

MANAGEMENTS' OVERCONFIDENT TONE AND CORPORATE POLICIES

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ABSTRACT

This paper introduces a new measure of management overconfidence, overconfident tone, and shows its association with excess investments, larger share repurchases, and higher stock portions in CEO compensations. Overconfident tone is composed of abnormal positivity and abnormal certainty. They are calculated by dividing conference call transcripts into management parts and analyst parts, and separately analyzing tones using Loughran-McDonald (2011) Dictionary for corporate documents. The results are consistent with previous literature on CEO overconfidence, with overconfident tone associated with excess investment and larger share repurchase. We also test abnormal positivity and abnormal certainty with CEO's exposure to firm-specific risk to confirm the viability of overconfident tone as a new measure of management overconfidence.

I. INTRODUCTION

Textual analysis in accounting allows researchers and investors to look deeper into hidden cues of corporate information. Previous literature analyzes linguistic complexity, sentiment, and even CEO's voice to understand more about management traits and behaviors. Using the tools available through the development of textual analysis, this paper aims to introduce a new measure of management overconfidence: overconfident tone. Using conference call transcripts, we calculate abnormal positive tone and abnormal certain tone of management, and test the association between them and corporate decisions such as investments and share repurchases.

CEO overconfidence has two major aspects: over-optimism and miscalibration. Over-optimistic managers overestimate the returns on their investments, and believe themselves to be "better-than-average." Miscalibration refers to managers underestimating the uncertainties surrounding their firms. Abnormal positivity and abnormal certainty as measured in this paper each tackle the two major aspects of management overconfidence. Managers who speak more positively and with higher certainty are likely to be more confident.

By using conference call transcripts, this paper identifies abnormal tones. Since conference call transcripts include words from both managers and analysts at the same time and setting, we can calculate the difference of tones between the two. Distributions of abnormal positive tone and abnormal certain tone show that in general, most managers speak more positively and with greater certainty than analysts.

Regression analysis illustrates the relation between overconfident tone and excess investment. Overconfident managers overestimate the returns on their future investments, and are therefore inclined to make more investments compared to their peers. This paper also shows that overconfident tone is statistically significantly associated with larger share repurchases and larger

stock portions of CEO compensation. These empirical results support overconfident tone as a viable measure of management overconfidence.

The findings contribute to the management overconfidence literature by proposing a new measure of management overconfidence utilizing tone analysis. This paper also contributes to the literature on textual analysis in accounting by providing empirical evidence that management tone is associated with real corporate decisions.

II. RELATED LITERATURE

Management Overconfidence

There is extensive literature on management overconfidence in both finance and accounting. Management overconfidence is characterized to have two major aspects: over-optimism and miscalibration (Libby and Rennekamp 2011). Over-optimism overestimates the returns on future investments, and previous studies relate it to the better-than-average effect of social psychology. Miscalibration refers to underestimating the uncertainties related to a manager's firm. Previous literature focuses on how this management trait affects corporate policies and reporting behavior.

Malmendier and Tate (2005a) is one of the earliest paper to connect management overconfidence with investment decisions. They show that overconfident managers overestimate the returns on their investments and believe that external funds are excessively expensive. They measure CEO overconfidence by calculating CEOs' personal exposures to company-specific risk through their holdings of stock options. Using a similar measure of overconfidence, Malmendier, Tate, and Yan (2011) show that overconfident managers prefer to finance projects with internal funds and prefer debt over equity. Ben-David, Graham, and Harvey (2007) also observe that overconfident managers invest more, use more debt, pay fewer dividends, repurchase more stock,

and use more long-term debt. Another measure of overconfidence is presented in Malmendier and Tate (2005b), and this measure captures how press portrays managers. They compare the number of articles in which a manager is described as confident or optimistic with the number of articles that describe the manager as not confident or not optimistic. Using both option-based and press-based measure of overconfidence, Hirshleifer, Low, and Teoh (2010) show that overconfident CEOs invest more in innovation and gain more patents.

Prior studies also research the relation between management overconfidence and reporting behavior. Schrand and Zechman (2011) show that overconfidence is likely to lead to initial misreporting from optimistic bias, which then snowballs into intentional misreporting in the future. Other paper demonstrate that management overconfidence is associated with a higher likelihood of issuing management forecast, a higher level of optimism in the forecasts, and a lower precision of the forecasts (Libby and Rennekamp 2011; Hribar and Yang 2016). Ahmed and Duellman (2012) observe evidence of a significant negative association between overconfidence and accounting conservatism.

