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Behavioral agency and the efficacy of analysts as external monitors: Examining the moderating role of CEO personality

Alina G. Andrei[1] | **Mirko H. Benischke**[1] | **Geoffrey P. Martin**[2]

[1]Department of Strategic Management and Entrepreneurship, Rotterdam School of Management, Erasmus University, Rotterdam, The Netherlands

[2]Melbourne Business School, University of Melbourne, Carlton, Victoria, Australia

Correspondence
Mirko H. Benischke, Department of Strategic Management and Entrepreneurship, Rotterdam School of Management, Erasmus University, Burgemeester Oudlaan 50, Rotterdam 3042 NA, The Netherlands.
Email: benischke@rsm.nl

Abstract

We integrate behavioral agency research and the five-factor model of personality to re-visit investment analysts' efficacy as a mechanism for reducing agency costs. We highlight the role of personality in shaping how CEOs respond to analyst recommendations, leading to boundary conditions for the efficacy of analysts as external monitors. We theorize that the extent to which a CEO perceives a threat from more positive analyst recommendations is contingent upon their personality, which shapes their subjective interpretation of the recommendation and their use of income-increasing earnings management in response. Our findings suggest that personality is critical to understanding how CEOs respond to external monitors and the agency costs associated with the positive analyst recommendations.

KEYWORDS

behavioral agency, CEO personality, corporate governance, external monitoring, investment analysts

Managerial Summary

Our study provides evidence that more positive analyst recommendations have, on average, negative consequences for shareholders by increasing agency costs, yet personality provides a boundary condition. Thus, in terms of boards' responsibility to minimize shareholder agency costs, our findings suggest that boards need to be more vigilant regarding the agency costs associated with more positive analyst recommendations if their CEO scores high on either agreeableness, conscientiousness, or openness. This could take the form of greater monitoring of accounting decisions that involve discretion, or directors could reduce the weighting of accounting measures in the CEO's incentive plans.

1 | INTRODUCTION

The critical role of investment analysts in influencing firm outcomes is well documented in the literature (for a review, see Brauer & Wiersema, 2018). Typically, corporate governance scholars have conceptualized investment analysts as information intermediaries that reduce agency costs by mitigating information asymmetries between agents and principals (e.g., Bednar et al., 2015; Gomulya & Boeker, 2014; Wiersema & Zhang, 2011). However, the extent to which investment analysts actually reduce shareholder agency costs remains an unresolved question. On the one hand, investment analysts have indeed been shown to reduce agency costs by highlighting undesirable management practices (Bednar et al., 2015) or facilitating the dismissal of underperforming CEOs (Park et al., 2021; Wiersema & Zhang, 2011). On the other hand, prior research has also indicated that analysts can create substantial earnings pressures to which CEOs respond by adopting strategies that increase agency costs (e.g., Busenbark et al., 2017; DesJardine & Bansal, 2019; Schulz & Wiersema, 2018).[1] As such, while there is consensus regarding the "widely acknowledged importance of financial analysts" (Brauer & Wiersema, 2018, p. 219), our understanding of analysts' impact on agency costs is less clear. The poignance of this dissonance is amplified by significant reductions in funding for analyst research, raising fundamental questions as to the broader implications of less analyst research and recommendations (Bloomberg, 2017).

One reason why agency costs associated with analysts remain unclear may be due to the potential for dissonance regarding the interpretation of analyst recommendations. Buy, sell, or hold recommendations are accompanied by analysis and commentary that includes information with both "positive and negative elements, resulting in the potential for ambivalent assessments" (Gamache & McNamara, 2019, p. 918). That is, more positive recommendations contain favorable information about the firm's future prospects that support the recommendation. At the same time, even such positive analyst reports also outline downside firm risk that, if realized, would prevent the firm's share price from meeting analysts' expectations. This suggests that there is scope for CEOs' interpretation of positive analyst recommendations. The process of interpreting external stimuli involves the *subjective* organizing of these stimuli to comprehend the meaning of information (Jackson & Dutton, 1988; Thomas et al., 1993). In the context of

[1]Such responses include limiting long-term strategic investments (Zhang & Gimeno, 2016) or using impression management techniques to influence analysts' perception of their firms (e.g., Busenbark et al., 2017).

this study, interpretation most likely involves a process whereby the negative and positive information embedded in more positive analyst recommendations are weighed against each other, meaning that any response is influenced by how a CEO weighs the positive and negative information. In this regard, it is likely that CEOs' interpretation of the implications of more positive analyst recommendations for their personal wealth is particularly consequential (Wiseman & Gomez-Mejia, 1998).

Specifically, we argue that CEOs who weigh the negative information more heavily may perceive a greater personal threat due to the possibility of failing to deliver on analysts' expectations given that failing to do so has implications for their financial wealth (e.g., forgone bonuses or loss of future outcome in the event of a performance-related dismissal; Wiersema & Zhang, 2011) and nonfinancial wealth (loss or reputation or social capital; Lins et al., 2017), and vice versa. Yet, prior research tends to assume homogeneity in how CEOs interpret the information associated with more positive analyst recommendations. However, this assumption is challenged not only by the aforementioned potential for ambivalent assessments of these recommendations but also by research suggesting that CEOs indeed vary significantly in how they interpret ambiguous information (Gamache & McNamara, 2019), especially if that information may have implications for their personal wealth (Benischke et al., 2019; Benischke et al., 2020; Wowak & Hambrick, 2010). Thus, in order to enhance the predictive validity of corporate governance research exploring the agency cost implications of analyst recommendations, it is critical to expand existing theory to accommodate variation regarding CEOs' subjective interpretation of analyst recommendations.

To that end, we integrate the behavioral agency model (BAM; Wiseman & Gomez-Mejia, 1998) with the five-factor personality model (FFM; McCrae & Costa, 1987) to argue that CEO personality moderates the effect of more positive analyst recommendations on income-increasing earnings management. The BAM argues that CEOs are loss averse, meaning that they are more sensitive to personal losses than gains. The BAM framework proposes that as agent (CEO) risk bearing, defined as "perceived threat to agent wealth" (Wiseman & Gomez-Mejia, 1998, p. 136), increases, they take action to reduce that threat. In the context of this study, we expect that CEOs, on average, perceive an increase in their risk bearing when confronted with more positive analyst recommendations due to over-weighting negative information. Since CEOs respond to increasing levels of risk bearing with actions that reduce that threat, we expect that CEOs will make greater use of income-increasing earnings management when experiencing more positive analyst recommendations (Abarbanell & Lehavy, 2003). In this situation, income-increasing earnings management can be used as a short-term solution to mitigate the risk that analyst expectations are not met (Irani & Oesch, 2016).[2] We further argue that the interpretation of more positive analyst recommendations—and, thus, their propensity to use income-increasing earnings management—differs across CEOs, depending on their personality. Specifically, we argue that CEO personality explains CEOs' subjective estimate of the probability that analysts' expectations cannot be met, which will, in turn, influence their perceived risk bearing. In a sample of 9280 firm-years with 1124 firms, we find that CEO

[2]We define income *increasing* earnings management as the use of judgment in financial reporting that leads to higher reported earnings in the focal accounting period. In contrast, when using incoming *decreasing* earnings management, firms degrade earnings in one period to inflate earnings in the following period (Cohen et al., 2008). For shareholders, income increasing earnings management increases agency costs as it involves financial reporting decisions that mislead stakeholders, thereby exacerbating information asymmetry (Healy & Wahlen, 1999). Thus, shareholders are less likely to be aware of the issues that have necessitated earnings management and may have led them to sell down the stock (Martin et al., 2019).

agreeableness, conscientiousness, and openness strengthen the relationship between analyst recommendations and earnings management.

Our findings contribute to the literature by clarifying how CEOs' psychological traits can explain how they interpret and respond to feedback from investment analysts. Prior research has argued that analyst recommendations create earnings pressures that can translate into a personal threat (to personal wealth) for the CEO; earnings pressure leads to responses that increase shareholders agency costs (DesJardine & Bansal, 2019; Schulz & Wiersema, 2018). Drawing on the BAM, we argue that analyst recommendations are more ambivalent, necessitating the theoretical integration of personality theory to predict variance in how CEOs interpret the potential implications of these recommendations for their personal wealth. As such, our study suggests that the implications of analyst monitoring depends on the CEO's personality and the associated probability that they will use discretion in financial reporting to mitigate a perceived personal threat in response to increasingly more positive analyst recommendations. Our study also enriches the BAM by shifting the locus of theorizing from internal stimuli to recognizing the role of analysts in explaining sources of agency costs. This is an important extension of the BAM framework because it recognizes loss-averse CEOs' responses to external stimuli as another potential source of agency costs. Lastly, our study also has practical implications because external stimuli such as feedback from analysts are problematic as they cannot be directly controlled by the board, and understanding CEO responses to such stimuli is thus critical for the board to be able to take corrective actions if necessary.

