

It Is Not Optimism When You Know You Are Right: CEO Optimism and Self-Attribution.

**Richard C. Walton
Pepperdine University**

**Abraham Park
Pepperdine University**

**Maretno A. Harjoto
Pepperdine University**

Existing literature uses option-holding patterns to identify CEOs as permanently overconfident or optimistic and finds such biases associated with investment and financing decisions damaging to shareholder interests. This study finds that a significant part of CEOs' optimistic behavior is a rational reaction to short-term conditions rather than, as previous scholarship posits, a permanent bias. While previous literature has focused exclusively on long-term CEO bias, this study examines the causes of annual variation in CEO optimism and finds support for the self-attribution hypothesis. This study proposes that CEO optimism which is not the result of self-attribution is justified by short-term conditions rather than caused by CEO bias. This has practical applications: allowing investors to identify biased CEOs and helping CEOs to recognize their own personal biases.

INTRODUCTION

Since the articulation of the principal-agent problem, it has widely been accepted that firms are not necessarily run in the best interests of their owners. The disproportionate impact of the Chief Executive Officer (CEO) on both the behavior and the performance of the firm has prompted research in corporate finance to better understand why CEOs behave as they do. Agency problems occur when the interests of the CEO and the shareholders diverge and CEOs intentionally follow policies that further their own interests at the expense of those of the shareholders (Berle and Means, 1932; Fama and Jensen, 1983; Jensen and Meckling, 1976; Jensen, 1986).

A different line of research considers how personal bias may cause CEOs to unintentionally act against the best interests of the shareholders even in the absence of any deliberate attempt to further their own advantage. Hirshleifer (2001) presents an overview of CEO personal biases which can affect investment. Two such biases in the literature are optimism about likely outcomes and overconfidence in the precision of the CEO's information. The literature is not always consistent in its use of the terms "overconfidence" and "optimism". This paper follows the traditional approach of Hackbarth (2008), which defines optimistic agents as predicting "that favorable future events are more likely than they

actually are” and overconfident agents as believing “that they have more precise knowledge about future events than they actually have.” In short, optimists overestimate expected values, and overconfident agents underestimate risk.

There is a broad and growing literature in which the personal option-holding patterns of CEOs are used to identify CEOs with an “upward bias in the assessment of future outcomes” (Malmendier and Tate, 2005). This bias is labelled as “overconfidence” by authors who wish to distinguish a CEO’s tendency to overestimate his personal attributes and achievements from a tendency to overestimate exogenous outcomes and as “optimism” by authors who wish to distinguish it from a tendency to underestimate risk. The bias is generally claimed to be present when a CEO fails to exercise exercisable options until the final year of the options’ vesting period or when a CEO fails to exercise exercisable options that exceed a threshold in-the-moneyness (ITM). Such behavior has been shown to be associated with a variety of behaviors which have mostly negative effects for the firm (Hirshleifer et al., 2012; Campbell et al., 2011; Malmendier and Tate, 2005; 2008). While these behavioral distortions have been identified in the literature, it is less well known *how* CEOs become subject to the optimism bias.

Related literature that uses the observed option-holding policies of CEOs in order to identify optimistic CEOs are generally “interested in a ‘permanent’ rather than a ‘transitory’ effect” (Malmendier and Tate, 2005). A CEO is typically classified as exhibiting an optimistic bias only if the CEO displays qualifying behaviors at least twice and, if so, only from the first such display until the end of the sample period. Malmendier et al. (2010) treats a CEO’s bias to overestimate future cash-flows in the same way as the effects of permanent impacts on a CEO’s personal history, such as growing up during the Great Depression or having a military background. Campbell et al. (2011) treats optimism as “semi-permanent” but only to the extent that a CEO’s optimism classification may change if the CEO exhibits the opposite bias later in the sample period.

Optimistic option-holding behaviors essentially identify CEOs whose expectations of the future value of the firm are more positive than those of the market. This can be the result of bias or a response to a temporary informational advantage concerning the prospects of the firm or the CEO’s abilities. This paper considers whether seemingly optimistic behaviors might sometimes be an unbiased response to short-term conditions and therefore examines the annual variation in a CEO’s measured optimism rather than treating optimism as a permanent characteristic. We find that CEOs in the period 1992-2006 who would be classified as exhibiting a permanent bias using the Holder67 measure (Malmendier and Tate, 2005) actually exhibit such overconfident behavior infrequently. Despite the high degree of annual variation in associated option-holding behaviors, the existing literature has focused exclusively on the effects of long-term bias.

Having established that CEO optimism does indeed vary over the short term, this paper investigates the factors that lead to annual changes in optimism and examines the *self-attribution hypothesis* that CEOs attribute good performance to their own skills and poor performance to bad luck. Thus, we test whether CEO optimism increases more following good performance than it decreases following poor performance and find evidence to suggest that self-attribution is a significant cause of changes in CEO optimism.

Given that short-term variation is at least partly caused by self-attribution, this paper proposes classifying according to the rationale for their optimism. CEOs whose option-holding behaviors identify them as optimists and whose optimism increases following superior CEO performance are classified as *Justified Optimists*. This nomenclature is chosen as this paper hypothesizes that the optimism of these CEOs increases as a result of private information rather than a personal bias. This paper chooses to classify optimism as justified based on the CEO’s *ex ante* rationale for increasing optimism rather than the *ex post* realized outcomes of the CEO’s option-holding decisions as the paper is interested in those CEOs who had a common rational justification for their optimism rather than those whose optimism happened to be profitable. After all, sometimes an unbiased, rational CEO will correctly predict a more positive view of the firm’s future than the market - in other words, it is not optimism if you know you’re right.