Textual Analysis in Accounting

Previous research on management overconfidence uses two main measures of overconfidence: a CEO's holding of stock options and press portrayal of the CEO. This paper suggests a new measure of management overconfidence which is measured through observing abnormal positive tone and abnormal certain tone from conference calls. Related to the methods used in this paper, there is an emerging literature on textual analysis in accounting and tone management.

Loughran and McDonald (2011) created a new word lists for financial documents, improving from Harvard Psychological Dictionary, which they show to be not as accurate when analyzing the tone of corporate documents. Based on an extensive sample of 10-Ks, they compiled negative, positive, uncertain, litigious, strong modal, and weak modal word lists that are widely used in measuring sentiments of texts. Other research focuses on the readability or complexity of financial documents. Firms with complex financial statements are more likely to make voluntary disclosures to supplement their complex reports (Guay, Samuels, and Taylor 2016). Bushee, Gow, and Taylor (2017) divide linguistic complexity into two conflicting components: information and obfuscation. They show that the information component of complexity is negatively associated with information asymmetry, while the obfuscation component is positively associated with information asymmetry.

Other literature connects disclosure tone with firm fundamentals. Firms being sued are shown to use more optimistic tone in their earnings announcements (Rogers, Van Buskirk, and Zechman 2011). Huang, Teoh, and Zhang (2014) find that managers generally use tone management to mislead investors regarding firm values.

The bag-of-words method is one of the most widely used methods in textual analysis in accounting (Loughran and McDonald 2016). The bag-of-words method uses a pre-specified lists of words that are related to certain sentiments, and the frequency of words in the lists are used to measure the tone. For instance, Rogers, Van Buskirk, and Zechman (2011) use a pre-defined list of optimistic words to gauge optimistic tone, and Huang et al. (2014) use lists of positive words and negative words to measure tone management. Literature on linguistic complexity uses a readability index such as the Fog Index, which is a function of sentence length and frequency of complex words.

Accounting Management and Real Activities

There is important an literature that connects accounting management and real corporate decisions. McNicholas and Stubben (2008) demonstrate that firms that engage in earnings management are more likely to make suboptimal investment decisions. They test and show that earnings management can also influence internal decisions as well as investors' perception of the company. Zang (2012) documents a substitutive relation between accrual-based earnings management and real activities manipulation. Managers trade-off between real activities manipulation and accrual-based earnings management depending on the costs associated with each method.

III. HYPOTHESES

This paper aims to reaffirm the relation between management overconfidence and corporate decisions by introducing a novel measure of management overconfidence measured through managements' abnormal tones. Previously used measures of CEO overconfidence are CEOs' holding of stock options and press' portrayal of the CEOs (Malmendier and Tate 2005a, Malmendier and Tate 2005b). CEO overconfidence quantified by these existing measures are shown to be associated with excess investment, larger stock repurchases, preference on long-term debt, and so forth (Malmendier et al. 2011, Ben-David et al. 2007, Hirshleifer et al. 2010). We introduce abnormal positivity and abnormal certainty as new measures of management overconfidence, and test the association between the new measure and corporate policies.

Among corporate decisions, we test if investments and share repurchases are related with overconfidence. Overconfident managers are likely to overestimate the returns on their future

investments, and therefore are more likely to make excess investments. Miscalibration, another facet of overconfidence, leads managers to underestimate the uncertainties related to the future projects. Overconfident managers also believe their stocks to be undervalued. Therefore, we expect to see positive correlation between management overconfidence and share repurchases. Our main arguments are as follows:

H1-a: Managers' abnormal positive tone is associated with excess investments.

H1-b: Managers' abnormal certain tone is associated with excess investments.

H2-a: Manager's abnormal positive tone is associated with larger share repurchases.

H2-b: Manager's abnormal certain tone is associated with larger share repurchases.

IV. RESEARCH DESIGN

Overconfident Tone as a Measure of Management Overconfidence

This paper introduces overconfident tone as a new method of quantifying CEO overconfidence. By directly observing the tone of management in conference calls, we can quantify management's confidence at a certain time. We expect that managers who speak more positively and with more certainty are likely to be more confident about a firm's conditions and prospects. Conducting textual analysis on conference call transcripts, we measure abnormal positivity and abnormal certainty of management to measure management overconfidence.

