: * $p < .10$, ** $p < .05$, *** $p < .01$. All variables are defined in Appendix 2.
Abbreviation: MB, market-to-book ratio.

variable of interest in Model 3 is $\Delta ROA * Ext\_Attr$. As the average market reactions to earnings are expected to be positive, a positive (negative) coefficient on β_3 would indicate that management attributions strengthen (weaken) investors' reactions to firm performance.

To test our hypotheses 3a and 3b, we focus on cash compensation because cash compensation can be determined by the discretion of board members (Banker et al., 2013; Shaw & Zhang, 2010), whereas no theoretical or empirical evidence suggests that managers' stock-based compensation is affected by qualitative performance explanations. To investigate the relation between executive cash compensation and management attributions, we estimate the following regression model.

$$\begin{aligned}\Delta Cash\_Comp\_CEO = {} & \beta_0 + \beta_1 \Delta ROA + \beta_2 \Delta Ext\_Attr \\ & + \beta_3 \Delta ROA * \Delta Ext\_Attr + \beta_4 RET \\ & + \beta_5 RET * \Delta Ext\_Attr + \beta_6 \Delta Size \\ & + \beta_7 \Delta MB \\ & + Year\&Industry indicators \\ & + \varepsilon \end{aligned} \quad \text{(Model 4)}$$

where $\Delta Cash\_Comp\_CEO$ is the change in CEO cash compensation of firm *i* from year *t*−1 to year *t*; ΔExt_Attr is the change in management attributions of firm *i* from year *t*−1 to year *t*; and *RET* is the 1-year cumulative stock return of firm *i* in year *t*.[10,11] The primary variable of interest in Model 4 is $\Delta ROA * \Delta Ext\_Attr$. If the sensitivity of executive compensation to firm performance varies with managers' attribution behavior, we expect a significant coefficient on β_3; otherwise, the coefficient of β_3 would be non-significant.

TABLE 4 Market responses to management attributions.

	Dependent Variable = $BHAR_{it}$			
	(1)	(2)	(3)	(4)
ΔROA_{it}	.836*	.342	1.026**	.348
	(1.85)	(.58)	(2.53)	(.59)
$Freq\_Ext_{it}$	−.059			
	(−1.16)			
ΔROA_{it} * $Freq\_Ext_{it}$	.396			
	(1.09)			
$Predict\_Ext_{it}$		−.118		−.125
		(−.44)		(−.48)
ΔROA_{it} * $Predict\_Ext_{it}$		1.424**		1.395*
		(2.00)		(1.93)
$Residual\_Ext_{it}$			−.055	−.054
			(−.80)	(−.81)
ΔROA_{it}* $Residual\_Ext_{it}$			.152	.112
			(.32)	(.23)
$Size_{it}$	−.631***	−.624***	−.633***	−.626***
	(−5.06)	(−4.98)	(−5.11)	(−5.01)
MB_{it}	−.071***	−.071***	−.071***	−.071***
	(−3.62)	(−3.59)	(−3.62)	(−3.62)
$Consensus_{it}$	.004***	.004***	.004***	.004***
	(3.65)	(3.61)	(3.64)	(3.65)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
N	29,840	29,840	29,840	29,840
Adjusted R^2	.050	.050	.050	.050

Note: The sample period is from 1996 to 2019. The *t*-statistics reported in parentheses are based on standard errors clustered by firm and year. Significance levels are based on two-tailed tests: * $p < .10$, ** $p < .05$, *** $p < .01$. All variables are defined in Appendix 2.
Abbreviation: MB, market-to-book ratio.

4 | SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

4.1 | Data and sample selection

The initial sample starts with 10-K filings from the SEC EDGAR database between 1996 and 2019. We focus on this sample period because the implementation of the EDGAR system started to apply to all United States public firms in 1996, while the last year with complete data before the outbreak of the COVID-19 pandemic is 2019. We extract Item 7 (MD&A) from the 10-K filings and combine the initial sample with financial data from Compustat annual files using the Central Index Key (CIK) and the fiscal year-end date as a unique identifier.[12] We follow prior studies to exclude utilities and financial companies (with a SIC code of 4800–4999 or 6000–6999) from the sample. We require observations with non-missing *Size* (logarithm of total assets), *ROA*, and *MB* (market-to-book ratio).[13] All continuous financial variables are winsorized at 1% and 99%. The final sample contains 38,889 firm-year observations from 5346 unique firms. In addition, this study creates a reduced sample to test the association between management attributions and the sensitivity of executive compensation to firm performance. Due to the coverage of the Execucomp database, we obtained 12,803 observations with CEO cash compensation data.

