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Management's causal reasoning on performance and earnings management

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ABSTRACT

We investigate the association between the intensity of causal reasoning on performance in a firm's annual management commentary and its earnings management propensity. Anticipated earnings management concerns are argued to constitute a significant accountability predicament, bringing management to offer more intense causal reasoning in order to mitigate investors' earnings management concerns. We use computer-intensive techniques to measure causal reasoning intensity as a generic disclosure quality in the management commentary of a large sample of US firms from 1999 to 2007. We find that accruals earnings management (signed discretionary accruals) is positively associated with causal reasoning intensity. The positive association holds for alternative specifications of accruals earnings management (an earnings management dummy model and an analyst expectations model) and in a change model. Our results are consistent with the assertion that firms strategically use causal reasoning on performance to establish appropriateness and cognitive legitimacy, increase perceived plausibility of reported performance and mitigate performance-related concerns of investors.

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Introduction

We investigate the relationship between causal reasoning intensity as an overall narrative characteristic of management's annual performance commentary and the incidence of accruals earnings management in a large sample of US firms. Earnings management can be broadly defined as the opportunistic exercise of managerial discretion that causes performance reported to external audiences to be different from the true underlying economic performance of the firm (Dechow & Skinner, 2000). Anticipated earnings management concerns are argued to constitute a significant accountability predicament, bringing management to offer more performance explanation as a logic-based, rationale-giving response in order to contextualize and rationalize post-managed earnings and performance (Aerts & Cheng, 2011; Brown & Tucker, 2011; Graham, Harvey, & Rajgopal, 2005).

Causal reasoning is central to management commentary reports, such as the directors' report in the EU and the Management Discussion and Analysis (MD&A) in the US. In management commentary reports, firms not only provide a description of their accomplishments, related accounting outcomes, and prospective statements regarding future developments, but they also frame corporate events and performances by providing explanations in terms of logical interconnections, correlated factors, reasons

and causes. Such explanatory statements add argument, meaning and understanding to the more factual information in the financial statements. Both regulators and standard-setters, such as the Securities and Exchange Commission (SEC) and the International Accounting Standards Board (IASB), have insisted on providing more explanation of performance outcomes in management commentary reports. In 2010, for example, the IASB issued an IFRS practice statement on management commentary reports, suggesting that management commentary should provide management's perspective on the business and its analysis of the interaction of the relevant intervening factors to help readers contextualize the firm's financial statements and understand management's objectives and strategies for achieving those objectives (IASB, 2010). Similarly, the SEC argued that the basic requirement for the MD&A is to 'provide such other information that the registrant believes to be necessary to provide an understanding of its financial condition, changes in financial condition and results of operations' (SEC, 2002). Causal reasoning as displayed in management commentary is, however, not neutral. Management commentary is embedded in accountability processes and, as an accountability device, exhibited causal explanation may involve assertions or messages aimed at affecting perceptions of the intended audience. Given the relatively high level of managerial discretion in deciding on the content of the management commentary report, impression management motives may be prominent in configuring commentary content (Aerts & Tarca, 2010).

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Prior studies examining the relationship between accruals earnings management and causal disclosure (Aerts & Cheng, 2011; Aerts, Cheng, & Tarca, 2013) find evidence of a significant relationship between specific explanation types (e.g. assertive self-serving performance attributions, explicit causality-based explanations), in small samples or in a specific context (e.g. in the prospectus of initial public offerings in China). In this study, we develop and test an overall measure of the intensity of causal reasoning, which is more consistent with how the IASB and the SEC portray the need for more performance explanation, in a large sample context. We extend prior research by investigating whether firms use a logic-based, rational appeal strategy as a coping mechanism to signal appropriateness in the face of accountability threats, and this independently of the content or type of explanations used. In that sense, our results allow a high level of generalizability of the relationship between accruals earnings management and the use of performance-related causal reasoning.

We use signed discretionary accruals as our primary proxy for accruals earnings management. We use alternative specifications of this earnings management measure to test the robustness of our results. Moreover, we investigate whether firms whose pre-managed earnings fail to meet the analysts' earnings expectation benchmark, but succeed in just meeting or beating the benchmark after taking into account discretionary accruals, use more intense causal reasoning on performance. We use automated text analysis procedures to identify and measure the amount and intensity of causal reasoning on performance. Our analysis is based on the MD&A sections of the 10-K filing of listed US firms. Our sample covers an eight-year period (fiscal years 1999–2007). In our analyses we take into account that the relationship between causal reasoning intensity and accruals earnings management might be endogenously determined within a more global disclosure strategy. In addition, we investigate the association between change in accruals earnings management and change in causal reasoning intensity.

Consistent with expectations, our results show a positive and significant association between the intensity of overall causal reasoning on performance and the extent of accruals earnings management in different specifications. Our results are consistent with prior research documenting that especially upward earnings management drives the relationship between accruals earnings management and specific types of causal disclosure. Moreover, we find that firms tend to use more intense causal reasoning on performance when they just meet or beat analysts' earnings forecasts. In addition, we find the association between change in accruals earnings management to be positively and significantly related to change in causal reasoning intensity, providing a primary indication of a causal relationship between accruals earnings management and intensity of performance explanation.

Our study contributes to the literature in several respects. To the best of our knowledge, this study is the first to examine, in a large sample of US firms, the relationship between the intensity of a firm's performance-related causal reasoning in its annual report and its earnings management propensity. Moreover, our results demonstrate the usefulness of a generic measure of causal reasoning intensity as an overall narrative style characteristic to investigate presentational tendencies in management commentary. We document that the generic intensity of causal language use in performance-related management commentary and the strength of accruals management, are closely aligned. The study adds to the earnings management literature by providing corroborating evidence that accruals earnings management drives the need to justify performance changes when the expected earnings management costs are perceived to be high, which is especially so in a strong scrutiny environment such as the US. Whereas prior research shows a relationship between causal disclosure tactics

and earnings management in a high achievement context with no prior performance history, such as an IPO, our results indicate that such a tendency is generalizable to a broader, mainstream market context and is not dependent on the absence of a prior performance track record that could limit the scope and credibility of causal reasoning. This study also adds to the impression management literature by evidencing incentives for the opportunistic use of causal reasoning language in periodic reporting and, thus, sheds light on its discretionary use of the use of logic-based rational appeal as a rhetorical strategy. Lastly, whereas accruals earnings management and impression management studies typically examine samples of firms for which the incentives for earnings management are expected to be strong, our sample relates to a more general setting, thus corroborating the robustness and generalizability of our findings.

The remainder of the paper is structured as follows: "Literature review and theory development" presents a literature review and develops the research questions. "Data and Method" introduces the research design and describes our data. "Results" analyses the data and presents the results. "Discussion and conclusion" discusses results and concludes.

Literature review and theory development

Causal reasoning in management commentary

Causal reasoning and argumentation make up a large part of the content of management commentary in annual reports. Causal reasoning on corporate achievements and related performance outcomes usually refer to internal and external causes, although explanations may also be provided in terms of needs and motives and not simply in terms of unintentional causes. For our purposes, the term 'causal reasoning' refers to the whole range of explanations that may arise in a discursive context such as a management commentary report. In practice, they may include technical accounting explanations (Aerts et al., 2013) and effects of changes in the regulatory environment which together with causality-based and motivational explanations constitute a composite signal of logic-based cognitive effort to contextualize performance outcomes.

Causal reasoning in a communicative context is basically about sense-giving (Antaki, 1994) and about the rhetorical use of logic-based, rational appeal to the audience's way of making sense of the situation (Blair, 2012). By connecting events and outcomes to reasons, intervening factors and causes, causal reasoning delineate and typify critical performance attributes on which to judge the appropriateness and reasonableness of the firm's actions and outcomes. This rationale-giving behavior may be especially important in listed firms which act under strong norms of rationality and where the use of proper reasoning can be expected to be effective in demonstrating competence (Gowler & Legge, 1983) and fostering trustworthiness (Sonenshein, Herzenstein, & Dholakia, 2011). In this regard, firms which operate in an environment with considerable ambiguity, are typically perceived as being more effective when they are able to demonstrate evidence of rational and reasoned behavior and provide appropriate causal reasoning (Staw, 1980).