This paper divides conference call transcripts into management parts and analyst parts to calculate managements' abnormal tone. We use analysts' tones as a benchmark, and see how managers' tones differ from them. This research setting from Bushee et al. (2017) provides an adequate environment to observe management overconfidence. In every conference call, managers

and analysts are discussing the same firm at the same time. This allows us to measure overconfidence more specifically and accurately. Analysts do not have incentives to speak more or less positively and with more or less certainty about companies in conference calls, providing us with a good benchmark. This unique feature of overconfident tone allows us to better identify management confidence in excess of the benchmark. Moreover, since overconfident tone can be measured for every conference call, we can measure CEO overconfidence at a specific year or quarter, or observe variations across time.

We measure tones using the bag-of-words methods using the Loughran-McDonald Dictionary (2011) for corporate documents. Namely, we use L-M Negative word list, L-M Strong Modal word list, L-M Weak Modal word list, and L-M Uncertainty word list in our model. The formulas for abnormal positive tone and abnormal certain tone for firm i at year t are described below.

$$Abnormal\ Positivity_{i,t} = Management\ Positive\ Tone_{i,t} - Analyst\ Positive\ Tone_{i,t}$$

where

$$Positive\ Tone_{i,t} = \frac{LM\ Negative\ Word\ Count_{i,t}}{LM\ Master\ Word\ Count_{i,t}} \times (-1)$$

$$Abnormal\ Certainty_{i,t} = Management\ Certain\ Tone_{i,t} - Analyst\ Certain\ Tone_{i,t}$$

where

$$Certain\ Tone_{i,t} = \frac{LM\ Strong\ Modal\ Count_{i,t} - LM\ Weak\ Modal\ Count_{i,t} - LM\ Uncertainty\ Count_{i,t}}{LM\ Strong\ Modal\ Count_{i,t} + LM\ Weak\ Modal\ Count_{i,t} + LM\ Uncertainty\ Count_{i,t}}$$

We use the L-M Negative word list when capturing positive tone instead of the L-M Positive word list for better accuracy. Positive words are easily negated inside sentences, making positive word lists a noisy dictionary to use when measuring optimism in texts.

Measuring Excess Investments

This paper intends to reaffirm the association between overconfidence and excess investment using management abnormal tone. Our primary measure of excess investment are capital expenditures after controlling for Global Industry Classification Standard (GICS) Industry Group, size, and profitability. Size is measured as total assets, and profitability as earnings before interest and tax over total revenue.

We use a second model of investment to confirm that we are truly capturing excess investments over investment opportunities. One could plausibly argue that there could be cases where managers are overconfident because their firms have better investment opportunities compared to their peers. A widely used model of investment explains the level of investment as a function of Q ratio and cash flows:

$$INV_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 CF_{i,t} + \varepsilon_{i,t}$$

where $Q_{i,t-1}$, or Tobin's Q of firm i at year $t - 1$, represents investment opportunities and $CF_{i,t}$ captures the firm's ability to realize the opportunities. This paper runs an additional test on the relation between overconfident tone and investments after controlling for Tobin's Q, cash flows, and GICS Industry Groups.

Data

Managements' and analysts' tones are analyzed from conference call transcripts of S&P 500 firms from 2013 to 2015 (1,556 firm years). Conference call transcripts are collected from Thomson Reuter Streetevents. Word lists and dictionaries used to measure tones are from Loughran-McDonald Dictionary (2011). Firm annual fundamentals and market values are collected from Compustat. Data on management compensation is available from ISS (formerly RiskMetrics).

Empirical Procedures

This paper conducts four tests, first two directly testing the main hypotheses and the last two supporting and reinforcing the results from the first two tests. First, we test H1-a and H1-b to show the association between overconfident tone and excess investments controlling for size, profitability, growth, and industry group fixed effects. Since tones are collected from fiscal year-end conference calls, we use next year's investments as the dependent variable.

$$\begin{aligned} \text{Test 1: } INV_{i,t} = & \alpha + \beta_1 Abn_Pos_{i,t-1} + \beta_2 Abn_Cert_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_4 Profitability_{i,t-1} \\ & + Industry\ FE + \varepsilon_{i,t} \end{aligned}$$

Size refers to firms' total assets, and *Profitability* is calculated as earnings before income and tax divided by total revenue.