4.2 | Descriptive statistics

Panel A of Table 1 reports the descriptive statistics. The mean (median) of *Freq_Ext* is .476 (.150), indicating that in every 1000 sentences, we capture an average of 4.76 (1.50) sentence groups of external attributions.[14] The statistics of control variables are consistent with previous studies and exhibit significant cross-sectional variations. For example, the mean (median) of the total number of words in the MD&A is 8364 (7474), comparable with prior studies (Brown & Tucker, 2011; Li, 2010). The mean of the

TABLE 5 Cross-sectional test for market responses to management attributions.

	Dependent variable = $BHAR_{it}$	
	$Bad\_Rep = 1$	$Bad\_Rep = 0$
	(1)	(2)
ΔROA_{it}	−.435	.388
	(−.37)	(.62)
$Predict\_Ext_{it}$	.358	−.212
	(.61)	(−.81)
ΔROA_{it}* $Predict\_Ext_{it}$	.009	1.587**
	(.02)	(2.34)
$Residual\_Ext_{it}$	.047	.086
	(.42)	(−1.13)
ΔROA_{it}* $Residual\_Ext_{it}$	.450	.566
	(.53	(.66)
$Size_{it}$	−.566	−.635***
	(−1.61)	(−4.91)
MB_{it}	−.004	−.085***
	(−.13)	(−3.93)
$Consensus_{it}$	−.172**	.004***
	(−2.41)	(3.83)
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
N	5115	23,912
Adjusted R^2	.059	.045
Testing coefficient diff.:		
ΔROA_{it}* $Predict\_Ext_{it}$	$p < .001$	
ΔROA_{it}* $Residual\_Ext_{it}$	$p = .298$	

Note: The sample period is from 1996 to 2019. The t-statistics reported in parentheses are based on standard errors clustered by firm and year. Significance levels are based on two-tailed tests: * $p < .10$, ** $p < .05$, *** $p < .01$. All variables are defined in Appendix 2. Abbreviation: MB, market-to-book ratio.

variable *ROA_Increase* is .498, suggesting that, on average, 49.8% of firm-year observations have an earnings increase compared with the previous year. The mean (median) of *GDP_Corr* is .219 (.235), suggesting that most firms' quarterly revenue moves in the same direction as the economy (i.e., procyclicality). The variable *Rev_Corr* has a mean (median) of .148 (.145), indicating that most companies have revenues moving in the same direction as their industry peers.

Panel B of Table 1 presents the correlation matrix. The correlation between *Freq_Ext* and Δ*ROA* is significantly negative ($p < .001$), suggesting that poorly performing firms tend to make more external attributions. This result is consistent with prior studies of self-serving attribution bias (e.g., Bettman & Weitz, 1983; Staw et al., 1983). The correlations of all the other variables are consistent with prior studies, as well as with the predictions of this paper.

5 | MULTIVARIATE TEST RESULTS

5.1 | Firm performance and management attributions

This section discusses the results of testing our hypotheses 1, 1a, and 1b about the association between firm performance and management attribution behavior. As shown in Column (1) of Table 2, we find a negative coefficient of Δ*ROA* in the regression of *Freq_Ext*, suggesting that managers are inclined to attribute firm performance to external factors when firms perform poorly. Column (2) shows a qualitatively similar result when we replace Δ*ROA* with *ROA_Increase*, a binary performance metric. This pattern supports hypothesis 1 and corroborates prior studies highlighting managers' self-serving attribution behavior. In other words, managers attribute poor performance to external factors.

To test hypotheses 1a and 1b, we attempt to isolate the credible and strategic portions of managers' external attributions. In Table 3, Panel A, we report the results of estimating Model 1 for each industry-year. We find significantly positive coefficients of *GDP_Corr* and *Rev_Corr*, consistent with the notion that some external attributions are credible. We obtain the predicted values (*Predict_Ext*) as the credible part of external attributions. We attempt to use the residuals (*Residual_Ext*) to proxy for strategic attributions because this part is expected to capture managers' attribution bias and noise.