Causal reasoning in general and as displayed in management commentary reports, is, however, a highly discretionary act. It is likely to start with a diagnosis phase which probably leads to the identification of one or more 'probable' generating factors of the event. The subsequent communicative phase usually comes down to a selection process in which the communicator finally makes a selection of one or more necessary conditions as 'the' explanation for an event or outcome (Buttyn & Morris, 2001). As such, causal

explanation becomes a highly discretionary discursive practice in which it may be used to posit a preferred representation of previously equivocal cues in order to affect external perception or signal rational cognitive effort and managerial competence in order to accommodate external sense-making needs.

Moreover, prior research indicates that the extent of causal reasoning is often responsive to the occurrence of an accountability predicament (Aerts & Tarca, 2010; Tetlock, 1985). Brown and Tucker (2011) document that the MD&A content increased significantly more after an earnings decline than after an earnings increase. They indicate that this is due to longer and more differentiated discussion and causal reasoning. Matsumoto, Pronk, and Roelofsens (2011) offer similar arguments in the context of conference calls to analysts. Cianci and Kaplan (2010) show that management's performance explanations for poor performance affects investors' judgments of the firm's future performance, especially when management's pre-existing reputation is negatively affected.

In this paper, we argue that earnings management concerns may represent a significant accountability predicament for management, bringing them to increase rational cognitive effort and intensity of causal reasoning on earnings-related outcomes in order to accommodate audience uncertainty with regard to the firm's performance and achievements.

Earnings management as an accountability predicament

Earnings management has been the subject of an extensive body of literature (Healy, 1999). Prior evidence suggests that managers either use earnings management to meet or beat earnings benchmarks, avoid debt-covenant violation or to delay reporting profits to facilitate meeting targets easily in the future. Earnings management is, however, not costless. Prior research indicates that earnings management may bring about considerable negative consequences. Research findings show, for example, that earnings management increases the probability of litigation (Ibrahim, Xu, & Rogers, 2011; Jones & Wu, 2010). Audit fees also tend to increase with earnings management risk (Bedard & Johnstone, 2004). Moreover, earnings management is costly to outside investors, since it reduces firm transparency and decreases outsiders' ability to monitor insiders' performance (Bailey, Karolyi, & Salva, 2006; Bartov & Mohanram, 2004). Bartov and Mohanram (2004) document that accruals earnings management is positively associated with information asymmetry. In this regard, both opportunistic and beneficial earnings management (Jiraporn, Miller, Yoon, & Kim, 2008) may engender similar concerns as they both tend to increase *ex ante* information uncertainty.

Ex-ante uncertainty with regard to earnings management motives may feed investor concerns about earnings management and related earnings persistence (Aerts & Cheng, 2011; Graham et al., 2005). In their survey of high-level managers, Graham et al. (2005) report that firms are concerned about the pressures that capital market participants will bring to bear on them when there are suspicions of earnings management and that, when earnings management were to be detected and exposed, this would significantly harm their general reporting reputation and firm value. They state that firms may intend to mitigate earnings management related reputation costs by altering earnings management choices, by temporarily increasing disclosure levels (Davis & Tama-Sweet, 2012; Jo, Kim, & Park, 2007), by changing the language tone used in earnings announcements, by using self-serving explanation tactics (Aerts & Cheng, 2011). To this we add that managers may also try to mitigate reputation costs by generally increasing the intensity of explanation of performance measures in order to signal rational and reasoned management. In this sense, potential earnings management evidence may be perceived as a significant accountability predicament and provide a strong incentive to increase

cognitive effort to rationalize and frame firm performance and related achievements. By offering additional diagnostic information to contextualize achievements and performances and/or discuss performance outcomes as resulting from intentional, reasoned and goal-directed behavior, firms may tend to accommodate uncertainty with regard to reported earnings.

Indirect evidence at an aggregate level is provided by Li (2008) who demonstrates, for profitable firms, an association between a higher frequency of causation words (such as "because") in the MD&A section of annual reports and lower persistence in future earnings. He suggests that managers are inclined to strategically use causal reasoning together with other lexical features of accounting narratives to cover adverse information about future earnings. Aerts and Cheng (2011) show that accruals earnings management is positively related with the amount of assertive attributional tactics used, such as enhancements and entitlements, but not with the level of defensive attributional tactics such as causality denials and excuses. Aerts et al. (2013) show a differential relationship between (the direction of) accruals earnings management and the type of explanations used. They typically investigate the level of causal reasoning and not its intensity. Davis and Tama-Sweet (2012) argue that managers of firms reporting high levels of accruals may provide additional explanation and discussion of these items and find that higher levels of accruals are associated with lower levels of pessimistic tone in earnings press releases and MD&A.

Building on these arguments and references, we develop and test a generic measure of causal reasoning on performance and the intensity of its use, which is more consistent with how the IASB and the SEC envision the need for more explanation effort in management commentary, and apply it in a large sample context. We extend prior research by investigating whether firms tend to increase a logic-based, rational appeal strategy and intensify the use of causal reasoning on performance as a coping mechanism to signal appropriateness in the face of accountability threats, and this independently of the content or type of explanations used.¹ So, we expect that the intensity of causal reasoning on performance as a generic measure of management's use of a logic-based, rational appeal strategy to accommodate audience concerns is positively related to the extent of accruals earnings management and posit the following formal hypothesis:

Hypothesis. The intensity of causal reasoning on performance in a firm's management commentary section of the annual report is positively associated with the extent of accruals earnings management in the accompanying financial statements.

Data and method

This study examines the association between causal reasoning on performance and earnings management in the MD&A section of the 10-K filing of US firms, covering fiscal years 1999–2007. We collect our data from two databases: Compustat and SEC Edgar. The causal reasoning content is gathered through automated text analysis procedures (see below). Data from the two databases are matched based on a central index key which uniquely refers to a firm. Our initial sample consists of 27,681 firm-year observations, covering 6207 different firms. After deleting observations with extreme values (using a 5% and 95% threshold) on the main

¹ This generic approach works in a sense against finding strong results, as content-based strategies might be more powerful in specific contexts (which tend to have an impact on audience background expectations such as an IPO or a high litigation risk environment), but the results of our study show that a rational appeal strategy also works at a generic level which is a significant research finding as such and may underpin the generalizability of our research results.

accruals earnings management proxy (see later), the sample is reduced to 26,297 firm-year observations.

Measuring causal reasoning on performance

We use Practical Extraction and Reporting Language (PERL) coding procedures to perform programmed content analysis of the firms' annual management commentary with regard to performance outcomes. PERL has been used successfully in prior research (Leone, Rock, & Willenborg, 2007; Li, 2008). Leone et al. (2007) use PERL to analyze text in IPO prospectuses with regard to the use of IPO proceeds. Li (2008) uses PERL to extract MD&A sections and analyze text readability. In our research, PERL enables us to (1) download 10-K filings from the SEC Edgar database, (2) extract relevant Management Discussion and Analysis (MD&A) sections from the filings, (3) identify and extract financial performance-related paragraphs from the MD&A, and (4) measure causal reasoning on performance content.² Within the financial performance-related paragraphs, we identify causal reasoning content using a list of causal connectors as identified by Coh-Metrix. Coh-Metrix stands for text analysis procedures and software developed by the department of psychology of the University of Memphis (Graesser, McNamara, & Kulikowich, 2011). It applies the latest in computational linguistics and psycholinguistics and focuses on measuring coherence and logical connections in texts. A causal reasoning sentence is defined as a sentence including at least one of the causal connectors featuring in the Coh-Metrix list (Appendix A). Appendix B shows examples of causal reasoning sentences as identified by the text analysis procedures, and Appendix C elaborates on the details of the programming procedures.

