Managers' Self-Serving Attribution Bias and Corporate Financial Policies*

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Abstract

The self-serving attribution bias ("SAB") refers to individuals taking responsibility for good outcomes and blaming others for bad outcomes. Consistent with the existence of managerial SAB, I find that managers tend to use more first-person pronouns (relative to second- and third-person pronouns) in the Management Discussions and Analysis Section of the 10-K filings when firm performance is better. A consequence of SAB is overconfidence (i.e., overestimating the mean and underestimating the variance of future cash flows). Consistent with this argument, managers with more SAB are more likely to issue forward-looking statements and make earnings forecasts, the tone (e.g., positive versus negative) of their forward-looking discussions has smaller variation, and their earnings forecasts tend to be more optimistic. Firms whose managers have more SAB have higher investment-cash flow sensitivity and experience more negative market reactions around acquisition announcements. These firms also tend to have higher leverage, are more likely to repurchase stocks, and are less likely to issue dividends. Collectively, the evidence suggests that managers have self-serving attribution bias and this bias has implications for corporate policies.

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"Solid execution of our strategies and the absence of significant catastrophes contributed to our outstanding results in 2006. Around the world and across all of our business segments we are capitalizing on growth opportunities, using our business diversity and matrix management structure to respond quickly to customer needs."

American International Group, Inc. 2006 Annual Report

"AIG reported that the continued severe credit market deterioration, particularly in mortgage-backed securities, and charges related to ongoing restructuring activities, contributed to a record net loss for the fourth quarter of $61.7 billion, or $22.95 per diluted share, compared to a 2007 fourth quarter net loss of $5.3 billion, or $2.08 per diluted share."

American International Group, Inc. 2008 Annual Report

1. Introduction

A central part of behavioral economics deals with economic agents' overconfidence and its economic consequences.[1] One mechanism through which people become overconfident is the existence of self-serving attribution bias (SAB), which refers to individuals taking responsibility for successful outcomes but blaming circumstances or other persons for unsuccessful outcomes (Daniel, Hirshleifer, and Subrahmanyam 1998, Gervais and Odean 2001, Malmendier and Tate 2005, 2008, Billett and Qian 2008, Libby and Rennekamp 2012).

While there is pervasive evidence that individuals exhibit SAB in lab experiments or surveys, relatively little direct evidence based on archival data exists on whether corporate executives have SAB and whether managerial SAB has economic consequences. The first goal of this paper is to examine whether corporate managers exhibit SAB. To test for possible management SAB, I examine the language in the

[1] Malmendier and Tate (2005) define overconfidence as the underestimate of variance and/or overestimate of mean, while Baker et al. (2007) label the underestimate of variance as overconfidence and the overestimate of mean as optimism. I follow Malmendier and Tate in this paper.

Management Discussion and Analysis (MD&A) section of firms' 10-K filings. Under the regulations of the Securities and Exchange Commission, firms are required to provide a narrative explanation of firm operations in the MD&A. The MD&A is mandatory and subject to auditor's examination and thus provides an ideal setting with minimum selection bias to test for management SAB. Examining the language in the MD&A is also consistent with the approach used extensively in the social psychology literature, which generally studies the language patterns of the experimental subjects to identify SAB (Miller and Ross 1975).

I use the percentage of first-person pronouns relative to that of second- and third-person pronouns in the MD&A to measure managers' tendency to self-reference. Examining more than 30,000 MD&As filed between 1994 and 2007 by U.S. public firms, I find that consistent with managers having self-serving attribution bias, their self-referencing tendency is positively associated with firm performance as measured using stock returns during the fiscal year. However, this result might be explained by unobserved management characteristics such as management ability. To mitigate this concern, I examine firms whose performance is similar to the average firm in the same industry. The contribution of managers' ability to these firms' performance is relatively small. However, I find that managers' self-referencing tendency also positively relates to firm performance for these firms.

I then explore cross-sectional variations in the degree of SAB. Prior research in psychology has identified individuals' cognitive limitations, including selective attention and informational accessibility in memory, as one of the main explanations for SAB (Miller and Ross 1975). Therefore, the noisier the performance feedback, the more severe

people's self-serving attribution bias is. Cognitive theories also predict that SAB is an increasing function of the ex ante expectation for success (Campbell and Sedikides 1999, Shepperd et al. 2008). Consistent with these predictions, I find that managerial SAB increases with firm size, the number of business segments, and past firm performance.

To further mitigate the concerns about omitted variables, I explore within-MD&A sentence-level variation. I examine the attribution process reflected in the sentences that contain causal words (e.g., "because"). The sentence-level analysis can control for any unobserved firm-year specific factor by allowing *interaction*s of firm and year fixed effects in the regression. I find that *within* an MD&A, managers use more self-referencing pronouns in the causal sentences with more positive tone. This evidence shows that unobserved firm-year specific factors (such as management ability or confidence) are unlikely to explain the association between performance and managers' self-referencing tendency.

The second goal of this paper is to link management SAB to management overconfidence. If SAB is one mechanism through which managers become overconfident, then the degree of SAB is expected to positively relate to the extent of overconfidence, i.e., underestimating the variance and overestimating the mean of future cash flows. I classify managers as having SAB if the MD&As contain abnormally high (low) percentage of self-referencing when firm performance is good (poor). I find that managers with SAB are more likely to issue forward-looking statements in MD&As and make earnings forecasts. Using a Bayesian machine learning algorithm to measure the positive/negative tone of the forward-looking sentences in MD&As, I find that the tone of these statements made by managers with SAB tends to be more homogeneous. This result

indicates that they possess a more precise belief about their firms' future cash flows. The earnings forecasts made by managers with SAB are also more optimistic. Collectively, these results suggest that SAB leads to overconfidence.

Finally, I examine the implications of managerial SAB for investment and financing policies. Prior research documents that overconfident managers tend to overinvest, make poor acquisitions, rely more on debt financing, are more likely to repurchase stock, and are less likely to issue dividends (Malmendier and Tate 2005, 2008, Ben-David et al. 2007, Billet and Qian 2008, Malmendier et al. 2010). If SAB leads to overconfidence, similar behavior is expected for managers with SAB. The empirical results are consistent with this prediction. I find that firms whose managers have SAB have higher investment-cash flow sensitivity, more negative market reactions to acquisition announcements, higher leverage, higher probability of repurchasing stocks, and lower probability of issuing dividends.

The results in this paper provide support for the existence of managerial self-serving attribution bias and show that the individual SAB documented extensively in lab experiments and surveys in the prior literature (Miller and Ross 1975, Sedkides et al. 1998, Libby and Rennekamp 2012) is also observed in archival data. This study also contributes to the growing behavioral corporate finance literature (see Baker et al. 2007 for a review) by showing that self-serving attribution bias is a possible cognitive reason for management overconfidence. Furthermore, using textual analysis to measure managers' behavioral bias provides a methodology for future research on management SAB.