We then examine how *Predict_Ext* and *Residual_Ext* are associated with firm performance. Panel B of Table 3 presents the results. For both *Predict_Ext* and *Residual_Ext*, the coefficients of Δ*ROA* and *ROA_Increase* are significantly negative. These results imply that when firm performance improves (worsens), managers tend to make fewer (more) of both types of external attributions. These results support our hypotheses 1a and 1b.

5.2 | Market responses to management attributions

Next, we examine whether the stock market reaction to firm performance varies with management attributions. Table 4 presents the regression results. The independent variables of interest are the interaction items between Δ*ROA* and our attribution measures (i.e., *Freq_Ext*, *Predict_Ext*, and *Residual_Ext*). In Column (1), we observe no significant interactive effect of Δ*ROA* with *Freq_Ext*. Column (2) shows a significantly positive coefficient on Δ*ROA***Predict_Ext*. This evidence suggests that credible external attributions are associated with more pronounced market responses to firm performance. In contrast,

TABLE 6 CEO compensation analyses.

	Dependent variable = $\Delta Cash\_Comp\_CEO_{it}$				
	(1)	(2)	(3)	(4)	(5)
ΔROA_{it}	.348***	.348***	.352***	.346***	.348***
	(4.62)	(4.84)	(4.96)	(4.63)	(4.93)
$\Delta Freq\_Ext_{it}$		−.024***			
		(−3.89)			
ΔROA_{it} * $\Delta Freq\_Ext_{it}$		−.086**			
		(−2.21)			
$\Delta Predict\_Ext_{it}$			−.055**		−.062**
			(−2.39)		(−2.61)
ΔROA_{it} * $\Delta Predict\_Ext_{it}$			−.146		−.146
			(−.96)		(−.98)
$\Delta Residual\_Ext_{it}$				−.022***	−.025***
				(−3.59)	(−3.98)
ΔROA_{it} * $\Delta Residual\_Ext_{it}$				−.077*	−.079**
				(−1.85)	(−1.96)
RET_{it}	.093***	.091***	.091***	.092***	.090***
	(4.91)	(4.80)	(5.04)	(4.87)	(5.03)
RET * $\Delta Freq\_Ext_{it}$		−.001			
		(−.07)			
RET * $\Delta Predict\_Ext_{it}$			−.041		−.044
			(−.83)		(−.93)
RET * $\Delta Residual\_Ext_{it}$				.006	.007
				(.69)	(.87)
$\Delta Size_{it}$	.044*	.044*	.046*	.043*	.045*
	(1.74)	(1.78)	(1.91)	(1.69)	(1.83)
ΔMB_{it}	.003*	.003*	.003*	.003*	.003*
	(1.77)	(1.74)	(1.77)	(1.73)	(1.73)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
N	12,803	12,803	12,803	12,803	12,803
Adjusted R^2	.101	.103	.102	.103	.104

Note: The sample period is from 1996 to 2019. The t-statistics reported in parentheses are based on standard errors clustered by firm and year. Significance levels are based on two-tailed tests: * $p < .10$, ** $p < .05$, *** $p < .01$. All variables are defined in Appendix 2.
Abbreviations: CEO, chief executive officer; MB, market-to-book ratio.

Column (3) reveals no significant interaction of ΔROA with *Residual_Ext*, indicating that investors overlook strategic external attributions when assessing the value implications of earnings. Column (4) includes *Predict_Ext* and *Residual_Ext* in one model and presents similar results to those reported in Columns (2) and (3).

Overall, our results in Table 4 imply that investors pay more attention to the predicted part of external attributions because credible attributions enhance investors' understanding of a firm's performance. In contrast, strategic attributions do not affect investors' interpretation of earnings. This evidence further corroborates the validity of our prediction model that separates credible external attributions from the residuals.

The above results pertain to the average market responses to management attributions and their interactions with earnings performance. To substantiate our argument that credible attributions help investors understand firm performance, we conducted a cross-sectional test. In particular, we examine whether the role of credible external attributions varies with firms' track records of strategic disclosures. In a repeated game, managers will lose their reputation for credible disclosure if they consistently make strategic external attributions for poor performance. In such cases, the market would assign less weight to management attributions when assessing a firm's prospects. To test this prediction, we create an indicator variable for bad disclosure reputation, *Bad_Rep*,

TABLE 7 Other executives' compensation analyses.