Measuring accruals earnings management

This study uses discretionary accruals to proxy for earnings management. Discretionary accruals serve as an indicator of earnings manipulation (Rusmin, 2010). Most empirical earnings management studies decompose total accruals into discretionary accruals and non-discretionary accruals and employ aggregate discretionary accruals regression models, such as the modified Jones model or a performance-adjusted modified Jones model (Jaggi, Leung, & Gul, 2009). In this study, we use the performance-adjusted modified Jones model in an industry and year cluster-based estimation. We use this model as the standard versions (*i.e.*, Jones models) tend to be misspecified due to correlation between financial performance and accruals (Kothari, Leone, & Wasley, 2005). Dechow, Sloan, and Sweeney (1995) find that measurement error in the estimation of discretionary accruals is correlated with firm performance. Total accruals are estimated as follows:

$$\frac{TAC_{i,t}}{TA_{i,t-1}} = \beta_1 \frac{1}{TA_{i,t-1}} + \beta_2 \frac{\Delta SALES_{i,t} - \Delta TR_{i,t}}{TA_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{TA_{i,t-1}} + \beta_4 ROA_{i,t} + \epsilon_{i,t}$$

The use of beginning total assets as a deflator is intended to mitigate heteroskedasticity. $TAC_{i,t}$ stands for total accruals. Total accruals is defined as earnings taken from the cash flow statement minus cash flow from operations, also taken from the cash flow statement (Ball & Shivakumar, 2006). $\Delta SALES_{i,t}$ represents change in sales. $\Delta TR_{i,t}$ stands for change in trade receivables. $ROA_{i,t}$, return on assets, is the financial performance proxy. $PPE_{i,t}$ is defined as gross property, plant, and equipment. We predict the value of the error term and use the predicted error term as our proxy for discretionary accruals. We use signed discretionary accruals rather than unsigned (absolute) discretionary accruals because the literature on earnings management (Boone, Khurana, & Raman, 2009; Heninger, 2001; Palmrose, Richardson, & Scholz, 2004; Peasnell, Pope, &

Young, 2005) provides evidence that earnings management risk is not perceived symmetrically by key corporate and market participants and that key stakeholders respond asymmetrically to income-increasing versus income-decreasing earnings management. Consistent with these observations, prior research (Aerts & Cheng, 2011; Aerts et al., 2013) corroborates significantly different relationships between the direction of accruals earnings management and specific types of performance explanations, with associations being generally much more significant for upward earnings management than for downward earnings management. In that regard, signed discretionary accruals measures tend to be more diagnostic in investigating the relationship between accruals earnings management and explanatory disclosures than unsigned (absolute) discretionary accruals measures.

Empirical models and the endogenous nature of accruals

We use the following regression models to estimate the association between causal reasoning on performance and earnings management:

$$\begin{aligned} \text{Causal reasoning}_{i,t} = & \alpha + \beta_1 EM_{i,t} \\ & + \beta_2 \text{Litigation sensitive industry}_{i,t} \\ & + \beta_4 \text{Leverage}_{i,t} + \beta_5 \Delta_5 \text{Sales}_{i,t} \\ & + \beta_6 \log(\text{Market value})_{i,t} + \beta_7 \text{LOSS}_{i,t} \\ & + \beta_8 \text{ROA}_{i,t} + \beta_9 \text{Big4}_{i,t} \\ & + \beta_{10} \text{Number of segments}_{i,t} \\ & + \beta_{11} \text{Text length}_{i,t} + \sum \beta_i \text{Year Dummies} + \epsilon_{i,t} \end{aligned}$$

[Baseline Model]

$EM_{i,t}$ refers to the accruals earnings management proxy. We use causal reasoning intensity to proxy for causal reasoning on performance:

$$\begin{aligned} \text{Causal reasoning intensity}_{i,t} \\ = & \frac{\text{Amount of causal reasoning on performance sentences}_{i,t}}{\text{Total amount of sentences in performance paragraphs of MD\&A}_{i,t}} \end{aligned}$$

Causal reasoning intensity is measured in percentage terms. In our analyses, we first apply OLS regression techniques to examine the baseline model, controlling for litigation-sensitive industry, leverage, change in sales, firm size, loss firms, ROA, Big4 auditor, number of business segments, text length, year and industry dummies. In addition, we use 2SLS models to control for endogeneity effects between causal reasoning and accruals earnings management (see "Endogenous nature of accruals earnings management").

Litigation risk has been shown to significantly affect disclosure quality. Arguments on how disclosure affects litigation risk go both ways. Johnson, Kasznik, and Nelson (2001) document that firms with high litigation risk provide more earnings forecasts including specific quantitative information and qualitative information. In the same vein, Field, Lowry, and Shu (2005) find evidence that disclosure deters litigation. On the other hand, voluntary disclosure can be used by plaintiffs as evidence of managerial misrepresentation. Rogers and Van Buskirk (2009) suggest that firms tend to reduce their disclosure level after litigation. Consistent with prior research, we include a litigation-sensitive industry dummy which equals 1 if the industry classification 'SIC' code is within the following ranges: 2833–2838 (Biotech firms), 3570–3577 (Computer firms), 3600–3674 (Electronics firms), 5200–5961 (Retail firms), 7370–7374 (Computer firms), 8731–8734 (Biotech firms), and 0 otherwise (Francis, Philbrick, & Schipper, 1994; Kim & Skinner, 2011). We use leverage and an indicator variable for loss firms to control for financial risk. Prior research evidences a significant association between disclosure level and leverage (Ali, Ahmed, &

² The full details of the programming procedures are available on request.

Table 1

Definition and measurement of dependent and independent variables.

Causal reasoning intensity ₁	Causal reasoning intensity is measured as amount of Coh-Metrix causal reasoning sentences in the performance-related MD&A sections divided by total number of sentences in those sections. Causal reasoning intensity ₁ is measured in percentage terms
Causal reasoning intensity ₂	Log (1 + Causal reasoning intensity ₁)
Causal reasoning intensity ₃	Causal reasoning intensity ₃ is measured as the error term estimated from the following OLS model: <i>Causal reasoning intensity₁ = f (sales growth, market-to-book ratio, industry concentration, standard deviation of monthly stock returns, litigation-sensitive industry, ROA, firm size)</i>
Earnings management (main proxy)	Signed discretionary accruals as estimated from a performance-adjusted Jones model. The earnings management measure is estimated from the error term in the model
Earnings management dummy	Equals 1 if accruals earnings management (main proxy) is larger than 0, otherwise 0
Litigation-sensitive industry	Litigation-sensitive industry dummy which equals 1 if the industry classification 'SIC' code is within the following ranges: 2833–2838 (Biotech firms), 3570–3577 (Computer firms), 3600–3674 (Electronics firms), 5200–5961 (Retail firms), 7370–7374 (Computer firms), 8731–8734 (Biotech firms), and 0 otherwise
Loss firm	Equals 1 if earnings before extraordinary items is less than zero, and zero otherwise
ROA	Earnings before extra ordinary items scaled by total assets
Leverage	Total liabilities divided by total assets
Firm size	Natural logarithm of total market value
Big 4 auditor	Equals 1 if the firm's auditor is one of the big four auditors, otherwise 0
Number of business segments	The number of business segments is taken from the Compustat segment files at the end of a fiscal year
Growth	Change in total sales
Economic variability	Standard deviation of asset-scaled operating cash flows in prior 5 years
Firm age	Number of years since the firm's first appearance in the CRSP monthly stock return files
Text length	Natural logarithm of 1 plus total number of sentences in the performance-related MD&A sections
AFD	Equals 1 if pre-managed earnings is less than the mean of analysts' consensus earnings forecast, and the actual earnings minus the mean of analysts' consensus earnings forecast is at least larger than 0 but less than 0.1

Henry, 2004; Singh & Zahn, 2008). Leverage is measured as total liabilities divided by total assets. The loss dummy equals 1 if income before extraordinary items is less than 0, otherwise 0. Next to financial risk, a firm's growth potential is expected to affect explanatory disclosures as well (Aerts & Tarca, 2010). We include change in sales as a proxy for growth. This variable also implicitly controls for mergers and acquisitions. Firm size captures many aspects of a firm's operational and business environment (Li, 2008), including a firm's information disclosure environment (Lang & Lundholm, 1993). Firm size is measured as the logarithm of the firm's market capitalisation. Miller (2002) finds that managers' disclosure choice is associated with firm performance. We use ROA to measure profitability level. Additionally, the presence of a Big4 auditor implies higher external monitoring and tends to add credibility to management disclosure (Khurana & Raman, 2004). Big4 auditor equals 1 if the firm's auditor is linked to one of the big four auditors, otherwise 0. In order to further control for the complexity of firm's operating environment, we use two additional control variables: the number of business segments and text length. We use the number of business segments from the Compustat segment files at the end of a fiscal year. Text length also has been used as a convenient proxy for the complexity of the firm's working environment (Li, 2010).³ We use the natural logarithm of the total number of sentences of the MD&A section to measure text length. Definition and measurement details of the dependent and independent variables of the baseline model are provided in Table 1.