The rest of the paper proceeds as follows. Section 2 discusses prior literature and hypotheses. Section 3 describes the data and empirical measures. Section 4 presents the empirical evidence on the existence of managerial SAB and its cross-sectional variations and Section 5 examines the firm investing and financing implications of management SAB. Section 6 concludes.

2. Prior literature and hypotheses development

2.1 Existence of management self-serving attribution bias and its cross-sectional variations

Psychology research has found pervasive evidence that individuals have self-serving attribution bias in lab experiments or surveys (Larwood and Whittaket 1977, Shepperd et al. 2008). However, classical economic theories in general do not model this bias. Recent behavioral economics and finance research begins to model the implications of overconfident market participants for asset prices and corporate financial decisions (Daniel et al. 1998, Gervais and Odean 2001). A key assumption in these overconfidence models is the economic agents' self-serving attribution bias (Daniel et al. 1998). For instance, Gervais and Odean (2001) model a trader's overconfidence in a dynamic learning model where the trader learns about her ability over time and a key ingredient of their model is the trader's self-serving attribution bias modeled as her overweighing past performance success.

Given the importance of the self-serving attribution bias in the behavioral economics literature, it is crucial to empirically test for its existence. Prior studies have found some evidence of management SAB (Bloomfield 2008, Koonce, Seybert, and Smith 2010).

Analyzing 181 letters to shareholders, Bettman and Weitz (1983) find that managers exhibit self-serving attribution bias. Baginski, Hassell and Hillison (2000) and Baginski, Hassell and Kimbrough (2004) find that managers are likely to make internal (external) attributions in earnings forecasts when the news is good (bad), and those attributions can influence investors. Libby and Rennekamp (2012) find that managers exhibit SAB in experiments and surveys and this bias leads to overconfidence.[2]

The first goal of this paper to extend prior studies by showing that managers have SAB using data from 10-K MD&As. Because MD&As are mandatory and subject to auditors' examination (SEC 1980), this setting provides a much larger sample with less selection bias. The empirical tests in this paper therefore complement the results on managers' SAB in prior studies.

More importantly, the larger sample size enables me to examine the cross-sectional variations in management SAB based on SAB theories. The psychology literature has proposed two types of explanations for SAB: cognitive and motivational. The cognitive explanation argues that people have SAB because of their limited cognitive ability due to selective attention, information availability, or accessibility in memory (Miller and Ross 1975). On the other hand, the motivational approach argues that people make internal attributions for success and external attributions for failure for self-enhancement or self-presentation reasons. The self-enhancing motivations help individuals protect self-esteem by creating causal explanations that serve to make themselves feel better (Zuckerman 1979). The self-presentation motivations refer to the drive to convey a desired image to others, i.e., although people may not believe the content of a self-serving utterance, they

[2] Choi and Lou (2008) measure the self-serving attribution bias of investors indirectly using past performance volatility, which is indirect and potentially captures many factors other than SAB.

may nevertheless offer it to others in order to create a favorable impression (Schlenker 1980).

There is an ongoing debate in the psychology literature on which of the two explanations is the main factor that leads to the self-serving attribution bias. Miller and Ross (1975) review the literature and point out that cognitive reasons could be sufficient in explaining SAB. However, more recent research in social psychology has accumulated substantial evidence that motivational reasons might be the dominant factor that drives SAB (Sedikides et al. 1998, Sheppard et al. 2008).

Whether cognitive or motivational factors drive the SAB of market participants has significant implications for the overconfidence research in behavioral economics. If managers have SAB primarily to seek additional (self-enhancing or self-presenting) motivations, then the SAB seems less likely to lead to overconfidence with real decision consequences. However, the cognitive explanation is a more plausible factor with real-consequence implications because a key difference between the cognitive and motivational explanations is that economic agents with cognitive limitations are less likely to realize that they have the bias.

In this paper, I test the cognitive versus motivational explanations for SAB by examining the cross-sectional variations in SAB based on the predictions of cognitive theories. The cognitive psychology literature argues that individuals often stop well short of examining all possible explanations for an outcome, accepting instead the first logical explanation that comes to mind, a search strategy that is satisfying and requires the least amount of effort (Simon 1956, Kunda 1990, Pyszczynski and Greenberg 1987). To the extent that a noisier performance feedback is more likely to lead to selective information

gathering, SAB is expected to be more severe in a noisier information environment. Another prediction of the cognitive explanations for SAB is that people's ex ante expectations for success is positively associated with the ex post attribution process (Campbell and Sedikides 1999). This is because when outcomes confirm a positive expectation, people do not search for an explanation for why the outcome occurred (rather, they generally fall back on the explanation that gives rise to the positive expectation); when outcomes disconfirm a positive expectation, people initiate a search for the cause of the failure.

Based on these predictions, I expect management SAB to be an increasing function in the following factors. First, larger firms are more complex and their performance feedback is likely to be noisier. In addition, managers of larger firms are likely to be more successful in the past and therefore have higher expectations about their performance. This reasoning suggests that managers of larger firms have more significant SAB. Second, I expect that managerial SAB increases with the number of business segment, a proxy for the complexity of a firm's information environment. Third, I expect managerial SAB to increase with a firm's recent performance.

To summarize, the first empirical hypothesis of this paper is:

H1: Managers exhibit SAB in MD&As; the managerial SAB is more significant for larger firms, firms with more business segments, and firms with better recent performance.

2.2 The implications of management SAB for management overconfidence

The second goal of this paper is to show that management SAB is associated with overconfidence. Prior studies identify SAB as a mechanism through which market participants become overconfident (Daniel et al. 1998, Gervais and Odean 2001, Billet and Qian 2007, Libby and Rennekamp 2012). Individuals can have innate overconfidence (Libby and Rennekamp 2012). But even if individuals start out without overconfidence, the self-serving attribution bias can lead them to become overconfident, as demonstrated in Gervais and Odean (2001). I therefore empirically test the association of management SAB with overconfidence. This test extends the results documented by Libby and Rennekamp (2012), who show that SAB can lead to overconfidence as reflected in management initiation of earnings forecasts using experimental and survey data.[3]

Overconfidence implies miscalibration and dispositional optimism, i.e., underestimating the variance and overestimating the mean of future cash flows (Malmendier and Tate 2005, Libby and Rennekamp 2012). I measure management overconfidence using two settings that capture managers' belief about future cash flows: the forward-looking statements in the MD&As and management earnings forecasts.