2 | THEORY AND HYPOTHESES

2.1 | Analyst recommendations and agency costs

Investment analysts are considered important information intermediaries who collect and evaluate information about public firms (Brauer & Wiersema, 2018). Specifically, positive analyst recommendations (a "buy" recommendation) suggest that the analyst believes that the current share price undervalues the firm's future fundamentals. In contrast, a negative analyst recommendation (a "sell" recommendation) is issued if the analyst expects the firm's share price to underperform relative to the market. These recommendations and, in particular, the accompanying analyst reports, thus, largely constitute new information to which the market typically reacts (Asquith et al., 2005; Bascle & Jung, 2023; Brav & Lehavy, 2003; Huang et al., 2009). From a governance perspective, the information offered by analysts is particularly relevant as it can reduce agency costs by mitigating information asymmetries between agents and principals (Bednar et al., 2015). As a result, CEOs have less scope to act opportunistically (e.g., Bednar, 2012; Busenbark et al., 2022; Hussain et al., 2023; Park et al., 2021; Sualihu et al., 2021). For example, in almost 14% of fraud cases that were detected due to whistleblowers, it was investment analysts covering these firms that were revealing the fraud (Dyck et al., 2010).

However, there is also evidence pointing towards unintended negative consequences of external monitoring by investment analysts. For example, it has been suggested that the recommendations offered by analysts can create significant employment risk for CEOs (e.g., Park et al., 2021; Wiersema & Zhang, 2011) to which these CEOs may respond with increased short-termism (Currim et al., 2018; DesJardine & Bansal, 2019; Zhang & Gimeno, 2010, 2016), reduced competitive behavior (Zhang & Gimeno, 2016), or lower investments into exploratory

innovations (Chang et al., 2019; He & Tian, 2013). While these strategic choices clearly benefit management by allowing them to buffer against the short-term earnings pressures associated with positive analyst recommendations, they often create additional agency costs and are, thus, not necessarily beneficial for shareholders (Brauer & Wiersema, 2018).

This discussion suggests that the agency cost implications of external monitoring by investment analysts are not yet fully understood. In this regard, we argue that dissonance in the literature regarding the agency cost implications of analyst recommendations can at least partially be attributed to the fact that these recommendations have "the potential for ambivalent assessments" (Gamache & McNamara, 2019, p. 918). Given that CEOs' subjective interpretation of such stimuli is likely to be shaped by psychological attributes (Gamache & McNamara, 2019; Strauss et al., 2003), we argue that agency cost implications of monitoring by analysts are contingent on the CEO's personality, which influences how they interpret this ambiguous information and associated consequences for their personal wealth.

2.2 | Behavioral agency model

The BAM (Wiseman & Gomez-Mejia, 1998) enhanced the conception of risk in classic agency theory's models of agent risk-taking by replacing agency theory's assumption of risk-averse agents with prospect theory's (Kahneman & Tversky, 1979) empirically grounded concept of loss aversion. Loss aversion broadly suggests that individuals are more sensitive to prospective losses than prospective gains. The BAM uses the agent risk bearing concept (threat to personal wealth) to estimate sensitivity to prospective personal losses. Risk bearing is a perceptual construct, given it represents the CEO's subjective estimate of the personal losses if the decisions they make on behalf of their firm prove unsuccessful. To illustrate, in the event of failed strategic investments that result in a lower share price, CEOs experience commensurate losses in their equity wealth due to declines in the firm's share price (Devers et al., 2008); CEOs with more equity wealth will, thus, perceive a greater threat to their personal wealth. The BAM suggests that, as risk bearing increases, loss-averse CEOs will take actions that mitigate the perceived threat to their personal wealth (e.g., Benischke et al., 2019, 2020, 2022; DesJardine & Shi, 2021; Larraza-Kintana et al., 2007; Martin et al., 2013).

Earnings management has also been explored by behavioral agency scholars as a lever to mitigate a perceived threat to personal wealth due to missing earnings guidance (e.g., Harris & Bromiley, 2007; Martin et al., 2016). Given the focus of the BAM on internal governance mechanisms, it is not surprising that this work has largely focused on examining the link between compensation design and earnings management (e.g., Martin et al., 2019; Zhang et al., 2008). Specifically, *income-increasing* earnings management can be used to deliver on the earnings guidance CEOs have previously provided to analysts (Cohen et al., 2008; Leuz et al., 2003). Thus, the use of income-increasing earnings management is more common in the accounting period before CEOs sell shares, given higher reported earnings can stimulate or preserve the share price to maximize the value of shares sold (Cheng & Warfield, 2005).[3] In contrast, when using *incoming-decreasing* earnings management, firms degrade earnings in one period to inflate earnings in the following period (Cohen et al., 2008). This work has created a space for

[3]We acknowledge that earnings management can also create a threat to the CEOs non-financial wealth (reputation) in the longer-term if used to the extreme (Martin et al., 2016; Zhang et al., 2008). However, the notion that distant losses are more heavily discounted (myopic loss aversion; Thaler et al., 1997) suggests the CEO is likely to accept longer-term risk to reduce short-term risk.

research that considers the use of earnings management as a lever available to CEOs to mitigate perceived risk bearing. Hence, the BAM is likely to also have utility in the context of external stimuli, such as analyst recommendations.

2.3 | Analyst recommendations and income-increasing earnings management

Upgrades in analyst recommendations are a positive signal about the firm's future prospects, given analysts have increased their estimates of future earnings. At the same time, more positive analyst recommendations have also been shown to create short-term earnings pressures (e.g., Currim et al., 2018; DesJardine & Bansal, 2019; Zhang & Gimeno, 2010, 2016). For example, it has been found that 78% of managers admitted to "sacrificing long-term value to smooth earnings" (Graham et al., 2005, p. 4). This use of earnings management is driven by a desire to meet market expectations (Bascle & Jung, 2023), given share prices decline disproportionally if earnings guidance is missed (DesJardine & Bansal, 2019). More positive recommendations make a firm's share price even more sensitive to a downgrade should the expectations of the analyst not be met (Abarbanell & Lehavy, 2003). Given the correlation between downgrades and the firm's share price (e.g., Diether et al., 2002), such a downgrade due to failure to meet analysts expectations could translate into CEO financial wealth loss such as forgone bonuses or loss of future income (in the event of dismissal; Park et al., 2021; Wiersema & Zhang, 2011) and non-financial wealth loss such as the loss of reputation and social capital (Boivie et al., 2016; Harrison et al., 2018; Lins et al., 2017). More positive analyst recommendations can thus increase the CEO's perceived risk bearing, given their estimate of potential losses increases (in the event of not achieving earnings guidance associated with the more positive analyst recommendation).

The BAM suggests that, in this situation, the CEO will respond by taking actions that mitigate the perceived threat to their wealth. Given that income-increasing earnings management provides a short-term solution to mitigate the perceived threat to their personal wealth (that justifies the analyst recommendation; Abarbanell & Lehavy, 2003), we expect that CEOs will respond to more positive analyst recommendations by making greater use of income-increasing earnings management. Formally,

> *Baseline Hypothesis*: *Increasingly more positive analyst recommendations are positively related to income-increasing earnings management.*

Our baseline hypothesis assumes homogeneity in how CEOs interpret more positive analyst recommendations. Below, we will draw upon the FFM to relax that assumption and theorize how CEO personality will influence our baseline relationship. Strategy scholars have used the FFM to analyze how CEO personality shapes their perception and responses to external stimuli (e.g., Benischke et al., 2019; Gupta et al., 2019; Harrison et al., 2019, 2020; Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010).

2.4 | CEO personality and risk bearing

As noted before, we have argued that increasingly more positive analyst recommendations have "the potential for ambivalent assessments" (Gamache & McNamara, 2019, p. 918) because they

can contain both positive and negative elements. Based on the FFM, we now explain how CEOs' subjective estimate of the probabilities that analysts' expectations can be met depends on CEOs' *individual* tendencies to over-weigh threat-consistent (negative) versus opportunity-consistent (positive) information, or the "degree to which one has generalized positive expectations about future events" (Wowak & Hambrick, 2010, p. 810), due to their personality. In general, the BAM suggests that CEOs (on average) tend to be more sensitive to negative information indicating the potential for personal losses. This view is consistent with related work (also drawing on prospect theory) suggesting that individuals are more sensitive to threat-consistent information than opportunity-consistent information (Baumeister et al., 2001; Jackson & Dutton, 1988).