Panel A: Regressions of CFO's cash compensation			
	Dependent variable = $\Delta Cash\_Comp\_CFO_{it}$		
	(1)	**(2)**	**(3)**
ΔROA_{it}	.307***	.291***	.302***
	(5.40)	(4.53)	(5.37)
$\Delta Predict\_Ext_{it}$	.003		−.001
	(.14)		(−.04)
ΔROA_{it} * $\Delta Predict\_Ext_{it}$	−.128		−.128
	(−.83)		(−.86)
$\Delta Residual\_Ext_{it}$		−.019**	−.019**
		(−2.17)	(−2.22)
ΔROA_{it} * $\Delta Residual\_Ext_{it}$		−.067*	−.064*
		(−1.89)	(−1.79)
Other variables in Table 6	Yes	Yes	Yes
Industry/Year fixed effect	Yes	Yes	Yes
N	10,369	10,369	10,369
Adjusted R^2	.060	.060	.061
Panel B: Regressions of COO's cash compensation			
	Dependent variable = $\Delta Cash\_Comp\_COO_{it}$		
	(1)	**(2)**	**(3)**
ΔROA_{it}	.284***	.270**	.274***
	(3.08)	(2.58)	(3.05)
$\Delta Predict\_Ext_{it}$	−.017		−.022
	(−.36)		(−.46)
ΔROA_{it} * $\Delta Predict\_Ext_{it}$	−.124		−.123
	(−.37)		(−.39)
$\Delta Residual\_Ext_{it}$		−.026**	−.027**
		(−2.45)	(−2.45)
ΔROA_{it} * $\Delta Residual\_Ext_{it}$		−.127*	−.126*
		(−1.73)	(−1.87)
Other variables in Table 6	Yes	Yes	Yes
Industry/Year fixed effect	Yes	Yes	Yes
N	5040	5040	5040
Adjusted R^2	.071	.072	.073

Note: The sample period is from 1996 to 2019. The *t*-statistics reported in parentheses are based on standard errors clustered by firm and year. Significance levels are based on two-tailed tests: * $p < .10$, ** $p < .05$, *** $p < .01$. All variables are defined in Appendix 2.

Abbreviations: CFO, chief financial officers; COO, chief operating officers.

which equals one if the firm's *Residual_Ext* is consistently above the industry median over the past 5 years, and zero otherwise. We then estimate Model 3 separately for firm-years with a bad reputation for strategic attributions (*Bad_Rep* = 1) and firm-years without such a bad reputation (*Bad_Rep* = 0).

Table 5 show that the coefficient of Δ*ROA*Predict_Ext* is significantly positive only for firm-years without a bad reputation for strategic attributions. In addition, the difference in the coefficients of Δ*ROA*Predict_Ext* between the two subsamples is statistically significant ($p < .001$). This result is consistent with our prediction.

5.3 | Management attributions and pay-performance sensitivity

Table 6 presents the results of the association between management attributions and executive pay-performance sensitivity. Column (1) replicates prior studies and shows that Δ*Cash_Comp_CEO* is highly sensitive to Δ*ROA* and *RET*. This evidence suggests that executive cash compensation is significantly associated with the firm's earnings performance and stock returns, consistent with previous studies (e.g., Armstrong et al., 2010; Beyer et al., 2010). Column (2) includes the interaction items between changes in total external attributions (Δ*Freq_Ext*) and firm performance (*ΔROA* and *RET*). We find a significantly negative coefficient for Δ*ROA*Δ*Freq_Ext*, suggesting that the positive association between Δ*Cash_Comp_CEO* and Δ*ROA* is mitigated when managers make more external attributions.

In Columns (3) and (4), we introduce Δ*Predict_Ext* and Δ*Residual_Ext*, respectively, along with their respective interaction terms with firm performance. In Column (3), none of the interaction items (Δ*ROA*Δ*Predict_Ext* and *RET*Δ*Predict_Ext*) are significant, suggesting that the predicted portion of external attributions does not affect the pay-performance sensitivity of executive cash compensation. In Column (4), however, we find a significantly negative coefficient of *ΔROA*Δ*Residual_Ext*, indicating lower pay-performance sensitivity to earnings performance for firms with higher strategic attributions. Column (5) confirms these findings when including both Δ*Predict_Ext* and Δ*Residual_Ext* in the model. These results suggest that managers could benefit from reduced penalties for poor performance by making strategic external attributions.