First, I examine the association between SAB and manager's tendency to issue forward-looking statements and provide earnings forecasts. If managers underestimate the variance or overestimate the mean of future cash flows, they are more likely to issue forward-looking statements and earnings forecasts to the extent that they view the costs

[3] This test also complements the findings in Hribar and Yang (2010) and Schrand and Zechman (2010) who find that overconfident managers are more likely to miss their own earnings forecasts and engage in earnings management.

of missing forecasts to be smaller.[4] Second, I link management SAB to the earnings forecasts errors by managers. If SAB leads to overconfidence, managers with this bias should make earnings forecasts that are more optimistic. Lastly, to measure the variance of managers' belief about future performance, I compute the variation in the tone of the forward-looking statements in MD&As. Everything else equal, if the tone of the sentences in MD&As is more homogeneous, this means that managers have tighter belief about the future and are more confident. For instance, assume that there are 100 sentences in the MD&A and there are two scenarios: in scenario A, these 100 sentences consist of 10 positive tone sentences, 80 neutral tone sentences, and 10 negative tone sentences; in scenario B, the composition is 45 positive, 10 neutral, and 45 negative. Then even though the two scenarios imply the same level of optimism, scenario A indicates a smaller variation and signals a tighter belief of the manager.

To summarize, the second hypothesis of this study is:

H2: Managers with SAB tend to be overconfidence, i.e., they tend to make more forward-looking statements in MD&As and are more likely to issue earnings forecasts; the earnings forecasts by these managers tend to have more positive forecast errors; and the forward-looking statements in their MD&As tend to be more homogeneous.

2.3 Implications of management SAB for corporate financial policies

Prior research has shown that management overconfidence is associated with corporate investing and financing decisions. First, overconfident managers tend to overinvest and this is reflected in the higher investment-cash flow sensitivity. This is

[4] The earnings forecasts by managers have significant implications for stock prices (Patell 1976, Penman 1980, Nagar et al. 2003, Hutton and Stocken 2007) and providing good earnings forecasts by managers can potentially reduce the cost of capital (Coller and Yohn 1997).

because overconfident managers systematically overestimate the return to their investment projects or underestimate the variance of future cash flows and hence use lower discount rate in valuation (Malmendier and Tate 2005; Ben-David et al. 2007). With sufficient internal funds for investment, these managers overinvest relative to the first-best. Without sufficient internal funds, however, they are reluctant to raise capital through external financing because they perceive the stock of their company to be undervalued by the market and hence reduce the investment. If self-serving attribution bias leads to overconfidence, a positive association between SAB and overinvestment is expected. Second, overconfident managers tend to overestimate their ability to obtain synergies from a merger and as a result they overpay for target companies and undertake value-destroying mergers (Malmendier and Tate 2008, Billett and Qian 2008). Lastly, Malmendier et al. (2010) and Ben-David et al. (2007) show that because overconfident managers view equity financing as costly, they tend to use higher leverage, are more likely to repurchase shares, and are less likely to issue dividends.

To the extent that self-serving attribution bias is a factor that leads to overconfidence, I test whether managers with SAB are more likely to make similar investing and financing decisions. One of the concerns with the overconfidence measures in the prior studies is that they potentially capture omitted economic variables. For instance, the "holding-options-too-long" measure used by Malmendier and Tate (2005, 2008) might capture the unobserved private information of managers or other incentives to hold onto the options. Because SAB is a more fundamental cognitive concept compared to overconfidence, linking management SAB to corporate investing and financing decisions strengthens the cognitive foundation of the overconfidence argument and provides

additional evidence on the importance of modeling the behavioral biases in economic analysis.

These discussions lead to the third hypothesis of the paper:

H3: Firms whose managers have SAB have higher investment-cash flow sensitivity, engage in more value-destroying acquisitions, use higher leverage, repurchase more stocks, and are less likely to issue dividends.

3. Data and empirical measure of managers' self-references

I construct my sample based on the intersection of firm/years available on the EDGAR filings database maintained by the Securities and Exchange Commission (SEC) and the Compustat annual file for years 1994-2007. These databases are manually joined based on Compustat GVKEY and the SEC's Central Index Key. Firms without matches are dropped from the sample. For each firm-year observation I download the corresponding 10-K filing. Filings with less than 3,000 words or 100 lines are dropped. In addition, I exclude firms without CRSP data to compute stock returns. I extract the MD&A section of the 10-K filings following the process employed in Li (2010). I require that each MD&A contain a minimum of five hundred words to ensure that the empirical measures derived from it are not due to random noise. These procedures result in a sample of 38,953 firm-year observations. Depending on the specific empirical tests and control variables, the sample size varies.

I use the Linguistic Inquiry and Word Count (LIWC) package to compute the self-referencing measure. LIWC is a text analysis software program designed by psychologists James W. Pennebaker, Roger J. Booth, and Martha E. Francis; the program

is able to calculate the degree to which people use different categories of words across a wide array of texts.[5] The default LIWC dictionary consists of 2,300 words and word stems with each word or word stem defining one or more word categories.

I compute managers' self-referencing tendency as the percentage of self-referential pronouns relative to the pronouns that refer to other parties in the MD&A:

$$Self = We - Other,$$

where *We* is the percentage of first-person pronouns (20 words in the LIWC dictionary such as "I," "We," and "Our"), and *Other* is the sum of the percentages of second-person pronouns (14 words in the dictionary such as "You" and "Your") and third-person pronouns (22 words in the dictionary such as "She," "Their," and "Them").[6]

Table 1 shows the descriptive statistics of these measures and other variables used in the empirical tests. The mean values of *We* and *Other* are 1.27 percent and 0.12 percent, respectively. For comparison, Panel B of Table 1 presents the mean of these two variables for other text sources documented in Pennebaker et al. (2001, Table 3). On average, "emotion writing" has 3.5 percent self-referring pronouns and 2.1 percent other-referring pronouns; books have 0.5 percent self-referring pronouns and 1.3 percent other-referring pronouns. Therefore, the frequency of first-person pronouns of MD&A text is between "emotion writing" and "books." However, the frequency of second- and third-person pronouns is much lower in the MD&A setting. This is likely because managers seldom use words like "you" or "they" in the MD&A; rather, they tend to use generic words such as "the economy" to discuss external factors. The empirical results in this

[5] More details about the software can be found at http://www.liwc.net/ and http://homepage.psy.utexas.edu/homepage/Faculty/Pennebaker/Home2000/Words.html.

[6] In the management literature, researchers use the frequency of first person singular pronouns relative to first person plural pronouns as an indication of "narcissism" and study its implications for firm practices (Chatterjee and Hambrick 2007).

paper are based on *Self*; however, all empirical inferences remain the same if *We* is used to measure managers' self-referring tendency.

The change in managers' self-referencing tendency, *ΔSelf*, is calculated as the year-to-year change in *Self*. Table 1 shows that there is substantial variation in *ΔSelf*: the standard deviation of *ΔSelf* is 0.86 and the inter-quarter range is 0.19, which are significant compared with the mean value of *Self* (1.15).

4. Existence of managerial self-serving attribution bias

4.1 Managers' self-referencing tendency and firm performance

Table 2 presents the regression results of *ΔSelf* on firm performance and other control variables. Examining *ΔSelf*, rather than *Self,* offers several advantages. First, it helps filter out time-invariant factors that might drive both firm performance and managers' self-referencing tendency. Second, a change specification can remove the stale information because prior literature has shown that there is substantial boilerplate in MD&A that does not change over time (Brown and Tucker 2010). I measure firm performance using the twelve-month stock returns during the fiscal year. Year and industry fixed effects are included in the regressions. Since a firm's auditor is involved in the preparation of the firm's 10-K filing, auditor fixed effects are also included.