While this explains the baseline effect we have described above, personality theory also suggests there is likely to be variation in CEOs' tendency to over-weigh negative information. In this regard, the FFM is particularly relevant as it has been instrumental in explaining the personality traits that can predict variance in individuals' subjective estimate that an outcome will eventuate when interpreting external stimuli (Bono & Judge, 2004; McCrae & Costa, 1997). Personality is a behavioral manifestation of the individual style used to form a perception (Aron & Aron, 1997). In the context of our study, we posit that CEO personality influences the perception of threat due to positive analyst recommendations. To make sense of this threat, we argue that CEOs will subjectively estimate the probability that analysts' expectations can or cannot be met. CEOs who are more (less) likely to over-weigh the negative information in analyst reports—when interpreting analyst recommendations—will have a higher (lower) subjective estimate of the probability that they will be unable to meet analysts' expectations. We suggest that the probability of meeting expectations positively correlates with the perception of threat and risk bearing, which affects the likelihood that the CEO will use income-increasing earnings management in response to the analyst's recommendation. This equates to a moderation argument: CEO personality weakens or strengthens the relationship between analyst recommendations and earnings management, contingent upon the specific CEO personality trait.

Below, we will describe how personality traits—extraversion, emotional stability, agreeableness, conscientiousness, and openness—influence CEOs' subjective estimates of the probability that they will be able to meet analysts' expectations.

2.4.1 | CEO extraversion

We expect that CEO extraversion leads to lower perceived threat to personal wealth when assessing the consequences of positive analyst recommendations. Extraversion captures a broader group of traits, most of which relate to individuals' desires for interpersonal engagement (Malhotra et al., 2018). In contrast to introverts, who tend to be "more socially reserved, serious, and controlled" (Swickert et al., 2002, p. 878), CEOs who score high on extraversion are considered to be sociable. This is reflected in their ability to build relationships within and across the firm (Judge et al., 2002), putting them in a better position to spin information in a way that is more favorable to their views (Gupta et al., 2019). This contributes to their generalized positive perception of future events. Indeed, extraverts have been shown to be more optimistic, which explains their higher risk tolerance when making decisions with uncertain payoffs (Harrison et al., 2020). Extraverts also have been linked to higher self-esteem, suggesting greater self-confidence (Watson & Clark, 1997). Due to their optimism and self-esteem, extravert CEOs have also been shown to focus their attention on

upside outcomes and discount the possibility of failure when evaluating stimuli (Bono & Judge, 2004; Herrmann & Nadkarni, 2014; Judge et al., 2002). This suggests that extraverts tend to have generalized positive expectations about future events and are, thus, less likely to focus on the downside possibilities. In contrast, introvert CEOs may consider "more negative and neutral information in combination with positive information" (Malhotra et al., 2018, p. 375). Thus, extravert CEOs will perceive a lower threat to personal wealth when interpreting more positive analyst recommendations than introvert CEOs, making them less likely than introvert CEOs to use income-increasing earnings management as analyst recommendations are upgraded.

Hypothesis 1. *CEO extraversion weakens the positive relationship between analyst recommendations and income-increasing earnings management.*

2.4.2 | CEO emotional stability

We propose that CEOs with greater emotional stability will also perceive lower threat due to more positive analyst recommendations, for different reasons to the logic associated with extraversion. Emotional stability broadly describes individuals' tendency to experience emotional stress (McCrae & Costa, 1992) in that emotionally stable individuals remain calm in difficult situations (Judge et al., 2013), are not as easily panicked (Costa & McCrae, 1998), and are, thus, better able to adapt to new situations (Herrmann & Nadkarni, 2014; Nadkarni & Herrmann, 2010). Emotionally stable individuals are also less susceptible to experiencing emotional stress and worry when confronted with new situations (McCrae & Costa, 1997) and respond less to uncertainty (Hirsh & Inzlicht, 2008). Due to their lower probability to experience emotional stress, emotionally stable CEOs also tend to be more self-confident and exhibit less self-doubt (Judge et al., 2013); they are also more likely to discount potential downside outcomes when making decisions under uncertainty (Benischke et al., 2019). In contrast, less emotionally stable (more neurotic) individuals tend to experience feelings of anxiety and worry (Thompson, 2008). This suggests that more emotionally stable CEOs will estimate a lower probability that analysts' expectations will not be met and are, therefore, less likely to use income-increasing earnings management than less emotionally stable CEOs.

Hypothesis 2. *CEO emotional stability weakens the positive relationship between analyst recommendations and income-increasing earnings management.*

2.4.3 | CEO agreeableness

We argue that CEO agreeableness will lead to a greater perceived threat to personal wealth due to more positive analyst recommendations. Agreeableness captures traits related to interpersonal behavior (Costa & MacCrae, 1992; Judge et al., 2013). Specifically, agreeableness describes individuals' attitudes toward others. For example, agreeable individuals are also eager to please and avoid conflict with those around them (Judge et al., 2013; Peterson et al., 2003), meaning that an important source of anxiety for agreeable individuals lies in the possibility of relationship breakdowns. Those potential relationship breakdowns can be a source

of future nonfinancial losses. Their ability to avoid interpersonal conflict explains a tendency to focus on threat-consistent information because that information may provide more information regarding the possibility of a relationship breakdown (Judge et al., 2013). In the context of our study, agreeable individuals' tendency to focus on threat-consistent information suggests that agreeable CEOs are more sensitive to the negative information outlining the possibility of failure to meet analysts' expectations and associated stock price declines because it can result in strained relationships with affected firm stakeholders. As a result, agreeable CEOs are relatively more likely to estimate a greater probability of failure to meet analysts' expectations and threat to personal wealth, leading to greater use of income-increasing earnings management when confronted with increasingly positive analyst recommendations.

Hypothesis 3. *CEO agreeableness strengthens the positive relationship between analyst recommendations and income-increasing earnings management.*

2.4.4 | CEO conscientiousness

We propose that CEO conscientiousness will accentuate the perceived threat to personal wealth because of more positive analyst recommendations. Conscientiousness describes individuals' traits relating to their ability to succeed in a given task environment. As such, conscientiousness has been commonly associated with a high achievement orientation (Peterson et al., 2003). Their achievement orientation is the main driver of their fear of being perceived as incompetent (Cianci et al., 2010), which manifests itself in a fear of failure (Shi & DesJardine, 2022). This fear explains conscientious individuals' preference for cautious and deliberate actions (Costa & McCrae, 1998). In fact, conscientiousness has more broadly been linked to risk-averse behaviors (e.g., Harrison et al., 2019; Nadkarni & Herrmann, 2010) and low uncertainty tolerance (Costa & McCrae, 1998). To minimize risk and uncertainty, conscientious individuals tend to take control of situations to achieve what they have promised (Judge & Bono, 2000; Zhao & Seibert, 2006). In contrast, in situations in which they have less control over outcomes, they will analyze the situation very carefully because of their fear of failure (Shi & DesJardine, 2022). During this process, it is likely that they will pay particular attention to information that could point towards potential loss outcomes because they seek to proactively address any potential downside risk (Miller & Toulouse, 1986) due to their fear of failure (Shi & DesJardine, 2022). Low conscientious individuals, on the other hand, tend to lack self-control and act more careless and, as a result, often discount the presence of risk in their decision-making. In support of this argument, prior research shows that low-conscientious individuals are more likely to be involved in workplace accidents (Wallace & Vodanovich, 2003). This suggests that conscientious CEOs are likely to overweigh negative information when interpreting more positive analyst recommendations and, thus, have a higher estimate of the probability that analysts' expectations may not be met. Consequently, conscientious CEOs are expected to perceive a greater threat, leading to greater use of income-increasing earnings management:

Hypothesis 4. *CEO conscientiousness strengthens the positive relationship between analyst recommendations and income-increasing earnings management.*

2.4.5 | CEO openness

We propose that CEO openness also accentuates the perceived threat to wealth due to more positive analyst recommendations. Openness is positively correlated with environmental sensitivity, which is also referred to as sensory processing sensitivity (Lionetti et al., 2019). In this respect, individuals who are higher on the openness trait are more prone to emotional excitation (Aron et al., 2012). This makes open individuals more vulnerable to an array of psychological conditions. It is not surprising, for instance, that open individuals are easily overwhelmed and react negatively to environmental stimuli when making sense of a situation (Smolewska et al., 2006). Specifically, open individuals tend to show a greater behavioral response to environmental stimuli and, within these stimuli, are more likely to be emotionally affected by the negative dimensions of environmental stimuli (Ahadi & Basharpoor, 2010). In the context of our study, this suggests that open CEOs are more likely to have generalized negative expectations about the future, suggesting that they are likely to weigh more heavily the negative information that is included within increasingly positive analyst recommendations. This suggests that open CEOs will likely have a higher estimate of the probability that analysts' expectations may not be met and, thus, perceive greater levels of threat. We, thus, argue that open CEOs are more likely to use income-increasing earnings management:

> **Hypothesis 5.** *CEO openness strengthens the positive relationship between analyst recommendations and income-increasing earnings management.*

3 | METHODOLOGY

3.1 | Sample and data sources

The sample of our study consists of public companies listed in the Standard & Poor's 1500 index, anytime between 1994 and 2015. This index combines the three leading indices—S&P500, S&P MidCap 400, and S&P SmallCap 600—that jointly make up roughly 90% of the United States market capitalization (S&P Dow Jones Indices, 2021). Our sample selection was informed by the need to research companies that are closely and consistently monitored by the investment community. We initiated the data collection from Compustat, where we extracted all financial information relevant to our phenomenon and proceeded to merge that data with Execucomp, IBES, and Refinitiv (formerly known as Thomson Reuters) data. The sample's start was guided by the earliest availability of data; whereas financial information is readily accessible for this index from 1992 onwards, Execucomp began data collection on the S&P 1500 index only in 1994. We start from Compustat as it provides the 10-K report data for publicly traded corporations; these reports contain the balance sheet and income statement information that is necessary to calculate discretionary accruals (earnings management). From Compustat, we obtained an initial list of 2667 unique firms[4] for which we then collected analyst recommendations data and identified the CEOs for each year. Upon merging this sample with Execucomp data, the number of firms drops to 1642 because data for CEOs' demographics and compensation were less consistently collected by Execucomp for the earlier years of covering the S&P1500 index. Finally, we merge the resulting list of firms with the personality traits data

[4]More than 1500 firms were identified for the period because of the changes that occur in the index composition throughout the entire period.

obtained from coding Refinitiv's transcripts of quarterly earnings calls. Not all transcripts could be reliably related to the list of firms because the transcript files are identified by a ticker ID and company name only. Considering that the ticker number is not unique to firms (across time), we developed a matching system that combined company name, CEO name, quarter, and year. The final dataset consists of 9280 firm-year observations, corresponding to 1124 unique firms.

3.2 | Dependent variable

3.2.1 | Earnings management

We operationalize earnings management by estimating discretionary accruals (DA), following the model developed by Dechow et al. (1995) and recently implemented in other management studies investigating classic agency problems stemming from the separation of ownership and control (e.g., Gavana et al., 2017; Martin et al., 2019; Peasnell et al., 2012). Accruals refer to expenses and revenues that firms register in their profit calculations but that reflect transactions that have not yet been settled. The accrual accounting practice provides management some discretion regarding the revenues and expenses to be recorded in a given period, such that the timing and the magnitude of these items can be adjusted as desired. The management of accruals can be perceived as a double-edged sword; on the one hand, it can serve as a mechanism useful in smoothing a firm's income stream, which in turn can help decrease a firm's cost of borrowing, whereas, on the other hand, it can be perceived as a deviant mechanism that CEOs can manipulate to ensure they protect the value of their stocks (Dechow et al., 1995). Prior studies show that discretionary accruals are used to increase or decrease a firm's earnings, depending on the executive's agenda (Healy & Wahlen, 1999). We calculate discretionary accruals based on the modified Jones model developed by Dechow et al. (1995). First, we estimate total accruals (TA) and nondiscretionary accruals (NDA), accounting for firm performance, and then estimate discretionary accruals as the difference between TA and NDA, as per the below:

$$\mathrm{DA_{it}} = \mathrm{TA_{it}} - \mathrm{NDA_{it}} \tag{1}$$

With:

$$\mathrm{NDA}_t = \alpha_1(1/\mathrm{A}_{t-1}) + \alpha_2(\Delta\mathrm{REV}_t - \Delta\mathrm{REC}_t) + \alpha_3(\mathrm{PPE}_t) \tag{2}$$

where TA_{it} is the total accruals for firm i in year t; $\mathrm{NDA_{it}}$ is the nondiscretionary accruals for firm i in year t; A_{t-1} is the total assets at $t-1$; $\Delta\mathrm{REV}_t$ is the change in revenues in year t with respect to $t-1$, scaled by total assets at $t-1$; $\Delta\mathrm{REC}_t$ is the change in net receivables in year t with respect to $t-1$, scaled by total assets at $t-1$; PPE_t is the gross property plant and equipment in year t, scaled by total assets at $t-1$; $\alpha_{1,2,3}$ is the firm-specific parameters.

The firm-specific parameters, α_1, α_2, and α_3, are estimated using OLS as a_1, a_2, and a_3 from the below model, where TA is total accruals scaled by lagged total asset:

$$\mathrm{TA}_t = a_1(1/A_{t-1}) + a_2(\Delta\mathrm{REV}_t - \Delta\mathrm{REC}_t) + a_3(\mathrm{PPE}_t) + \varepsilon \tag{3}$$

Consistent with prior research on earnings management (Dechow et al., 1995; Martin et al., 2016), the TA composition is as follows:

$$TA_t = (\Delta CA_t - \Delta CLt - \Delta Cash_t + \Delta STD_t - Dep_t)/A_{t-1} \quad (4)$$

where ΔCA reflects the change in current assets, ΔCL is the change in current liabilities, ΔCash is the change in cash and cash equivalents, ΔSTD is the change in short-term debt, Dep is the depreciation and amortization expense, and A is the total assets.

3.3 | Independent variable

3.3.1 | Analyst recommendations

We collected the mean analyst recommendations from I/B/E/S via Eikon (Thomson Reuters). Analyst recommendations are reported on a five-point scale on which a high score reflects a lower recommendation. To ensure coherence with our thesis that more positive analyst recommendations may create earnings pressure for CEOs to maintain those recommendations and avoid the personal consequences of a downgrade, we reverse-coded the recommendations. To do so, we subtract it from six, such that the high scores for analyst recommendations reflect a positive (e.g., buy) recommendation. We calculated the average consensus recommendation for firm *i* in year *t* and weighed this average by the number of analysts covering the security. We take this last step to account for the fact that the number of analysts covering a security usually varies over time (Wiersema & Zhang, 2011). In line with prior research (Benner & Ranganathan, 2012), we lag the recommendations one year.

3.4 | Moderating variables

3.4.1 | CEO personality traits

For CEO personality traits operationalization, we rely on a linguistic measure of the framework typically known as the Big Five (Costa & MacCrae, 1992; Digman, 1990). The Big Five personality traits are *Extraversion* (vs. Introversion), *Emotional stability* (vs. Neuroticism), *Agreeableness*, *Conscientiousness*, and *Openness* to experience. In this study, we build on the approach developed and validated by Harrison et al. (2019) and make use of their open-language personality tool. Harrison et al. (2019) developed personality traits measures using R's machine-learning capabilities in three stages: (a) text vectorization, (b) training and model selection, and (c) trait prediction. In the first stage, Word2Vec is used to "extract language features from the larger text corpus of 3,573 CEOs" (Harrison et al., 2019, p. 1320). This algorithm created a vocabulary from the text employed and then learned linguistic representations. In the second stage, the vectors produced previously were used to build regression models to estimate each personality trait. In the final stage, the best-performing regression was applied to predict personality traits for all CEOs in the initial sample of CEOs.

We obtained the tool from Harrison and colleagues, and we applied it to our collected set of transcripts of quarterly earnings calls. The transcript data come from Refinitiv (Thomson Reuters' StreetEvents dataset). The calls are structured in two sections—a presentation segment and a Q&A segment. In our coding, we use the Q&A text. While the presentation part is likely to be scripted either by others or the CEO himself/herself, it is more likely that the answers provided by the CEO in response to analysts' questions to be more spontaneous and unscripted (Matsumoto et al., 2011). We have, thus, used the Q&A text to obtain the personality scores

using the open-language personality tool. However, although using the Q&A text is consistent with extant research using text-based analyses to measure CEO-related traits (e.g., Harrison et al., 2020; DesJardine & Shi, 2021; Shi et al., 2019; Shi & DesJardine, 2022), we have performed sensitivity tests using personality scores we obtained applying the open-language personality tool to all text (i.e., the presentation and the Q&A segment). The results of these analyses are qualitatively similar to those we report in our main analyses below, with one exception regarding the moderating effect of CEO conscientiousness (new *p*-value = .052). The full results are included in the Appendix S1.