In order to test the robustness of our findings, we use two additional (alternative) measures of causal reasoning intensity: the natural logarithm of one plus causal reasoning intensity as above, to control for potential skewness effects, and unexpected causal reasoning intensity, estimated from the following OLS regression model:

$$\begin{aligned} \text{Causal reasoning}_{i,t} = & \alpha + \beta_1 \text{Industry concentration}_{i,t} \\ & + \beta_2 \text{Litigation sensitive industry}_{i,t} \\ & + \beta_3 \text{Std(monthly stock returns)}_{i,t} \\ & + \beta_4 \Delta \text{Sales}_{i,t} + \beta_5 \log(\text{Market value})_{i,t} \\ & + \beta_6 \text{ROA}_{i,t} + \beta_7 \text{Market to book ratio}_{i,t} + \delta_{it} \end{aligned}$$

We apply OLS regression techniques to estimate un-predicted causal reasoning intensity, controlling for industry concentration, the standard deviation of adjusted monthly stock returns, and the market-to-book ratio to differentiate from the baseline model. Causal reasoning disclosure may be costly due to proprietary costs. We use industry concentration to proxy for proprietary costs of explanatory performance disclosures. We also add growth prospects (Market-to-book) and market return variability as additional determinants of causal reasoning intensity.⁴ Both variables proxy for the demand for causal reasoning due to larger information uncertainty (Bhagat & Bolton, 2008). We measure industry concentration using the Herfindahl index, which is calculated as

$$\text{Herfindahl}_j = \sum_{i=1}^I s_{ij}^2$$

where s_{ij} is the market share of firm i in industry j .

Endogenous nature of accruals earnings management

As the earnings management proxy might correlate with omitted variables, such as features of the firm's economic environment, management's incentives to manage earnings, and managerial opportunistic strategies, endogeneity issues arise (Al-Attar, Hussain, & Zuo, 2008). This could cause measurement error and yield biased results. To investigate potential endogeneity effects, we additionally apply a two-stage least squares (2SLS) procedure to control for endogeneity. The first stage models are specified as follows:

$$\begin{aligned} \text{EM}_{i,t} = & \alpha + \beta_1 \text{EM}_{i,t-1} + \beta_2 \text{EM}_{i,t-2} + \beta_3 \text{Economic variability}_{i,t} \\ & + \beta_4 \text{Firm age}_{i,t} + \beta_5 \text{Litigation sensitive industry}_{i,t} \\ & + \beta_6 \text{Leverage}_{i,t} + \beta_7 \log(\text{Market value})_{i,t} + \beta_8 \Delta \text{Sales}_{i,t} \\ & + \beta_9 \text{LOSS}_{i,t} + \beta_{10} \text{ROA}_{i,t} + \beta_{11} \text{Big4}_{i,t} \\ & + \beta_{12} \text{Number of segments}_{i,t} + \beta_{13} \text{Readability}_{i,t} \\ & + \sum \beta_i \text{Year Dummies} + \sum \beta_j \text{Industry Dummies} + \varepsilon_{it} \end{aligned}$$

[First Stage]

Prior research shows that discretionary accruals from the modified Jones model are correlated with age, economic variability,

³ Dropping text length as a control does not materially affect our results.

⁴ We also used the baseline model to estimate the unexpected causal reasoning intensity, and the results remained largely unchanged.

one-year lagged earnings management, and two-year lagged earnings management. These variables have commonly been used as determinants of earnings management propensity (Aerts & Cheng, 2011; Baunsgaard & Keen, 2010; Campbell & Mankiw, 1990; Cavallo & Daude, 2011; Kang & Sivaramakrishnan, 1995), but do not significantly impact causal reasoning. The justification of using lagged earnings management proxies as instrumental variables is that, although current values of the earnings management proxies may be endogenous relative to causal reasoning, past values of earnings management proxies are unlikely to be related. Moreover, although lagging earnings management proxies by older periods is more likely to result in exogenous associations, its effect is also likely to be weaker than when more recent lagged earnings management proxies are used. We use instruments lagged by two periods in order to mitigate the effects of possible first-order correlations in earnings management proxies (Campbell & Mankiw, 1990; Kang & Sivaramakrishnan, 1995). Economic variability is measured as standard deviation of asset-scaled operating cash flows in prior 5 years. Firm age is defined as the number of years since a firm's first appearance in the CRSP monthly stock return files (Fan, 2007). In the second stage, we test the baseline model, replacing accruals earnings management proxies with predicted accruals earnings management proxies.

Robustness tests

In order to further test the robustness of our findings, we use two alternative proxies for accruals earnings management: an earnings management dummy and an analysts' earnings expectations measure. The earnings management dummy equals 1 if the discretionary accruals measure is larger than zero, and 0 otherwise. The earnings management dummy can also be interpreted as whether a firm engages in upward earnings management. In addition, prior research shows that the incidence of earnings management is particularly pronounced when pre-managed earnings fall below the analysts' earnings forecast benchmark. Burgstahler and Eames (2006), for example, document cross-sectional results that firms manage their earnings to just meet or beat their analysts' earnings forecast benchmark. Payne and Robb (2000) show that when pre-managed earnings are below analysts' forecasts, firms tend to use income-increasing abnormal accruals to meet or beat the forecasts. Therefore, we also investigate whether firms, whose

pre-managed earnings fail to meet the analysts' earnings expectation benchmark, but succeed in just meeting or beating the analyst benchmark after taking into account the discretionary accruals, use more causal reasoning on performance. In order to test for this behavior, we first estimate pre-managed earnings as actual earnings minus discretionary accruals. Next, we construct a measure, labeled AFD, to indicate that pre-managed earnings fail to meet the analyst earnings forecast benchmark, but that the firm succeeds in just meeting or beating the benchmark after taking into account the discretionary accruals. The AFD variable equals 1 if pre-managed earnings is less than the mean of the analysts' consensus earnings forecast, and the actual earnings minus mean of analysts' earnings forecast is at least larger than 0 but less than 0.1 (Barua, Legoria, & Moffitt, 2006).

Finally, we also test the association between causal reasoning intensity and earnings management in a change model. A change model captures inertia in narrative disclosure behavior and may reveal more direct evidence of a causal relationship between accruals earnings management and causal reasoning intensity.

Results

Table 2 presents descriptive statistics (mean, median, minimum, maximum and standard deviation) for the dependent and independent variables as used in our study. The mean of causal reasoning intensity₁ is 11.20, indicating that somewhat more than 11% of the sentences in the performance-related paragraphs of the MD&A are classified as causal reasoning sentences. Average causal reasoning intensity₂ is 2.40 and average unpredicted causal reasoning (causal reasoning intensity₃) amounts to 0.00. The causal reasoning intensity₃ measure is estimated from an OLS regression model; this explains that the minimum and median value of the variable are lower than zero. The mean of the main accruals earnings management variable (signed discretionary accruals) is close to zero. Forty percent of the sample firms belong to a litigation-sensitive industry. The mean for Big4 auditor is 0.80, indicating that 80% of our sample firms are audited by big4 auditors.

Table 3 presents a correlation matrix for the main variables. Causal reasoning intensity is significantly correlated with most variables. The correlation coefficient between causal reasoning intensity₁ and the main accruals earnings management variable (0.009) is not significant. The causal reasoning intensity measures are negatively and sig-

Table 2
Descriptive statistics of the dependent and independent variables as used in the regression models ($N = 26,297$).

	Mean	Min.	Median	Max.	St.dev.
Causal reasoning intensity ₁ (%)	11.200	3.300	10.800	20.100	4.500
Causal reasoning intensity ₂	2.400	1.500	2.500	3.000	0.400
Causal reasoning intensity ₃	0.000	-14.000	-0.300	10.200	4.300
Change in causal reasoning intensity ₁	0.100	-16.800	0.000	16.800	3.900
Change in causal reasoning intensity ₂	0.000	-1.600	0.000	1.600	0.400
Change in causal reasoning intensity ₃	0.100	-17.100	0.000	17.100	3.900
Accruals earnings management	0.000	-39.300	7.400	33.000	14.700
Earnings management dummy	0.600	0.000	1.000	1.000	0.400
Change in earnings management	0.200	-72.300	0.200	72.300	10.400
Litigation-sensitive industry	0.400	0.000	0.000	1.000	0.500
Loss firm	0.400	0.000	0.000	1.000	0.500
ROA	-0.100	-7.800	0.000	0.600	0.600
Leverage	0.500	0.000	0.500	8.800	0.400
Firm size	5.600	1.300	5.600	10.800	2.000
Big 4 auditor	0.800	0.000	1.000	1.000	0.400
Growth (change in sales)	70.000	-109.100	11.700	546.000	155.800
Number of business segments	2.100	1.000	1.000	7.000	1.500
Text length	5.400	2.300	5.500	7.900	1.100
AFD	0.200	0.000	0.000	1.000	0.400
Economic variability	0.100	0.000	0.000	5.300	0.300
Firm age	16.300	1.000	11.000	53.000	13.300

The variables are defined in Table 1.