Column (1) in Table 2 presents the univariate regression of *ΔSelf* on the stock returns (*Ret*). The t-statistics are calculated based on standard errors that are clustered at the year level. The positive coefficient on *Ret* (0.11 with a t-statistic of 4.40) suggests that managers have self-serving attribution bias. The economic magnitude of the coefficient is significant. For instance, the inter-quartile range of *Ret* is 0.61, implying that an inter-

quarter change in *Ret* impacts the dependent variable (*ΔSelf*) by 0.07 (calculated as 0.61 * 0.11), which is about one-third of the inter-quartile range of *ΔSelf* (Table 1).

In column (2), I control for several firm characteristics, including Tobin's Q, log of book value of assets, and firm age. Q is the market value of the assets divided by the book value at the end of the fiscal year. Firm age is the average number of years since a firm shows up in CRSP monthly stock return file. The coefficient on *Ret* remains positive (0.09) and statistically significant (t-statistic = 4.98).

However, unobserved time-varying management ability might explain the positive association between performance and managers' self-referencing tendency. A firm might perform better because its managers are more capable compared with last year. If this is true, then to the extent that more capable people tend to use more self-referencing words, a positive association between performance and the frequency of self-referencing words in MD&As is observed. Another possible explanation is that when firm performance is better, managers tend to be more confident and more confident people may like to use more self-referencing words.

To mitigate these concerns, I examine two sub-samples. The first sample is a set of firms whose performance is within a relatively small range of that of the average firm in the same industry. The second sample consists of firms with small idiosyncratic stock return volatility, i.e., the stock returns of these firms can be explained mostly by the market and industry returns. The performance of firms in these two sub-samples closely mimics that of the market and hence the contribution of managers' ability to performance is relatively small. If there is evidence of SAB for these two sub-samples, then it is less likely that the result is driven by the unobserved management ability.

Column (3) in Table 2 presents the results for firm-years whose stock returns are between the 25th percentile and the 75th percentile of the returns of the firms in the same two-digit SIC industry in the same year. To make sure that the industry definition is meaningful, I require that each industry has at least ten firms in the sample for a given year. The results indicate that *Ret* is still positively and significantly associated with *ΔSelf*. In fact, the coefficient on *Ret* (0.14 with a t-statistic of 3.08) is larger that in column (2). In column (4), the empirical tests are conducted using firm-years whose stock returns are within the +/- 5% range of the median return of firms in the same industry. Again the results show that there is positive relation between firm performance and the frequency of self-referencing words. Column (5) shows the results based on firms in the bottom quartile of idiosyncratic return volatility, which is calculated as the standard deviation of the residuals from the firm-specific regression of monthly stock returns on the CRSP value-weighted market index returns and the two-digit SIC industry returns using data from the fiscal year. The results based on this subsample are similar to those in columns (1) and (2): the coefficient on *Ret* is 0.08 with a t-statistic of 2.36.

4.2 Cross-sectional variations in the self-serving attribution bias

Examining cross-sectional variations based on the theoretical determinants of SAB provides another approach to mitigate the concerns about omitted variables. As discussed above, I examine SAB as a function of firm size, the number of business segments, and the recent performance. These factors are predicted to be positively associated with management SAB based on the cognitive explanations of SAB.

I measure firm size using *Size*, log of the market value of equity at the end of a fiscal year. The number of business segment is captured by *Num_seg*, log of the number of business segment reported in Compustat. A firm recent performance is measured using a dummy variable *Success* that equals 1 if a firm's stock return is above industry median in both of the last two years and 0 otherwise.

Columns (1) to (3) in Table 3 show that larger firms, firms with more business segments, and more successful firms are indeed more likely to have management SAB, as indicated by the positive and significant coefficients on the interactions of *Size*, *Num_seg*, and *Success* with *Ret*. In column (4), the three factors are included together in the regression and the results show that all three interaction terms are still positive and statistically significant. Overall, the evidence supports the predictions of the cognitive explanations that management SAB is an increasing function of information noisiness and expectation for success.

4.3 Managers' self-referencing tendency in causal sentences

Another way to mitigate the concern about omitted firm-year specific factors is to examine the sentences in the MD&As. I focus on sentences in MD&As that contain causal words, such as "because" and "hence" ("causal sentences"). By definition, managers use these sentences to explain something. If managers have SAB, then they are more likely to use self-referencing words in causal sentences which have positive tone, i.e., when they express something positive, the managers are more likely to attribute it to themselves. A significant advantage of the sentence-level analysis is that it allows the

interactions of firm and year fixed effects in the regressions to control for firm-year specific factors.

To implement this test, I first extract all the sentences in the MD&As that contain at least one of the 49 causal words based on LIWC. This procedure yields about 3.5 million causal sentences. Following Li (2010), I measure the tone of the causal sentences using a Naïve Bayesian machine learning algorithm (Manning and Schutze 1999).[7] For every sentence, the Naïve Bayesian algorithm predicts the probability of the sentence having positive, neutral, or negative tone. I define a dummy variable *Positive_tone* for each sentence, which equals one if the probability of the sentence having positive tone is the highest among the three categories as predicted by the Naïve Bayesian algorithm and zero otherwise.

I then regress *Self*, the percentage of the first-person pronouns minus the percentages of second- and third-person pronouns of the sentence, on *Positive_tone* and control variables. In column (1) of Table 4, firm, year, and auditor fixed effects are included, the coefficients on *Positive_tone* is 0.32 (t-statistic clustered at year level = 4.78). In column (2), the interactions of firm and year fixed effects are included in the regression; since there are about 8,000 firm fixed effects and 13 year fixed effects, this translates into more than 10,000 (unreported) fixed effect coefficients in the regression. The results in column (2) show that in the causal sentences with positive tone, managers are more likely to use self-referencing words compared with those with negative tone in the same MD&A (the

[7] To implement the Naïve Bayesian learning algorithm, I first manually categorize 30,000 sentences of randomly-selected statements extracted from corporate MD&As into three different tones (e.g., positive, neutral, and negative tone). These manually-coded sentences are then used as training data in a Naïve Bayesian machine learning algorithm to classify the tone of other forward-looking statements. Details of the implementation follow Li (2010).

coefficient on *Positive_tone* is 0.37 with a t-statistic clustered at year level of 4.68). The coefficients in column (2) are estimated based on variations within a specific MD&A. Therefore, any firm-year specific factors, such as the self-confidence of managers, do not explain the finding in this column. In columns (3) and (4), the same empirical tests as those in columns (1) and (2) are conducted using firms with at least 8 years of data in the sample and the results are similar.

In summary, this evidence based on the causal sentences suggests that the unobserved firm-year specific variables (such as management ability or confidence) are unlikely to explain the positive association between firm performance and managers' self-referencing tendency.