Moreover, although the tool had previously been validated by Harrison et al. (2019) on a sub-sample of CEOs for whom expert raters scored each of the five personality traits using the 50-item International Personality Item Pool (Goldberg, 1992) based on publicly available video clips (Hill et al., 2019), we have performed additional analyses to validate the content validity of the tool and, thus, predicted personality scores we have obtained using that tool. First, we have followed the approach by Harrison et al. (2020) and identified language markers that have been found to be related to each of the five traits. We have then checked the correlation of these language markers with the personality scores we obtained using the tool. The results of this additional analysis provide further support for the overall content validity of the tool for each of the five traits. Second, to alleviate concerns regarding the representativeness of earnings call transcripts text for the CEOs' use of language in other settings, we recalculated the personality scores based on the text of letters to shareholders. The personality scores we obtain from this analysis converge with the ones we have obtained using the Q&A text. Additionally, taking into account the relatively high intercorrelations between our estimated personality traits that may raise discriminant validity concerns, we make a comparison to the extended personality traits research. Finally, we looked at our highest and lowest personality scores and checked the transcripts for the language that the tool is using/picking up on to produce these scores. Showing actual language used by CEOs will provide some face validity to our measure. Table 3 below shows an example of the type of text the tool picks up for high and low scores of CEO personality; for brevity, here we show text for one trait only—Openness. Appendix S1 provides examples for all traits. The results of these additional tests provide additional evidence supporting the validity of our approach. We have included these analyses in the Appendix S1.

For each quarterly earnings call, Refinitiv records a transcript which is identifiable by ticker, company name, and quarter-year. Due to the unreliability of the ticker as an identifier, we had to develop a unique identifier per firm and one per each speaker on the earnings call (transcript). We first code personality traits from the universe of earnings call transcripts made available by Thomson Reuters, and then we match this with the CEOs of firms in our sample.

3.5 | Control variables

To adjust for potential confounding effects, we control for firm- and CEO-related characteristics that were found to influence discretionary accruals, analyst recommendations, and factors that are likely to impact CEO behavior and decision-making. To this end, at the firm level, we include in our analyses *firm size* (log number of employees[5]) since larger firms are usually more

[5]We include number of employees instead of total assets due to the higher correlation that exists between total assets and other control variables, such as performance and performance volatility. Nevertheless, the results do not change if we operationalize firm size using (the log of) total assets.

closely scrutinized by the investment community (Wiersema & Zhang, 2011), *firm performance* (Tobin's Q; Benischke et al., 2019), *liquidity* (calculated as [Current Assets + Inventory − Current Liabilities]/[Current Assets]), and *performance volatility* (standard deviation of ROA over the prior 3-year period; Ali et al., 2007; Bartov et al., 2001) considering that all of these are likely to materially impact the decision to engage in earnings management. Furthermore, to control for corporate governance characteristics (Hubbard et al., 2017; Parrino et al., 2003), we include *institutional ownership* operationalized as the percentage of the firm's shares concentrated in the hands of institutional investors. The *average number of analysts covering the security* is included to control for likely higher investor scrutiny (Wiersema & Zhang, 2011) that may influence CEO behavior, and, we think, that *industry-level average analyst recommendations* will be a good proxy for the overall state of the financial market. At the CEO level, we include *CEO age*, *tenure*, *gender*, and *duality*, considering that personal characteristics and previous work experience were found to influence CEO behavior. CEO age and tenure may account for differences in knowledge and abilities that were found to influence risk-taking behavior. Prior research found that there are significant differences between genders when it comes to engaging in riskier business decisions (Jurkus et al., 2011). CEO duality is considered to increase CEO power and hence reduce the career concerns of CEOs (Oehmichen et al., 2021). Additionally, to account for the potential effects of CEO incentives on CEO behavior and/or decisions, we control for different types of compensation—*cash compensation*, *restricted stock*, *prospective wealth*, and *equity risk bearing* (Benischke et al., 2019; Gomez-Mejia et al., 2019). All firm-level and CEO-performance variables are measured at *t-1*. We included *year dummies* to control for year-fixed effects. Considering we do not use control variables estimates for theory building or discuss any (marginal) effects of the controls included (Hünermund & Louw, 2020), we only report the extended models in Appendix S1, available with this article.

3.6 | Analysis

Table 1 shows an overview of the dataset's descriptive statistics and correlations. We aim to examine how CEOs frame analyst recommendations and respond to the perceived threat of analyst downgrade using earnings management to increase reported earnings. The relationship between analyst recommendations and firms' (increasing) earnings management raises potential endogeneity concerns. More specifically, it would be reasonable to expect that a firm's earnings management may subsequently affect analyst propensity to give a positive recommendation to that firm. To capture the true nature of our baseline relationship, we, therefore, must address this endogeneity concern. In doing so, we follow the approach employed by Wiersema and Zhang (2011) and Yu (2008) and create a proxy for each of the analyst recommendations measures that is uncorrelated with the firm's prior firm performance and earnings management practices. We first estimate the following model of the analyst recommendations measures:

$$\begin{aligned} &\textit{Average analyst recommendations} \\ &\quad = \textit{Firm size} + \textit{Prior industry adjusted financial performance} \\ &\qquad + (\textit{prior})\,\textit{Earnings management} + \textit{Time}(\textit{year dummies}) \end{aligned} \tag{5}$$

The above model estimates analyst recommendations based on firm size, prior year industry adjusted ROA and Tobin's Q, earnings management,[6] and time. Following previous research on analyst recommendations, we include industry-adjusted accounting and market measures of performance. Table 2 shows the results of this regression. Average analyst recommendations are positively related to firm size and performance, positively but not statistically significantly related to earnings management over the same year, and negatively related to the earnings management from the prior fiscal year. We estimate the residuals from this model and use them as a proxy for the firm's average analyst recommendations that are uncorrelated with earnings management, firm performance, size, and time. This approach addresses endogeneity concerns regarding the relationship between firms' analyst recommendations and earnings management (Wiersema & Zhang, 2011; Yu, 2008).

Taking into account our dataset's panel structure, we further have to assess whether a fixed (FE) or random effects (RE) estimation procedure is preferred. Since FE models are not able to estimate coefficients for variables that do not vary over time (Certo et al., 2016) and the CEO personality traits measure in our study does not vary for the individual CEO, the remaining solution would be using RE as an estimation procedure. However, in our study, the lack of variance in CEO personality traits may pose fewer concerns as we are interested in their effect as moderators rather than independent predictors. In this context, the interaction term is the product of more positive analyst recommendations—a variable that shows variation from one year to the other—and a constant, namely the CEO personality traits. Thus, the resulting term will display variation within firms, across the sample years. Considering that we wish to examine how *within*-firm changes in analyst recommendations influence earnings management and how these within-firm changes in analyst recommendations are perceived and acted upon by CEOs, we decided to employ a fixed effects estimation procedure.

We winsorize at the 1% all variables that show outliers in their distribution. Furthermore, all non-binary variables were standardized with a mean 0 and a standard deviation of 1, except for the discretionary accruals variable (our earnings management measure).

4 | RESULTS

In light of the high correlations between some of the personality traits, we do not test nor report a saturated model as robustness but, instead, test our moderation hypotheses separately. Our findings are presented in Table 4. It is noteworthy that the R^2 statistics across all models are close to 0.10, which is in line with the standard in discretionary accruals models in existing research (Bergstresser & Philippon, 2006; Chen et al., 2008; Martin et al., 2016). *Model 1* tests the baseline hypothesis, and models 2–6 show the estimates of the relation between more positive analyst recommendations and earnings management and the CEO personality traits' moderating effects on this relationship. The Baseline Hypothesis states that positive analyst recommendations are positively related to income-increasing earnings management. In *Model 1*, we indeed find a positive estimate of analyst recommendations ($\beta = 0.008$, SE = 0.004,

[6]Considering that earnings management and average analyst recommendations reporting moments may overlap within the same year, we include earnings management in the same period and an earlier year relative to the analyst recommendations. In additional robustness tests, we also predict the residuals from the model including only the lag of earnings management, run all our analyses using this proxy for our average analyst recommendations measure, and the results are similar.

TABLE 1 Descriptive statistics and correlations.