Finally, we explore how the compensation of other executives, such as chief financial officers (CFOs) and chief operating officers (COOs), relates to management attribution behavior. Specifically, we investigate whether the pay-performance sensitivity of cash compensation of CFOs (Δ*Cash_Comp_CFO*) and COOs (Δ*Cash_Comp_COO*) is associated with management attributions with a pattern similar to that of CEOs. As shown in Table 7, we find lower pay-performance sensitivity for CFOs and COOs of companies with strategic external attributions, consistent with the findings for CEOs reported in Table 6. These results are reasonable because COOs and CFOs, who are often held liable for firm performance, may also benefit from avoiding punishment in their cash compensation by making strategic external attributions.

6 | CONCLUSIONS

This paper employs textual analysis techniques to create a large sample of performance explanations (i.e., attributions) from the MD&A section of 10-K filings. Using this large sample of management attributions, we find that managers tend to attribute unfavorable firm performance to external factors. We propose a prediction model to separate the credible part (i.e., the predicted value) of external attributions from the residuals. We find that both components of external attributions are negatively related to firm performance. Furthermore, we find that stock market investors react more strongly to earnings with credible external attributions, and this effect is particularly evident for firms without a bad reputation for strategic attributions. Finally, when managers make strategic external attributions, their compensation is less sensitive to firm performance.

This paper contributes to the accounting literature by providing new evidence on management attributions. It reconciles the evidence of previous studies by showing that managers' performance explanations contain credible and strategic components. We find that it is the credible component of external attributions that strengthens market reaction to firm performance, and executives could benefit from making strategic attributions to avoid punishment in compensation for poor firm performance.

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DATA AVAILABILITY STATEMENT

Data are obtained from public sources identified in this paper.

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ENDNOTES

[1] This paper follows the Staw et al. (1983) approach to construct measures of management attributions. When reading a random sample of 500 MD&As, we find that, unlike external attributions that are remarkably similar across firms (e.g., most external attributions refer to economic factors or industry situations), firm-specific internal attributions are highly idiosyncratic (see Appendix 1). Due to the intrinsic difficulty in compiling a comprehensive wordlist of internal attributions, it is not feasible for us to capture internal attributions in the same way as external attributions for a large sample of firms. Therefore, we focus on the external attributions of firm performance. We follow Staw et al. (1983) to identify *external attribution sentence groups* when both *causality words* and *external factor words* appear in the same sentence or two adjacent sentences. The dictionary of causality words and external factor words is shown in Appendix 1.

[2] We attempt to use the residuals from the regression to proxy for strategic attributions because, although this component may include noise, it would contain managers' attribution bias if such bias exists.

[3] For example, it could be the case that poor firm performance is truly caused by exogenous shocks in the economy or the industry. Kimbrough and Wang (2014) find that investors see through part of managers' seemingly self-serving attributions by referring to the performance commonality of the industry. Jayamohan et al. (2017) notice that management self-serving attributions do not necessarily reflect deliberate deception.

[4] The justification of strategic attribution in narrative disclosures is consistent with a common generalization of the basic Fischer-Verrecchia (2000) model, which demonstrates managerial reporting bias when the capital market is efficient and both managers and investors are rational. Fischer and Verrecchia (2000) demonstrate that as long as outsiders are uncertain about managers' reporting incentives, the market cannot fully "back out" reporting bias even in a rational expectations equilibrium. The authors state that these results also hold for various situations under which managers try to manipulate the evaluations of other parties, such as regulators, bondholders, and the board of directors.

[5] This phenomenon has also attracted media attention for a long time. In a Washington Post article, White and Johnson (2005) quote a sentence from Professor Lucian Bebchuk's book entitled "Pay Without Performance": "Even though the escalation of pay has often been justified as necessary, when you look at the details, that is not the case, because much of the pay is not all that sensitive to performance."

[6] The two alternative explanations are not mutually exclusive. Bebchuk and Fried (2004) state that whether board members favor managers in compensation arrangements depends on the governance mechanism and executive entrenchment but also on how outsiders perceive these arrangements. Causal explanations could help managers alleviate possible "outrage" risk among other stakeholders and reduce the costs of managerial rent extraction.