This paper contributes to existing literature by demonstrating that there is considerable annual variation in CEO optimism and that many CEOs categorized as permanently overconfident or optimistic based on their option-holding behavior actually exhibit the qualifying behavior relatively infrequently. Furthermore, by focusing on the determinants of annual variation in optimistic behaviors, rather than treating the optimistic bias as a permanent trait, this paper identifies self-attribution as a significant mechanism for changes in optimism. This paper finds evidence to support the hypothesis that for a significant proportion of observed CEO optimism, such behavior is most likely a rational response to temporary conditions rather than the consequence of bias. Lastly, we identify distinct groups of optimistic CEOs according to the causes of variation in their optimism and hypothesize that the investment and financing decisions of Justified Optimists will not be subject to distortions affecting other optimistic CEOs identified in the literature. This last claim will be tested in future research.

DATA AND METHODOLOGY

Measuring Optimism

There are two general approaches to measuring an individual's optimism. Surveys of specific individuals potentially generate the most accurate measures of optimism but are expensive and time-consuming to collect, particularly for a large sample of individuals or over a long period of time. Ben-David et al. (2007) uses the results of a survey of CFO predictions, while Graham et al. (2007) applies psychometric tests to test subjects.

The alternative to surveys of limited samples of subjects is to identify optimistic behaviors using information from existing archival databases that cover a large sample of CEOs over a long period of time. Researchers have successively innovated by applying related research to develop measures of optimism exploiting existing, large databases. Hall and Murphy (2002) develops a theoretical threshold ITM of 67% at which a rational under-diversified CEO should exercise his stock options. Cicero (2009) confirms that executives do immediately sell their shares after exercising their options about 70% of the time thereby reducing their risk exposure to their own company. Malmendier and Tate (2005) applies this theoretical threshold to actual CEO option-holdings and classifies CEOs who "persistently fail" to exercise options at or above the threshold as overconfident. Unfortunately, as Kolasinski and Li (2013) highlights, the compensation data they use comes from proxy statements and 10-K forms requiring "costly hand collection ...[as a result of which]...empirical research on CEO overconfidence is largely limited to a relatively small sample of less than 500 large firms that ends in 1994."

Campbell et al. (2011) overcomes this limitation by developing a measure of average values of ITM using information available in the Execucomp database. While a large sample of US firms is covered over a reasonable period, the required option information is only available in Execucomp from 1992. Kolasinski and Li (2013) proposes an even more readily calculable alternative, where a CEO is classified as being overconfident in a given year if the CEO "on average loses money from open-market purchases of his own company's stock in the next 2 years." Confusingly, different researchers use the same metric as a measure of both CEO "overconfidence" and CEO "optimism". This paper is concerned with short-term variation in a CEO's evaluation of the firm's prospects and follows Campbell et al. (2011) by referring to the metric as a measure of optimism, except when reviewing the extant literature where the cited studies' own preferred description is used.

Sources of Data

This paper employs data from the Execucomp database for information on CEO compensation including the number and estimated value of unexercised, exercisable options, and the number and estimated realized value of exercised options. The sample consists of S&P1500 firms from 1992 to 2012. We supplement the data with information on stock returns, index returns, and market prices from the Center for Research in Security Prices (CRSP) database. Data on a company's annual balance sheet and income statement items comes from the Compustat Annual database. Data on industry returns and the

definitions of the 49 different industries is taken from Kenneth French's website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

In order to demonstrate the relative infrequency of optimistic behavior amongst CEOs classified as exhibiting a permanent bias, this paper aims to create a sample of CEOs using criteria similar to those used in Malmendier & Tate (2005). When investigating the causes of changes in optimism, a larger sample considering all firms available in Execucomp is used. The construction of these two data samples is described in the respective sections below. Variable definitions are also given in the sections of the paper where they are used and in the respective tables.

PERMANENCE OF OPTIMISM

Sample Selection

In order to investigate the permanence of the optimism bias this paper calculates the frequency of the option-holding behavior used by Malmendier and Tate (2005) to identify permanently overconfident CEOs.

Malmendier and Tate (2005)'s sample considers 477 large publically traded US firms which had been classified as one of the 500 largest US firms at least four times over the period 1984-1994. The variable 'Holder67' for CEOs of these firms is assigned the value of one if they held unexercised exercisable options with an ITM of at least 67% at least two times during the sample period 1980-1994. Because the CEOs from Malmendier and Tate's (2005) sample are randomly selected from a larger sample (Hall and Liebman, 1998) and the data is collected from proxy statements and 10-K forms, this paper matches this methodology as closely as possible by creating a sample of firms using similar criteria and by using compensation data from Execucomp. We consider 588 large publically traded firms which had been in the S&P500 at least four times over the period 1996-2006. This paper identifies 530 CEOs of these firms who held unexercised exercisable options with an ITM of at least 67% at least two times during the sample period 1992-2006.

Results of Analysis

Table 1 shows the frequency of years in which the ITM of unexercised exercisable options is at least 67% for the CEOs in the sample. The rows of the tables represent the number of annual observations where the ITM can be calculated. The columns represent the number of annual observations where ITM met or exceeded the 67% threshold. Panel A shows that 48.7% of CEOs never exhibited optimistic behavior and 13.8% exhibited it only once. The remaining 37.5% of observations represent the 530 CEOs who would have been classified as permanently biased according to the Malmendier and Tate's Holder67 measure.

Panel B shows the distribution of just those CEOs that meet the Holder67 classification for each year. The values along the diagonal line represent the 21.7% of CEOs who held exercisable options with an ITM greater than 67% every year that they were in the sample. The remaining 78.3% of CEOs did not hold exercisable options with an ITM greater than 67% every year they were in the sample. It should be noted that 57.7% of CEOs classified as Holder67 (or permanently biased) exhibited this behavior in less than two-thirds of the years in which the ITM could be calculated, and 40.2% of CEOs exhibited this behavior in fewer than half of the years in which the ITM could be calculated. These results show that CEOs who have been previously identified as permanently biased actually exhibit such qualifying option-holding behavior relatively infrequently. As the next step, this study investigates further to understand what factors cause variations in CEOs' optimistic behavior.