Variables	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Firm size (empl.)	8.89	41.21	1.000											
(2) Tobin's Q	2.22	2.62	−0.255*	1.000										
(3) Performance volatility	0.08	0.10	−0.509*	0.376*	1.000									
(4) Liquidity	0.60	0.41	−0.006	−0.125*	−0.139*	1.000								
(5) Instit. own.conc.	0.20	0.26	−0.465*	0.053*	0.317*	−0.074*	1.000							
(6) CEO prospective wealth	28564.33	82259.42	0.222*	0.212*	−0.063*	−0.067*	−0.072*	1.000						
(7) CEO cash compensation	1176.07	1522.171	0.281*	−0.048*	−0.084*	−0.113*	−0.070*	0.216*	1.000					
(8) CEO options granted	99.03	125.88	0.239*	0.080*	0.074*	−0.072*	−0.065*	0.250*	0.199*	1.000				
(9) CEO restricted stock	1584.97	2354.33	0.244*	−0.048*	−0.099*	−0.114*	−0.075*	0.101*	0.184*	0.056*	1.000			
(10) CEO tenure	7.26	7.36	−0.041*	0.039*	−0.069*	0.076*	−0.031*	0.055*	0.032*	−0.086*	−0.038*	1.000		
(11) CEO age	56.00	7.49	0.106*	−0.081*	−0.099*	0.043*	−0.007	0.016*	0.094*	−0.063*	0.009	0.413*	1.000	
(12) CEO gender	0.97	0.17	−0.013*	−0.008	0.003	0.012*	−0.003	0.007	0.017*	0.007	−0.033*	0.055*	0.037*	1.000
(13) CEO duality	0.48	0.5	0.189*	−0.023*	−0.116*	−0.047*	−0.070*	0.081*	0.139*	0.099*	0.014*	0.221*	0.229*	0.046*
(14) Avg. number analysts	7.70	7.06	0.522*	0.065*	−0.198*	−0.152*	−0.308*	0.313*	0.224*	0.259*	0.315*	−0.032*	0.000	−0.011*
(15) Industry avg. mean recom.[a]	3.79	0.23	−0.037*	0.120*	0.050*	0.073*	0.060*	0.028*	−0.013*	0.100*	−0.145*	0.020*	−0.052*	0.046*
(16) Avg. analyst recom.[b]	3.78	0.58	−0.111*	0.148*	0.004	0.076*	0.017*	0.063*	0.015*	0.037*	−0.054*	0.032*	−0.043*	0.040*
(17) CEO Extraversion	4.73	0.17	0.164*	0.123*	−0.002	0.085*	0.009	0.069*	−0.033*	0.100*	0.007	−0.036*	−0.122*	−0.001
(18) CEO Stability[c]	2.86	0.12	0.113*	0.210*	0.072*	0.121*	−0.012	0.073*	−0.037*	0.111*	−0.001	−0.006	−0.077*	−0.076*
(19) CEO Agreeableness	4.05	0.15	−0.001	0.238*	0.107*	0.146*	−0.007	0.058*	−0.067*	0.108*	0.003	−0.028*	−0.147*	−0.057*
(20) CEO Conscientiousness	5.11	0.11	0.076*	0.059*	−0.025*	−0.017*	0.012	0.017*	0.012	0.049*	0.031*	−0.046*	−0.061*	−0.056*
(21) CEO Openness	4.66	0.13	0.001	0.209*	0.079*	0.028*	0.019*	0.063*	−0.044*	0.099*	−0.007	0.007	−0.144*	−0.056*
(22) DCA[d]	−0.64	0.30	0.033*	−0.042*	−0.067*	0.036*	−0.009	−0.011	−0.009	−0.011	0.014*	0.005	0.014*	−0.004

TABLE 1 (Continued)

Variables	Mean	SD	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(13) CEO duality	0.48	0.5	1.000									
(14) Avg. number analysts	7.70	7.06	0.041*	1.000								
(15) Industry avg. mean recom.[a]	3.79	0.23	0.088*	−0.087*	1.000							
(16) Avg. analyst recom.[b]	3.78	0.58	0.035*	−0.112*	0.367*	1.000						
(17) CEO extraversion	4.73	0.17	−0.023*	0.001	0.087*	0.012	1.000					
(18) CEO Stability	2.86	0.12	−0.018*	0.066*	0.072*	0.033*	0.189*	1.000				
(19) CEO agreeableness	4.05	0.15	−0.088*	0.024*	0.147*	0.065*	0.547*	0.383*	1.000			
(20) CEO conscientiousness	5.11	0.11	−0.016*	0.003	−0.053*	−0.035*	0.459*	0.211*	0.510*	1.000		
(21) CEO openness	4.66	0.13	−0.071*	0.030*	0.073*	0.018*	0.595*	0.413*	0.698*	0.644*	1.000	
(22) DCA[c]	−0.064	0.30	−0.010	−0.001	−0.005	0.029*	0.049*	0.053*	0.041*	0.046*	0.051*	1.000

*Correlation is significant at the .05 level.

[a]All analyst recommendations are reverse coded (1 means "strong sell" and 5 is a "strong buy").

[b]Average over 1 year, weighted by the number of analysts covering the security.

[c]The Harrison et al. (2019) code outputs a score for Neuroticism (vs. Emotional Stability); considering our theoretical predictions involve Emotional Stability, we reverse-coded this variable.

[d]Discretionary accruals variable is the proxy for Earnings Management.

TABLE 2 Regression that generates residuals used as proxies for average analyst recommendations measure.

	Dependent variable: Average analyst recommendation		
Variables	***β***	**SE**	***p*-value**
Earnings management	.011	0.016	.487
1-Year lag earnings management	−.031	0.015	.004
Firm size (log Empl)	.019	0.010	.061
Prior year industry-adjusted ROA	.511	0.033	.000
Prior year industry-adjusted Tobin's Q	.059	0.004	.000
Constant	3.891	0.033	.000
Observations (firm-years)	12,160		
R^2	0.1531		
Year dummies	Yes		

Note: Robust standard errors are presented.
***$p < .01$, **$p < .05$, *$p < .1$ (two-tailed tests).

$p = .041$). In practical terms, on average, 1 SD increase in analyst recommendations is associated with an increase in earnings management of approximately 12.5% (i.e., the main effect divided by the average DCAs). This is also a practically relevant effect, considering that the firms in our dataset are some of the world's largest listed firms (all present in the S&P1500). Therefore, we infer that the Baseline Hypothesis is supported by our data.

Hypothesis 1 predicts that CEO extraversion has a negative effect on the relationship between analyst recommendations and earnings management. As shown in *Model 2b*, the interaction estimated effect between CEO extraversion and analyst recommendations is β = 0.027 (SE = 0.019) with a p-value of 0.153, rejecting Hypothesis 1.

Hypothesis 2 suggests that CEO emotional stability weakens the positive relationship between analyst recommendations and income-increasing earnings management. *Model 3b* in Table 4 tests this hypothesis, and the results (β = 0.009, SE = 0.04, $p = 0.047$) suggest that we cannot conclude statistical support for Hypothesis 2 in our sample. We find that, *on average*, an increase of one 1 SD in CEO stability increases the positive relation between analyst recommendations and earnings management by a further 14%. In contrast to our prediction, this result indicates that higher CEO emotional stability might be associated with more use of income-increasing earnings management in response to positive analyst recommendations.

Hypothesis 3 states that CEO agreeableness strengthens the positive relationship between analyst recommendations and income-increasing earnings management. As can be seen from *Model 4b*, the results (β = 0.011, SE = 0.004) support this hypothesis, showing a positive effect with a p-value of 0.012. The interaction effects are depicted in Figure 1a, and the graph shows a stronger positive relation between analyst recommendations and earnings management at higher levels of CEO agreeableness. We find that, *on average*, an increase of 1 SD in CEO agreeableness accentuates the positive relationship between analyst recommendations and earnings management by a further 17.1%, indicating that CEOs scoring high on agreeableness increase their use of earnings management practices in response to more analyst recommendations. Thus, we infer statistical support for Hypothesis 3 in our data.

In Hypothesis 4, we predict that CEO conscientiousness strengthens the relationship between analyst recommendations and earnings management. *Model 5b* tests this hypothesis,

TABLE 3 Illustrative example of text spoken by CEOs scoring *High* and *Low* on the Openness dimension of the FFM.