[7] This paper focuses on CEOs' cash compensation because cash compensation can be determined by the discretion of board members (Banker et al., 2013; Shaw and Zhang, 2010), and no theoretical or empirical evidence suggests that managers' stock-based compensation is affected by qualitative performance explanations. Shaw and Zhang (2010) present the timeline of a CEO's cash compensation. Before the fiscal year t starts, the CEO and committee members agree upon the ex-ante cash compensation contracts. These contracts generally involve accounting measures (e.g., the return on assets) and market-based measures (e.g., stock returns) used to evaluate the CEO's performance. After observing the operating results for year t, committee members determine the CEO's cash compensation by comparing the performance results to ex-ante targets. At the same time, committee members consider managerial performance explanations before finalizing cash compensation. In

recent years, with more companies adopting the "say on pay" votes that allow shareholders to monitor the compensation of highly paid executives, causal explanations in the MD&A can help committee members justify the CEO's cash compensation, especially when the firm performed poorly.

[8] Prior studies normally select a random sample of 500 corporate disclosures and manually code them to identify management attributions. Because of the small sample size, self-serving attribution bias is generally defined as managers' overall tendency to attribute favorable performance to internal factors and unfavorable performance to external factors. One limitation of this definition is that management attributions can reflect the real underlying situation in the absence of managerial opportunism. For example, poorly performing firms could be affected by an exogenous shock to the economy/industry, and managers may discuss these factors in the performance explanations.

[9] As illustrated in Appendix 1, internal attributions are highly idiosyncratic and differ significantly across firms, which makes it extremely difficult to summarize them in the same way as we do for external attributions. To ensure the feasibility of our analyses, this paper focuses on identifying external attributions of firm performance.

[10] Performance metrics based on stock price (e.g., stock returns) and accounting performance (e.g., ROA) are the two fundamental categories of performance measures in executive compensation contracts. Following prior studies (e.g., Leone et al., 2006; Shaw and Zhang, 2010; Sloan, 1993), we select changes in ROA and the 1-year cumulative stock return as performance measures to test the impact of attributions on the sensitivity of CEO cash compensation.

[11] In executive compensation tests, we follow prior studies to employ a changes specification rather than firm fixed effects to mitigate the problems with omitted correlated variables (e.g., Albuquerque, 2009; Jensen and Murphy, 1990; Lambert and Larcker, 1987).

[12] For companies with modifications of annual reports in a particular year, we keep the earliest available MD&A.

[13] To exclude the impact of outliers, we eliminate observations with negative total sales or total assets and observations with a return on assets (*ROA*) greater than 100% or smaller than −100%.

[14] For interpretation purposes, we multiply *Freq_Ext* by 100 in our empirical tests.

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Appendix 1: Coding examples and dictionary for the algorithm of external attributions

Causality word list:

attribute/driven/due to/reason/result/impact/cause/because/contributed/reflect/affected/stemmed/effect

Attribution types included in the algorithm (242 out of the 500 manually coded MD&As):