5. Consequences of managerial self-serving attribution bias

5.1 Self-serving attribution bias and managerial overconfidence

Next, I examine the link between management SAB and overconfidence. Linking management SAB to managers' overconfidence lends further support to the argument that the positive relation between firm performance and managers' self-referencing tendency documented in Tables 2 to 4 captures managers' self-serving attribution bias.

To measure managerial SAB, I first run the following regression by pooling all firm-years together:

$$\Delta Self_{it} = \alpha + \beta \ \mathrm{Re}t_{it} + \varepsilon_{it}.$$

The residual $\hat{\varepsilon}_{it}$ is then calculated as $\hat{\varepsilon}_{it} = Self_{it} - (\hat{\alpha} + \hat{\beta} \ \mathrm{Re}t_{it})$, where $\hat{\alpha}$ and $\hat{\beta}$ are the estimated intercept and slope in the regression. $\hat{\varepsilon}_{it}$ captures the amount of managerial

self-referencing that is not explained by the average level of self-serving attribution bias and firm performance in the sample.

To capture managers' SAB, I construct a dummy variable SAB_{it} as the following:

$$SAB_{it} = \begin{cases} 1 \; if \; \mathrm{Re}t_{it} \geq 0 \; and \; \hat{\varepsilon}_{it} \geq 0 \\ 1 \; if \; \mathrm{Re}t_{it} < 0 \; and \; \hat{\varepsilon}_{it} < 0 \\ 0 \; if \; \mathrm{Re}t_{it} \geq 0 \; and \; \hat{\varepsilon}_{it} < 0 \\ 0 \; if \; \mathrm{Re}t_{it} < 0 \; and \; \hat{\varepsilon}_{it} \geq 0 \end{cases}$$

The intuition behind this construct is that when firm performance is good (poor) and a firm has abnormally high (low) self-referencing in its MD&A, then its managers have SAB.

Since overconfidence captures either miscalibration (underestimating the variance of ability or future cash flows etc.) or dispositional optimism (overestimating the mean) (Malmendier and Tate 2005, Libby and Rennekamp 2012), I measure management overconfidence using (1) the tendency to make forward-looking statements in the MD&As and issue earnings forecasts; (2) the earnings forecast errors; and (3) the variation in the forward-looking statements in MD&As.

First, I extract all the forward-looking statements from the MD&As using the algorithm in Li (2010). I also obtain the forecasts of next quarter's earnings per share made by managers from the Thomson Reuters First Call Company Issued Guidelines database. Table 1 Panel A shows that the mean value of *NFLS*, the number of forward-looking sentences in MD&As, is 228. In the empirical analysis, I focus on its log value, *Ln(NFLS)*, because of the skewness in the variable, but the empirical inferences based on the raw values are essentially the same. The mean value of *Forecast*, a dummy variable

which equals one if a manager issues forecasts of next quarter's earnings afrter the 10-K filing date, is 0.11.

Column (1) in Table 5 presents the regression results of *Ln(NFLS)* on *SAB* with firm size, Q, firm age, current earnings, stock return volatility, and year and industry fixed effects as control variables. Managers with more SAB appear to make more forward-looking statements in their MD&As, as indicated by the positive and significant coefficient on *SAB* (0.066 with a t-statistic of 10.57). Given that the standard deviation of *Ln(NFLS)* is 0.73 (Table 1), the result suggests that *SAB* explains about 9 percent of the variation in *Ln(NFLS)*.

Columns (2) reports the marginal effects from the logistic regression of *Forecast* on *SAB* and control variables. The marginal effect of *SAB* on management earnings forecast is 0.009 (z-statistic = 4.39), indicating that managers' self-serving attribution bias is positively associated with the likelihood of managers issuing earnings forecasts (i.e., the probability of forecasting earnings by managers with *SAB* is about 1 percent higher compared with those without the bias). Given that on average about 11 percent of managers in my sample make earnings forecasts, this effect is economically significant.

Next, I directly examine the mean of managers' expectation about future cash flows using earnings forecast error (*FERR*), the earnings per share forecasts minus actual earnings per share divided by book value of assets per share. A positive *FERR* indicates that managers overestimate the mean of future cash flows. Column (3) in Table 5 shows the regression result of *FERR* on *SAB* with year and industry fixed effects included. The coefficient on *SAB* is 0.039 with a t-statistic of 2.36. This suggests that managers with self-serving attribution bias have more optimistic estimates of future cash flows. Since

the standard deviation of *FERR* is 0.55 (Table 1), the result suggests that SAB can account for about 7 percent of the standard deviation of *FERR*.

To measure the variance of managers' belief about future performance, I compute the variation in the tone of the forward-looking statements in MD&As. For each MD&A with at least three forward-looking statements, I calculate the index of qualitative variation (Healy 2008) as:

$$IQV_{it} = 3 \times [1 - (P_{it1}^2 + P_{it0}^2 + P_{it,-1}^2)] / 2 ,$$

where IQV_{it} is the index of qualitative variation for firm i in year t and P_{it1} (P_{it0}, $P_{it,-1}$) is the percentage of sentences with positive (neutral, negative) tone. The index measures the dispersion of the distribution of a qualitative variable; it is bounded between 0 and 1 and is increasing in the dispersion. If one category dominates (e.g., all sentences are positive and there is no variation in tone), then the index has a value of zero. If each category is represented equally, then the index equals 1.

The mean value of *IQV* is 0.81 (Table 1), suggesting that the tone of the forward-looking statements within an MD&A has substantial variations. Column (4) in Table 5 shows that *SAB* is negatively associated with *IQV* (the coefficient on *SAB* is -0.004 with a t-statistic of -2.77), suggesting that managers with more SAB tend to issue forward-looking statements in the MD&A that are more homogeneous in tone. Given that the standard deviation of *IQV* is 0.14 (Table 1), this result suggests that managerial self-attribution bias can explain about 3 percent of the standard deviation of *IQV*.

5.2 Self-serving attribution bias and corporate investment

I estimate the relation between SAB and the investment cash-flow sensitivity in Table 6, where the sensitivity of investment to cash flows is a proxy for overinvestment (Fazzari et al. 1988). The dependent variable is the amount of capital and R&D expenditure scaled by the beginning value of Property, Plant, and Equipment. The independent variables include cash flows and its interaction with SAB and other control variables. Column (1) presents the baseline results without any control variable. The coefficient on the interaction of *SAB* with cash flow is positive (0.431) and statistically significant. The result is robust to including additional control variables, the interactions of industry fixed effects and cash flows, and the interactions of year fixed effects and cash flows (columns (2) and (3)). The evidence shows that managers who demonstrate a higher level of SAB tend to overinvest. The economic magnitude is comparable to that documented in Malmendier and Tate (2005). For instance, Malmendier and Tate (2005) document that overconfident CEOs are associated with an investment-cash flow sensitivity higher by 0.2339 (column V in Table 5 of their paper). In column (3) the coefficient on *SAB* * *CF* is 0.304, suggesting that the investment-cash flow sensitivity is higher by 0.304 when managers have SAB.