TABLE 1
DISTRIBUTION OF FREQUENCY OF CEO-YEAR OBSERVATIONS (1992-2006) WHERE ITM OF UNEXERCISED, EXERCISABLE OPTIONS >= 67%

		PANEL A: PERCENTAGE OF TOTAL CEOs IN SAMPLE																
		Number of years where ITM >=67%																
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
1		9.4	1.9															11.3
2		9.0	1.6	1.8														12.4
3		7.8	2.4	1.1	1.7													13.0
4		5.6	2.1	1.3	0.6	1.3												10.9
5		4.8	1.2	1.8	1.2	0.9	0.8											10.7
6		3.9	1.4	1.1	1.3	0.4	0.6	0.7										9.4
7		3.4	1.6	0.9	0.6	0.7	0.5	0.9	0.4									9.0
8		1.8	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6								6.7
9		1.6	0.5	0.3	0.6	0.3	0.4	0.4	0.4	0.1	0.4							4.9
10		0.5	0.2	0.2	0.2	0.6	0.4	0.4	0.2	0.4	0.4	0.2						3.6
11		0.2	0.1	0.3	0.2	0.3	0.2	0.4	0.1	0.2	0.1	0.1	0.1					2.1
12		0.2	0.1	0.4	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1				1.8
13		0.2			0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			1.4
14		0.4	0.1	0.1	0.1		0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1		1.8
15		0.1			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	1.0
Total		48.7	13.8	10.0	7.8	5.4	3.5	4.0	2.3	1.7	1.1	0.6	0.4	0.3	0.1	0.2	0.1	100.0

Number years in sample

Sample covers option-holding behavior over 1992-2006 of 1,416 CEOs whose firms were included in the S&P500 at least 4 times over the period 1996-2006. In-The-Money (ITM) of unexercised, exercisable options is calculated using the methodology described in Campbell et al. (2011).

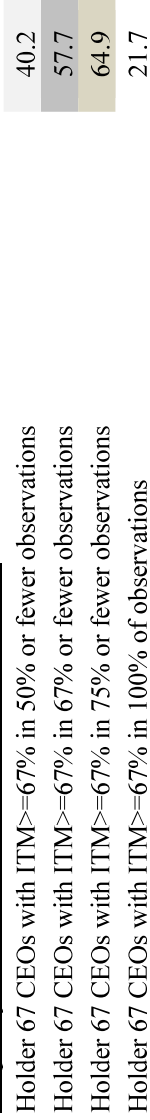
TABLE 1
DISTRIBUTION OF FREQUENCY OF CEO-YEAR OBSERVATIONS (1992-2006) WHERE ITM OF UNEXERCISED,
EXERCISABLE OPTIONS >= 67%

PANEL B: PERCENTAGE OF CEOS IN SAMPLE WITH ITM >=67%

Number of years where ITM >=67%

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
1																	0.0
2			4.7														4.7
3			3.0	4.5													7.5
4			3.4	1.7	3.4												8.5
5			4.9	3.2	2.5	2.1											12.6
6			2.8	3.6	1.1	1.5	1.9										10.9
7			2.5	1.7	1.9	1.3	2.5	0.9									10.8
8			1.9	1.9	1.5	1.5	1.7	1.5	1.7								11.7
9			0.8	1.5	0.8	1.1	1.1	0.4	0.9								7.7
10			0.6	0.6	1.5	0.9	0.9	0.6	0.9	1.1	0.6						7.7
11			0.8	0.6	0.8	0.6	0.9	0.2	0.6	0.2	0.2						4.7
12			0.9	0.4	0.2	0.8	0.6	0.4	0.4	0.2	0.4	0.2	0.2				4.0
13				0.4	0.6	0.2	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2			3.2
14			0.4	0.4	0.2	0.2	0.4	0.6	0.2	0.2	0.2	0.4	0.2	0.4			3.4
15			0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.6	0.2	0.2			2.5
Total			26.6	20.8	14.5	9.4	10.8	6.0	4.5	2.8	1.7	0.9	0.8	0.4	0.6	0.2	100.0

Frequency of CEO observations where ITM >=67%



Holder 67 CEOs with ITM >=67% in 50% or fewer observations

Holder 67 CEOs with ITM >=67% in 67% or fewer observations

Holder 67 CEOs with ITM >=67% in 75% or fewer observations

Holder 67 CEOs with ITM >=67% in 100% of observations

DETERMINANTS OF CHANGES IN ANNUAL OPTIMISM

Sample Selection

To investigate the causes of annual variation in displays of CEO optimism this paper uses all the CEO-year observations available in Execucomp for which Campbell et al.'s methodology can be used to estimate the average ITM of a CEO's unexercised, exercisable options and the realized ITM of exercised options. Of a sample of 35,413 CEO-year observations from Execucomp over the period 1992 to 2012, 18,940 could be classified as "high-optimism", "moderate-optimism" or "low-optimism" according to the methodology outlined in Campbell et al. (2011). This classification is based on the estimated average ITM of unexercised, exercisable options, and the estimated average realized ITM of exercised options. When the estimated average ITM of a CEO's unexercised, exercisable options in a given year is greater than or equal to 100%, this paper classifies the CEO as an Optimist. When a CEO's option-holding policy in a given year would be classified as an indicator of low-optimism or moderate-optimism, this paper classifies the CEO as a Not Optimist. Of the remaining CEO-year observations, 15,941 could not be classified, as the combination of the ITM of unexercised, exercisable options, and the realized value of exercised options did not allow a definitive classification while 532 could not be classified because of missing data.