Attribution type: Macro economy (102 out of the 500 manually coded MD&As)	
Word list	**Examples**
Economic/economy	The state of the United States economy/soft United States economy/economic trends that impacted the demand/challenging economic and retail conditions/general economic slowdown/distressed economic conditions/worldwide economic downturn/poor economic condition/economic slump accelerated/difficulties in the economy/market sluggishness associated with the current economy/sluggish economy/turmoil in the broader economy/macroeconomic fluctuations/deteriorating macroeconomic environment/general economic recovery/overall improvement in the economy/expansion phase of the economy/economic expansion
Crisis	global credit crisis and plunging consumer confidence/global macroeconomic crisis
Recession	global recession and credit contraction/worldwide economic recession
Attribution type: Industry (140 out of the 500 manually coded MD&As)	
Word list	**Examples**
Industry(sector)… condition/competi-(competition, competitor, competitive pressure, etc.)	lackluster retail environment in the industry/industry factors were significantly unfavorable/slowdown in the…sectors/downturn in the…industry prolonged unfavorable industry conditions/improved industry conditions/worse industry conditions/difficult industry conditions/competitive pressures/competitive environment/our competitive disadvantage/increased competitive activity/increased (increasing) competition/competition from low cost foreign imports/new competition in the market/intense competition from foreign producers and new domestic entrants/failure to match competitors/ very aggressive spending by a competitor/directly compete with our…product/introduction of competing products
Pricing	pricing pressures/favorable pricing/increasingly difficult pricing environment
Market saturation/market demand/industry demand/demand in…industry/market/sector	decline in the industry demand/market saturation/reduced demand in the…market/reduction of overall demand in the industry/strong demand of the…industry/increased demand in the…sector/persistent weak demand in the market
***Attribution types not included in the algorithm (258 out of the 500 manually coded MD&As)*:**	
Attribution type: Internal factors (173 out of the 500 manually coded MD&As)	
Sub-type	**Examples**
Corporate strategy and structure	strategic repositioning activities/change in our strategy/company shifts its strategic focus/re-deploy of production assets/our strategy of/corporate milestones/execution of our strategic plan/execution of our core strategic initiatives/our diversification strategy/our focus on/shift in strategy/the success of our strategic relationships/strategic network alliance/better execution and continuing benefits from the centralized merchandising model/new business strategy/transition of the Company's business/continuous customer-focused strategy/Company's growing reputation/management negotiations/management personnel changes/a more efficient corporate structure/organizational changes
Product-mix related	termination of a product/product relocation/changes in sales mix/favorable mix/case mix trends/newly developed products/change in the mix of services/shift to higher margin products/greater product diversification/a favorable business mix/weaker mix of products/enhancements to existing products/company focused…on its other product lines/reduced certain of its product offering/improved mix of inventory/higher margin product mix/rework product/successful development of new products/release of new…and…products/termination of …products/reduced sales of higher gross margin product/change in our product focus/upgrading the products and services/new product introductions/decline in our…and…products/development of new applications for existing products/cross-selling of products/our maturation in identifying new retail products/changes in the mix of fee type/mix of government and non-government contracts/increased number of programs offered

Attribution types not included in the algorithm (258 out of the 500 manually coded MD&As):	
Attribution type: Internal factors (173 out of the 500 manually coded MD&As)	
Sub-type	**Examples**
Marketing and promotional activities	new promotional plans/seasonal product promotions/increased reimbursement rates/higher rebates granted/effective selling time/sales efforts/sales force is well positioned/ continued rebuilding of the sales channel/a dedicated sales and marketing team/ marketing initiatives/higher engineering and marketing expenses/promotional and advertising spending/increased marketing spending/reduction in promotional activity/effective marketing programs/local and national advertising/more effective use of media/banner advertising arrangements/extensive advertising campaigns
Customer and contract related	attracted new customers/loss of one of our significant customers/large retailer that filed for bankruptcy and was liquidated/the bankruptcy of two wholesale customers/loss of 50% of our…program/reduced contract activity and lower beginning backlog/completion of government and commercial/development contracts/United States Government…contracts/new European customer/loss of the…contract/clients filing for bankruptcy protection/certain customers relocating manufacturing operations to Mexico and Asia/ broadening the Company's customer base/decision by major United States retail customers to shift plan/terminating our agreement with…/new agreements/new contract/deepening our relationship with existing customers/large customers deciding not to renew
***Attribution types not included in the algorithm—Continued*:**	
Attribution type: Internal factors—Continued	
Sub-type	**Examples**
Costs and expenses	savings from supply chain cost-reduction/savings from the cost containment/cost-control programs/effective cost reduction effort/reduced spending in…costs/expense control/cost savings programs/cost cutting measures/operational improvements and cost controls/higher operating expenses/increased headcount-related costs/increased labor costs/increased freight costs/higher costs as we purchase certain raw materials at low volume/additional operating costs/increased payroll costs, contracted consulting fees/increase of clinical trial costs/increase in license fees paid to third-party/reduced selling and administrative costs/ higher utility expenses/additional personnel and professional fees/spending on employee incentive programs/Company's efforts to control nonrecurring expenses
Investment and technology	investments in equipment/our increased investment/increased spending on development projects/information technology spending/reduction in activities related to finding and investigating new projects/reduction in research and development expenditures/innovations by our research and development/increased research funding/expenses incurred in the development of our technologies/implementation of lean manufacturing techniques/new information technology
Exit (discontinuation), acquisition, restructuring, or expansion of business	exit of the business line/sale of the worldwide professional products line/liquidation and divestiture of stores/gain on sales of assets/divestiture of the…business/shutdown of our operations/divest of product lines/disposition of several non-core operations/sale of the…division/discontinuance of operations/discontinuing unprofitable programs/closing the Company's manufacturing facility in…/businesses which were sold/new trials initiated/synergies from acquisition/company restructuring/acquisition of a subsidiary/deconsolidation of operations/ international expansion/decrease in restructuring charges and unusual items/costs associated with restructuring/charges to restructure…/gained efficiencies relating to the integration of…/impact of the…acquisition/the integration of acquisitions and geographic expansion/ the…transaction/acquired and newly constructed stores/successful integration of acquired businesses/successful integration of acquired businesses/new store opening
Efficiency and productivity	increased economies of scale/productivity improvement/operational efficiencies/better utilization/utilization level of manufacturing capacity/manufacturing inefficiencies/increase in average occupancy/lower factory utilization/improved drilling efficiency/increased overhead absorption/improvements in cycle time and inventory turns/improvements in supply chain management
Other operations related	staff reductions/strong relationships with suppliers/reduced operating leverage/outsourcing/challenge of insufficient supply of our major material/implemented changes in our operating procedures
Accounting related	inventory write-downs/losses from obsolete inventory/large unusual write downs/impairment charges/one-time write-off of a portion of an international receivable/increase in film amortization/53rd week in the prior year/extra week/restatement