To the extent that self-serving attribution bias leads to overconfidence and overconfident managers tend to make more value-destroying deals, I test whether managers with SAB are more likely to conduct poor acquisitions. I use the SDC Platinum database to identify all completed acquisitions of private, public, and subsidiary targets announced after the 10-K filing date and before the next 10-K filing date by my sample firms. Following Moeller, Schlingemann, and Stulz (2004) I select M&A deals that satisfy the following criteria: (1) the target firm has to be a U.S. firm; (2) the deal value is

at least $1million; (3) the percentage stake that the acquirer seeks in the deal is at least 50%; and (4) the deal is completed. This procedure yields a sample of 7,712 acquisitions for my sample firms.

CAR[-1,1], the cumulative abnormal return in the three days around the deal announcement date, is then calculated where day 0 is the deal announcement date. Table 7 presents the regression results of *CAR[-1,1]* on *SAB* and other control variables. Firms with managers who have SAB experience significantly more negative reactions to merger announcements. For instance, column (2) indicates that the announcement return to mergers done by managers with SAB is lower by 0.8 percent, after common firm and deal characteristics and year and industry fixed effects are controlled for. This effect is comparable to that documented by Malmendier and Tate (2008), who find that the market reaction to mergers done by overconfident managers is 0.8 percent more negative.

In summary, the evidence based on the investment-cash flow sensitivity and the acquisition announcement return suggests that managers with SAB are more likely to overinvest and invest sub-optimally.

5.3 Self-serving attribution bias and corporate financing decisions

In this section, I examine whether management SAB is systematically associated with corporate financing decisions. I measure leverage at the end of a fiscal year as defined as the book value of debt divided by the sum of book value of debt and market value of equity and then include the SAB based on the corresponding 10-K MD&A as an explanatory variable to explain the leverage.

Column (1) in Table 8 shows that management SAB is positively associated with a firm's leverage after year and industry fixed effects and other control variables are included in the regression. When managers have SAB, the leverage is higher by 0.040. Given that the standard deviation of firm leverage is 0.26 (Table 1), this shows that SAB explains about 15 percent of the standard deviation of firm leverage.

Following Ben-David et al. (2007), I measure a firm's repurchase and dividend policy for a given fiscal year using *Repurchase* (a dummy variable that equals 1 if purchase of common and preferred stock by a firm in the fiscal year is greater than 1 percent of equity and zero otherwise) and *Dividends* (a dummy variable that equals 1 if a firm declares dividends in a year and zero otherwise). Column (2) reports the marginal effects of the logistic regression of *Repurchase* on SAB based on the 10-K MD&A for the same fiscal year and other control variables. The marginal effect of *SAB* on stock repurchase is 0.024 (Z-statistic=3.95). This indicates that a manager with SAB is 2.4 percent more likely to repurchase stocks. Column (3) shows a negative relation between *SAB* and *Dividends* in a logistic regression setting. The marginal effect of *SAB* on dividend issuance is -0.011 (z-statistic=-2.42), indicating that the probability of a firm issuing dividends when the managers have SAB is lower by 1 percent.

Overall, the financing policies by mangers with SAB are consistent with the hypothesis that these managers view equity as undervalued and as a result prefer debt financing, repurchase stocks more often, and avoid paying dividends. The empirical results in this paper show that the cognitive explanations are at least partially responsible for corporate managers' self-serving attribution bias and this bias is associated with financial policies.

6. Conclusion

I find significant evidence that managers tend to use first-person pronouns in MD&As more often when firm performance is better. This tendency increases with a firm's information environment complexity and past success. Within specific MD&As, managers also tend to use more self-referencing pronouns when the sentence has positive tone. Management SAB leads to overconfidence: I find that when managers have more SAB, they are more likely to include forward-looking statements in the MD&As and issue earnings forecasts; their forward-looking statements are more homogeneous in tone and their earnings forecasts tend to be more optimistic. Also, firms whose managers have SAB tend to overinvest in that they have higher investment-cash flow sensitivity and have more negative stock returns around merger announcements. Finally, these firms tend to have higher leverage, are more likely to repurchase stock, and are less likely to issue dividends. Collectively, evidence in this paper supports the existence of management self-serving attribution bias and suggests that it is important to model this bias and the resulting management overconfidence in economic analysis.

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Table 1 Descriptive statistics

Panel A: Variables for the empirical tests

Variable	Obs	Mean	Std.	P25	Median	P75
MD&A variables						
We	38953	1.27	1.73	0.02	0.12	2.78
Other	38953	0.12	0.10	0.06	0.10	0.17
Self	38953	1.15	1.70	-0.06	0.04	2.65
ΔSelf	38953	0.15	0.86	-0.08	0.00	0.11
Other variables						
Ret	38953	0.19	0.97	-0.24	0.06	0.38
Size	38877	5.53	1.99	4.13	5.44	6.85
Ln(assets)	38953	5.83	2.02	4.35	5.77	7.15
Q	38786	1.93	1.63	1.05	1.33	2.09
Firmage	38945	0.15	0.11	0.08	0.12	0.19
RETVOL	37765	0.50	0.12	0.08	0.12	0.19
NFLS	37773	228	187	106	179	290
Ln(NFLS)	37773	5.17	0.73	4.66	5.19	5.67
Forecast	37773	0.11	0.32	-	-	-
FERR	4268	0.04	0.55	-0.24	-0.04	0.29
IQV	37773	0.81	0.14	0.75	0.84	0.91
Leverage	30445	0.24	0.26	0.02	0.19	0.38
LTD	25814	0.72	0.33	0.56	0.87	0.98
Repurchase	30583	0.30	0.46	-	-	-
Dividends	30583	0.32	0.47	-	-	-

Notes: This table shows the descriptive statistics of the variables examined in the empirical tests. *We* is the percentage of first-person pronouns in the MD&A. *Other* is the percentage of second- and third-person pronouns in the MD&A. *Self* is *We* minus *Other*. *ΔSelf* is the year-to-year change in *Self*. *Ret* is the annual stock return during the fiscal year. *Size* is the logarithm of the market value of equity (Compustat annual item 25 * item 199). *Ln(Asstes)* is the logarithm of the book value of assets (item 6). *Q* is the market value (item 6 * item 199 + item 181) divided by the book value of the assets (item 6). *Firmage* is the average number of years since a firm shows up in CRSP monthly stock return file. *RETVOL* is the standard deviation of the monthly stock returns during the fiscal year. *NFLS* is the number of forward-looking statements in MD&As; *Ln(NFLS)* is the logarithm of *NFLS*. *Forecast* is a dummy variable that equals 1 if the manager of a firm makes forecasts of next quarter's earnings per share after the 10-K filing date and 0 otherwise. *FERR* is the earnings per share forecast minus the actual earnings per share scaled by the book value of assets per share. *IQV* is the index of qualitative variation of the tone of the forward-looking statements in MD&A. *Leverage* is the book value of total debt (long-term plus short-term) divided by the sum of the book value of total debt and the market value of equity at the end of the fiscal year. *LTD* is the percentage of long-term debt in total debt (item 9 / (item 9 + item 34)). *Repurchase* is a dummy variable that equals 1 if purchase of common and preferred stock (item 115 / (item 6 – item 181)) is greater than 1% of equity, and zero otherwise. *Dividends* is a dummy variable that equals 1 if a firm declares dividends in the fiscal year (i.e., item 21 > 0) and zero otherwise.