High	Low
"[...] I think it depends how *things evolve*. I think things like *continuing* medical *education*, *training programs* for physicians, particularly on new instruments, it is where I see the device industry being different than pharma, where there is *clearly a need for ongoing training because of the hands-on nature of the use of some of the products that we have*. And so I think you may see shifts in some of the investments from one area to another, but *I still think* that you are going to *need to have an appropriate level of investment to be able to introduce and educate on the new technologies*. But clearly it will be *a shift* from some areas to others. [...]"	"[...] Our *highest priority is to produce revenues and cash flows from the assets we already own*. I would *leave it at that*. We are *focused on what we have today*, *not what we might see as an opportunity in the future*. I think the Paris Compont activities are already slowed up and suspended. They went from a run rate of about $500 million a year to $100 million a year. So no, I'm *not really concerned about it slowing things up*. *They are already slowed up*, and *the projects that we are doing are already contracted* and up and running and going. [...]
"[...] Just one comment I would make earlier to pick up on one of Dominic's, I think that as he said, obviously we are always focused on being as cost conscious as we can be, but at the same time I think it's important to note that *we think it's really important to be able to invest in growth opportunities* [...]. That being said, that's why *we need to continue to innovate*. *I think* the breadth of our product line also helps us in that area and we are watching it very closely. That's what I am seeing right now. That's certainly our goal and *I think it depends*, one, is *you have to constantly be introducing new products*. One thing about the MD&D space, it's *all about innovation cadence* and you cannot be just because you have a slightly different angle on a device *but something that is more breakthrough*. *That's number one*. [...] "Everybody, thank you very much. I hope after the discussions that we have had this morning that you have a better understanding of our strategies, priorities, and plans to really help more patients and *to drive our growth going forward*. Please keep in mind that the contributions we make to our shareholders always start from *the innovative*, *ever-increasing contributions our employees make every day* to patients and consumers all around the world. *I really believe that healthcare is one of the most important and rewarding industries around the globe and we look forward at Johnson & Johnson to helping lead it*, *shape it*, *for many years to come*." (Alex Gorsky, J&J)	"[...] I do not think we have seen much of a change at all. The level of inquiries is virtually unchanged. The number of rigs working there is virtually unchanged. We've decreased our count when we moved rigs to Mexico, and within this last week we have brought one rig back out to replace the Nebraska, the last one that came down. I feel pretty confident, based on our discussions right now that if we wanted to force a couple of rigs into the market, we could do that. *We're sticking with the same philosophy that we have had for the last five years* or so with respect to the Gulf, and that's we are not going to work the rigs down where we cannot make cash contributions from them. And we are not going to bring additional rigs back out until there's enough backlog on the rigs working and the new rig to justify doing that. So we have added one additional rig, and we are looking at opportunities now and trying to book additional backlog that will justify bringing another unit out. *I really do not see much of a change* one way or the other. The prices that we were getting were already sort of the bottom of the barrel as far as what we were prepared to take. So you will not see that declining, either.[...] *our criteria is really about the same it's been for the last three or four years* and that's that all the rigs that are working in the fleet we want to have about 120 days *of backlog before we look to bring out an additional one*, and we do not want to bring out an additional one unless we can contract to 120 days or so of work.[...] (Paul Bragg, Pride Int'l)

TABLE 4 Results of FE estimation predicting earnings management (robust standard errors).

	Baseline model			Model 1			Model 2a			Model 2b			Model 3a			Model 3b		
Variables	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**
Control variables	Included			Included			Included			Included			Included			Included		
Analyst recommendations				**.008**	**0.004**	**.041**	**.008**	**0.004**	**.042**	−.120	0.090	.180	**.008**	**0.004**	**.046**	−.218	0.114	.056
Extraversion							.029	0.020	.146	.030	0.022	.172						
Analyst Recom. × Extraversion										.027	0.019	.153						
Stability													−.025	0.044	.578	−.028	0.046	.541
Analyst Recomm. × Stability																**.009**	**0.040**	**.047**
Agreeableness																		
Analyst Recom. × Agreeableness																		
Conscientiousness																		
Analyst Recom. × Conscientiousness																		
Openness																		
Analyst Recom. × Openness																		
Year dummies	Included			Included			Included			Included			Included			Included		
R^2	0.0900			0.1013			0.1014			0.1013			0.1016			0.1021		
Number of firms	1124			1124			1124			1124			1124			1124		
Number of observations	9280			9280			9280			9280			9280			9280		

TABLE 4 (Continued)

	Model 4a			Model 4b			Model 5a			Model 5b			Model 6a			Model 6b		
Variables	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**	***β***	**SE**	***p*-value**
Control variables	Included			Included			Included			Included			Included			Included		
Analyst recommendations	**.008**	**0.004**	**.047**	.007	0.004	.088	**.008**	**0.004**	**.045**	**.008**	**0.004**	**.030**	**.008**	**0.004**	**0.048**	**.008**	**0.004**	**.048**
Extraversion																		
Analyst Recom. × Extraversion																		
Stability																		
Analyst Recom. × Stability																		
Agreeableness	.003	0.005	.593	.004	0.005	.496												
Analyst Recom. × Agreeableness				**.011**	**0.004**	**.012**												
Conscientiousness							.005	0.003	.149	.005	0.004	.178						
Analyst Recom. × Conscientiousness										**.006**	**0.003**	**.037**						
Openness													.005	0.004	.274	.005	0.005	.350
Analyst Recom. × Openness																**.010**	**0.004**	**.006**
Year dummies	Included			Included			Included			Included			Included			Included		
R^2	0.1014			0.1024			0.1014			0.1019			0.1014			0.1025		
Number of firms	1124			1124			1124			1124			1124			1124		
Number of observations	9280			9280			9280			9280			9280			9280		

Note: All tests are two-tailed. Bold indicates the estimates have a *p*-value lower than 0.05.

and the results (β = 0.006, SE = 0.003) show that the interaction estimated effect between CEO conscientiousness and analyst recommendations is positive and with a p-value of 0.037. We find that, *on average*, an increase of 1 SD in CEO conscientiousness increases the positive relation between analyst recommendations and earnings management by a further 9.4%, which indicates that conscientious CEOs might indeed perceive a greater threat to not meeting analyst recommendations and thus make use of income-increasing earnings management. Thus, we conclude there is support for Hypothesis 4. This result is plotted in Figure 1b.

In Hypothesis 5, we predict that CEO openness strengthens the effect of analyst recommendations on income-increasing earnings management. *Model 6b* shows the results (β = 0.010, SE = 0.004, $p = 0.006$) and provides support for Hypothesis 5 in our data. Figure 1c shows this relationship graphically. From the graph, we see a stronger positive relation between analyst recommendations and earnings management at higher CEO openness levels. In practical terms, on average, for firms led by CEOs that score high on openness, the effect of analyst recommendations on earnings management is a 16% increase in earnings management. This result implies that agreeable CEOs are more likely to employ income-increasing earnings management practices in response to more positive analyst recommendations.

4.1 | Robustness and additional endogeneity tests

As a first robustness test, we test whether our findings are potentially affected by omitted variable bias. To address this concern, we also ran an endogenous treatment effects estimation

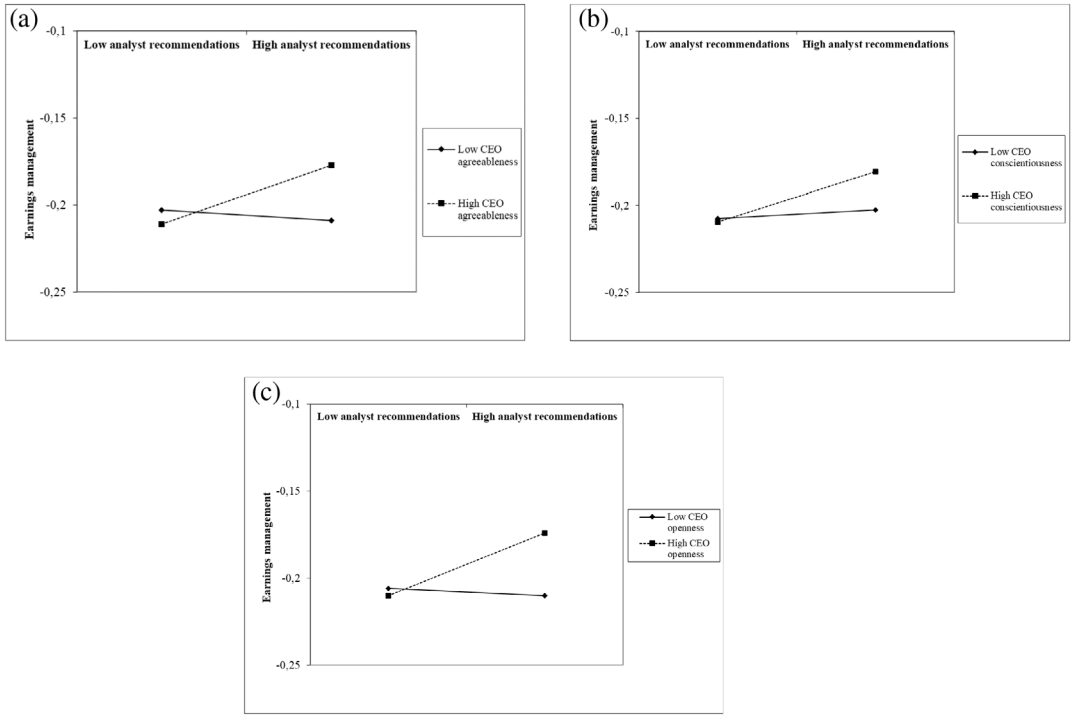

FIGURE 1 CEO personality traits—moderating effects.