Attribution types not included in the algorithm—Continued:		
Attribution type: Others (85 out of the 500 manually coded MD&As)		
Sub-type	**Frequency**	**Examples**
Other attribution	39	decrease in government procurement/decline in federal spending/ federal tax/policy imposed by the PRC government/the extent of governmental regulation and taxation/new regulation/state budget cuts/reduction in the level of funding/changes in the regulatory environment/changes in emission laws/ unresolved compliance issues with the FDA/overseas troop deployment/adverse weather conditions/ changes in FX translation rates/unfavorable foreign exchange rate/ weakening of the United States dollar/ very cold winter/abnormally warm winter/serious drought/powerhouse explosion/the 2005 hurricanes/ the events of September 11/Chimes in 2000/Year 2000 Compliance
No attribution	46	N/A

Appendix 2: Variable definitions

Variable	Definition
Attribution variables	
Freq_Ext	The number of *External Attribution Sentence Groups* scaled by the total number of sentences in the MD&A.
Δ*Freq_Ext*	The change in *Freq_Ext* from year *t*−1 to year *t*.
Predict_Ext	The predicted value of external attributions from regressions of Model 1.
Δ*Predict_Ext*	The change in *Predict_Ext* from year *t*−1 to year *t*.
Residual_Ext	The residual value of external attributions from regressions of Model 1.
Δ*Residual_Ext*	The change in *Residual_Ext* from year *t*−1 to year *t*.
Other Variables	
Bad_Rep	A dummy variable that equals one if the firm's *Residual_Ext* is constantly above the industry median in the past 5 years, and zero otherwise.
BHAR	The 3-day (−1, +1) buy-and-hold stock return (size adjusted) around the 10-K filing date.
Δ*Cash_Comp*	The change in an executive's cash compensation from year *t*−1 to year *t*.
Consensus	Analysts' consensus forecasts of annual earnings per share, scaled by the stock price at the end of fiscal year.
GDP_Corr	The correlation between changes of a firm's quarterly revenue and changes in Un**ited** St**ates** GDP.
Length	The natural logarithm of the total number of words in the MD&A.
Δ*Length*	The change in *Length* from year *t*−1 to year *t*.
MB	The ratio of a firm's market value of equity to book value of equity.
Δ*MB*	The change in *MB* from year *t*−1 to year *t*.
RET	The cumulative stock return over the fiscal year.
Rev_Corr	The correlation between changes in the firm's quarterly revenue and changes in the total revenue of all other firms in the same industry.
ROA	The income before extraordinary items scaled by the average total assets.
Δ*ROA*	The change in *ROA* from year *t*−1 to year *t*.
ROA_Increase	A dummy variable that equals one if a firm has a positive value of Δ*ROA*, and zero otherwise.
Size	The natural logarithm of a firm's total assets at the end of the fiscal year.
Δ*Size*	The change in *Size* from year *t*−1 to year *t*.
Total_Words	The total number of words in the MD&A.
Total_Sentence	The total number of sentences in the MD&A.
Total Assets	The total assets at the end of the fiscal year.