Panel B: Mean values of first-person pronouns and second- and third-person pronouns in typical text domains

	Emotion writing	Control writing	Books	Talking
We	3.49	3.22	0.49	1.68
Other	1.13	0.50	1.27	1.65

Notes: This table shows the percentages of first-personal pronouns (*We*) and second- and third-personal pronouns (*Other*) of the text in the research articles surveyed by Pennebaker et al. (2001, Table 3). Emotion writing studies require participants to write about their emotions and thoughts about personally relevant topics; Control Writing involves writing about non-emotional topics, such as plans for the day or descriptions of ordinary objects or events; Books refers to a semi-random sample of pages from the 30 best-selling fiction books of 1995; Talking files come from transcripts collected from individuals who are talking in non-experimental settings (i.e., correlational studies).

Table 2 Regression of managers' self-referencing tendency on firm performance

	Full sample	Full sample	Sub-sample	Sub-sample	Sub-sample
	(1)	(2)	(3)	(4)	(5)
Variable	ΔSelf	ΔSelf	ΔSelf	ΔSelf	ΔSelf
Ret	0.11***	0.09***	0.14***	0.25*	0.08**
	(4.40)	(4.98)	(3.08)	(2.14)	(2.36)
Q		0.03**	0.02*	0.03	0.00
		(2.16)	(2.15)	(1.34)	(0.34)
Ln(assets)		0.01*	0.01	0.00	0.01**
		(1.78)	(1.71)	(0.42)	(2.86)
Firmage		-0.00	-0.00	-0.00	-0.00
		(-0.68)	(-1.52)	(-0.77)	(-0.33)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Auditor fixed effects	Yes	Yes	Yes	Yes	Yes
Standard error	cluster by year	cluster by year	cluster by year	cluster by year	cluster by year
Observations	35558	35430	18981	5001	9719
R-squared	0.04	0.05	0.03	0.04	0.02

Notes: All variables are as defined in Table 1 Panel A. In coding the auditor fixed effects, all non-big-eight auditors are grouped together. T-statistics is shown in parentheses. The sub-sample in column (3) includes firms whose stock returns are between 25 and 75 percentiles of the returns of firms in the same 2-digit SIC industry. The sub-sample in column (4) includes firms whose stock returns are within the 5 percent range of the median returns of firms in the same 2-digit SIC industry in the same year. The sub-sample in column (5) includes firms whose idiosyncratic stock returns are in the bottom quartile of all firms in my sample.

Table 3 Managers' self-serving attribution bias as a function of firm size, number of business segment, and past success

	(1)	(2)	(3)	(4)
Variable	ΔSelf	ΔSelf	ΔSelf	ΔSelf
Ret	0.08***	0.05	0.00	-0.09**
	(3.78)	(1.23)	(0.10)	(-2.79)
Size		0.01		0.00
		(1.33)		(0.92)
Ret * Size		0.01*		0.02***
		(2.06)		(3.89)
Num_seg			-0.02	-0.02
			(-0.86)	(-0.98)
Ret * Num_seg			0.07**	0.06***
			(2.86)	(3.10)
Success	-0.02			-0.02
	(-1.37)			(-1.11)
Ret * Success	0.05***			0.04*
	(3.52)			(1.93)
Q	0.02*	0.02*	0.02	0.01
	(1.83)	(1.96)	(1.68)	(1.11)
Firmage	-0.02	0.00	0.00	-0.01
	(-0.65)	(0.12)	(0.16)	(-0.59)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Auditor fixed effects	Yes	Yes	Yes	Yes
Standard error	cluster by year	cluster by year	cluster by year	cluster by year
Observations	31006	35329	20103	18227
R-squared	0.05	0.05	0.04	0.04

Notes: *Size* is the logarithm of the market value of equity (Compustat annual item 25 * item 199). *Num_seg* is the logarithm of the number of business segments from Compustat. *Success* is a dummy variable that equals 1 if a firm's stock return is above industry median in the last two years and 0 otherwise. All the other variables are as defined in Table 1 Panel A. T-statistics is shown in parentheses.

Table 4 Association between tone and self-referencing tendency of the causation sentences in MD&As

	(1)	(2)	(3)	(4)
Variable	Self	Self	Self	Self
Positive_tone	0.32***	0.37***	0.33***	0.37***
	(4.78)	(4.68)	(5.39)	(5.18)
MDA_length	-0.37***		-0.35***	
	(-10.78)		(-14.82)	
Size	0.18***		0.20***	
	(8.51)		(6.58)	
Q	-0.02		-0.05*	
	(-1.16)		(-1.98)	
Firmage	-0.01		-0.01	
	(-1.66)		(-1.99)*	
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	No	Yes	No
Auditor fixed effects	Yes	No	Yes	No
Firm fixed effects * year fixed effects	No	Yes	No	Yes
Standard error	cluster by year	cluster by year	cluster by year	cluster by year
Observations	3165111	3562110	1659908	1855964
R-squared	0.30	0.40	0.26	0.38

Notes: The sample used in the regressions consists of all the sentences that contain at least one "causal" words defined by LIWC, such as "because," "effect," and "hence." In columns (3) and (4), the sample requires a firm to have at least 8 years of MD&A. *Positive_tone* is a dummy variable that equals one if the probability of a sentence being positive predicted by the Naïve Bayesian algorithm is the highest among the three categories (positive, neutral, and negative), and zero otherwise. *MDA_length* is the logarithm of the number of words in an MDS&A. All the other variables are as defined in Table 1 Panel A. T-statistics is shown in parentheses.