(Certo et al., 2016)—(*eteffects* in Stata). This analysis amounts to simultaneously estimating a treatment selection regression model (predicting analyst recommendations) and an outcome regression model (predicting earnings management)[7] under the null hypothesis that the residuals resulting from both regression models are uncorrelated. For the treatment, we create a binary variable that takes the value 1 for all cases of analyst recommendations higher or equal to the sample median and 0 for all other recommendations. The results of the endogenous treatment effects analysis show that we cannot reject the null hypothesis, suggesting that endogeneity due to uncontrolled confounding variables is most likely not a concern.

Second, to ensure that our findings are not highly dependent on our estimation procedure, we also used generalized linear models (GLM) as an estimation procedure. GLM models are preferred in pooled time series, as they allow for any degree of interaction effects and accommodate nonlinearity and nonconstant variance structures in the data (Agresti, 2015). We used robust variance estimators for all regressions and a Gaussian distribution with an identity link function. The results obtained from GLM remain consistent.

5 | DISCUSSION

In this study, we have explored how personality affects how CEOs interpret and respond to feedback from analysts. Our findings suggest that agreeableness, conscientiousness, and openness strengthen the relationship between analyst recommendations and earnings management. Contrary to our prediction, emotional stability also accentuates this relationship. We believe that our findings have important implications for theory.

5.1 | Theoretical implications

Our study expands an important stream of research in the corporate governance domain that has considered the role of investment analysts—and external governance more generally—in mitigating agency problems. Specifically, we depart from the notion that positive performance evaluations by analysts will be uniformly interpreted as a personal threat by CEOs (e.g., Abarbanell & Lehavy, 2003; Shipilov et al., 2019; Wiersema & Zhang, 2011) and, instead, argue that CEO personality explains variation in responses to increasingly more positive analyst recommendations. At first, this insight may seem somewhat counterintuitive, given that the recommendation itself can be viewed as relatively unambiguous, leaving little room for interpretation. However, our study suggests that the focus should not necessarily be on the recommendation (i.e., buy, hold, or sell) itself but on CEOs' perceived ability to meet analysts' expectations, meaning that these analyst recommendations should be understood in the context of their potential implications for the CEO's personal (financial and nonfinancial) wealth.

As such, while our study echoes earlier attempts to bring the CEO into conversations about external governance (e.g., Shi et al., 2017), we offer a significant advancement by explaining why two firms experiencing the same changes in positive analyst recommendations can experience different outcomes. These differences arise as CEO personality traits affect the CEO's

[7]Both models include predictors related to firm size, performance, governance quality, CEO-related compensation, industry, and time fixed effects. The outcome model is estimated as a linear regression, whereas the procedure for the treatment model is a probit estimation—given the test-imposed binary-nature of the treatment.

subjective interpretation of more positive recommendations. Indeed, Wowak and Hambrick (2010) already speculated that CEOs' perceived ability to generate positive outcomes for themselves will influence their responses to stock options, but their model offers limited insights into how this mechanism would affect CEOs' subjective interpretation of more positive analyst recommendations. Our study, thus, suggests that CEOs vary not only in their responses to compensation arrangements but also to analyst recommendations and that this variation can be explained by CEOs' individual differences, in our case personality.

More broadly, our study also contributes to agency theory by advancing our understanding of the agency cost implications of external monitoring. The study of cognition and decision-making in the context of the firm has emphasized the combination of internal and external factors in shaping executive decisions (e.g., compensation as internal and share price or industry factors as external influences; Devers et al., 2007). External factors, however, have been mostly secondary to internal factors in BAM research when considering antecedents to decisions that may create agency costs (e.g., Benischke et al., 2019; Devers et al., 2008; Martin et al., 2013). Yet, the performance of peers or the opinions of analysts have been proven to be instrumental in shaping executive choices in other domains within management research (e.g., Greve, 2008; Iyer & Miller, 2008). Hence, these external factors deserve more attention when examining factors that may mitigate or accentuate agency costs. For example, our findings suggest an unintended consequence of more positive recommendations: greater use of discretion in financial reporting in the form of income-increasing earnings management.

Indeed, our findings suggest that similar mechanisms may explain CEO responses to other external monitors, such as the media (e.g., Bednar, 2012) or the market for corporate control (Giroud & Mueller, 2011). For instance, while empirical evidence supporting the market for corporate control hypothesis is relatively weak, and many boundary conditions seem to exist (Shleifer & Vishny, 1997), this could potentially be explained by variation in CEO interpretation of the threat of a hostile takeover. Similarly, by its very nature, media reports are open to CEO interpretation. This suggests that our framework is particularly suited to inform research in these contexts. Our study also points towards the possibility that CEOs who are concerned about their ability to meet analysts' earnings expectations may use other measures, such as pension funding (Martin et al., 2020) or CSR-directed investments (Ioannou & Serafeim, 2015) to increase the chances of meeting analysts' expectations. This suggests that our framework may have implications for our understanding of how analyst recommendations can create agency costs not only for shareholders but also for a broader range of stakeholders, such as employees (due to pension underfunding) or society-at-large (due to CSR-underfunding).

Our analysis shows that the predicted effects of extraversion and emotional stability were not supported in our data. Regarding extraversion, we have noted that extravert CEOs have greater self-confidence than introverts (Watson & Clark, 1997), which we suggested leads to less perceived threat due to analyst recommendations. Yet, it also may lead to greater self-confidence or optimism that they can use income-increasing earnings management in the current period without negative consequences in the next period—they may believe they can find extra earnings to compensate for the reversal of accruals (an effect of income-increasing earnings management in the prior period). This manifestation of extraversion may outweigh our predicted effect. Regarding emotional stability, one possible explanation could be that neurotic individuals have been shown to excel in highly demanding contexts, reflected in their solving of complex and challenging goals (Ferris et al., 2011). Greater worry by more neurotic individuals is associated with motivation to solve problems (Tamir, 2005). Greater worry (in demanding environments) may, in fact, lead less emotionally stable (more neurotic) individuals

to direct greater attention to the earnings problem, such that they mitigate the perceived risk of not delivering on the expectations of analysts. Given less emotional stability has been positively associated with surpassing expectations for group-task contributions (Bendersky & Shah, 2013), one could argue that the less emotionally stable individual is effective at mitigating perceived risk, meaning that neuroticism (rather than emotional stability) weakens the association analyst recommendations and income-increasing earnings management.

5.2 | Practical implications

Our study suggests that, in terms of boards' responsibility to minimize shareholder agency costs, boards need to be more vigilant regarding the agency costs of more positive analyst recommendations if their CEO score higher on agreeableness, and/or conscientiousness, and/or openness. Indeed, in our sample, about 50% of the CEOs score high on at least one of these three traits, and about 39% of all CEOs score high on all these three dimensions. If we look further at CEOs who respond to more positive analyst recommendations by engaging in earnings management, we observe that approximately 41% of these CEOs score high on agreeableness, 34% on conscientiousness, 39% on openness, and about 26% on all three traits. For these CEOs, boards should invest in greater monitoring of accounting decisions that involve discretion, or directors could reduce the weighting of accounting measures in CEO incentive plans.

5.3 | Future directions and limitations

As with any empirical study, ours is also not free of limitations. While we expected that all five personality dimensions could explain variation in CEOs' behavioral responses to increasingly positive analyst recommendations due to upgrades, our results support only the moderation effect of agreeableness, conscientiousness, and openness. This suggests that not all CEO personality dimensions are equally consequential when it comes to the interpretation of ambiguous external stimuli such as analyst recommendations. Further research is clearly needed to develop a deeper understanding of which CEO personality traits are relevant in which situation, but by combining insights from the BAM literature and research on the FFM, our study provides initial evidence for the notion that individual differences in agreeableness, conscientiousness, and openness are most relevant to explain heterogeneous responses to analyst recommendations.

The measures that we use for the CEO personality traits are not directly obtained from each CEO's profile but rather from using a linguistic algorithm developed to quantitatively assess a more general population. While our approach is consistent with prior research (e.g., Harrison et al., 2019, 2020), and although we have taken additional steps to validate these measures, we recognize that there is scope for future research to further validate the approach we have been using to operationalize CEO personality. Ideally, future research would validate our measures by directly measuring the personality of CEOs within our sample. As such, while our findings support that our measures are systematically capturing individual differences between CEOs on the five dimensions, our results should be interpreted with these limitations in mind.

Lastly, we focus on one source of agency costs: income-increasing earnings management. While prior research has documented that analyst recommendations may, for example, result in greater short-termism, our framework implies that those effects may be contingent on

individual personality differences across CEOs. Future research may pursue this line of reasoning in other contexts to develop a more complete picture of analysts' role in shaping firm strategy.

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DATA AVAILABILITY STATEMENT

Research data are not shared.

ORCID

Alina G. Andrei https://orcid.org/0000-0001-9016-2625
Mirko H. Benischke https://orcid.org/0000-0001-5695-5293

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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