Table 3

Correlation table with regard to the variables included in the baseline models.

	0	1	2	3	4	5	7	8	9	10	11	12	13	14
0. Causal reasoning sentences	1.000													
1. Causal reasoning intensity ₁ (%)	0.403	1.000												
2. Causal reasoning intensity ₂	0.000	0.412	1.000											
3. Causal reasoning intensity ₃	0.000	0.394	0.976	1.000										
4. Earnings management (main proxy)	-0.081	0.009	0.013	-0.012	1.000									
5. Earnings management dummy	-0.068	0.109	0.032	0.063	0.795	1.000								
6. Litigation-sensitive industry	0.113	0.213	0.183	0.008	-0.003	0.058	1.000							
7. Loss firm	0.076	0.137	0.137	0.073	0.027	0.076	0.210	1.000						
8. ROA	-0.034	-0.075	-0.075	-0.035	0.027	-0.020	-0.169	-0.406	1.000					
9. Leverage	0.002	-0.049	-0.044	-0.026	-0.095	-0.126	-0.126	0.068	-0.090	1.000				
10. Firm size	0.115	-0.040	-0.039	0.008	-0.486	-0.487	-0.017	-0.361	0.144	-0.045	1.000			
11. Big 4 auditor	0.067	0.018	0.020	0.024	-0.148	-0.143	0.038	-0.076	0.050	-0.017	0.334	1.000		
12. Growth (change in sales)	0.026	-0.053	-0.051	-0.026	-0.351	-0.301	-0.038	-0.184	0.076	0.051	0.396	0.088	1.000	
13. Number of business segments	<i>0.011</i>	-0.085	-0.081	-0.026	-0.196	-0.208	-0.235	-0.154	0.124	0.119	0.242	0.065	0.165	1.000
14. Text length	0.088	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.795	0.128	0.198	0.131	-0.058	-0.061	0.019	0.034	-0.009	0.019	0.094	0.044	0.043	0.031
	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.152	0.002	0.000	0.000	0.000	0.000

Bold numbers imply significance at the 99% level, **bold + italic** significance at the 95% level, and *italic* significance at the 90% level (two-tailed). The variables are defined in Table 1.

nificantly correlated with leverage. Causal reasoning intensity₁ and causal reasoning intensity₂ are positively related to the litigation-sensitive industry dummy. The correlation coefficients of firm age and the causal reasoning intensity measures are significantly negative, indicating that older firms display on average less causal reasoning on performance. Moreover, the amount of causal reasoning sentences (causal reasoning sentences) is positively and significantly correlated with the number of business segments at the 90% significance level, but the correlation between the number of business segments and the causal reasoning intensity measures is significantly negative, indicating the scaling effect of the intensity measures. The correlation coefficients between causal reasoning intensity and other control variables are relatively low.

Table 4 presents results for the association of causal reasoning intensity (three alternatives) and accruals earnings management (signed discretionary accruals). In the regression models we scale the accruals earnings management by 1000 to ease interpretation of the results. Overall, the results are consistent with our expectations. The CR sentence intensity (%) model (Table 4) shows that the regression coefficient of accruals earnings management is positive and significant ($t = 2.006$, $p = 0.023$), suggesting that more accruals earnings management stimulates more intense causal reasoning on performance. The coefficient of accruals earnings management means that firms would, on average, increase causal reasoning by 0.5% (based on average CR of 11%) for a one-unit increase in discretionary accruals. Similarly, the log of CR sentence intensity model and the unexpected CR sentence intensity model (Table 4) show that the regression coefficients for accruals earnings management are positive and significant. Loss firms are positively associated with causal reasoning in all of the three models. Litigation-sensitive industry is positively associated with causal reasoning

sentence intensity and log of causal reasoning sentence intensity, suggesting that causal reasoning disclosure may be used to deter the litigation risk. The association between unexpected causal reasoning sentence intensity and litigation-sensitive industry is negative and significant, as the unexpected causal reasoning estimation model includes litigation-sensitive industry as a significant control. Dropping text length as a control in these regressions does not materially affect our results. As we use signed discretionary accruals, our results are consistent with previous findings that the association between accruals earnings management and causal reasoning on performance is primarily driven by upward earnings management.

Table 5 presents the 2SLS regression results for the causal reasoning intensity models. The partial F -test in the first stage could detect a weak instruments problem (Larcker & Rusticus, 2010; Stock, Wright, & Yogo, 2002). As previously explained, we use the following instrumental variables in predicting earnings management: lagged earnings management, lagged₂ earnings management, firm age and economic variability. The F -statistic in the first stage of Table 5 is 1319.350. Stock et al. (2002) develop benchmarks for the relevant size of F -statistics. When the number of instruments is 3, 5 or 10, the recommended critical F -values are 12.83, 15.09, and 20.88 respectively. The F -statistic of the first stage model is much larger than 20.88, implying that the instrument variables cannot be considered to be weak instruments. Table 5, shows that predicted accruals earnings management is positively and significantly associated with the causal reasoning sentence intensity (%) ($t = 2.677$, $p = 0.003$), which is consistent with our expectations. Similar results are obtained for the log of CR sentence intensity model and for the unexpected CR sentence intensity model. The highly similar results for the main associa-

Table 4
Pooled regression of causal reasoning measures on accruals earnings management (main proxy).

Causal reasoning (CR) regression	CR sentence intensity (%)	Log of CR sentence intensity	Unexpected CR sentence intensity
Accruals earnings management	0.488 [*] (2.006)	0.056 ^{***} (2.570)	0.439 [*] (1.804)
Litigation-sensitive industry	0.665 ^{***} (10.355)	0.043 ^{***} (7.399)	-1.153 ^{***} (-17.972)
Loss firm	0.586 ^{***} (9.158)	0.055 ^{***} (9.558)	0.523 ^{***} (8.175)
ROA	-0.100 [*] (-1.935)	-0.011 ^{**} (-2.320)	-0.120 ^{**} (-2.329)
Leverage	0.019 (0.254)	-0.001 (-0.131)	0.008 (0.104)
Firm size	-0.058 ^{***} (-3.155)	-0.006 ^{***} (-3.668)	0.028 (1.524)
Big 4 auditor	0.192 ^{***} (2.930)	0.019 ^{***} (3.159)	0.194 ^{***} (2.957)
Growth (change in sales)	0.000 [*] (-2.142)	0.000 ^{**} (-2.046)	0.000 [*] (-2.060)
Number of business segments	-0.044 [*] (-2.408)	-0.004 ^{**} (-2.703)	-0.041 ^{**} (-2.251)
Text length	0.441 ^{***} (18.101)	0.067 ^{***} (30.414)	0.437 ^{***} (17.916)
Constant	7.098 ^{***} (23.098)	1.925 ^{***} (69.493)	-3.790 ^{***} (-12.334)
N	26,297	26,297	26,297
Adjusted R ²	13.79%	13.73%	9.27%

Accruals earnings management is scaled by 1000.

^{*} Significance at the 90% level (two-tailed, one-tailed for EM variables). The variables are defined in Table 1.

^{**} Significance at the 95% level.

^{***} Significance at the 99% level.

tions in Table 4 (OLS) and Table 5 (2SLS) suggest strong direct ties between upward accruals earnings management and intensity of causal reasoning on performance.

Table 6 and Table 7 document the results of robustness tests, where signed discretionary accruals are replaced by alternative accruals earnings management measures. Table 6 shows the main causal reasoning intensity measures regressed on the accruals earnings management dummy and controls according to a 2SLS approach. The *F*-statistic in the first stage (Table 6) again implies that the instrument variables cannot be considered to be weak instruments. The CR sentence intensity model shows that the accruals earnings management dummy is strongly positively associated with the causal reasoning variable ($t = 3.068$, $p = 0.001$), which is consistent with our findings in Table 4. Similarly, in both the log of CR sentence intensity model and the unexpected CR sentence intensity model, the coefficient of the predicted accruals earnings management dummy is positive and significant.