TABLE 2
SUMMARY STATISTICS

PANEL A: CEO OBSERVATIONS BY YEAR

Year	Total	Optimist	Not Optimist
1992	214	65	149
1993	659	258	401
1994	797	294	503
1995	903	356	547
1996	977	440	537
1997	1,096	580	516
1998	1,027	524	503
1999	988	515	473
2000	1,018	516	502
2001	935	354	581
2002	791	218	573
2003	1,056	370	686
2004	1,139	429	710
2005	1,073	424	649
2006	1,166	498	668
2007	1,121	473	648
2008	695	183	512
2009	735	200	535
2010	897	255	642
2011	811	234	577
2012	842	238	604
Total	18,940	7,424	11,516

Sample includes CEOs of S&P1500 firms whose optimism can be calculated according to the methodology described in Campbell et al. (2011).

Panel A of Table 2 shows the distribution of CEO-year observations by year and their classification as Optimist or Not Optimist by year. There are 18,940 CEO-year observations, representing 4,810 unique CEOs and 2,993 firms. Of these there are 7,424 CEO-year observations where the CEO exhibits optimistic behaviors, representing 2,722 unique CEOs and 2,206 unique firms. There are 11,516 CEO-year observations where the CEO is a Not Optimist, representing 4,098 unique CEO's and 2,651 unique firms. This means only 2,088 (43%) of the 4,810 CEOs never exhibited optimistic option-holding behavior.

Panel B of Table 2 shows key summary statistics for the total sample of 18,940 CEO-years and for the sub-sample of 7,424 CEO-years when the CEO was classified as an Optimist.

It is widely accepted that humans are subject to a psychological bias called “self- attribution” where individuals credit success to their own skills and failure to external factors. Langer and Roth (1975) succinctly puts it, “heads I win, tails it’s chance”. There are theoretical models linking self-attribution and overconfidence in investors (Daniel et al., 1998) and traders (Gervais and Odean, 2011). Hilary and Menzly (2006) offer empirical support for a link between confidence and self-attribution for analysts. Using the full sample of CEOs and the measure of optimism described in Campbell et al. 2011, this paper provides evidence of an association between annual variation in CEO optimism and self-attribution.

TABLE 2
SUMMARY STATISTICS

PANEL B: CEO-YEAR OBSERVATIONS

	N	Mean	Median	Std Dev	Min	Max
<u>All CEOs</u>						
Optimist CEO indicator	18,940	0.39	0.00	0.49	0.00	1.00
ITM unexercised, exercisable options	18,940	1.74	0.77	5.05	0.00	61.37
Total returns (%)	17,562	28.2%	17.9%	72.4%	-98%	2810%
Industry-adjusted returns (%)	17,562	9.7%	3.0%	66.5%	-313%	2654%
CEO age	18,266	55.4	55.0	7.2	29.0	91.0
CEO female indicator	18,940	0.02	0.00	0.12	0.00	1.00
<u>CEO Optimists</u>						
ITM unexercised, exercisable options	7,424	3.69	1.88	7.67	1.00	61.37
Total returns (%)	6,843	45.7%	31.7%	83.0%	-98%	1773%
Industry-adjusted returns (%)	6,843	24.6%	13.4%	76.6%	-313%	1739%
CEO age	7,218	54.9	55.0	7.5	32.0	90.0
CEO female dummy	7,424	0.01	0.00	0.11	0.00	1.00

Industry-adjusted returns are the firm's excess equity returns relative to the firm's industry average equity returns.

Conditional Logit Regressions and the Self-Attribution Hypothesis

This paper first tests the self-attribution hypothesis by performing a conditional logit regression to show how the probability of a CEO being classified as an Optimist is affected by conditional returns. If the self-attribution hypothesis is correct then the probability that a CEO is optimistic should increase more as a result of positive total equity returns than it decreases as a result of comparable negative equity returns. This can be tested using the following conditional logit regression:

$$\text{Pr}[\text{Optimistic CEO}_t] = b_1[\text{returns} \mid \text{returns}>0] + b_2[\text{returns} \mid \text{returns}<0] + b_3 [\text{controls}] \quad (1)$$

where a CEO is Optimistic in year t if the ITM of a CEO's unexercised, exercisable options is greater than or equal to 100% in year t . A conditional logit regression is performed rather than a regular logit regression to allow the use of fixed effects without introducing bias due to the incidental parameters problem identified by Chamberlain (1980). Standard errors are robust to heteroscedasticity across the error terms.

The key variables of interest are the conditional returns. The self-attribution hypothesis predicts: $b_1 > b_2 \geq 0$. In other words, the probability that a CEO is optimistic increases more as a result of positive total equity returns than it decreases as a result of comparable negative equity returns. It is expected that b_2 will be positive as negative returns are expected to reduce the probability that a CEO is optimistic. It should be expected that returns are associated with optimism as high returns lead to high equity prices and, *ceteris paribus*, high ITM of options. However, unless the stock price is close to the exercise price of the unexercised option, a situation which is later controlled for, the impact of positive and negative returns on the ITM of the unexercised, exercisable options should be symmetrical. Equity returns are winsorized at 0.5% to avoid distortions from extreme values.

Control variables include: change in total volatility versus the prior year; year and industry fixed effects (using Fama-French 49 classification); and age and gender CEO characteristics. Total volatility is calculated as the 60-month annualized volatility of the firm's equity returns. *Young* is an indicator variable with a value of 1 if the CEO is 52 years old or younger in the year of observation (representing the lowest tercile of CEO age in the sample) and 0 otherwise. *Old* is an indicator variable with a value of 1 if the CEO is 59 years old or older in the year of observation (representing the highest tercile of CEO age in the sample) and 0 otherwise. *Female* is an indicator variable with a value of 1 if the CEO is female and 0 otherwise. Utility and finance firms (SICs between 4900- 4999 and 6000-6699 respectively) are excluded from the sample as industry specific regulation may influence the behaviors of their CEOs. The results of these analyses are still robust when we include these firms.