Secondly, we test H2-a and H2-b to examine the relation between overconfident tone and stock repurchases. The control variables are the same as those in Test 1.

$$\begin{aligned} \text{Test 2: } Repurchase_{i,t} = & \alpha + \beta_1 Abn_Pos_{i,t-1} + \beta_2 Abn_Cert_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_4 Profitability_{i,t-1} \\ & + Industry\ FE + \varepsilon_{i,t} \end{aligned}$$

In Test 3, we test H1-a and H1-b using different controls to identify excess investments. In this test, we control for Tobin's Q and cash flows. Tobin's Q (*TobinQ*) is calculated as (Market Value of Equity – Book Value of Equity + Total Assets) / Total Assets, and cash flows (*CF*) as sum of net operating cash flow and net financing cash flow. Tobin's Q captures the investment opportunities a firm has and cash flow measures the firm's ability to fund the investments.

$$\begin{aligned} \text{Test 3: } INV_{i,t} = & \alpha + \beta_1 Abn_Pos_{i,t-1} + \beta_2 Abn_Cert_{i,t-1} + \beta_3 TobinQ_{i,t-1} + \beta_4 CF_{i,t} \\ & + Industry\ FE + \varepsilon_{i,t} \end{aligned}$$

Test 4 serves to validate overconfident tone as a measure of management overconfidence. We test the association between overconfident tone and the stock portion of management compensation to show that abnormal positivity and abnormal certainty are associated with CEO's exposure to firm-specific risk, which is a commonly used measure of CEO overconfidence. We expect CEO compensation packages to be similar within industry groups; therefore, the excess stock portion of compensation relative to the peers can be used as a proxy of CEOs' exposure to idiosyncratic risk. *Stock%*_{*i,t*} is calculated as stock compensation divided by total compensation of CEO of firm *i* at year *t*.

$$\text{Test 4: } Stock\%_{i,t} = \alpha + \beta_1 Abn_Pos_{i,t} + \beta_2 Abn_Cert_{i,t} + Industry\ FE + \varepsilon_{i,t}$$

V. RESULTS

Descriptive Statistics

The summary statistics of the independent and dependent variables of our research model are shown in Table 1. The means and lowest quartiles of both *Abnormal Positivity* and *Abnormal Certainty* are positive values, showing that in general, managers speak more

positively and with more certainty compared to analysts at conference calls. This is an empirical evidence that managers are managing their tone, to sound more confident.

Table 1: Descriptive Statistics of Independent and Dependent Variables

	mean	std	min	25%	50%	75%	max
Abn_Pos	0.0046	0.0043	-0.0102	0.0019	0.0046	0.0071	0.0184
Abn_Cert	0.6152	0.2163	-0.0328	0.4687	0.6139	0.7564	1.2250
Size	59300.35	198713.0	383.90	6961.73	15743.00	39946.00	2573126.0
Profitability	0.1748	0.2466	-4.0597	0.1093	0.1698	0.2544	0.7046
Growth	0.0936	0.1561	0.0000	0.0198	0.0384	0.0803	1.3925
TobinQ	2.259	1.581	0.621	1.325	1.802	2.562	20.923
CF	2146.58	5704.29	-89375.00	268.24	850.00	2329.85	63550.00
INV	1280.06	2875.81	0.00	128.00	368.00	1199.00	35407.00
Repurchase	1094.41	2508.48	0.00	29.83	332.38	1057.90	45000.00
Stock%	0.4338	0.2279	0.0000	0.2807	0.4445	0.5941	1.0000

Primary Results

Table 2 summarizes the OLS regression results of Test 1. The results show that abnormal positivity and abnormal certainty are associated with higher investments controlling for size, profitability, growth, and industry fixed effects at the 5% significance level. The results are consistent with previous literature that show an association between CEO overconfidence and excess investment.

The results for Test 2 are presented in Table 3. Controlling for size, profitability, growth, and industry fixed effects, abnormal positive tone is statistically significantly associated with larger stock repurchases. Overconfident managers believe their shares to be undervalued, and therefore more likely to repurchase shares.

In Test 3, we use a different model of investment to ensure that we are actually capturing excess investments in Test 1. A widely used model of investments describe investments as a function of investment opportunities (Tobin's Q) and cash flows. Results of Test 3 show that

abnormal positivity and abnormal certainty are statistically significantly associated with excess investments after controlling for Tobin's Q, cash flows, and industry group (Table 4). This is another empirical evidence that overconfident tone is related with excess investments.