Table 7 shows the results of whether firms whose pre-managed earnings fail to meet the earnings benchmarks and succeed in just meeting or beating the benchmarks after taking into account the discretionary accruals, use more intense causal reasoning on performance. The AFD variable equals 1 if pre-managed earnings is less than the mean of the analysts' consensus earnings forecast, and the earnings minus mean of analysts' consensus earnings forecast is at least larger than 0, but less than 0.1. In Table 7, the associations between the AFD variable and the causal reasoning measures show to be positive and highly significant, suggesting that firms whose pre-managed earnings fail to meet the analysts' earnings forecast benchmark but succeed in just meeting or beating this benchmark after taking into account the discretionary accruals, use more causal reasoning on performance. Again, the results for this alternative accruals earnings management variable shows to be consistent with our findings for the other earnings management proxies.

Finally, Table 8 shows the results of a change model whereby change in causal reasoning measures is regressed on change in discretionary accruals and related controls (of which some follow a change specification depending on the nature of the control

variable). Overall, the results are consistent with results in Table 4. The change in CR sentence intensity (%) model (Table 8) shows that the regression coefficient of change in accruals earnings management is positive and significant ($t = 2.354$, $p = 0.008$), suggesting that more change in accruals earnings management leads to an increase in the intensity of causal reasoning on performance. Similarly, both the change in log of CR sentence intensity model and the change in the unexpected CR sentence intensity model (Table 8) show that the regression coefficients for change in accruals earnings management are positive and significant. Change in leverage is negatively associated with change in causal reasoning in all three models of Table 8. The results of the change models provide strong corroborating evidence of the significant relationship between earnings management signals and increased efforts to provide causal context for the firm's performance and achievements.

Discussion and conclusion

Causal reasoning on performance as displayed in management commentary reports is largely discretionary and offers considerable leeway to develop coping mechanisms to handle accountability demands. In this paper, we use the term 'causal reasoning' to cover the full repertoire of instances of performance explanation that may arise in response to 'why' and 'how' questions with regard to earnings-related outcomes. In the mainly retrospective context of management commentary (Merkl-Davies, Brennan, & McLeay, 2011), the discursive elaboration of the 'how' question – commenting on the underlying factors that bring about financial statement outcomes – is probably the most straightforward and prominent response. We argue that, as a generic narrative characteristic of management commentary, overall causal reasoning intensity is expected to increase when an accountability predicament arises due to potential earnings management evidence.

We use computer-intensive techniques to study the association between performance-related causal reasoning intensity and accruals earnings management in the MD&A section for a large US sample from 1999 to 2007. We find that accruals earnings management (proxied by signed discretionary accruals) is

Table 5
2SLS regression of causal reasoning measures on predicted accruals earnings management.

Causal reasoning (CR) regression	Accruals earnings management		Log of CR sentence intensity	Unexpected CR sentence intensity
	First stage	Second stage	Second stage	Second stage
Predicted accruals earnings management		1.159*** (2.677)	0.105*** (2.687)	1.022*** (2.361)
Litigation-sensitive industry	0.004*** (3.300)	0.650*** (9.844)	0.041*** (6.910)	-1.167*** (-17.691)
Loss firm	-0.026*** (-18.630)	0.577*** (8.364)	0.054*** (8.622)	0.513*** (7.453)
ROA	0.016*** (9.360)	-0.290*** (-3.727)	-0.027*** (-3.887)	-0.261*** (-3.353)
Leverage	-0.013*** (-7.760)	-0.019 (-0.246)	-0.005 (-0.650)	-0.014 (-0.184)
Firm size	-0.017*** (-41.970)	-0.039 (-1.728)	-0.005** (-2.375)	0.041* (1.800)
Big 4 auditor	0.004*** (2.780)	0.178*** (2.627)	0.018*** (2.878)	0.177*** (2.620)
Growth (change in sales)	0.000*** (-16.640)	0.000 (-1.165)	0.000 (-1.187)	0.000 (-1.116)
Number of business segments	-0.002*** (-4.300)	-0.031 (-1.636)	-0.003* (-1.921)	-0.026 (-1.375)
Text length	0.000 (-0.820)	0.428*** (17.089)	0.066*** (29.007)	0.421*** (16.829)
One-year lagged accruals earnings management	0.415*** (70.790)			
Two-year lagged accruals earnings management	0.196*** (32.400)			
Economic variability	0.013*** (5.560)			
Firm age	0.000*** (-8.850)			
Constant	0.172*** (25.210)	7.877*** (23.115)	2.000*** (64.877)	-2.811*** (-8.255)
N	24,795	24,795	24,795	24,795
F-statistics	1319.350			
Adjusted R ²	61.47%	13.83%	13.71%	9.18%

Accruals earnings management is scaled by 1000.

* Significance at the 90% level (two-tailed, one-tailed for EM variables). The variables are defined in Table 1.

** Significance at the 95% level.

*** Significance at the 99% level.

significantly and positively associated with causal reasoning intensity. This finding is consistent with prior research documenting differential effects of upward versus downward earnings management on explanatory activity. It builds on the argument that firms experience an asymmetric relationship with regard to the potential consequences of accruals earnings management. Firms are likely to experience stronger incentives to accommodate earnings management concerns under conditions of income-increasing accruals management than under conditions of income-decreasing earnings management. This may be due to expected litigation and reputation costs being higher for overstating earnings than for reporting understated earnings (Aerts et al., 2013; Graham et al., 2005). The differential effect of downward earnings management can be reconciled with prior research showing a managerial tendency to avoid defensive causal disclosures (e.g. excuses and causality denials) when commenting on decreases in performance (Aerts & Cheng, 2011) or to prefer framing of performance outcomes in other ways than through explicit causal language when expected costs of increased causal explanations may be higher than their potential remedial benefits (Aerts et al., 2013; Brown & Tucker, 2011).

In our findings, the positive association between accruals earnings management and causal reasoning holds for alternative proxies for accruals earnings management (an earnings management dummy model and an analyst expectations model). Additionally, in a change model, the analyses effectively measure change in causal reasoning intensity and show that this is related to change in discretionary accruals. Controlling for endogeneity, resulting from

a common disclosure policy that may simultaneously affect accruals earnings management and causal reasoning intensity, does not qualitatively change our findings, indicating that strong direct ties operate between potential (upward) earnings management costs and the increased provision of causal performance disclosures. Overall, these results are consistent with the assertion that causal reasoning on performance can be purposefully invoked to establish appropriateness and rationality and anticipate on audience concerns with regard to reported performance, in order to broaden cognitive legitimacy and perceived plausibility of reported performance outcomes. Prior research in the field of impression management tends to assume that the remedial nature of account-giving and related causal reasoning often expects that explanatory activity portrays the actor in a more positive light. Whether true or biased, such explanations are argued to provide important diagnostic information in times of uncertainty through delivering broader (even if partial and potentially misleading) situational knowledge (Sonenshein et al., 2011). One way of providing more situational knowledge is through using a wider repertoire of causal claims which aggregate to an overall level of logic-based cognitive effort that signals reasonableness and rationalized competence.

The results of our study may be useful for regulators and standard-setters (such as the IASB and the SEC) who have called for more causal disclosure on business performance in order to increase the quality of management commentary and improve its ability to support investor comprehension of financial information. Both the SEC and the IASB portray increased causal reasoning as an overall quality characteristic of management commentary that

Table 6
Pooled regression of causal reasoning measures on accruals earnings management dummy.