Table 5 Managers' self-serving attribution bias and managerial forward-looking statements and earnings forecasts

	(1)	(2)	(3)	(4)
Variable	Ln(NFLS)	Forecast	FERR	IQV
		(marginal effects shown)		
SAB	0.066***	0.009***	0.039**	-0.004***
	(10.57)	(4.39)	(2.36)	(-2.77)
Size	0.131***	0.023***	0.022***	-0.007***
	(37.95)	(24.49)	(3.23)	(-9.90)
Q	-0.017***	-0.001**	0.010***	-0.002***
	(-7.90)	(-2.36)	(4.29)	(-3.85)
Firmage	0.001	-0.001***	-0.001**	0.000***
	(1.54)	(-5.07)	(-2.39)	(3.90)
Earn	-0.228***	0.072***	-0.259***	0.021***
	(-10.71)	(8.85)	(-2.83)	(4.40)
RETVOL	0.464***	-0.016	-0.074	-0.079***
	(10.29)	(-1.26)	(-0.50)	(-8.22)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Standard error	Cluster by firm	Cluster by firm	Cluster by firm	Cluster by firm
Observations	37389	37332	4227	37389
R-squared	0.36	0.20	0.09	0.07

Notes: For firm *i* in year *t*, SAB is a dummy variable that equals 1 if Ret_{it} is positive and ε_{it} is positive, 1 if Ret_{it} is negative and ε_{it} is negative, 0 if Ret_{it} is positive and ε_{it} is negative, and 0 if Ret_{it} is negative and ε_{it} is positive. ε_{it} is the residual from the pooled regression of *Self* on *Ret*. All other variables are as defined in the Notes to Table 1 Panel A. Column (2) presents the marginal effects from the logistic regression. T-statistics is shown in parentheses for columns (1), (3), and (4). Z-statistics is shown in parentheses for column (2). The R-squared in column (2) is the pseudo R-squared from the logistic regression.

Table 6 Managers' self-serving attribution bias and corporate investment-cash flow sensitivity

	(1)	(2)	(3)
Variable	CAPX	CAPX	CAPX
CF	-1.513***	-0.140	-0.033
	(-8.97)	(-0.42)	(-0.00)
Q	0.338***	0.281***	0.280***
	(11.16)	(9.76)	(9.81)
CF * Q	-0.104***	-0.060**	-0.048*
	(-3.46)	(-2.14)	(-1.67)
SAB	-0.271***	-0.272***	-0.213**
	(-2.88)	(-2.84)	(-2.24)
SAB * CF	0.431***	0.406**	0.304*
	(2.75)	(2.47)	(1.86)
Size		0.103***	0.020
		(3.31)	(0.62)
Size * CF		-0.285***	-0.090*
		(-5.88)	(-1.69)
Earn		-1.338***	-1.494***
		(-3.33)	(-3.71)
Earn * CF		2.358***	1.104***
		(5.56)	(2.93)
Firmage		-0.024***	-0.021***
		(-4.11)	(-3.65)
Firmage * CF		0.014	0.021*
		(1.20)	(1.75)
RETVOL		1.789***	1.767***
		(5.19)	(5.23)
RETVOL * CF		2.759***	1.062**
		(5.20)	(2.02)
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Year effects * CF	No	No	Yes
Industry effects * CF	No	No	Yes
Standard error	cluster by firm	cluster by firm	cluster by firm
Observations	29555	29524	29524
R-squared	0.17	0.19	0.23

Notes: The dependent variable is *CAPX*, the capital expenditure (Compustat annual item 128) plus research and development expenditure (Compustat item 46) divided by the amount of property, plant, and equipment at the beginning of the year (item 8). *CF* is earnings before extraordinary items (item 18) plus depreciation (item 14) and is normalized by the amount of property, plant, and equipments at the beginning of the year (item 8). For firm *i* in year *t*, SAB is a dummy variable that equals 1 if Ret_{it} is positive and ε_{it} is positive, 1 if Ret_{it} is negative and ε_{it} is negative, 0 if Ret_{it} is positive and ε_{it} is negative, and 0 if Ret_{it} is negative and ε_{it} is positive. ε_{it} is the residual from the pooled regression of *Self* on *Ret*.All other variables are as defined in Table 1 Panel A. T-statistics is shown in parentheses.

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Table 7 Managers' self-serving attribution bias and acquisition announcement returns

Variable	(1) CAR[-1,1]	(2) CAR[-1,1]
SAB	-0.007***	-0.008***
	(-3.15)	(-3.28)
Size		-0.002***
		(-2.71)
Q		-0.001
		(-1.23)
Firmage		0.000
		(1.02)
Earn		0.018*
		(1.85)
RETVOL		0.065**
		(2.18)
Cash		0.005**
		(2.11)
Deal_size		-0.002*
		(-1.90)
Diversify		-0.000
		(-0.11)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Standard error	cluster by firm	cluster by firm
Observations	7712	7615
R-squared	0.03	0.04

Notes: The dependent variable is *CAR[-1,1]*, the cumulative abnormal return measured over the window [-1,1] where day 0 is the deal announcement date. The daily abnormal return is calculated as raw returns subtract the CRSP value-weighted daily index returns. For firm *i* in year *t*, SAB is a dummy variable that equals 1 if Ret_{it} is positive and ε_{it} is positive, 1 if Ret_{it} is negative and ε_{it} is negative, 0 if Ret_{it} is positive and ε_{it} is negative, and 0 if Ret_{it} is negative and ε_{it} is positive. ε_{it} is the residual from the pooled regression of *Self* on *Ret*. *Cash* is the percentage of cash payment in the deal. *Deal_size* is the log of the value of the transaction scaled by the market value of equity of the acquirer. *Diversify* is a dummy variable that equals 1 if the target and the acquirer do not have the same 2-digit SIC code and 0 otherwise. All other variables are as defined in Table 1 Panel A. T-statistics is shown in parentheses

Table 8 Managers' self-serving attribution bias and corporate financing policies

	(1)	(2)	(3)
Variable	Leverage	Repurchase (marginal effects shown)	Dividends (marginal effects shown)
SAB	0.040***	0.024***	-0.011**
	(15.54)	(3.95)	(-2.42)
Size	-0.026***	0.035***	0.041***
	(-14.85)	(12.52)	(11.55)
Q	-0.016***	0.004*	-0.033***
	(-9.99)	(1.74)	(-7.14)
Firmage	0.001***	0.002***	0.006***
	(4.46)	(5.02)	(9.42)
Earn	0.036***	0.082***	0.551***
	(4.84)	(3.23)	(13.44)
RETVOL	0.017	-0.523***	-1.452***
	(0.93)	(-9.35)	(-17.32)
PPE(-1)	0.000***	0.000*	0.000
	(2.94)	(1.87)	(0.89)
RET(-1)	-0.006***	-0.030***	-0.020***
	(-3.39)	(-6.48)	(-5.58)
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Standard error	cluster by firm	cluster by firm	cluster by firm
Observations	27310	27375	27347
R-squared	0.32	0.08	0.42

Notes: For firm *i* in year *t*, SAB is a dummy variable that equals 1 if Ret_{it} is positive and ε_{it} is positive, 1 if Ret_{it} is negative and ε_{it} is negative, 0 if Ret_{it} is positive and ε_{it} is negative, and 0 if Ret_{it} is negative and ε_{it} is positive. ε_{it} is the residual from the pooled regression of *Self* on *Ret*. *PPE(-1)* is the amount of property, plant, and equipments at the end of last year. *RET(-1)* is the stock returns from last fiscal year. All other variables are as defined in the Notes to Table 1 Panel A. Columns (2) and (3) present the marginal effects in the logistic regression. T-statistics is shown in parentheses for columns (1) to (4). Z-statistics is shown in parentheses for columns (2) and (3). The R-squared in columns (2) and (3) is the pseudo R-squared from the logistic regression.