Panel A of Table 3 presents the results from the conditional logit regression. Model 1 compares the impact of the positive total conditional equity returns and negative total conditional equity returns. Model 2 compares the impact of positive industry-adjusted conditional equity returns and negative industry-adjusted conditional equity returns. Total equity returns are actually the result of CEO performance and general industry trends outside the CEO's control; whereas industry-adjusted returns are more closely related to CEO performance relative to his industry peers. Models 1(b) and 2(b) exclude observations where the ITM of the CEO's unexercised, exercisable options are less than 30%. The remaining CEOs would be classified as moderately or highly optimistic according to Campbell et al.'s (2011) thresholds. The price of the underlying stock should be sufficiently above than the exercise price of the underlying options to avoid distortions due to the non-linear payoffs of options close to their exercise price. To counter concerns that high values of the ITM of unexercised, exercisable options may identify inattentive CEOs rather than optimistic ones, models 1(c) and 2(c) also exclude years in which the CEO did not exercise any options. Holding some options despite having exercised others indicates a conscious decision not to exercise the remaining options.

Panel A of Table 3 presents the conditional logit regressions estimating the impact of various factors on the probability that a CEO is optimistic for an original sample of 15,054 CEO-year observations of all those CEO-year observations where the CEO optimism could be classified according to Campbell et al. (2011) methodology. It shows the absolute estimated coefficients for the variables; separate t-tests are performed to confirm whether the estimates of b_1 and b_2 are statistically different from one another.

Panel A of Table 3 provides some support for the self-attribution hypothesis. The estimated coefficients for conditional returns in each of the models are significantly different from zero and the point estimates of the coefficients for positive conditional returns are higher than those for negative conditional returns. However, t-tests show that the estimated coefficient for positive total conditional returns is statistically distinguishable from the estimated coefficient for negative total conditional returns only in models 1(b) and 1(c). Models 2(a), 2(b) and 2(c) show that while the estimated coefficients for industry-adjusted conditional returns in each of the models are significantly different from zero and the point estimates of the coefficients for positive conditional returns are higher than those for negative

conditional returns, the coefficients for positive industry-adjusted conditional returns are not statistically different from the coefficients for negative industry-adjusted conditional returns.

Interestingly, changes in the volatility of the stock price of the underlying stock do not have a statistically significant impact on a CEO's optimism even though it will have an impact on the value of the CEO's options. There is a non-linear relationship between CEO optimism and CEO age with both the youngest and the oldest tercile of CEOs being more likely to be optimistic. We also find that female CEOs are less likely than male CEOs to be Optimists.

TABLE 3
SELF-ATTRIBUTION – DIFFERENTIAL IMPACT OF POSITIVE AND
NEGATIVE RETURNS ON OPTIMISM

PANEL A: CONDITIONAL LOGIT REGRESSIONS OF FACTORS INFLUENCING
PROBABILITY OF CEO BEING AN OPTIMIST

	<u>Model</u> <u>1(a)</u>	<u>Model</u> <u>1(b)</u>	<u>Model</u> <u>1(c)</u>	<u>Model</u> <u>2(a)</u>	<u>Model</u> <u>2(b)</u>	<u>Model</u> <u>2(c)</u>
Number of observations	11,032	9,421	4,776	11,032	9,421	4,776
Pseudo R-squared	0.042	0.034	0.039	0.047	0.037	0.042
<u>Stock Returns</u>						
Total returns, given >0	1.979***	0.959***	1.082***	x	x	x
Total returns, given <0	0.880***	0.19	0.19	x	x	x
Ind-adj returns, given >0	x	x	x	1.096***	1.003***	1.181***
Ind-adj returns, given <0	x	x	x	0.997***	0.799***	0.730***
Change in total volatility	-0.577	-0.405	-0.433	-0.763	-0.425	-0.547
<u>CEO characteristics</u>						
Young (<52 years)	0.154	0.110*	0.194***	0.157***	0.112**	0.198***
Old (>59 years)	0.108*	0.116**	0.075	0.105**	0.11**	0.072***
Female	-0.795***	-0.688***	-0.761***	-0.811***	-0.705***	-0.777**
<u>Fixed effects</u>						
Years x Industry (FF49)	Y	Y	Y	Y	Y	Y
<u>T-test</u>						
Coefficients equal	x	N***	N**	x	x	x

Sample of 15,054 CEO-year observations (excluding finance and utility firms) over the period 1992-2012. Table shows estimated coefficients from logit regressions of the probability that the ITM of a CEO's unexercised, exercisable options $\geq 100\%$. *Total returns, given >0* are total positive equity returns. *Total returns, given <0* are total negative equity returns. *Ind-adj returns, given >0* are positive industry-adjusted equity returns. *Ind-adj returns, given <0* are negative industry-adjusted equity returns. All models include fixed effects for industry x year. Standard errors are robust. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Multivariate Regression and the Self-Attribution Hypothesis

The following robustness check tests the impact of conditional returns on the ITM of a CEO's unexercised, exercisable options through the following ordinary least square (OLS) regression:

$$\text{ITM} = b_1 [\text{returns} \mid \text{returns} > 0] + b_2 [\text{returns} \mid \text{returns} < 0] + b_3 [\text{controls}] \quad (2)$$

If the self-attribution hypothesis is correct, then we would expect the following to be true: $b_1 > b_2 \geq 0$ (the ITM of unexercised, exercisable options should increase as a result of positive returns more than it decreases as a result of negative returns). This is because increasing ITM of unexercised, exercisable options is associated with increasing optimism. It is expected that b_2 will be greater than zero as negative returns should reduce the ITM of unexercised options. Panel B of Table 3 summarizes the results of OLS regressions estimating the impact of various factors on the change in ITM of a CEO's unexercised, exercisable options for a sample of 15,054 CEO-year observations of all those CEO-year observations where the CEO optimism could be classified according to Campbell et al.'s (2011) methodology and where the firms were not utility or finance firms.