Causal reasoning (CR) regression	Accruals earnings management <i>First stage</i>	CR sentence intensity (%) <i>Second stage</i>	Log of CR sentence intensity <i>Second stage</i>	Unexpected CR sentence intensity <i>Second stage</i>
Predicted accruals dummy		0.577*** (3.086)	0.052*** (3.061)	0.515*** (2.756)
Litigation-sensitive industry	0.013*** (3.170)	0.643*** (9.739)	0.041*** (6.809)	-1.172*** (-17.757)
Loss firm	-0.065*** (-14.900)	0.584*** (8.472)	0.054*** (8.720)	0.520*** (7.558)
ROA	0.037*** (7.150)	-0.287*** (-3.693)	-0.027*** (-3.851)	-0.258*** (-3.324)
Leverage	-0.043*** (-8.510)	0.003 (0.039)	-0.003 (-0.367)	0.006 (0.076)
Firm size	-0.048*** (-38.900)	-0.024 (-0.974)	-0.004 (-1.593)	0.055** (2.218)
Big 4 auditor	0.009** (2.100)	0.174** (2.575)	0.017*** (2.827)	0.174** (2.572)
Growth (change in sales)	0.000*** (-12.020)	0.000 (-1.315)	0.000 (-1.348)	0.000 (-1.241)
Number of business segments	-0.003** (-2.590)	-0.030 (-1.605)	-0.003* (-1.894)	-0.025 (-1.343)
Text length	-0.002 (-1.160)	0.429*** (17.120)	0.066*** (29.035)	0.422*** (16.857)
One-year lagged accruals dummy	0.323*** (52.230)			
Two-year lagged accruals dummy	0.209*** (33.700)			
Economic variability	0.035*** (4.740)			
Firm age	-0.002 (-7.770)			
Constant	0.760*** (33.130)	7.411*** (17.815)	1.959*** (52.039)	-3.231*** (-7.772)
<i>N</i>	24,795	24,795	24,795	24,795
<i>F-statistics</i>	808.660			
<i>Adjusted R</i> ²	49.42%	13.85%	13.72%	9.21%

* Significance at the 90% level (two-tailed, one-tailed for EM variables). The variables are defined in Table 1.

** Significance at the 95% level.

*** Significance at the 99% level.

Table 7
Pooled regression of causal reasoning measures on earnings management to meet or beat analysts' consensus earnings forecast.

Causal reasoning (CR) regression	CR sentence intensity (%)	Log of CR sentence intensity	Unexpected CR sentence intensity
AFD	0.298*** (4.741)	0.023*** (4.081)	0.275*** (4.375)
Litigation-sensitive industry	0.664*** (10.346)	0.043*** (7.404)	-1.154*** (-17.991)
Loss firm	0.608*** (9.533)	0.056*** (9.750)	0.544*** (8.527)
ROA	-0.109** (-2.119)	-0.011** (-2.465)	-0.129** (-2.499)
Leverage	0.024 (0.325)	-0.001 (-0.175)	0.013 (0.175)
Firm size	-0.081*** (-4.921)	-0.009*** (-5.716)	0.007 (0.426)
Big 4 auditor	0.181*** (2.753)	0.018*** (3.028)	0.183*** (2.792)
Growth (change in sales)	0.000** (-2.221)	0.000** (-2.303)	0.000** (-2.124)
Number of business segments	-0.043*** (-2.341)	-0.004*** (-2.714)	-0.040** (-2.186)
Text length	0.441*** (18.078)	0.067*** (30.389)	0.436*** (17.895)
Constant	7.238*** (24.534)	1.943*** (73.029)	-3.665*** (-12.424)
<i>N</i>	26,297	26,297	26,297
<i>Adjusted R</i> ²	13.90%	13.80%	9.30%

Accruals earnings management is scaled by 1000.

* Significance at the 90% level (two-tailed, one-tailed for EM variables). The variables are defined in Table 1.

** Significance at the 95% level.

*** Significance at the 99% level.

Table 8
Pooled regression of change in causal reasoning on change in accruals earnings management.

	Δ CR sentence intensity (%)	Δ Log of CR sentence intensity	Δ Unexpected CR sentence intensity
Δ Accruals earnings management	0.794*** (2.354)	0.061** (1.936)	0.734** (2.171)
Litigation-sensitive industry	-0.036 (-0.543)	-0.003 (-0.430)	-0.031 (-0.468)
Loss firm	0.078 (1.262)	0.005 (0.925)	0.058 (0.942)
Δ ROA	0.060 (1.039)	0.004 (0.740)	0.015 (0.249)
Δ Leverage	-0.266*** (-2.623)	-0.027*** (-2.827)	-0.265*** (-2.607)
Δ Firm size	-0.086** (-2.000)	-0.009** (-2.132)	-0.003 (-0.058)
Big 4 auditor	-0.035 (-0.532)	-0.003 (-0.483)	-0.050 (-0.760)
Growth (change in sales)	0.000 (-0.230)	0.000 (-0.355)	0.000 (-0.174)
Δ Number of business segments	0.107** (2.514)	0.009** (2.369)	0.107** (2.508)
Δ Text length	0.348*** (15.149)	0.058*** (27.080)	0.349*** (15.144)
Constant	-0.586** (-2.257)	-0.057** (-2.338)	0.499* (1.884)
N	20,748	20,748	20,748
Adjusted R ²	1.93%	4.24%	2.03%

Accruals earnings management is scaled by 1000.

* Significance at the 90% level (two-tailed, one-tailed for EM variables). The variables are defined in Table 1.

** Significance at the 95% level.

*** Significance at the 99% level.

underpins its usefulness to market participants. Their view on causal disclosure is largely congruent with our generic measure of causal reasoning intensity. Although prior research shows that causal disclosures are incrementally informative and add to the firm's financial reporting package (Baginski, Hassell, & Kimbrough, 2004), our findings suggest that their selective and discretionary nature offers considerable leeway for purposeful managerial choice when incentives arise.

Our study extends the literature in several ways. First, to the best of our knowledge, this study is the first in examining the association between the intensity of causal reasoning on performance and accruals earnings management in a large sample of US firms. Prior studies focused only on specific self-serving forms of causal disclosure (explicit attribution tactics) and/or on a specific achievement context (such as Chinese IPOs). Our results corroborate the usefulness of a more generic measure of causal reasoning intensity as an overall narrative style characteristic of management commentary. We document a close alignment of the strength of accruals management and generic intensity of causal language use in performance-related management commentary. Our results suggest that firms purposively increase the intensity of their use of causal explanation in order to portray a picture of a rational agent, using a logic-based discursive strategy to signal intentional, reasoned and goal-directed behavior in order to accommodate accountability concerns when an accountability predicament, such as public earnings management evidence, arises. Even 'neutral' causal reasoning language is instrumental in signaling logic-based managerial action and sense-making. Second, the study adds to the earnings management literature by providing corroborating evidence that accruals earnings management may significantly drive the need to justify performance changes when the expected earnings management costs are perceived to be high, which is especially so in a strong scrutiny environment such as the US. Such tendency not only affects the absolute amount of specific assertive or defensive types of explanation, but also the intensity of causal reasoning as an

overall narrative property. Whereas prior research shows a relationship between causal disclosure tactics and earnings management in a high achievement context with no prior performance history such as an IPO, our results indicate that such a tendency is generalizable to a broader, mainstream market context and is not dependent on the absence of a prior performance track record that could limit the scope and credibility of causal reasoning. Third, this study adds to the impression management literature by evidencing incentives for the use of causal reasoning language in management commentary and, thus, sheds light on its discretionary use of the use of logic-based rational appeal as a rhetorical strategy. Where prior research investigated the impression management potential of specific self-serving explanatory tactics, our results point to the remedial relevance of the use of causal reasoning on performance as such, when incentives to accommodate audience perception are strong. Lastly, whereas accruals earnings management and impression management studies typically examine samples of firms for which the incentives for earnings management are expected to be strong, our sample relates to a more general setting, thus corroborating the robustness and generalizability of our findings.

Although we posit that 'neutral' causal reasoning is instrumental in a logic-based rationale-giving response, we acknowledge that the link with the evaluative content of the commentary might be important as well. Further research could focus on the potential added value and differential effects of integrating the evaluative tone of causal explanations, if a meaning-related approach which goes beyond a mere words-based approach would be reliably integrated in the automated text analysis procedures.

We expect that our findings are to a large extent generalizable to a European context, essentially because the scope and content of causal reasoning in management commentary as conceptualized and applied in this study, is highly discretionary in a US as well as in a European context. Although the format of an MD&A report in the US may be more standardized than the format of a management commentary report (or directors' report) in the European

context, its causal reasoning content is not. As our measure of causal reasoning intensity does not differentiate between types of explanation and their potential costs which may depend on the institutional environment, we posit that our results should be generalizable across institutional settings, as long as incentives for impression management remain significant. In that sense, we speculate that similar tendencies in causal disclosure may also be prominent in European capital markets and may even be stronger when investor protection characteristics are weaker than in the US market.