Table 5 contains results of Test 4, which tests the association between overconfident tone and the stock portion of manager's total compensation. One of the previously used measures of CEO overconfidence is CEOs' exposure to idiosyncratic risk. We expect the compensation packages to be similar within an industry, and a higher stock portion of total compensation relative to peers to signal greater CEO exposure to firm-specific risks. Results show that abnormal positivity and abnormal certainty are both associated with a higher stock portion in CEO compensation. This result supports overconfident tone as a new measure of management overconfidence.

The results show that overconfident tone is associated with excess investments, larger share repurchases, and CEOs' stock portions of total compensations. The evidence supports that abnormal positive tone and abnormal certain tone can be used as measures of management overconfidence.

However, overconfident tone as proposed in this paper relies on a potentially problematic assumption that analysts' tones are accurate benchmarks of an appropriate level of managers' positivity and certainty. Due to information asymmetry, we expect managers to know best about firms' conditions and prospects. Therefore, our assumption could be criticized on the basis that some managers could have overconfident tone, solely because they know better than the analysts, when the internal information is positive and promising. However, we saw from the descriptive statistics of *Abnormal Positivity* and *Abnormal Certainty* that in general managers speak more positively and with greater certainty compared to analysts. This can be interpreted as

evidence of widespread practice of tone management. With CEOs managing their tones to show higher confidence, it is hard to say that managers' tones are more accurate compared to the analysts' tones. We believe that analysts have no incentive to deviate their tone from a normal level, and therefore use their tones as a benchmark.

Table 2: OLS Regression Results of Test 1 (Dep. Variable: INV)

	coef	std err	t	P > t
Const	-910.4901	2247.563	-0.405	0.685
Abn_Pos	5.069e+04	1.63e+04	3.105***	0.002
Abn_Cert	872.2353	338.500	2.577**	0.010
Size	0.0049	0.001	8.197***	0.000
Profitability	566.5657	356.356	1.590	0.112

* Significant at 10%; ** significant at 5%; *** significant at 1%

The results are controlled for industry fixed effects.

Table 3: OLS Regression Results of Test 2 (Dep. Variable: Repurchase)

	coef	std err	t	P > t
Const	-621.9980	1620.204	-0.384	0.701
Abn_Pos	4.528e+04	1.19e+04	3.797***	0.000
Abn_Cert	300.8975	246.627	1.220	0.223
Size	0.0043	0.000	10.497***	0.000
Profitability	776.1977	258.020	3.008***	0.003

* Significant at 10%; ** significant at 5%; *** significant at 1%

The results are controlled for industry fixed effects.

Table 4: OLS Regression Results of Test 3 (Dep. Variable: INV)

	coef	std err	t	P > t
Const	-504.7593	2188.151	-0.231	0.818
Abn_Pos	7.203e+04	1.72e+04	4.191***	0.000
Abn_Cert	787.2058	346.730	2.270**	0.023
TobinQ	-126.9358	58.446	-2.172**	0.030
CF	0.2493	0.015	16.510***	0.000

* Significant at 10%; ** significant at 5%; *** significant at 1%

The results are controlled for industry fixed effects.

Table 5: OLS Regression Results of Test 4 (Dep. Variable: Stock%)

	coef	std err	t	P > t
Const	0.6556	0.212	3.099***	0.002
Abn_Pos	2.9263	1.311	2.232**	0.026
Abn_Cert	0.0779	0.027	2.912***	0.004

* Significant at 10%; ** significant at 5%; *** significant at 1%

The results are controlled for industry fixed effects.

VI. CONCLUSION

This paper suggests new measures of management overconfidence, abnormal positive tone and abnormal certain tone, and shows that they are associated with excess investments, larger share repurchases, and higher stock portions of CEO compensations. Abnormal positivity and abnormal certainty are calculated by dividing conference call transcripts into management parts and analyst parts, and separately analyzing tones using Loughran-McDonald (2011) Dictionary for corporate documents. The results are consistent with previous literature on CEO overconfidence, with overconfident tone being associated with excess investments and larger share repurchases. We also tested abnormal positivity and abnormal certainty with CEO's exposure to firm-specific risk to confirm the viability of overconfident tone as a new measure of management overconfidence.

The findings are strongly consistent with our hypotheses that overconfident tone is related to excess investments and larger share repurchases. Along with additional tests, we provide evidence that management abnormal tone can be used to capture and measure management overconfidence.

This research contributes to the management overconfidence literature by introducing a new measure of management overconfidence. Overconfident tone can be a more direct and time-specific measure of management overconfidence. This paper also contributes to the literature on textual analysis in accounting by demonstrating that management tone is associated with corporate policies.

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