TABLE 3
SELF-ATTRIBUTION – DIFFERENTIAL IMPACT OF POSITIVE AND
NEGATIVE RETURNS ON OPTIMISM

PANEL B: OLS REGRESSIONS OF FACTORS INFLUENCING ITM OF UNEXERCISED,
EXERCISABLE OPTIONS

	<u>Model</u> <u>1(a)</u>	<u>Model</u> <u>1(b)</u>	<u>Model</u> <u>1(c)</u>	<u>Model</u> <u>2(a)</u>	<u>Model</u> <u>2(b)</u>	<u>Model</u> <u>2(c)</u>
Number of observations	11,499	9,791	5,224	11,499	9,791	5,224
R-squared (adj)	0.042	0.034	0.057	0.038	0.031	0.048
<u>Stock Returns</u>						
Total returns, given >0	0.959***	0.910***	1.311***	x	x	x
Total returns, given <0	0.883**	0.871*	1.329*	x	x	x
Ind-adj returns, given >0	x	x	x	1.147***	1.052***	1.579***
Ind-adj returns, given <0	x	x	x	0.323*	0.371*	0.20
Change in total volatility	1.370**	1.424**	3.016**	1.199*	1.291*	2.651**
<u>CEO characteristics</u>						
Young (<52 years)	0.063	-0.032	-0.300	0.066	-0.035	-0.289
Old (>59 years)	0.133	0.160	0.104	0.136	0.157	0.112
Female	-0.187	0.048	0.073	-0.145	0.066	0.138
<u>Fixed effects</u>						
Firm	Y	Y	Y	Y	Y	Y
Years	Y	Y	Y	Y	Y	Y
<u>T-test</u>						
Coefficients equal	x	x	x	N**	N*	N**

Sample of 15,054 CEO-year observations (excluding finance and utility firms) over the period 1992-2012. Table shows estimated coefficients from OLS regressions of the ITM of a CEO's unexercised, exercisable options. *Total returns, given >0* are total positive equity returns. *Total returns, given <0* are total negative equity returns. *Ind-adj returns, given >0* are positive industry-adjusted equity returns. *Ind-adj returns, given <0* are negative industry-adjusted equity returns. All models include firm and year fixed effects. Standard errors are clustered by firm. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Model 1 considers the differential impact of total conditional returns; model 2 considers the differential impact of positive industry-adjusted conditional returns and negative industry-adjusted conditional returns. As in panel A of Table 3, models 1(b) and 2(b) exclude observations where the ITM of the CEO's unexercised, exercisable options were less than 30% and models 1(c) and 2(c) also exclude observations where the CEO did not exercise any options in order to exclude any observations where the CEO might not have made a deliberate decision to hold onto the unexercised exercisable options. In all models, ITM and equity returns are winsorized at 0.5% to avoid distortions from extreme values. The OLS regressions use firm and year fixed effects; otherwise, each model uses the same control variables as in panel A of Table 3. Standard errors are clustered by firm and are robust to heteroscedasticity and correlation in the residuals across observations for the same firm. The adjusted r-squared for all models is low (about 3-6%). This is to be expected as there are many other factors impacting the ITM of unexercised exercisable options including the availability of exercisable options and the CEO's decision whether to exercise any exercisable options.

As predicted, the estimated coefficients for the positive conditional returns are highly significant and positive. The estimated coefficients for negative conditional returns are positive in all models and lower than those for positive conditional returns in all but model 2(c). This is consistent with the predictions of the self-attribution hypothesis: $b_1 > b_2 \geq 0$. However, the t-tests show that the estimated coefficients for positive conditional returns are only statistically different from those for conditional negative returns for the industry-adjusted returns. Overall, the results from Table 3 suggest that ITM increases more when industry-adjusted returns are positive than it decreases when they are negative, which is consistent with the self-attribution hypothesis.

Alternative Explanations

One alternative explanation of these results might be that the CEO was falsely classified as an Optimist due to a combination of the mechanistic impact of higher returns on the ITM of the CEO's unexercised, exercisable options and CEO inertia (a failure to exercise options due to inaction rather than as a deliberate decision). This explanation is unlikely. The mechanistic impact of returns on the ITM of unexercised, exercisable options would not generally explain the asymmetric impact of positive and negative returns. As long as the price of the stock underlying the option is not close to the exercise price of the option, then an increase in the stock price will cause a comparable change in the ITM of an option to a comparable decrease in the stock price. It is true that when the stock price is close to the exercise price of the option the impact of positive and negative returns will not be symmetrical. However, the ITM of an unexercised, exercisable option is not purely a function of the price of the underlying stock: so long as an option has a positive ITM, the CEO can decide to exercise the option (in which case the option will not be included in the unexercised options) or hold the option. Secondly, to reduce concerns that the asymmetric impact of positive and negative returns is driven by options which were close to the money, models 1(b), 1(c), 2(b) and 2(c) in Tables 2 and 3 exclude observations where the ITM was below 30%. The remaining observations are above Campbell et al.'s (2011) threshold for moderate optimism and are unlikely to have been close to the money options.

Panel A of Table 3 shows that the asymmetric impact of positive and negative returns on the probability of a CEO being an Optimist actually becomes more pronounced when this adjustment is made. For CEOs to be misclassified as Optimists, they would also have to unintentionally hold the exercisable high ITM options. Such CEO inertia could occur if the CEOs were too busy to manager their personal wealth; however, over 54% of Optimists did exercise some options (this is only 6% lower than

for Not Optimists), suggesting that these CEOs did make a conscious decision to hold onto their remaining exercisable options.