Appendix A. The Coh-Metrix list of causal connectors

a consequence of after all	for (the/these/that) purpose hence	so
arise from	if	the consequence of
arise out of	in case	then again
as a consequence	in order that	therefore
as a result	it follow that	thus
as soon as	it follows	to (these/this) ends
because	make	to that end
cause	now that	to those ends
conditional upon	on (the)* condition that	whenever
consequently	on condition that	although
due to	only if	even though
enable	provided that	nevertheless
even then	purpose (of/for) which	nonetheless
follow that	pursuant to	though
for	since	unless

Source: <http://cohmetrix.memphis.edu/CohmetrixWeb2/causal%20connectives.htm>

Appendix B. Examples of causal reasoning sentence on performance

Firm name: ADAMS RESOURCES & ENERGY, INC.
File ID: 0000002178-09-000007.

- Absent the inventory items, crude oil earnings from operations were reduced in 2008 **as a result** of escalated prices for the diesel fuel consumed in the trucking function of this business.
- Refined product driven operating earnings were reduced during 2008 **because** of an increased allowance for doubtful accounts receivable through a bad debt charge of \$700,000.

Firm name: GLADSTONE COMMERCIAL CORP.
File ID in SEC EDGAR: 0000950133-09-000441.
Examples:

- Directors' fees decreased during the year ended December 31, 2008, as compared to the year ended December 31, 2007, primarily **as a result** of fewer committee meetings occurring in the year ended December 31, 2008 coupled with one of the independent directors becoming an interested director in January 2008, and **thus** the director no longer receiving fees for attending board meetings.

- Rental income increased for the year ended December 31, 2007, as compared to the year ended December 31, 2006, primarily **due to** the acquisition of 14 properties and one leasehold interest during 2007, and properties acquired during 2006 that were held for the full year in 2007.

Appendix C. PERL programming procedures, extracting causal reasoning on performance

Step 1 – Downloading the electronic 10-K filings

We download the 10-K filings (annual reports) of our sample firms for the period 1999–2007 from the SEC Edgar website. The Compustat file and the SEC Edgar data both include a central index key (*i.e.*, CIK code) as identifier. In general, each firm has a unique CIK code. We download the 10-K filings if the 10-K filings' central index key matches with the central index code in Compustat file.

Step 2 – Extracting the MD&A sections from the 10-K filings

Each file is analyzed twice (*i.e.*, in two rounds). First, we process the file line by line. Then, in a second round, we process the file paragraph by paragraph (for reasons elaborated below). Consistent with Li (2008) we next proceed as following:

- Transfer html language to plain text language – First, we extract 'central index key', 'conformed period of report' (refers to fiscal year end date), and 'filed as of date' (refers to 10-K filing submitting date) from each 10-K filing. Second, all the tables that begin with <TABLE>⁵ and end with </TABLE> are deleted.⁶ All the paragraphs that contain <S> or <C> are also deleted. Third, we replace html language format ' ' with blanks and remove other html language format.⁷ Finally, we clean each file again by reading paragraph by paragraph (*i.e.*, the second round), to make sure that all the tables, tabulated text or financial statements are excluded. In this round, all the paragraphs with more than 50% of non-alphabetic characters (*e.g.*, white spaces or numbers) are deleted.
- Extract the MD&A section – Within the remaining text, the program first removes the leading and trailing blanks in each line. The MD&A section is the content lying in between the starting matching content (*i.e.*, the 'starting point') and the ending matching content (*i.e.*, the 'ending point'). The program identifies a line that satisfies one of the following criteria as the beginning of the MD&A section (*i.e.*, starting point): (1) the line starts with 'management's discussion'; (2) the line contains both of 'management's discussion' and ('item' + one or more white space + '7') or ('item' + one or more white space + '6')⁸ and does not contain the word 'see', 'refer to', or 'refers to'; (3) the line starts with 'managements discussion'; or (4) the line contains 'managements discussion' and ('item' + one or more white space + '7') or

⁵ All html tag language is matched on a case-insensitive basis.

⁶ Li (2008) notes that <S> and <C> html tags are used by some firms to present tables.

⁷ Li (2008) replaces all html tags with blanks. We believe that our treatment will deliver similar results as Li (2008), since we already replaced ' ' with blanks. Moreover, it is possible that some files may use html tags to decorate the MD&A section header. If we replace these html tags with blanks, it may cause a defective matching pattern. For example, if we replace in the extract 'Mmanagement's discussion and analysis...' the html tag (*i.e.*, and) with blanks, the line would become: ' M anagement's discussion and analysis...', whereas if we remove the html tag, the line would be read as: 'Management's discussion and analysis...'.

⁸ We add the 'item 6' into the beginning matching pattern, because some firms present their MD&A section in item 6.

('item' + one or more white space + '6') and does not contain the words or phrases: 'see', 'refer to', or 'refers to'. We save the matching content of the beginning MD&A section (i.e., starting point).

The program identifies a line that satisfies one of the following criteria as the ending of the MD&A section (i.e., ending point): (1) the line begins with 'Financial Statements'; (2) the line contains 'item' + one or more white spaces + '8' and the matching content of the beginning of the MD&A section (i.e., starting point) does not contain '6'; (3) the line contains 'Supplementary Data'; or (4) the line begins with 'SUMMARY OF SELECTED FINANCIAL DATA'; (5) the line contains 'item' + one or more white spaces + '7' and the line does not contain 'management' and the beginning of the matching content contains '6'. The MD&A section is the content lying in between the starting matching content and the ending matching content. If the matching content (i.e., MD&A section) is less than 20 lines, the program re-searches the starting point and the ending point. The MD&A extraction program will stop when the matching content is larger than 20 lines, or when the end of the file is reached.

Step 3 – Extracting performance related paragraphs from the MD&A section

First, we split each identified management commentary text into paragraphs. The paragraph split is based on PERL's paragraph definition. Each paragraph is treated as a unit of account. Second, we identify whether the paragraph contains performance-related content, based on a dictionary of 'financial performance' items. If a paragraph includes at least one of the words in the performance word list, it is retained for further analysis. The dictionary list contains expense-related words and income-related words. The expense-related word list includes the following words or phrases: amortization, cost, depreciation, disposition, expense, research and development, R&D, impairment, loss, write off. The income-related word list includes earnings, EBIT, EBITDA, income, sales, revenue, profit, margin, benefit, break even, contribution, EPS, earnings per share and return. Before identifying causal reasoning content, we correct for dot-signs such as: 'i.e.' to 'ie', 'U.S.' to 'US', 'No.' to 'number', 'Corp.' to 'corporation', 'et al.' to 'et al'. Even if a sentence does not include a performance-related word, the sentence will be included as a causal reasoning sentence in the calculation of CRI if it includes a causal word (or phrase) and belongs to a paragraph that refers to a performance-related word.

Step 4 – Measuring causal reasoning content

For each performance-related paragraph identified in the previous step, we identify and measure causal reasoning by sentence. After excluding numbers and tables in the text, we first identify a sentence based on the occurrence of a dot ".". Next, we identify causal reasoning using a list of causal connectors as proposed by Coh-Metrix.⁹ Coh-Metrix is a text analysis software developed by the department of psychology of the University of Memphis¹⁰

⁹ <http://cohmetrix.memphis.edu/CohMetrixWeb2/HelpFile2.htm#References>.

¹⁰ The Coh-Metrix software aims at measuring the coherence of texts on a wide range of features. Coh-Metrix can be used to better understand linguistic differences between texts and to explore the extent to which linguistic and discourse features successfully distinguish between text types. Coh-Metrix can also be used to develop and improve natural language processing approaches. Scholars describe the value of the Coh-Metrix system for providing multilevel analyses of textual difficulty. Scholars showed that Coh-Metrix indices significantly distinguish high versus low cohesion versions of these texts. The insertion of causal connectors in a sentence has a substantial impact on comprehension and memory for text (McNamara, Louwerse, McCarthy, & Graesser, 2010; Graesser et al., 2011).

(McNamara et al. 2010; Graesser et al. 2011). A causal reasoning sentence is defined as a sentence within the performance-related paragraph including at least one of the causal words or phrases featuring in the Coh-Metrix causal connectors list. Examples of causal reasoning sentences with identified causal connectors are shown in Appendix B. We use the number of causal reasoning sentences divided by the total number of sentences in the performance-related paragraphs of the MD&A section as a proxy for the intensity of causal reasoning. We label this proxy as 'causal reasoning intensity'.

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