Cicero (2009) shows that executives are actually sophisticated and deliberate in their choice of option exercising strategies, choosing strategies which exploit differential tax rates and private information. Furthermore, concerns about the inertia hypothesis are alleviated by excluding all CEO-year observations where the CEO did not exercise any options in models 1(c) and 2(c). Exercising some but not all options implies that holding the unexercised, exercisable options was a deliberate decision by the CEO. Panel A of Table 3 shows that excluding potentially inert CEOs improves the explanatory power of the models while increasing the gap between the estimated coefficients b_1 and b_2 .

Another alternative explanation is that annual changes in the ITM of unexercised, exercisable options may be measuring annual changes in CEO risk tolerance rather than changes in CEO optimism. Hall and Murphy's (2002) threshold ITM was calculated assuming the CEO had a Constant Relative Risk Aversion (CRRRA) of 3. A CEO with a much higher risk tolerance will have a higher ITM threshold. If the ITM of unexercised exercisable options were actually measuring changes in annual risk tolerance rather than changes in optimism then the expected results of some tests in this paper would be different, for example it should not be expected that risk-tolerance reacts asymmetrically to positive and negative total returns. It is therefore reasonable to accept that the observed option-holding behavior is a result of annual changes in the CEO's optimism rather than risk tolerance. In summary, the combined results of the conditional logit and OLS regressions provide considerable evidence to support the self-attribution hypothesis.

GROUPING OPTIMISTIC CEOS

This paper shows that there is a significant and distinct group of optimistic CEOs whose apparently optimistic behavior is not necessarily the result of psychological bias. Malmendier and Tate (2005) divides its Holder67 CEOs into 'Hold and Win 67' and 'Hold and Lose 67', according to the outcome of their decision to hold exercisable options with an ITM of greater than 67% turned out *ex post*, in order to test whether investment distortions may be due to superior private information. They find no difference between the two groups.

While claiming that optimism is justifiable based on *ex post* realized returns might be intuitively appealing, it ignores the rationale for a CEO's expectation. A manager who believes his firm is undervalued without any reasonable justification will be right in a rising market; whereas a rational CEO without bias will not always realize positive outcomes even when the positive outcome could be rationally justified. In other words, the rationale for a decision is a better indication of the absence of bias than the ex-post results of that decision.

This paper distinguishes between justified and unjustified optimism based on the rationale for the optimism. This paper provides support for the claim that CEO optimism is subject to self-attribution (it increases more when CEO performance is positive than it decreases when CEO performance is negative) and so it is reasonable to separate optimistic CEOs into justifiable optimists and unjustifiable optimists according to the CEO's recent performance rather than the ex-post accuracy of their expectations. The results of this methodology suggest that this approach may be superior to the alternative of determining justifiability based on outcomes.

To identify "Justified Optimists", this study selects optimistic CEOs whose optimism increased following positive industry-adjusted equity returns. To identify "Unjustified Optimists", optimistic CEOs whose optimism increases despite following negative industry-adjusted equity returns are selected. The rationale for this classification is that increases in optimism due to positive industry-adjusted returns are likely to be due to the demonstrated superior skill or judgment of the CEO; whereas increases in optimism despite negative industry-adjusted returns are more likely to be due to self-attribution. The classification is performed using increasing ITM of unexercised, exercisable options as a measure of increasing optimism.

Panel A of Table 4 summarizes the annual frequency of Justified Optimists and Unjustified Optimists. There are 3,079 CEO-year observations where the CEO is classified as a Justified Optimist (16.3% of the total CEO-year observations and 41.5% of the observations classified as Optimistic). There are 1,269 CEO-year observations where the CEO is classified as an Unjustified Optimist (6.7% of the total CEO-year observations and 17.1% of the observations classified as Optimistic). This indicates that there are significantly more Justified Optimists than Unjustified Optimists among the CEOs.

Panel B of Table 4 summarizes the characteristics of the different groups of CEOs. The differences in the ITM of unexercised, exercisable options and returns reflect the definitions of the various groups. There seems to be no significant difference in the mean ages of the different groups of CEOs and, due to the low percentage of female CEOs, the differences in the gender ratio of the various groups is also low.

TABLE 4
SUMMARY STATISTICS

PANEL A: CEO OBSERVATIONS BY YEAR

<u>Year</u>	<u>Total</u>	<u>Not Optimist</u>	<u>Justified Optimist</u>	<u>Unjustified Optimist</u>	<u>Optimist Other</u>
1992	214	149	x	x	65
1993	659	401	71	67	120
1994	797	503	116	35	143
1995	903	547	164	96	96
1996	977	537	210	75	155
1997	1,096	516	304	105	171
1998	1,027	503	244	50	230
1999	988	473	195	96	224
2000	1,018	502	242	64	210
2001	935	581	105	55	194
2002	791	573	57	15	146
2003	1,056	686	98	150	122
2004	1,139	710	214	89	126
2005	1,073	649	200	62	162
2006	1,166	668	163	84	251
2007	1,121	648	214	21	238
2008	695	512	46	7	130
2009	735	535	63	64	73
2010	897	642	129	62	64
2011	811	577	125	23	86
2012	842	604	119	49	70
Total	18,940	11,516	3,079	1,269	3,076

Sample includes CEOs of S&P1500 firms whose optimism can be calculated according to the methodology described in Campbell et al. (2011). CEO classified as Optimist if ITM of unexercised exercisable options $\geq 100\%$ in given year. Justified Optimist is an Optimist where the ITM of unexercised, exercisable options has increased versus the prior year and industry-adjusted returns are positive. Unjustified Optimist is an Optimist where the ITM of unexercised, exercisable options has increased versus the prior year and industry-adjusted returns are negative.

The *CFO Optimist* indicator is shown as a simple robustness test for the Justified Optimist indicator. If the optimism of Justified Optimists is indeed justified, it would be expected that the CFOs working for Justified Optimists should be more likely to exhibit optimism than the CFOs of Unjustified Optimists. Firstly, CFOs are likely to be astute concerning the financial prospects of the firm and optimal option-holding behavior. Secondly, the CFO is less likely than the CEO to be subject to a biased evaluation of the CEO's abilities. Lastly, Wang et al. (2012) shows that CFOs tend to earn higher returns than CEOs when trading the stock of their own company and concludes that CFO trades have more informational content than those of CEOs.

TABLE 4
SUMMARY STATISTICS
PANEL B: CEO-YEAR OBSERVATIONS BY GROUP

	N	Mean	Median	Std Dev	Min	Max
<u>All CEOs</u>						
Optimist CEO indicator	18,940	0.39	0.00	0.49	0.00	1.00
CFO Optimist indicator	5,163	0.263	0.000	0.440	0.000	1.000
ITM unexercised, exercisable options	18,940	1.74	0.77	5.05	0.00	61.37
Total returns (%)	17,562	28.2%	17.9%	72.4%	-98%	2810%
Industry-adjusted returns (%)	17,562	9.7%	3.0%	66.5%	-313%	2654%
CEO age	18,266	55.4	55.0	7.2	29.0	91.0
CEO female indicator	18,940	0.02	0.00	0.12	0.00	1.00
<u>CEO Optimists</u>						
CFO Optimist indicator	1,649	0.664	1.000	0.472	0.000	1.000
ITM unexercised, exercisable options	7,424	3.69	1.88	7.67	1.00	61.37
Total returns (%)	6,843	45.7%	31.7%	83.0%	-98%	1773%
Industry-adjusted returns (%)	6,843	24.6%	13.4%	76.6%	-313%	1739%
CEO age	7,218	54.9	55.0	7.5	32.0	90.0
CEO female dummy	7,424	0.01	0.00	0.11	0.00	1.00
<u>Justified Optimists</u>						
CFO Optimist dummy	679	0.738	1.000	0.440	0.000	1.000
ITM unexercised, exercisable options	3,079	3.94	2.03	7.76	1.00	61.37
Total returns (%)	3,079	76.1%	52.6%	95.2%	-55%	1773%
Industry-adjusted returns (%)	3,079	57.1%	35.2%	84.5%	0%	1739%
CEO age	3,028	55.0	55.0	7.4	33.0	80.0
CEO female dummy	3,079	0.01	0.00	0.11	0.00	1.00
<u>Unjustified Optimists</u>						
CFO Optimist dummy	234	0.543	1.000	0.499	0.000	1.000
ITM unexercised, exercisable options	1,269	3.47	1.75	7.80	1.00	61.37
Total returns (%)	980	21.9%	20.2%	34.2%	-88%	142%
Industry-adjusted returns (%)	980	-24.1%	-15.4%	26.0%	-313%	0%
CEO age	1,237	55.5	55.0	7.6	34.0	83.0
CEO female dummy	1,269	0.01	0.00	0.09	0.00	1.00

Other Optimists

CFO Optimist dummy	736	0.635	1.000	0.482	0.000	1.000
ITM unexercised, exercisable options	3,076	3.52	1.81	7.51	1.00	61.37
Total returns (%)	2,784	20.4%	6.6%	68.1%	-98%	829%
Industry-adjusted returns (%)	2,784	5.7%	-0.9%	62.7%	-215%	747%
CEO age	2,953	54.5	54.0	7.6	32.0	90.0
CEO female dummy	3,076	0.01	0.00	0.12	0.00	1.00

The *CFO Optimist* indicator is equal to 1 when the CFO exhibits optimistic option- holding behavior and is set to 0 otherwise. Panel B of Table 4 shows that Justified Optimists have the highest mean value for *CFO Optimist* indicator (indicating that 73.8% of Justified Optimists' CFOs are also optimistic, compared to 26.3% for CFOs of the average CEO and 66.4% of CFOs of the average Optimist). Separate t-tests show the differences in means between Justified Optimists and all other CEOs (54.7%) and between Justified Optimists and all other Optimist CEOs (12.6%) are both statistically significant with p-values less than 1%. If it is accepted that CFOs are less likely to be biased and are more likely to be financially astute, then the higher coincidence of CFO optimism and CEO optimism for Justified Optimists is an indication that Justified Optimists are indeed justified in their optimism.

CONCLUSIONS

The literature treats CEO overconfidence and optimism as a permanent trait, and the corporate investment and financing decisions of CEOs classified as overconfident or optimistic as inferior to those of CEOs who are not so classified. This paper demonstrates that there is actually considerable annual variation in the exhibition of overconfident behavior by CEOs who have been classified as permanently overconfident: 57.7% of overconfident CEOs exhibited the characteristic behavior in less than 67% of the years where the behavior could be classified.

This paper finds that self-attribution helps to explain annual variation in CEO optimism: CEO optimism increases more as a result of good performance than it decreases as a result of poor performance. This suggests that CEOs whose apparent optimism increases as a result of superior industry-adjusted performance may be responding rationally to their firms' specific conditions rather than subject to bias.

This paper helps investors to identify when optimistic behavior is likely to be the result of bias and when it is likely to be a rational response to a firm's specific conditions. Identifying CEOs whose optimism is justifiable may aid investors in their evaluation of CEO decisions and improve capital market efficiency. Identifying CEOs whose optimism is not justifiable may aid research into how corporate governance and contracting can modify the behaviors of biased CEOs. Further research investigating whether the investment and financing decisions of CEOs classified as Justified Optimists are subject to the same distortions as those of other optimistic CEOs would clearly be of interest. Lastly, this paper help CEOs themselves to better evaluate their own performance and identify their own potential personal biases.

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